INDIA POLICY FORUM 2010|11

VOLUME 7

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PURPOSE

India Policy Forum 2010–11 comprises papers and highlights of the discussions from the seventh India Policy Forum (IPF) conference, held on July 13–14, 2010, in New Delhi. IPF is a joint venture of the Brookings Institution and the National Council of Applied Economic Research (NCAER) that aims to examine India's reforms and economic transition using policy-relevant empirical research.

The objective of the IPF is to generate theoretically rigorous, empirically informed research on important current and unfolding issues of Indian economic policy. A rotating panel of established local and overseas researchers interested in India has agreed to support this initiative through advice, personal participation and contribution of papers. Overall guidance is provided by a distinguished international advisory panel.

Papers appear in this publication after presentation and discussion at a yearly conference in New Delhi. During discussions at the conference, the authors obtain helpful comments and criticism about various aspects of their papers. These comments are reflected in the journal as discussants' comments. The papers, however, are finally the authors' products and do not imply any agreement by either those attending the conference or those providing financial support. Nor do any materials in this journal necessarily represent the views of the staff members or officers of the NCAER and the Brookings Institution.

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Correspondence regarding papers in this issue should be addressed to the authors. Manuscripts are not accepted for review because this journal is devoted exclusively to invited contributions. Feedback on the journal may be sent to NCAER, Parisila Bhawan, 11, I.P. Estate, New Delhi 110 002 or at ipf@ncaer.org.

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Editors' Summary

The India Policy Forum held its seventh conference on July 13 and 14, 2010 in New Delhi. This issue of the journal contains the papers and the discussions presented at the conference, which cover a wide range of issues. The first paper examines the services sector in India, evaluating its growth and future prospects. The second paper looks at India's corporate sector, analyzing the profitability of firms in the wake of liberalization. The third paper explores the reasons for the large time and cost overruns that have been endemic to Indian infrastructure projects. The final two papers focus on more political issues, looking at the impact of political reservations used to increase women's political voice, as well as the politics of intergovernmental resource transfers.

Among fast-growing developing countries, India is distinctive for the role of the service sector. Whereas many earlier rapidly growing economies emphasized the export of labor-intensive manufactures, India's recent growth has relied to a greater extent on the expansion of services. Although there are other emerging markets where the share of services in Gross Domestic Product (GDP) exceeds the share of manufacturing, India stands out for the dynamism of its service sector. Barry Eichengreen and Poonam Gupta critically analyze this rapid service-sector growth in their paper "The Service Sector as India's Road to Economic Growth?"

Skeptics have raised doubts about both the quality and sustainability of the increase in service-sector activity. They have observed that employment in services is concentrated in the informal sector, personal services, and public administration—activities with limited spillovers and relatively little scope for productivity improvement. They downplay information technology and communications-related employment on the grounds that these sectors are small and use little unskilled and semi-skilled labor, the implication being that a labor-abundant economy cannot rely on them to move people out of low-productivity agriculture. Some argue that the rapid growth of service-sector employment simply reflects the outsourcing of activities previously conducted in-house by manufacturing firms—in other words, that it is little more than a relabeling of existing employment. They question whether shifting labor from agriculture directly to services confers the same benefits in terms of productivity growth and living standards as the more conventional pattern of shifting labor from agriculture to manufacturing in the early stages of economic development.

This paper evaluates these claims, coming up with an in-depth look at the services sector in India. Eichengreen and Gupta find that the growth of the sector has been unusually rapid, starting 15 years ago from a very low level. The acceleration of service-sector growth is widespread across activities, but the modern services such as business services, communication, and banking are the fastest growing activities. Other rapidly growing service sectors are hotels, restaurants, education, health, trade, and transport. Some observers have dismissed the growth of modern services on the grounds that these activities constitute only a small share of output and therefore contribute only modestly to the growth of GDP. However, the results show that the contribution of the category communication, business services, and financial services has in fact risen to the point where this group contributes more to growth of GDP than manufacturing. A slightly broader grouping of communication, business services, financial services, education, health, and hotels accounted for roughly half of total growth of the service sector in 2000–08. These activities explain most of the post-1990 acceleration in service sector growth.

Modern services have been the fastest growing in India and their take-off began at much lower incomes than in the Organisation for Economic Co-operation and Development (OECD) countries. This, clearly, is a unique aspect of the Indian growth experience. Furthermore, the expansion of the modern service sector is not simply disguised manufacturing activity. Only a relatively small fraction of the growth of demand for services reflects outsourcing from manufacturing. Most production that does not go towards exports, in fact, derives from final demand at home. Thus, the growth of service sector employment does more to add to total employment outside agriculture than outsourcing arguments would lead one to expect.

Looking at the proximate determinants of services growth, Eichengreen and Gupta show that tradable services have grown 4 percentage points a year faster than nontradable services, other things equal. Services that have been liberalized have also grown significantly faster than the average. Regulatory change has been an important part of the story: where essentially all services were heavily regulated in 1970, the majority have since been partially or wholly deregulated. The services segments which were both liberalized and tradable grew 7–8 percentage points higher than the control group (nontradable/nonliberalized services). All this implies that policy makers should continue to encourage exports of IT, communication, financial, and business services while also liberalizing activities like education, health care, and retail trade, where regulation has inhibited the ability of producers to meet domestic demand.

The fact that the share of services has now converged more or less to the international norm raises questions about whether it will continue growing so rapidly. In particular, it will depend on the continued expansion of modern services (business services, communication, and banking). But, in addition, an important share of the growth will result from the application of modern information technology to more traditional services (retail and wholesale trade, transport and storage, public administration and defense). This second aspect obviously has more positive implications for output than for employment.

Finally, the authors find that the mix of skilled and unskilled labor in manufacturing and services is increasingly similar. Thus it is no longer obvious that manufacturing will need to be the main destination for the vast majority of Indian labor moving out of agriculture, or that modern services are a viable destination only for the highly skilled few. To the extent that modern manufacturing and modern services are both constrained by the availability of skilled labor, growth in both areas underscores the importance for India of increasing investments in labor skills.

The paper concludes that sustaining economic growth and raising living standards will require shifting labor out of agriculture into both manufacturing and services, not just one or the other. The argument that India needs to build up labor-intensive manufacturing and the argument that it should exploit its comparative advantage in services are often posed in opposition to one another. Eichengreen and Gupta argue that these two routes to economic growth and higher incomes are in fact complements, not incompatible alternatives.

In their paper "Sources of Corporate Profits in India: Business Dynamism or Advantages of Entrenchment?" Ashoka Mody, Anusha Nath, and Michael Walton ask whether the liberalization during the last two decades has led to increased competition, characterized by innovation and growth, or to profiteering through entrenchment and increased market power of the large firms. While the authors consider various indicators of market structures, the main focus of their analysis is the evolution of the profit rate at the firm level in the wake of liberalization. The authors find that while liberalization induced considerable new entry in the 1990s, that pattern did not continue into the 2000s. On the whole, the major business houses and public sector firms were able to maintain their dominance in terms of market share.

The authors employ firm-level data from the Prowess database, which provides detailed information on large- and medium-sized companies in India. They focus on firms listed on the Bombay Stock Exchange. While they present some trends for the period spanning 1989–2009, their core

econometric analysis covers the shorter period from 1993 to 2007, during which the sample size increased from 1,000 to about 2,300 firms. Several significant conclusions emerge from the authors' discussion of corporate and macroeconomic trends and their econometric analysis.

First, despite some deviations in the early years, they find a consistent pattern that the corporate profit rate—measured as a return on assets—has gone up and down in line with overall economic growth. Profit rates were high in the early 1990s (with a median rate of 10–12 percent) when growth accelerated and fell subsequently as GDP growth decelerated until around 2001 (reaching about 4 percent). The rates rose again (to about 8 percent in 2007–08) as growth in the Indian economy accelerated again.

Second, unless the expansion of the tradable sectors lagged behind the growth in nontradable sectors—a possibility that cannot be ruled out—the trade liberalization of the late 1980s did not have a major influence on corporate profits. There is a striking similarity in the evolution of profitability in the tradable and nontradable sectors, both moving in unison with domestic growth. Tradable sectors enjoyed a somewhat higher profit rate than nontradable sectors.

In contrast to trade liberalization, industrial deregulation was associated with a more definite impact on profitability. Following deregulation around 1991, the number of firms increased in virtually all sectors. This increase was associated with reduced market shares. The authors' econometric analysis suggests that smaller market shares, in turn, were associated with reduced profitability. Thus, in the second half of the 1990s, slower GDP growth and the scramble for market shares both contributed to driving down profit rates.

The bulk of new entry, in terms of numbers, was of Indian stand-alone firms, but both government-owned firms and business houses remain dominant in terms of sales and asset shares. Indeed, the share of business houses in the total sales rose slightly from 41 percent in 1989 to 42 percent in 2008.

Firm profitability does show substantial year-to-year persistence, raising the possibility of some market power. But the persistence declines when profitability is averaged over longer periods (up to four years), implying that some "super-normal" profits are whittled away over time. Also, more efficient firms tend to have more persistent profits. Thus, some part of the persistence reflects greater efficiency, although because of the overlap between efficient and large firms, the possibility that market power may play a role in maintaining the profit rate over time cannot be completely ruled out.

There is no consistent evidence of a general influence of market concentration on profitability: if anything, firms in less concentrated sectors have

slightly higher profit rates. The 2000s witnessed some reconcentration in some sectors, affecting about a third of all the firms, but the profit behavior of firms in re-concentrating sectors appears to be similar to that in the overall sample. Firms with growing market shares do enjoy higher profitability, but the pattern of results is more consistent with causality flowing in the other direction, that is, with the success of dynamism. In particular, this association is at least as strong for small firms and for less concentrated industries.

This said, following significant new entry and competition for market shares in the first half of the 1990s, the pace of entry abruptly stalled in the late 1990s, market shares stabilized, and concentration rates started to rise again in some sectors. Thus, the findings are also consistent with the possibility that the phase of competitive dynamism may be diminishing, with incentives for the exercise of market power and investment in business–government relationships being on the rise.

Finally, the authors' econometric results show that the faster a firm grew, the higher was its profitability. Supporting descriptive statistics add interesting nuances to this finding. The gap in firms' growth rates opened up in the 2000–07 period. During that period, the fast-growing firms opened up the largest gap in profitability rates relative to the medium-growth firms. Slow growing firms, typically much smaller in size, have had particularly low profit rates and have actually been shrinking in terms of real sales. This suggests that efficiency was rewarded: the dynamic medium-sized firms were able to grow fast and garner sizeable profits, reinforcing their ability to grow. The smallest firms fell increasingly behind. Thus, the shakeout resulted in a potentially more efficient structure.

Greatly expanded level of infrastructure investment is critical to sustaining Indian economic growth. During the last decade, an increasing volume of funds has been allocated to building infrastructure, and successive governments have accorded infrastructure a high priority. Nevertheless, delays and cost overruns remain large and frequent. Moreover, owing to a paucity of research on the subject, our understanding of the causes behind the cost and time overruns and their remedies remains poor. These issues assume additional importance in view of the recent changes in the official procurement policy in infrastructure. The central government as well as state governments are increasingly looking to private funding for infrastructure projects principally through public–private partnerships (PPPs). Though a shortage of funds within the government sector is largely responsible for this shift, there is equally a belief that private-sector participation can reduce delays and cost overruns. However, there is insufficient empirical work to either support or repudiate this confidence in the superiority of the private sector.

In his paper "Determinants of Cost Overruns in Public Procurement of Infrastructure: Roads and Railways," Ram Singh provides a detailed analysis of time and cost overruns in infrastructure projects in India using two large datasets that contain information on the key dates for implementing and completing projects and the difference between planned and actual costs. The first dataset includes 934 infrastructure projects completed during April 1992–June 2009. The second dataset includes 195 road projects under the supervision of the National Highways Authority of India (NHAI). The analysis develops several hypotheses and subjects them to empirical testing. Among other issues, the paper compares delays and cost overruns in PPPs with traditionally funded projects.

A simple tabulation of the data shows large cost overruns, averaging 15 percent, and time delays of about 80 percent. However, the author also finds that delays and cost overruns have declined over time. It is also evident that time delays are the primary cause of cost overruns and that larger projects lead to larger percentage cost overruns. Projects in sectors such as roads, railways, urban development, civil aviation, shipping and ports, and power have experienced much longer delays and higher cost overruns than those in other sectors, but the author finds no evidence of any regional pattern of cost overruns or delays. He suggests that incompleteness in the initial planning and contracting is responsible for many of the cost overruns.

The study shows that the design of the contract has a significant bearing on the level of delays. Traditional item-rate contracts provide little or no incentives to avoid delays. In contrast, since a PPP allows contractors to reap returns as soon as the project is complete, it creates a strong incentive to complete the project at the earliest possible date. Moreover, by bundling responsibility for maintenance with construction, the PPP also motivates contractors to avoid compromising on quality. Somewhat surprisingly, PPP projects experience higher cost overruns even though they have significantly lower time delays. The author attributes the shorter time delays to the fact that the project revenues do not begin until it is complete. The larger cost overruns are more puzzling, but may reflect incentives to expand the scope of the project.

Finally, according to the author, a comparison of road with railways sector projects suggests that organizational factors also contribute to delays and cost overruns. The author identifies three specific aspects. The railways sector is slower during planning and contracting phases. Second, contract management by the railways sector is poorer than by the roads sector. While the NHAI awards most project works to a single contractor, the railways award different

works to different contractors. This results in poor project coordination. Third, in the railways sector, projects are allocated funds only for the relevant fiscal year and this is done in the second half of the year. The NHAI's project delivery mechanism is not subject to this constraint.

Despite recent progress in India toward the social inclusion and empowerment of women, their presence in the country's state and national lawmaking bodies remains low, raising concerns about how well women's interests are represented. Previous empirical evidence has substantiated these concerns: women have different policy preferences than men, and elected leaders tend to implement policies in line with their own personal policy preferences, regardless of earlier campaign promises. These arguments provide an important motivation for gender-based affirmative-action policies.

In order to increase women's political voice, the Indian government amended its constitution in 1993, devolving significant decision-making powers to village-level councils called Gram Panchayats (GPs) and requiring a randomly selected third of all members and leaders (Pradhans) of these councils to be reserved for women. Most recently, in 2010, the upper house of the Indian parliament passed a bill applying similar reservation requirements to the state and national levels of government in the face of considerable resistance and skepticism. Despite the widespread adoption of such gender-reservation policies, several concerns about their effectiveness remain. First, little will change if husbands of female leaders elected to reserved seats lead by proxy, and second, reservation could leave fewer seats to be contested among other disadvantaged groups for which reservations were not established, such as India's Muslims.

Using new data spanning 11 Indian states, the paper by Lori Beaman, Esther Duflo, Rohini Pande, and Petia Topalova, "Political Reservation and Substantive Representation: Evidence from Indian Village Councils," assesses the impact of introducing political reservation in India's GPs, with particular attention to the aforementioned concerns. In conducting their study, the authors collect GP meeting data across five economically and socially heterogeneous states, obtain data on public-good provision from a nationwide survey, and conduct their own survey of 165 GPs within the Birbhum district of West Bengal.

The study examines the effect of reservations in local village councils; the results are likely to be applicable to similar provisions within higher levels of government because the electoral process is the same, voter participation is high, and political parties invest significant resources in elections across all levels of government. Furthermore, by exploiting the random assignment of

GP gender reservations, the authors are able to ensure that observed effects can be attributed to political reservations, rather than other factors, such as social attitudes toward women and local demand for public goods. The expansive data and novel study design allow the authors to shed light on three distinct elements of the debate on gender reservations in policymaking: politician selection, citizen participation in politics, and policymaking.

First, the authors assess the degree to which reservation affects politician selection. Encouragingly, they find no evidence that reservation for women has caused the crowding-out of other politically underrepresented social groups. Evidence does suggest, however, that women elected to reserved seats are less experienced and more likely to enlist their husband's help in carrying out their duties as Pradhan. Nevertheless, two years into their tenure, female Pradhans from reserved GPs claim they are as comfortable and effective in their roles as their counterparts in nonreserved seats.

The study also reveals the causal mechanisms through which issues important to women might receive insufficient attention in local government. The authors hypothesize that underinvestment in what they determine are "female-friendly" issues occurs because male leaders either possess entirely different preferences, or discriminate against the viewpoints of the opposite gender, regardless of whether or not their preferences diverge. The study revealed that neither is the case. Leaders in reserved GPs are neither more likely to react positively to a female-friendly issue, nor more likely to respond favorably to the inquiry of a female participant in Village Council (Gram Sabha or GS) meetings. On the contrary, women in both reserved and nonreserved GPs were found to receive more constructive responses in these meetings then men. This suggests that the problem lies not in unsympathetic leadership, but in a lack of female constituent participation in the political process that would voice women's policy concerns. Accordingly, the study also examines the effect of gender reservation on female participation in politics. Reservation does have a positive effect on whether women participate at all in the GS meeting, and the degree to which they remain engaged throughout the meeting. Therefore, inasmuch as electing women to Pradhan seats continues to encourage the participation of women in GS meetings, the reservations will continue to prove effective.

Finally, the study takes advantage of new data to elucidate earlier claims regarding the effects of political reservations on allocations of public goods. A first dataset, much broader in geographic scope than that of previous studies, confirms earlier findings that female Pradhans elected to reserved seats deliver more drinking water infrastructure, sanitation, and roads than

their nonreserved counterparts. However, in exploiting the richer cross-time variation of a second dataset, the study reveals that reservations have a much broader impact across sectors than previously thought. The data from the Birbhum region of West Bengal allow the authors to compare public goods allocation patterns between newly reserved GPs, GPs reserved twice in a row, and GPs that are currently unreserved but were reserved before. These new data indicate that, while continuing to push drinking water investments, women elected in the second term under a reserved seat also invest more in "male issues" such as school repair, health center repair, and irrigation facilities. These investment patterns are found to be enduring, as even male Pradhans elected to previously reserved seats continue to invest in female-friendly issues, after female reservation for their GP has expired.

Taken together, the findings of the study provide important insights into how leaders in reserved seats are elected, affect policymaking, and actual policy outcomes. While women elected in reserved GPs do differ from their male counterparts in their experience as leaders, they are able to increase female participation in the political process and make different policy decisions. The basic structure of India's fiscal federalism was in place within five years of the country's independence on August 15, 1947. The division of expenditure responsibilities and sources of revenue across units of the federation as well as the institutions for allocating resources between levels of government gave substantial discretion to the central government, thereby concentrating economic and political power at the federal level. The design was understandable in light of the perceived need to combat incipient forces of separatism and the economic logic of planned development. This framework for fiscal federalism has been remarkably stable, however, even as the fears of separatism faded, political power dispersed and new parties representing state interests gained representation at all levels of government, and markets replaced planners in directing investment.

In their paper "Inelastic Institutions: Political Change and Intergovernmental Transfer Oversight in Post-Independence India," T.N. Srinivasan and Jessica Seddon Wallack examine the persistence, and in some cases strengthening, of centralizing features in India's fiscal federalism, which is a surprising exception to the general trend toward decentralization that other analysts of India's political economy have described.

The paper focuses in particular on the two institutions—the Finance Commission (FC) and the Planning Commission (PC)—that oversee the bulk of intergovernmental resource transfers. The FC, a constitutional body designed to be independent of both Center and state constitutionally

defined jurisdictions, was created to ensure that states had predictable and stable resources and autonomy in their use. In practice, the FC has played a limited role relative to its constitutional potential. Many have argued that it has unique constitutional authority to oversee intergovernmental revenue transfers, but a substantial portion of these transfers are determined and allocated through the PC instead.

The PC, an entity created by a cabinet resolution and hence a part of the constitutional sphere of the Center, was to advise the Center on planning and plans for national development. In contrast to the FC, the PC has in fact played a much larger role in allocating transfers than advising would necessarily imply. As a transfer mechanism, it facilitates Central government oversight of states' development policies and has ample scope for Central government discretion in transfers. The centralizing aspects of this arrangement have been highlighted in various high-profile public discussions questioning the division of responsibilities between the FC and the PC as well as the various mechanisms for transfers by the PC. Yet, little has changed in terms of the institutional oversight over resource flows.

The authors explore various explanations for the persistence of these centralizing features and conclude that the most likely explanation lies in the barriers that India's federal institutions pose to collective action by states. State leaders have ample political reasons to seek greater control over their finances and in fact do appear to care about the centralizing implications of the fiscal federal framework. However, they are divided both by design—state boundaries were in many cases drawn on the basis of linguistic or cultural differences—as well as by the economic reality of diverging fortunes and varying dependence on transfers.

India's institutions also offer no authoritative forum for states and Central government to discuss federal arrangements and propose alternatives. The available arenas for intergovernmental discussions are either toothless or have structures that create incentives for individualist behavior. The Union Parliament, for example, would be able to effect changes to the federal structure through instruments available to it under the constitution or through constitutional amendments if needed. However, the parliamentary system also gives those state parties that are part of the government a vested interest in preserving the status quo.

Srinivasan and Wallack's analysis implies that there will be limited change in the intergovernmental transfer system, a conclusion that they find worrisome for India's ability to adjust economically and politically to changing circumstances. Not only does conventional public finance theory

favor decentralization of decision making with respect to the financing and provision of public goods and services, especially in heterogeneous societies, but "voices from below" are increasingly valuable as an information source about what is needed in a fast-changing world. They argue that India's record of government performance also suggests a dearth of accountability, and that real decentralization of roles and responsibilities—not delegated expenditure duties—can be more effective in creating stronger performance incentives.

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The Service Sector as India's Road to Economic Growth?

Introduction

Among fast growing developing countries, India is distinctive for the role of the service sector. Where earlier developers grew by exporting labor-intensive manufactures, India has relied to a greater extent on services. Although there are other emerging markets where the share of services in gross domestic product (GDP) exceeds the share of manufacturing, India stands out for the dynamism of its service sector.

But skeptics have raised doubts about both the quality and sustainability of the increase in service-sector output.[1] They have observed that employment in services is concentrated in the informal sector, personal services, and public administration—activities with limited spillovers and relatively limited scope for productivity improvement. They downplay information technology (IT) and communications-related employment on the grounds that these sectors are small and use little unskilled and semi-skilled labor, the implication being that a labor-abundant economy cannot rely on them to move people out of low-productivity agriculture. They worry that the rapid growth of service-sector employment reflects the outsourcing of activities previously conducted in-house by manufacturing firms—in other words, that it is little more than a relabeling of existing employment. They question whether shifting labor from agriculture directly to services confers the same benefits in terms of productivity growth and living standards as the more conventional path of shifting labor from agriculture to manufacturing in the early stages of economic development.

* We thank seminar and conference participants at ICRIER, the World Bank's office in New Delhi, and Indian Statistical Institute, Delhi for useful comments. Comments are welcome at eichengr@econ.berkeley.edu and pgupta@icrier.res.in.

1. See, e.g., Acharya (2003) and Panagariya (2008).

Our purpose in this paper is to evaluate these claims. The resulting picture is mixed. On the one hand, we find, consistent with the views of the skeptics, that while growth of the sector has been unusually rapid, it started 15 years ago from unusually low levels. That the share of services has now converged to international norms raises questions about whether it will continue growing so rapidly. In particular, whether service-sector output and employment continue to grow in excess of international norms will depend on the continued expansion of modern services (business services, communication, and banking) but, in addition, on the application of modern IT to more traditional services (retail and wholesale trade, transport and storage, public administration and defense). The second aspect obviously has more positive implications for output than employment.

At the same time, we show that the "modern services" that are growing most rapidly are now large enough where their future performance could have a significant macroeconomic impact, contrary to the skeptical view. The expansion of modern service-sector employment is not simply disguised manufacturing activity, again at odds with prevailing skepticism about the existence of significant macroeconomic effects. Finally, we find that the mix of skilled and unskilled labor in manufacturing and services is increasingly similar. Thus, it is no longer obvious that manufacturing is the main destination for the vast majority of Indian labor moving into the modern sector and that modern services are a viable destination only for the highly skilled few. To the extent that modern manufacturing and modern services are both constrained by the availability of skilled labor, this just underscores the importance for India of continuing to invest in labor skills.[2]

We conclude that sustaining economic growth and raising living standards will require shifting labor out of agriculture into both manufacturing and services and not just into one or the other. The argument that India needs to build up labor-intensive manufacturing and the argument that it should exploit its comparative advantage in services are often posed in opposition to one another. We argue that these two routes to economic growth and higher incomes are in fact complements, not incompatible alternatives.

India's Service-sector Growth in International Perspective

Figure D-1 (see Appendices) displays the shares of agriculture, industry, and services in GDP. It shows how the share of agriculture (the dashed line)

2. Though manufacturing perhaps relies more on infrastructure and is affected more by labor laws than services.

has fallen from 55 percent in 1950–51 to less than 17 percent in 2008–09.[3] The steadiness of the decline is its most eye-catching feature. The rise of industry, by comparison, has been episodic. The manufacturing share rose rapidly in the first 15 post-Independence years, reflecting Nehru's emphasis on heavy industry, but more modestly from the mid-1960s through the early 1990s. Following an increase at the outset of the 1990s, reflecting a first wave of liberalization, the share of industry then stagnated. Meanwhile, the share of services increased from 30 percent of GDP in 1950 to 57 percent in 2008–09, rising at an accelerating pace as the period progressed. The average growth rates of agriculture, services, and industry over these periods show clearly how the growth of services has accelerated while that of agriculture has declined.[4]

To put this performance in perspective, we show the shares of services and industry in GDP in different countries. We estimate the relationship of the share of services in GDP and per capita income as a quartic polynomial in log per capita income for a sample of some 80 countries for 1950–2006.[5]

The average relationship, shown in Figure D-2 for the periods 1950–69, 1970–89, and 1990–2006 along with the corresponding two standard-deviation bands, suggests the existence of two waves of service-sector growth. In the first wave, the share of services in output rises at a decelerating pace, leveling out at a per capita income of $1,800 in year 2000 US purchasing power parity dollars. The services share then begins climbing again at a per capita income of $4,000 before leveling off a second time. The evidence also suggests that the second wave starts at lower incomes after 1990 than before.[6]

3. Central Statistical Organization (CSO), the main source of data for gross domestic product (GDP) and sectoral growth rates, defines agriculture as including forestry and fishing; and industry as encompassing manufacturing, electricity, gas and water, mining and quarrying, and construction. Year 2008–09 refers to April 2008–March 2009 or fiscal year 2008.

4. Contrary to the perception of poor industrial sector performance, the growth of industry has in fact averaged 6–7 percent since 1990 and even higher since the turn of the century. Manufacturing (industry net of mining and quarrying, electricity, gas, water, and construction) has grown by a robust nearly 8 percent a year during 2000–08.

5. Regressions include country fixed effects, and allow for different intercepts in 1970–89 and in 1990–2006; and a different slope in 1990–2006 (for details see Eichengreen and Gupta, 2009). The data are from the *World Development Indicators*, which defines, consistent with the CSO, agriculture as agriculture, forestry, and fishing; and industry as manufacturing, electricity, gas and water, mining and quarrying, and construction.

6. The evidence also shows that this two-wave pattern and specifically the greater importance of the second wave in medium-to-high-income countries is most evident in democracies, in countries that are close to major financial centers, and in economies that are relatively open to trade (and especially to trade in services). See Eichengreen and Gupta (2009).

Next we superimpose the observations for India. The striking finding is that the Indian service sector was stunted all through the 1950–90 period, with the gap widening after 1960. The gap in the first part of this period can perhaps be explained by Nehru's heavy-industry drive, but one would have to attribute an unusually long-lived legacy of those policies for them to explain the fact that the service sector remained undersized in the 1970s and 1980s. Whatever the explanation for earlier performance, after 1990 there was then rapid convergence to the international norm. By 2005, the share of India's service sector increased to a level slightly above that predicted by the international cross-section.[7]

The question is whether this behavior is properly characterized as convergence toward the international norm or as a distinctive pattern of structural transformation. If it is simply structural convergence—India correcting the earlier anomaly of a stunted service sector—then one should be skeptical about whether the continued rapid growth of this sector will persist. If on the other hand this is a distinctive pattern of structural transformation—consistent with the observation that the share of output in GDP in India is now significantly above the international norm—then there are grounds for thinking that recent performance may continue.

Where Is Service-sector Growth Concentrated?

A starting point for understanding which interpretation is correct is to look more closely at what activities dominate the sector's recent growth.

7. An analogous relationship has been established for industry in Eichengreen and Gupta (2009). (There the estimated size of share of industry in GDP is based on a cubic polynomial relationship between the industry share and log per capita income. As before, regressions include country fixed effects and allow for different intercepts in 1970–89 and in 1990–2006; and a different slope in 1990–2006. The behavior of agriculture's share in GDP in India is unexceptional. It is right on top of the predicted downward sloping relationship with respect to income. To save space we do not show the figure for the share of agriculture here.) They show that the share of industry rises rapidly at low incomes, peaking at around 40 percent of GDP and an income level of $8,000 (in year 2000 US purchasing power parity dollars). In addition, they find that the share of the industrial sector has tended to peak at lower levels of per capita income over time. The observations for India suggest that until the mid-1990s, the industrial sector was larger than the international norm. Since then, industry has grown at the same as overall GDP. The relatively low share of manufacturing in India has been blamed for failing to provide an alternative to agriculture and from Figure D-2 it seems that services have helped to pick up the slack.

We distinguish three groups of services.[8] Group I is traditional services—retail and wholesale trade, transport and storage, and public administration and defense—which tend to be slow growing in the sense that their share in GDP has fallen in more advanced countries. Group II is a hybrid of traditional and modern services consumed mainly by households—education, health and social work, hotels and restaurants, and other community, social and personal services—whose share in GDP has risen in step with per capita income. Group III is made up of modern services—financial intermediation, computer services, business services, communications, and legal and technical services—whose share in GDP in the Organisation for Economic Co-operation and Development (OECD) countries has risen significantly faster than per capita income.[9]

Productivity growth has been highest in Group III, as expected (Table 1). But productivity increases have also been surprisingly rapid in Group I, some of whose components, such as retailing and wholesaling, have made extensive use of IT.[10] Evidently, the decline in the share of output accounted for by Group I reflects a relatively low income elasticity of demand and not simply increases in their relative cost. It is in Group II where the low productivity growth sometimes thought to be characteristic of services is most serious.

In India's case, service-sector growth is widespread across activities (Figure D-3). But the fastest growing activities are business services, communication, and banking, all of which are in Group III.[11] Business services include computer-related services, machinery rental, research, and accounting, legal, and technical services (where the well-known data-entry and call centers are located). Computer services, which accounted for more than four-fifths of business services in 2008–09, are the single fastest-growing member of this group. Financial services include banking and insurance,

8. Gordon and Gupta (2004) working on similar Indian data divided the services sector into two groups, the trend growers and the fast growers. The group of trend growers matched roughly with services included in Group I here and fast growers included activities in Groups II and III here.

9. For details on the growth and shares of different activities in Organization for Economic Co-operation and Development (OECD) countries in these three groups, see Eichengreen and Gupta (2009).

10. Suggestively, Group II ranks lowest in terms of the application of information technology (IT). It also has the least tradability, suggesting that limits on international competition and scope for specialization may be further factors in its low productivity growth.

11. Dehejia and Panagariya (2010) use firm-level data rather than sectoral aggregates from the CSO but find patterns broadly in line with ours.

TABLE 1. Characteristics of Different Services (Averages of OECD Countries in the EU KLEMS Database)

	Average annual productivity increase in 1980s (in percent)	*Average annual productivity increase in 1990–2005 (in percent)*	*ICT (producing or using)*	*Tradability*
Group I				
Public administration, defense	0.11	0.31	0	NT
Retail trade	1.71	1.17	1	NT
Transport and storage	1.85	1.01	0	?
Wholesale trade	1.54	1.88	1	?
Group II				
Education	0.13	−0.50	0	NT
Health, social work	−0.01	−0.53	0	NT
Hotels and restaurants	−0.14	−1.00	0	NT
Other community, social, and personal services	−0.71	−0.86	0	NT
Group III				
Posts and communication	3.13	7.17	1	T
Computer services	n.a.	n.a.	1	T
Financial intermediation	n.a.	n.a.	1	T
Legal, technical, advertising	n.a.	n.a.	1	T
Other business activities	n.a.	n.a.	0/1	T

Source: Eichengreen and Gupta (2009).

Note: ICT equal to 0 implies that the service neither produces nor uses information and communication technology; and a 1 indicates that the service uses or produces information and communication technology. In the last column, NT refers to non-tradable services and T refers to tradable services. The information on tradable and non-tradable services is derived from Jensen and Kletzer (2005). Jensen and Kletzer calculate the Gini Coefficient for the geographical dispersion of each activity, and use it to identify tradable and non-tradable services. The underlying idea is that services that are tradable can be geographically concentrated in order to reap economies of scale. Productivity refers to total factor productivity and the average annual growth rates have been calculated using data from EU KLEMS.

with banking being the largest and fastest growing. But there are also other rapidly growing service sectors not included in Group III, among them hotels, restaurants, education, health (Group II), and trade and transport (Group I). The transport sector includes road transport, railway transport, air transport, and water transport, the most dynamic of which is road transport, which has increased six fold since early 1990s.[12] The stagnant service sectors have

12. The rapid growth of trade and transport, which are placed in Group I on the basis of the experience of other countries, suggests that this is presumably an effect of post-1991 reforms.

been public administration and defense and miscellaneous other personal services (Table 2).[13]

Note that the share of Group I services appears to have stagnated following an early period of rapid growth. This is consistent with the convergence-to-the-norm interpretation, where the period of rapid growth simply reflected the fact that these services were underprovided in the early post-Independence years. That the share of Group II has continued to rise is again consistent with the experience of other countries and therefore with the convergence interpretation. What is unusual, then, is the marked acceleration in the rise in the share of modern Group III services after 1990. If services continue to support rapid economy-wide growth, it would appear, this would have to be on the basis of this group of services.

Some observers have dismissed the growth of modern services on the grounds that these activities constitute only a small share of output and therefore contribute only modestly to the growth of GDP. To investigate this, we multiply the share of each service category in GDP by its growth rate. The results show that the contribution of communications, business services, and financial services has in fact risen to the point where it contributes more to growth of GDP than manufacturing.[14] In particular, communications, business services, financial services, education, health, and hotels accounted for roughly half of total growth of the service sector in 2000–08.[15] These activities alone explain most of the post-1990 acceleration in service-sector growth.

International Comparisons

We now compare the growth of our three categories of services in India and the OECD countries using European-Union-level analysis of

13. Interestingly, the share of GDP accounted for by personal and other services continues to rise strongly in the OECD countries, in contrast to India where it has been falling (for reasons not entirely clear to us). The services included in this segment are entertainment, recreation, TV, radio, and personal services. Anecdotal evidence would suggest that with rising per capita incomes and an upcoming middle class, these services have grown quite rapidly. Jain and Ninan (2010) show that the entertainment and media sector has grown at around 19 percent a year in the last few years. The declining share of these services in GDP could very well be a reflection of poor data.

14. Details of these calculations are available from the authors on request.

15. In the 1990s, modern services contributed nearly as much to aggregate growth as agriculture or manufacturing and much more in recent years. Since 2000, communications alone has contributed more to GDP growth than agriculture.

TABLE 2. Growth Rates and Sectoral Shares of Different Services in India

Sector activities included	*Avg. growth rate in 1950–1979 (share in 1980)*	*Avg. growth rate in 1980–1989 (share in 1990)*	*Avg. growth rate in 1990–1999 (share in 2000)*	*Avg. growth rate in 2000–2008 (share in 2008)*
Trade (distribution services): Wholesale and retail trade in commodities both produced at home and imported, purchase and selling agents, brokers and auctioneers	4.8 (10.6)	5.7 (11.2)	7.0 (13.1)	7.7 (13.9)
Hotels and Restaurants: Services rendered by hotels and other lodging places, restaurants, cafes and other eating and drinking places	4.8 (0.81)	5.9 (0.89)	9.1 (1.3)	8.1 (1.4)
Railways	4.2 (1.6)	4.1 (1.5)	3.3 (1.2)	7.1 (1.2)
Transport by other means: Road, water, air transport, services incidental to transport	6.3 (3.6)	6.7 (4.0)	6.9 (4.6)	8.2 (5.2)
Storage	5.5 (0.14)	2.6 (0.11)	2.0 (0.1)	4.1 (0.1)
Communication: Postal, money orders, telegrams, telephones, overseas communication services, miscellaneous	6.7 (0.66)	5.8 (0.7)	13.8 (2.0)	23.1 (6.8)
Banking: Banks, banking department of RBI, post office saving bank, non-bank financial institution, cooperative credit societies, employees provident fund	7.2 (1.9)	10.0 (3.3)	10.6 (5.0)	8.9 (6.3)

Insurance: Life, postal life, nonlife	7.1 (0.55)	9.6 (0.62)	2.2 (0.61)	15.3 (1.3)
Dwellings, real estate	2.6 (4.5)	7.2 (5.8)	4.8 (5.2)	2.8 (3.6)
Business services: Renting of machinery, computer related services, accounting, research, etc.	4.2 (0.42)	9.1 (0.7)	15.9 (2.1)	16.3 (4.0)
Public administration, defense	6.1 (5.7)	6.7 (6.4)	5.9 (6.7)	6.1 (6.3)
Personal and other services: Domestic, laundry, barber, beauty shops, tailoring, recreation, entertainment, radio, TV, broadcast, sanitary services	1.4 (2.4)	2.5 (1.9)	4.7 (1.8)	6.0 (1.6)
Community services: Education, research, scientific, medical, health, religious, and other community	4.8 (4.6)	7.5 (5.1)	7.5 (6.3)	7.0 (6.1)

Source: Own calculations using the data from CSO.

capital (K), labour (L), energy (E), materials (M) and service (S) inputs (EU KLEMS) data.[16] We distinguish Korea from the other OECD countries, given its status, like India, as a late-developing (albeit higher income) economy. Its experience, therefore, provides something of a bridge between India and the rest of the OECD countries.[17]

While the share of Group I services is still rising in India, it has either stagnated or is in decline in the high-income countries (see Panel A of Figure D-5). EU KLEMS does not provide evidence for the period when the OECD countries had per capita incomes comparable to India's today, although the data for Korea suggests that the share of Group I services in India is in line with the international norm. Panel A clearly shows that the share of Group I services started tapering off at a per capita income level of $3,000 in South Korea (in 1974, when the share of Group I reached 28.2 percent).[18] This is close to India's 2008 per capita income of $2,900, as is the current share of Group I services (roughly 26 percent both in India in 2008 and South Korea in 1974). Assuming that India continues to track the international norm, the share of Group I services is likely to stabilize relatively soon.[19] Jain and Ninan (2010) suggest that retail trade is the main Group I activity with significant potential to grow.[20] This sector has been sheltered from foreign competition and remains dominated by mom-and-pop stores. Like others, they suggest that consolidation and increased competition from foreign retailers, together with the application of modern IT, have the potential to significantly increase the sector's efficiency. Of course, to the extent that capital and technology are substituted for labor in, inter alia,

16. The EU KLEMS release of 2008 spans the period 1970–2005 for the 15 founding (pre-2004) EU member states and for the United States, South Korea, Japan and Australia. Series from 1995 onwards are available for the new EU member states that joined the EU on May 1, 2004. Industries are classified according to the European NACE revision 1 classification, but the level of detail varies across countries, industries, and variables owing to differences in national statistical procedures. For our analysis, we do not include the new member states and further drop Luxembourg and Portugal. Thus, we use the data on Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, Spain, Sweden, the United Kingdom, and the United States.

17. Korea is well-known as being characterized by a relatively low level of service-sector productivity. But this problem is pervasive in middle-income countries. It can thus be argued that Korean experience is more broadly representative of the situation in countries with the middle-income status to which India aspires.

18. All figures are in year 2000 constant US purchasing-power-parity-adjusted dollars unless otherwise stated.

19. Assuming real per capita income growth around 5 percent.

20. The other main activity in this group is public administration and defense, which seems to be declining.

retailing, this has more positive implications for the growth of output than the growth of employment.

The share of Group II services is similarly unexceptional. International comparisons suggest that some activities within this group, such as health care and education, have considerable scope for expansion, reflecting increases in demand as per capita incomes rise. While it is widely acknowledged that India needs to invest more in education and that enrolments are likely to rise with per capita income, the sector will have to be liberalized for this to happen.[21] Similarly for health care. One can imagine the education and health-care sectors, having learned by doing for the domestic market, then becoming net exporters, just as IT has become an export industry. The country's Institutes of Technology could attract foreign students, and India could become a destination for medical tourists. The experience of other countries suggests that a country becomes a net exporter of education, health care, and similar services only when its per capita income exceeds $5,000.[22] This is a level that will take India 10 years to reach, assuming a real per capita income growth rate of 5 percent.

The last panel confirms that Group III services have been the fastest growing in India and that their take-off began at much lower incomes than in the OECD countries. This, clearly, is a unique aspect of Indian growth experience.

How Much Service-sector Output-outsourced Manufacturing Activity?

We now distinguish growth attributable to the intermediate demand for service inputs from that attributable to final demand. Intermediate demand may simply reflect re-categorization as service-sector employment of activities previously conducted in-house by manufacturing firms that are now outsourced to the service sector. If this practice has been widespread, it would imply a less favorable view of the net employment creating potential of the sector.

Let S refer to value added in services, A to value added in agriculture, I to value added in Industry, X to exports (i.e., the value added component in exports), $i_{a,s}$ to the input-output coefficient of agriculture for services inputs, and $i_{i,s}$ to the input-output coefficient of industry for services inputs (both defined as the use of service input per unit of value added in agriculture

21. A comprehensive analysis of the deficiencies in the Indian education system is in Panagariya (2008); an agenda for reform is in Kapur and Mehta (2004).

22. Again in year 2000 US purchasing power parity dollars.

and industry respectively) and C to consumption, which is the residual (the difference between value produced and other uses).[23] Then:

$$S = i_{a,s} \times A + \mathrm{i}_{i,s} \times I + X + C \tag{1}$$

We can also express the above as:

$$\frac{\Delta S}{S} = \frac{\Delta(i_{a,s} \times A)}{S} + \frac{\Delta(i_{i,s} \times I)}{S} + \frac{\Delta X}{S} + \frac{\Delta C}{S}$$

$$\frac{\Delta S}{S} = \left(\Delta i_{a,s} \times \frac{A}{S}\right) + \left(i_{a,s} \times \frac{\Delta A}{A} \times \frac{A}{S}\right) + \left(\Delta i_{i,s} \times \frac{I}{S}\right) + \left(i_{i,s} \times \frac{\Delta I}{I} \times \frac{I}{S}\right) + \left(\frac{\Delta X}{X} \times \frac{X}{S}\right) + \left(\frac{\Delta C}{C} \times \frac{C}{S}\right) \tag{3}$$

Equations 2 and 3 tell us that, for given input-output coefficients, the growth of services equals the weighted average of the growth of various sectors, the weights being the relative size of each sector relative to the size of the service sector as a whole. Beyond that, changes in input-output coefficients, whatever their cause, can also affect the demand for services.

Operationalizing this framework requires data on services used in industry and agriculture, on the growth rates of value added in agriculture, industry and exports, on the sizes of the respective sectors, and on the growth of services themselves. We take input-output coefficients from input-output matrices for India for 1993, 1998, and 2003. The size and growth rate of each sector are available from the Central Statistical Organization (CSO), while data for exports is available from the Reserve Bank of India. Final consumption is the residual.[24]

23. Input-output coefficients are defined in terms of the use of domestically produced services per unit of value added in agriculture and industry. Thus, we first convert the input-output coefficients for per unit of output available from different input-output matrices into the coefficients for per unit of value added. We assume that the same coefficient applies to services domestically produced and to imported services for industry. We further assume that in agriculture, only domestically produced services are used. Export data are usually available in terms of value of output; we assume that the ratio of value added to value of output for export of services is the same as that for total services.

24. We find that input-output coefficients of industry for services inputs are similar during these years (the values are 0.68, 0.64, and 0.74 respectively in the years 1993–94, 1998–99, and 2003–04). We assume the value to be 0.70 during the sample period. The input-output coefficient for value added in agriculture changes little during these years and is assumed to be the same through the period at 0.07.

Calculating the use of services per unit of value added in agriculture and industry using the three input-output matrices, as in Table 3, does not suggest that the intensity with which services are used in industry has changed much over time. The implication is that growth in the intermediate demand for services from industry is due mainly to increasing output rather than increasing outsourcing of in-house manufacturing-sector activities to the service sector.

TABLE 3. Service Input per Unit of Output in Agriculture and Industry in India

	1993	*1998*	*2003*
Agriculture	0.07	0.06	0.08
Industry			
Weighted	0.84	0.55	0.72
Unweighted	0.79	0.55	0.73

Source: Authors' own calculations using the data on input-output matrices from CSO. The data that we get from the CSO is for input use per unit of value of output. We transform these in terms of per unit of value added. The data is available for individual industries, which we average across industries. We calculate these averages by taking a simple average across various industries; and as a weighted average (with weights equal to the share of value added of each industry in total industry value added).

Combining the coefficients in Table 3 with value added growth in industry suggests that intermediate demand from industry accounts for about a third of value added in services. Since the coefficients have not changed and since industry has grown more slowly than services, the share of value added in services accounted for by intermediate demand from industry has evidently declined (from 40 percent in 1991 to the 31 percent in 2007).[25] Similar calculations show that the share of services value added used in agriculture is just 2 percent in 2007, down from 5 percent in 1991.

In contrast, the share of services that is exported has risen from about 3 percent in 1991 to 10 percent in 2007 (Figure D-6). This is a clear indication that exports and net domestic demand, and not just relabeled manufacturing activity, are behind the growth of service sector.[26]

Note that the analogous input-output coefficients have been stable in the United States, while in other advanced countries, they rose until roughly 2000

25. In Appendix D, we show the correlation between the growth rates in services and manufacturing. If indeed the intensity of use of services as an intermediate input were increasing, then we would see the correlation between services and manufacturing growth to be increasing over time. On the contrary, we find the correlation between growth in manufacturing and services to be declining over time.

26. As a robustness test, we use the average input-output coefficient for industry from the EU KLEMS countries to calculate the share of services used in industry in India. The overall pattern is found to be similar to the one reported here.

and stabilized subsequently. However, rising coefficients did not necessarily translate into a higher share of value added for the service used as an intermediate input. Value added in industry and agriculture is not growing fast enough to drive the overall growth rates for services. As Figure D-7 shows, US industry uses only about 15 percent of services value added, and that share has declined over the years. Exports also constitute a relatively modest 5 percent of US value added in services (their share has been rising slowly). In the United States, then, three-quarters of services are for final consumption.[27]

Exports have contributed significantly to the growth of services, modern Group III services in particular. India's share in global exports of services rose from 0.8 percent in 1998 to 1.3 percent in 2003 and 2.6 percent in 2008 (see Figure D-8). It is mainly modern services (referred to as "miscellaneous services" in data published by the Reserve Bank of India) that have been driving this export performance (Figure D-9). Further decomposing miscellaneous services into software, communications, business, and financial services reveals that exports are dominated by software services.

Figure D-10 shows that growth of private final demand accounts for about half of the growth of service-sector output. The other half is split between exports and outsourcing by industry, with exports of services accounting for a growing share in recent decades.[28]

The thrust of these calculations is thus inconsistent with the claim that the growth of the service sector is simply disguised manufacturing activity. Only a relatively small fraction of the growth of demand for services reflects outsourcing from manufacturing. Most production that does not go towards exports, in fact, derives from final demand at home. As emphasized in our introduction, the growth of service-sector employment does more to add to total employment outside agriculture than outsourcing arguments would lead one to expect.

27. The numbers are similar for the other OECD countries where, on an average, the service sector supplies about 18–20 percent of its value added to industry and 1–2 percent to agriculture.

28. We divide the post-reform liberalization period somewhat arbitrarily into three subperiods: 1991–97, 1998–2002, and 2003–08. The first period is the years after the reforms started when the GDP growth averaged 5.5 percent and it was broad-based growth. Industrial growth slowed down during the next subperiod 1998–2002 (from 6.3 percent in 1991–97 to 4.5 percent in 1998–2002) but exports of services were just picking up. Thus, based on the pickup in exports growth, the services sector continued to grow robustly even when industry did not grow at the same fast pace in this second period. The last subperiod, 2003–08, is the one in which the service sector growth accelerated handsomely. The growth was aided by revival in the industrial sector (which grew at an average annual growth rate of 8.2 percent), as well as growth in exports.

Proximate Determinants of Service-Sector Growth

We now attempt to shed more light on the relative importance of convergence to the international norm, on the one hand, and factors distinctive to India, such as its policies of product-market regulation, the tradability of its service-sector mix, and the heavily unskilled nature of its labor force, on the other, in the growth of its service sector. Using annual data for 1980–2007, we estimate an equation of the form:

$$\begin{aligned} \text{growth}_{it} = {} & \alpha(\text{Size}_{\text{EUKLEMS, initial}} - \text{size}_{\text{ind, t}-1}) + \beta\,\text{PCY}_t \\ & + \eta\, \textit{tradable services}_i + \lambda\, \textit{skilled labor}_i \\ & + \rho\, \textit{liberalization}_i + \tau\, \textit{correlation with ind}_i + \varepsilon_{it} \end{aligned} \tag{4}$$

The dependent variable is the growth in value added of service *i* in year *t*. The first explanatory variable is the difference between the share of service *i* in other countries and India.[29] This captures catch-up, or the extent to which an activity is likely to grow if its initial share is unusually small. Other explanatory variables are per capita income, the tradability of the service in question, whether the sector has been liberalized, its skilled-labor intensity, and whether the activity in question is correlated with industrial growth (this is our proxy for outsourcability).[30] Since the liberalization index and size gap are highly correlated, we also include them one at a time in the regressions.

In Table 4, we pool annual data for real growth rate of different services over the period 1980–2007. The service activities included are trade, hotels and restaurant, transport and storage, communication, banking and insurance, business services, public administration and defense, and education and health. CSO data are used for services output; sources for the rest of the data are in Appendix C.

The results confirm that the growth of value added in services increases with per capita income.[31] Consistent with the catch-up hypothesis, the

29. The gap is calculated as the difference between the share of respective services in GDP in the EU KLEMS sample (in 1980 for the period up to 1989 and in 1990 for the period since 1990) and one-year lagged share in India.

30. The correlation variable is based on the correlation coefficients between services growth and growth in manufacturing, calculated over different time periods. The correlation coefficients are consistently and significantly different from zero for three services: trade, hotels and restaurants, and transport. Tradability is indicated by a dummy variable, which takes a value of one if the service is considered to be tradable and zero otherwise. This indicator is based on Jensen and Kletzer. Details are in Appendix C.

31. The results presented in Table 4 are robust to including a trend variable or year fixed effects (and not including per capita income), including the data only from the 1990s, and including a dummy for services that use skilled labor intensively in the regressions.

TABLE 4. Explaining the Growth in Services in India

	I	*II*	*III*	*IV*	*V*	*VI*
Size gap	0.31	0.35**	0.48**	0.12	0.1	
	[1.48]	[1.98]	[2.46]	[0.54]	[0.27]	
Log per capita income	6.56***	6.62***	6.80***	6.30***	6.27***	6.12***
	[6.17]	[7.78]	[8.03]	[7.51]	[7.20]	[7.42]
Tradable (dummy)		5.59***	5.62***	4.40***	4.28**	3.95***
		[7.85]	[7.94]	[5.28]	[2.48]	[3.84]
Skilled labor intensity			−0.05**	−0.01	−0.01	−0.01
			[2.05]	[0.45]	[0.32]	[0.34]
Liberalization (index)				3.14**	3.25*	3.69***
				[2.57]	[1.71]	[3.44]
Correlated with industrial growth, dummy					−0.16	−0.47
					[0.09]	[0.45]
Observations	252	252	252	252	252	252
R-squared	0.13	0.36	0.37	0.39	0.39	0.39

Notes: Robust *t* statistics are in brackets. *, **, *** indicate the coefficients are significant at 1, 5, and 10 percent significance levels respectively. Regression equation estimated is in Equation 4.

growth rate is higher for services that have an unusually small share to start with relative to their share in the advanced countries. For every 1 percentage point of GDP that an activity's share is lagging, its growth is about 0.40 percent higher.

Tradable services have grown 4 percentage points a year faster than nontradable services, other things equal. This is important for explaining past performance: while the share of services exports in value added was not exceptionally high for India up until the mid-2000s, since then there has been a sharp increase in the exports of services making India an outlier in the share of exports in services value added. Similar patterns are seen in the share of services exports in GDP.

Services that have been liberalized have also grown significantly faster. This change has been quantitatively important as well: where essentially all services were heavily regulated in 1970, the majority have since been partially or wholly deregulated. The services segments which were both liberalized and tradable grew 7–8 percentage points higher than the control group (nontradable/nonliberalized services). All this implies that policymakers should continue to encourage exports of IT, communication, financial, and business services while also liberalizing activities like education, health care, and retail trade, where regulation has inhibited the ability of producers to meet domestic demand.

Employment in Services

One reason observers are skeptical about the developmental impact of the growth of the service sector is the presumption that modern services do not use significant amounts of unskilled and semi-skilled labor, the factor of production that India has in abundance. They downplay IT and communications-related service-sector employment on the grounds that these activities are small and use little unskilled labor, the implication being that a labor-abundant economy cannot rely on them to move people out of low-productivity agriculture.

TABLE 5. Employment Elasticity in India Using the Data from the NSS

	Employment in 2004–05 (million)	*Elasticity 1999–2000 to 2004–05*
Manufacturing	53.5	0.34
Trade, hotel, and restaurant	47.1	0.59
Transport, storage, and communication	17.4	0.27
Financing, insurance, real estate, and business services	6.9	0.94
Community social and personal services	35.7	0.28

Source: Derived from Rangarajan, Kaul and Seema (2007), who construct it using the data from the 61st round of the NSSO survey.

This hypothesis is untested, perhaps because little data is available for employment in services by skill. In Table 5, we report employment elasticities from Rangarajan et al. (2007), who calculate these from the NSSO data.[32] As is evident from the table, service-sector growth has in fact been quite labor intensive.

Although these data do not allow us to say whether this is an increase in skilled or unskilled employment, evidence from other countries sheds indirect light on this question.[33] We look at the GDP share of different services for the 17 OECD countries.[34] We again distinguish Korea; given its status as a middle-income OECD country, it is in some sense intermediate between India and the high-income OECD countries. While the share of Group I (traditional services) in GDP has declined over time, its share in employment has not. Group II (hybrid) services have accounted for a growing share of GDP and an even more rapidly growing share of economy wide employment.

32. NSSO data refer to the household survey data published by the National Sample Survey Organisation. The numbers we report are drawn from Rangarajan et al. (2007).

33. As does some anecdotal evidence described in the conclusion.

34. Again using the EU KLEMS database.

Group III (modern) services have accounted for increased shares of both GDP and employment over time.

Looking separately at shares in hours worked by low-skilled and high-skilled labor, we find that the movements mirror movements in relative labor productivity. Notably, for modern high-tech services, labor productivity exceeds labor productivity economy-wide. This group of activities is similarly distinctive in that there is no sign of changes over time in the gap relative to economy-wide labor productivity.

Next we calculate the elasticity of employment with respect to value added for 17 OECD countries in the period 1970–95. Though in principle we can calculate these for 1970–2005, the earlier period is likely to be more relevant to India. One might argue, not unreasonably, that India does not use the same technology as the advanced countries analyzed here. Given the relative endowments of labor and capital, India presumably uses more labor and more unskilled labor. Thus, when we calculate these elasticities using data only through 1995, the assumption is that technology lags in India by a decade and half.

Specifically, we estimate:

$$\text{Log Employment}_{ijt} = \alpha_{ij} + \delta_t + \beta \,\text{Log Value Added}_{ijt} + \varepsilon_{ijt} \qquad (5)$$

where α_{ij} refers to country-sector fixed effects and t to year fixed effects. As dependent variables, we consider number of employees, number of hours worked, and number of hours worked by skill level—low-skilled workers, medium-skilled workers, or high-skilled workers (all in log terms). We calculate these elasticities with respect to value added in agriculture, manufacturing, and different services.

In Table 6 we report these elasticities for number of hours worked and number of hours worked by the low- and high-skilled workers. The results show that employment elasticities are highest in Group II and Group III services, and that they are higher for high-skilled than low-skilled workers.[35]

Overall, the skill content of the labor employed in manufacturing and services is showing tendencies toward convergence. Manufacturing, like most service activities, has negative employment elasticity for unskilled labor hours, a positive but modest elasticity for medium skilled labor, and a large elasticity for skilled labor in Table 6. Thus, the skill content of both

35. We also estimate the regressions for employment elasticity with interaction terms for Korea. Elasticities are somewhat higher for Korea, in particular the elasticities for unskilled labor. This is consistent with the notion that there is an economically significant demand for unskilled labor associated with the growth of the service sector in less advanced economies.

TABLE 6. Employment Elasticity of Growth in Different Service Activities in Cross Country Data

Dependent variable	*Log employment*	*Log employment (hours)*	*Log employment low skilled (hours)*	*Log employment high skilled (hours)*
Log VA, agriculture	−0.28***	−0.30***	−0.57***	0.22***
	[12.15]	[12.72]	[12.62]	[3.54]
Log VA, manufacturing	0.07**	0.05*	−0.25***	0.43***
	[2.41]	[1.71]	[4.64]	[22.68]
Group I				
Log VA, wholesale trade	0.23***	0.21***	−0.13***	0.53***
	[11.40]	[10.04]	[4.56]	[18.82]
Log VA, retail trade	0.15***	0.12***	−0.23***	0.40***
	[7.25]	[5.14]	[7.10]	[10.35]
Log VA, transport	0.12***	0.13***	−0.17***	0.45***
	[8.68]	[9.85]	[5.41]	[30.95]
Log VA, public administration, defense	0.15***	0.13***	−0.20***	0.32***
	[12.67]	[10.55]	[6.29]	[16.89]
Group II				
Log VA, education	0.19***	0.18***	−0.13***	0.30***
	[21.01]	[21.44]	[5.62]	[11.52]
Log VA, health	0.21***	0.20***	−0.04***	0.35***
	[19.31]	[19.57]	[3.24]	[11.30]
Log VA, hotels	0.16***	0.14***	−0.11***	0.48***
	[12.49]	[12.28]	[8.02]	[12.88]
Log VA, other services	0.19***	0.17***	−0.11***	0.43***
	[20.25]	[25.99]	[8.36]	[12.13]
Group III				
Log VA, finance	0.26***	0.23***	−0.52***	0.58***
	[28.84]	[23.50]	[10.98]	[29.08]
Log VA, communication	0.12***	0.12***	−0.01	0.50***
	[8.97]	[10.63]	[0.31]	[18.72]
Log VA, business services	0.47***	0.47***	0.27***	0.61***
	[32.66]	[32.37]	[7.81]	[52.53]

Notes: Robust *t* statistics are in brackets. *, **, *** indicate coefficient is significant at 10, 5, and 1 percent levels respectively. All regressions include country-sector fixed effects. Coefficients correspond to the regressions, as in Equation 5.

the manufacturing and services sectors is increasing over time. It is not as if manufacturing employs only unskilled labor, while modern services employ only highly skilled labor. In fact, the skill mix of labor employed in the two sectors is becoming increasingly similar. The bad news is that skill shortages are likely to become an increasingly important constraint on the expansion of the Indian economy. The good news, as emphasized in the

introduction, is that it is no longer obviously the case that manufacturing is the main destination for the vast majority of Indian labor moving into the modern sector and that modern services are a viable destination only for the highly skilled few.

Conclusion

India is distinctive for the rapid growth of its service sector—high-tech IT, communications, and business services in particular. Whether the service sector provides a route out of poverty for the masses is disputed. Some say that the skill and education requirements of modern service-sector jobs make them an impractical destination for the rural masses. Others counter that as more skilled and educated workers "graduate" from manufacturing and traditional services into modern services, they open up economic space for less educated workers capable of upgrading their skills. They argue that the skilled–unskilled mix of the manufacturing and service sectors, each taken as a whole, is not as different as commonly supposed.

The critics object that much non-traditional service-sector employment is little more than the relabeling of activities previously undertaken in-house by manufacturing firms. Others counter that much of the growth of service-sector employment in fact represents new job creation. For our part, we find little evidence that the growth of the service sector is simply disguised manufacturing activity. We also find that the skilled–unskilled mix of labor in the two sectors, taken as a whole, is becoming increasingly similar. The implication is that it is no longer obvious that manufacturing is the exclusive destination for the vast majority of Indian labor moving into the modern sector, or that, modern services are a viable destination only for the highly skilled few.

While our analysis has been statistical, there is anecdotal evidence consistent with these conclusions. Polgreen (2009) describes how modern service-sector jobs are now migrating from India's urban centers to its small towns and rural villages, creating employment for semi-skilled workers. These workers may not have the mathematical training to work as computer programmers or the English fluency needed for employment in call centers, but with some high school education they are sufficiently numerate and have adequate facility in English to "do basic data entry, read forms, and even write simple e-mail messages." The wages of these rural service-sector workers are three to four times those in agriculture but only half those of workers in Bangalore, where the competition for labor is more intense and

living costs are higher. American trucking companies seeking to process timesheets in India may not have the local knowledge to find rural workers to undertake the task, but companies like Rural Shores have been established to run service-sector facilities in rural areas. By one estimate, 20 data entry and call centers have been set up in small towns and villages in recent years. Rural Shores alone has plans to operate 500 such centers by 2017.[36] In addition, there is growing anecdotal evidence of parents spending substantial sums on opportunities for children with only high school education on the acquisition of English language, computer utilization, and other basic skills that might enable them to take better advantage of openings in the service sector. These observations are consistent with the view that employment in modern service-sector activity can be a route out of poverty not just for the few and not just for urban residents. They are consistent with the conclusion that employment in modern services can be a useful supplement to employment in manufacturing as a route out of rural poverty.

We conclude that sustaining economic growth and raising living standards in India will entail shifting labor out of agriculture into modern services as well as manufacturing and not just into the latter. To the extent that the expansion of both sectors continues to be constrained by the availability of skilled labor, this simply underscores the importance for India of continuing to invest in labor skills.

APPENDICES

Appendix A: Issues Related to Measurement and Quality of the NAS Data

Bosworth, Collins, and Virmani (2007) provide a comprehensive account of the sources of growth in the Indian economy and its broad sectors since 1960 and lay out the limitations of the sectoral GDP data and employment data in India. They express reservations about the quality of the data in activities that are conducted in the informal (unorganized) sector. They point to the possibility that data on price inflation for services are not reliable and emphasize the shortcomings of the annual data for employment in services. They conclude that service-sector growth is probably overestimated because the price deflator underestimates inflation for services. Support for this thesis is found in the growth of productivity in certain services segments, which are traditionally known to be low productivity growth sectors.

36. For the estimate in question, see Magnier (2010).

Here, we comment on the quality of the data used in our paper and the areas in which the data quality needs to be improved.

Data on Value Added: Service activities are carried out in the organized as well as unorganized sectors. While the data on services produced in the organized sector is relatively reliable, the data for services activities in the unorganized sector is not measured directly and is imputed using the labor-input method. This involves estimating the labor input at the industry level (as the difference between the measures of total labor input and labor input in the organized sector, obtained from quinquennial household surveys and employer reports respectively) with measures of value added per worker (obtained from enterprise surveys). Bosworth et al. (2007) rightly point out that these estimates can be reasonably prepared for the benchmark years in which the quinquennial surveys are carried out. But since annual estimates for the years between the survey years are obtained by interpolation, these are likely to be imprecise.

While there is agreement that the measurement of value added in an unorganized sector is likely to be imprecise, the direction of the bias is not clear. The bias in the size of the various service sectors or growth rates can be in either direction—upward or downward. In Table A-1, we provide some details on the methodology used in measuring the value added in different services and an assessment of the data quality.

TABLE A-1. Methodology Used and Quality of Data on Services Value Added

Trade	Since a large part of trade is in unorganized sector, data quality may not be especially good. However, it is difficult to say whether the current practice results in underestimation or overestimation of the size and growth of this sector. Unsurprisingly, the growth in this sector is highly correlated with the growth in manufacturing.
Transport and storage	Data quality appears to be reasonably good for some of the main components of the transport sector, including railways, air transport, organized road transport, and organized water transport. The main activities for which the measurement can be improved are those in unorganized sector.
Public administration and defense	Data are relatively reliable.
Hotels and restaurants	Since a large segment operates in the unorganized sector, data quality is likely to be relatively poor. However, these activities constitute a very small part of the services sector.
Education, health, other services	Since many of these activities are also in the unorganized sector, data quality may again be relatively poor, due to, inter alia, underreporting.

(*Table A-1 continued*)

(*Table A-1 continued*)

Communication	Since a large share is either in the public or the organized private sector, data quality is likely to be relatively good.
Banking	Since a large percentage of the banking activity is carried out in the organized sector, data quality should be reasonable.
Business services	Modern business services such as chartered accountancy, legal services, technical services, advertising, construction design, etc., are carried out in the unorganized sector, so these are probably not captured well in the estimation of value added.

Source: Authors' estimate.

Below we compare the growth rates for selected services calculated using the CSO data with those calculated using the data from alternative sources (for the latter we rely on Jain and Ninan, 2010). Sectors include retail, entertainment, IT, transport, and education. Table A-2 shows that the growth for the last few years or that projected for the coming few years using alternative data sources is at par or higher than that calculated using CSO data.

TABLE A-2. Comparison of Growth Rates of Services Using the CSO Data and the Data from Other Sources (in percent)

	CSO	*Other sources*
Retail	7.7 percent (for wholesale and retail trade in 2006).	13 percent projected annual growth rate in 2006–11.[a] 8 percent projected annual growth rate in 2008–13, Technopak.[b]
Media and entertainment	2.8 percent (average of radio, broadcasting, entertainment, recreation between 2004–07).	18 percent projected annual growth rate between 2008–10.[c]
IT industry	19.4 percent (annual average growth rate of computer services between 2004–07).	30 percent based on the size of the IT industry between 2004–07.[d]

Sources:
a. Projected growth of retail business, based on ICRIER's study of the retail sector.
b. Based on the projected size of the Indian retail industry in US $ between 2008–13, Technopak.
c. Jain and Ninan (2010), drawing on ICCI Frames.
d. Jain and Ninan (2010).

Deflators: To address the concern of Bosworth et al. (2007) that the rate of increase of deflators for certain services, especially traditional services, is currently underestimated, we compare the deflators used for services subsectors relative to the deflator for manufacturing for India (deflators for India are based on the 1999–2000 data series provided by the CSO, calculated using

current and constant prices values) with the average of the OECD countries for which the data are available in the EU KLEMS database.

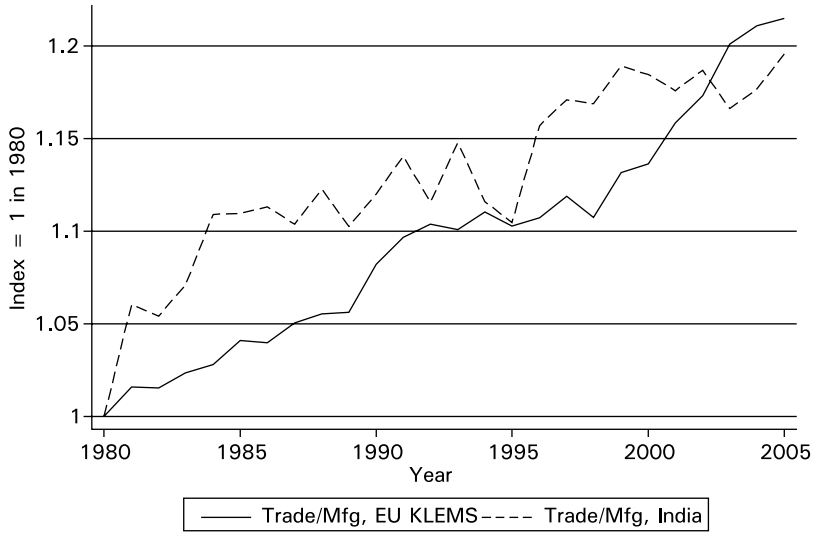
The results of the comparison are shown in Figure A-1. The index of relative deflators takes a value 100 in 1980. For all the service, except banking, the deflator has grown either faster or at the same pace in India as in the OECD countries. Based on this comparison, deflators for services in India do not seem to be underestimating price inflation.

Employment Data: Finally, the data for employment in services is not readily available even for organized activities. Some researchers use the National Sample Surveys (NSS) to get estimates of employment in services. These surveys are available every five years, data from which are interpolated to obtain annual series.

Some data on employment for India are available in the Economic Censuses, which have been conducted by the Ministry of Statistics and Programme Implementation, Government of India in 1977, 1980, 1990, 1998, and 2005. These cover non-agricultural enterprises, and use the enterprise as the unit of enumeration.

FIGURE A-1. Deflators of Services in India and in the Selected OECD Countries

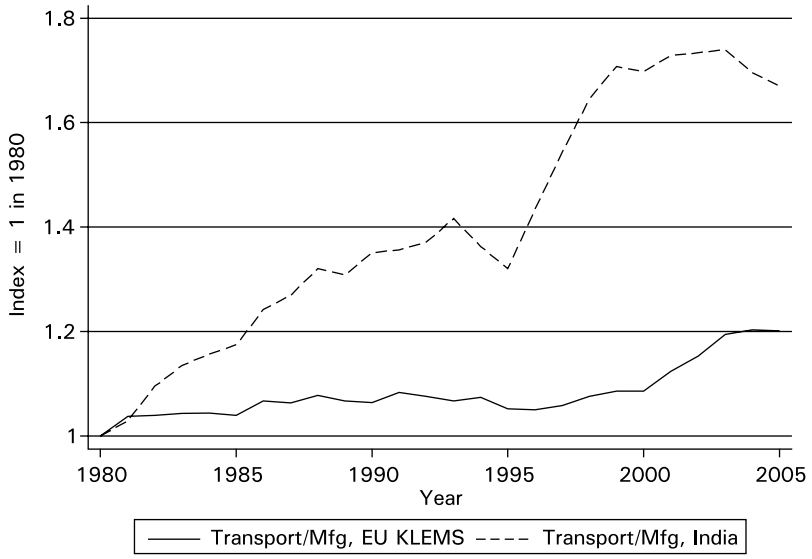
A. Trade



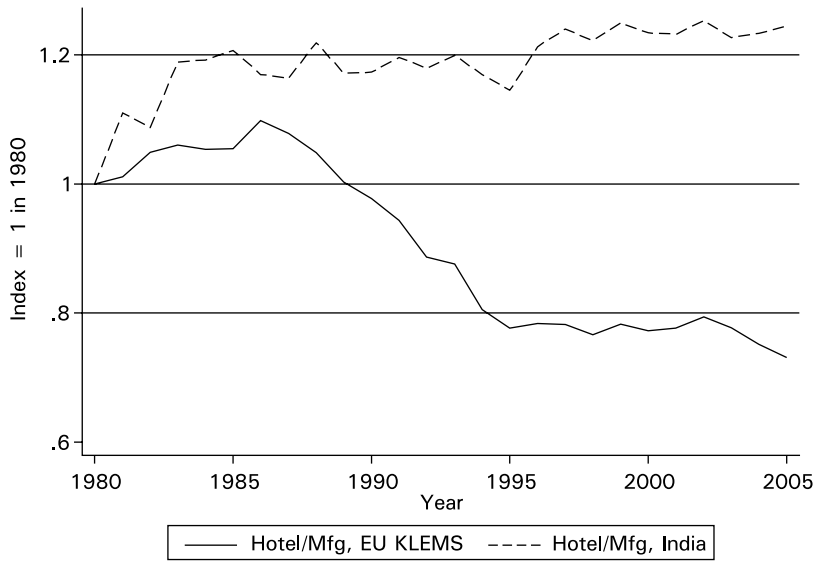
(*Figure A-1 continued*)

(*Figure A-1 continued*)

B: Transport



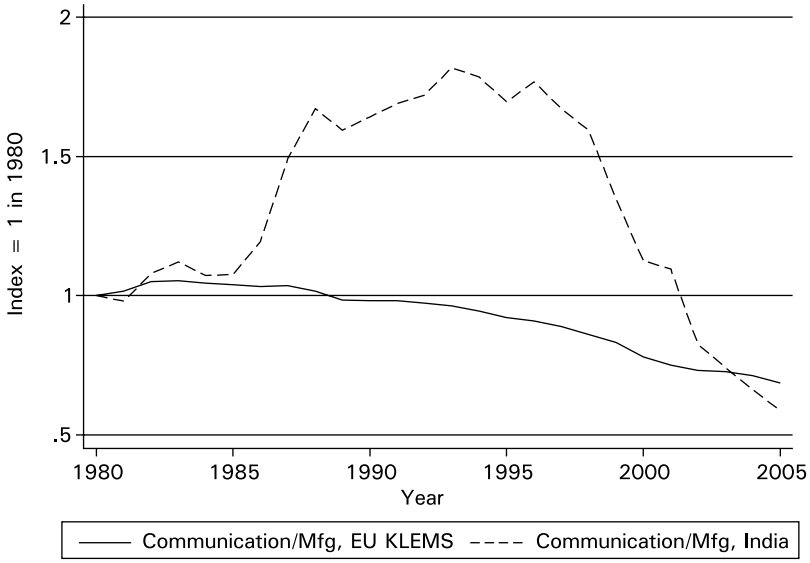
C: Hotels



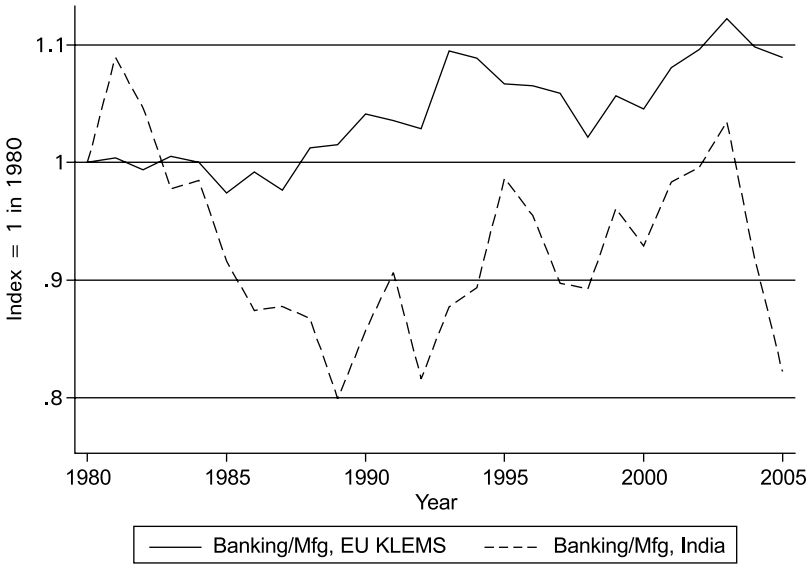
(*Figure A-1 continued*)

(*Figure A-1 continued*)

D. Communication



E: Banking



Source: Data for India is from CSO and for selected OECD countries is from the EU KLEMS. The deflators are relative to manufacturing.

Appendix B: Data Sources

TABLE B-1. Variables and Data Sources

Variable	*Data source*
Per capita income	Eichengreen and Gupta (2009) for data until 2004. We updated the data for 2005, 2006 using the latest version of the WDI and for India for FY 2006–08 using the CSO.
Share of services in GDP	Eichengreen and Gupta (2009) for data until 2004. We updated the data for 2005, 2006 using the latest version of the WDI and for India for 2005, 2006, and 2007 using the CSO.
Disaggregated services value added	For India latest data from CSO, for cross country from the EU KLEMS data, downloaded from: www.euklems.net
Input-output matrices	CSO
Exports and imports of services	World Development Indicators
Detailed data on exports and imports of services for India	Reserve Bank of India's Web site: www.rbi.org.in
Employment data for OECD countries	EU KLEMS's Web site: www.euklems.net
Deflators for India, OECD countries	Calculated using the current and constant price series for value added from CSO, EU KLEMS, respectively.

Appendix C: Construction of Services Characteristics

TABLE C-1. Characteristics of Different Services

Sector	*Tradable*	*Correlated with Mfg*	*Skill intensity*	*Skill intensity dummy*	*Liberalization index*
Trade	0	1	9.1	0	0.25
Hotels and restaurants	0	1	6.1	0	1
Transport, storage	0	1	6.7	0	0.5
Communication	1	0	9.2	0	1
Banking, insurance	1	0	21.6	1	0.5
Business services	1	0	26.7	1	1
PAD	0	0	22.4	1	0
Education	0	0	43.9	1	0.5
Health and social work	0	0	24.6	1	0.5

Source: Constructed using the sources indicated below.

Sources and Construction of Characteristics: Tradability is indicated by a dummy variable, which takes a value 1 if the service is considered to be tradable and zero otherwise, see Eichengreen and Gupta (2009) for details.

The dummy for correlation with manufacturing is based on the correlation coefficients between services growth and growth in manufacturing, calculated over different time periods. The correlation coefficients are consistently and significantly different from zero for trade, hotels and restaurants, and transport. Data from input-output matrices show that the coefficients for the use of trade, transport, and banking in manufacturing are the largest, but the hotels and restaurants industry does not have a large coefficient. We therefore also construct this dummy a second way, in which it takes the value 1 for trade, transport, and banking services, and zero for other services. Results do not change when we use this alternative measure.

The liberalization index is based on Cain et al. (2009). They divide different sectors of the economy into least liberalized, moderately liberalized, and significantly liberalized. We give a numeral score of 0, 0.5, and 1 respectively to these categories. Cain et al. (2009) work at a more disaggregated level, so in a few cases, services within the broad categories that we use here belonged to different categories. In such cases, we take a simple average of the numeral scores for the services in the same broad category that we use.

Appendix D: Correlation of Growth across Sectors

Here we report additional tests of whether the correlation between growth rates in services and manufacturing has increased or not. If the intensity of use of services as an intermediate input is increasing, then we should see the correlation between services and manufacturing growth to be increasing over time.

TABLE D-1. Correlation of Growth in Services and Growth in Other Sectors in India

	I	*II*
Period	Between services growth and manufacturing growth	Between services growth and agriculture growth
1951–65	0.77***	0.22
1966–80	0.59**	0.49*
1981–95	0.55**	−0.25
1996–2008	0.30	0.16

Source: Authors' calculations using the data for India from CSO.
Note: *, **, *** indicate that the correlations are significant at 1, 5, and 10 percent levels respectively.

The results show that the correlation between growth in manufacturing and services has been falling over time. These correlations confirm the

pattern that we see in the input-output matrices and imply that growth momentum in services in recent years has been largely independent of that in manufacturing.

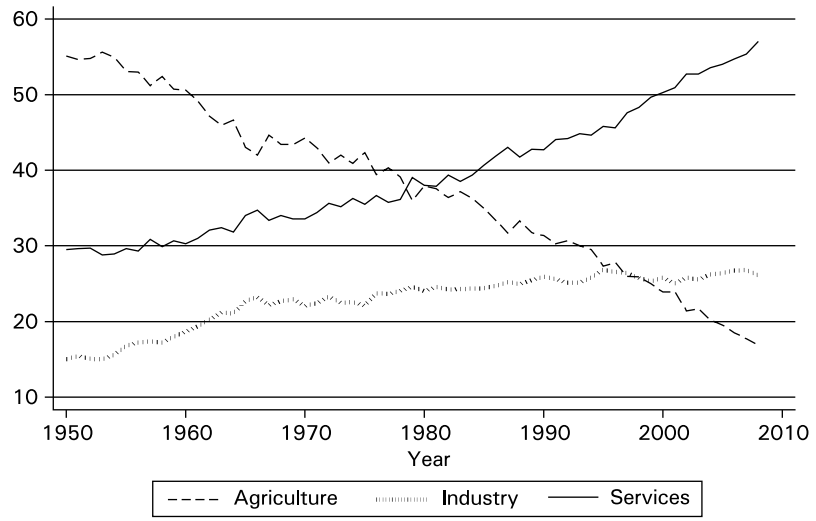
The Table D-2 shows the correlation between the growth of specific services and the growth of manufacturing. For traditional services such as trade and hotels, the correlation is relatively high though declining over time. Interestingly, the growth of modern services such as communications, business services, and financial services is not correlated with the growth of value added in manufacturing. Again, this implies that these services have a growth momentum of their own which does not simply derive from outsourcing by manufacturing.[37]

TABLE D-2. Correlation between Growth in Services Subsectors and Manufacturing in India

	Trade	*Transport*	*Hotels*	*Communication*	*Business services*	*Banking*
1951–65	0.86***	0.33	0.67***	0.45*	0.31	−0.14
1966–80	0.52**	0.01	0.49*	−0.15	−0.05	0.59*
1981–95	0.82***	0.39	0.37	0.41	0.53**	−0.16
1996–2008	0.01	0.71***	0.43	0.27	−0.43	0.06

Source: Authors' calculations using the data for India from CSO.
Note: *, **, *** indicate that the correlations are significant at 1, 5, and 10 percent levels respectively.

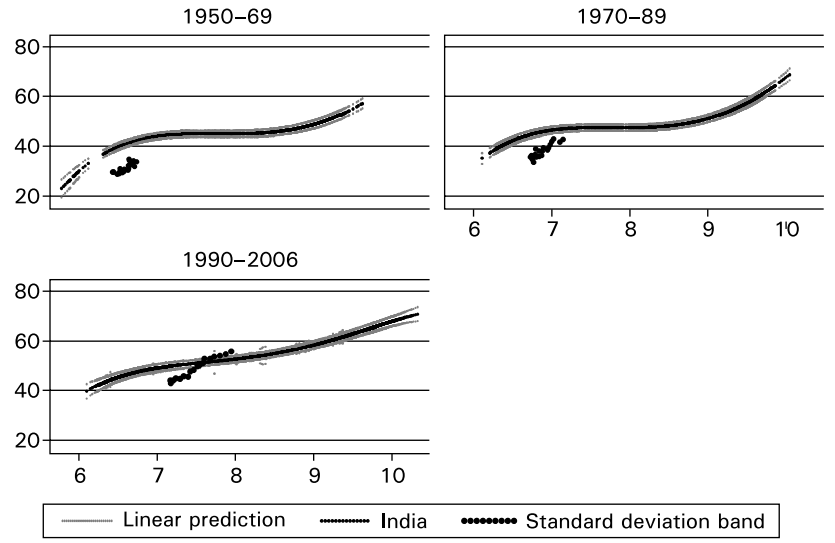
FIGURE D-1. Shares of Agriculture, Industry, and Services in India



Source: Data are from CSO for FY 1951–FY 2009.

37. The input-output coefficient is also the largest for trade, followed by transport.

FIGURE D-2. Service-Sector Share in GDP and Log per Capita Income

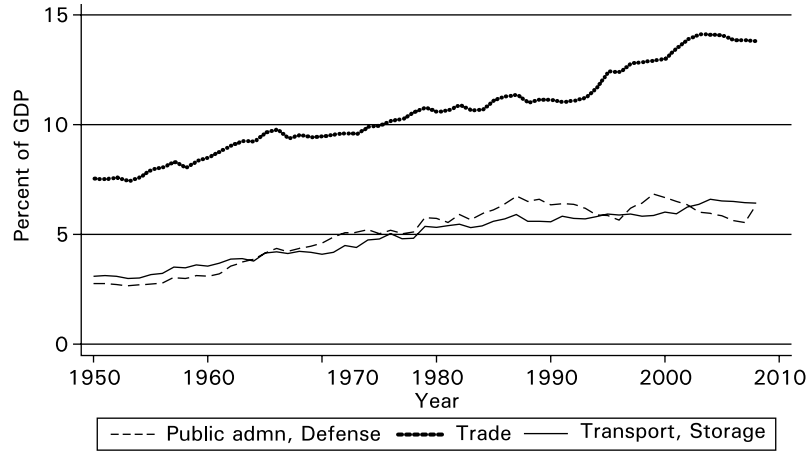


Source: Authors' estimates.

Notes: The charts extend the analysis in Eichengreen and Gupta (2009) through 2006. The estimated relationship is based on a regression of share of services in GDP on a quartic polynomial in log per capita income, and country fixed effects. The regressions allow for a different intercept in the three periods indicated and different slope parameters in 1990–2006.

FIGURE D-3. Size of Specific Services in India (Percent of GDP)

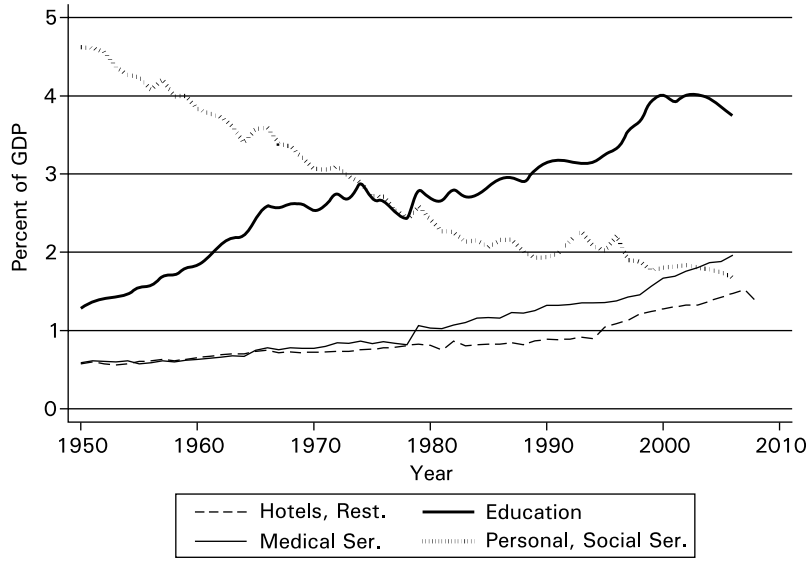
A. Group I



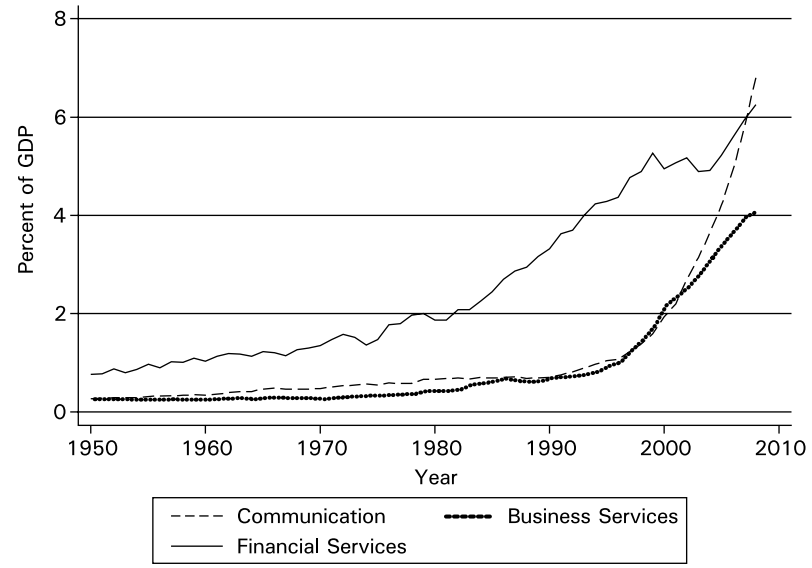
(*Figure D-3 continued*)

(*Figure D-3 continued*)

B. Group II



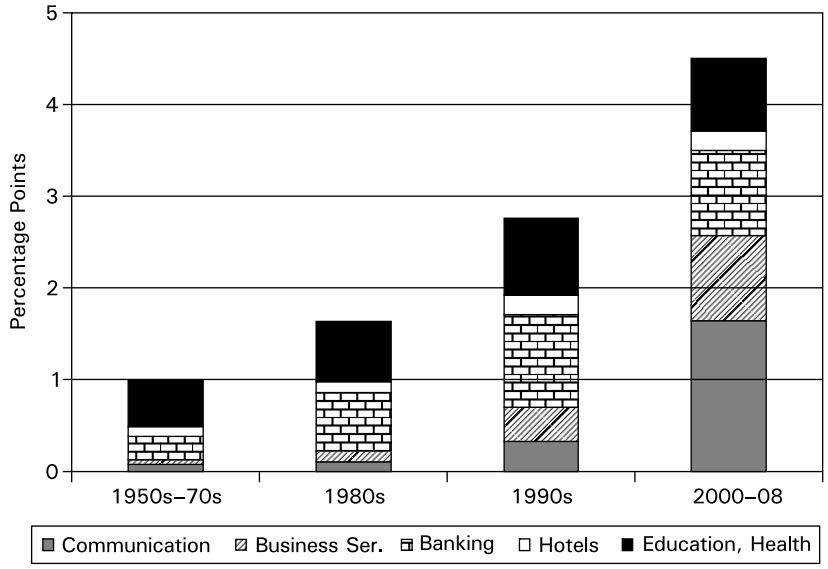
C. Group III



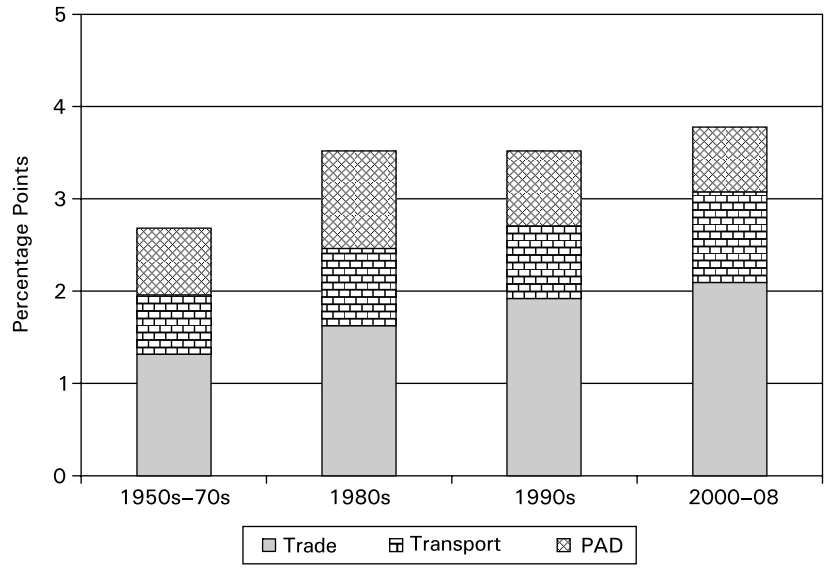
Source: Own calculations using the data from CSO.

FIGURE D-4. Contribution of Various Services to Total Services Growth

A. Groups II and III



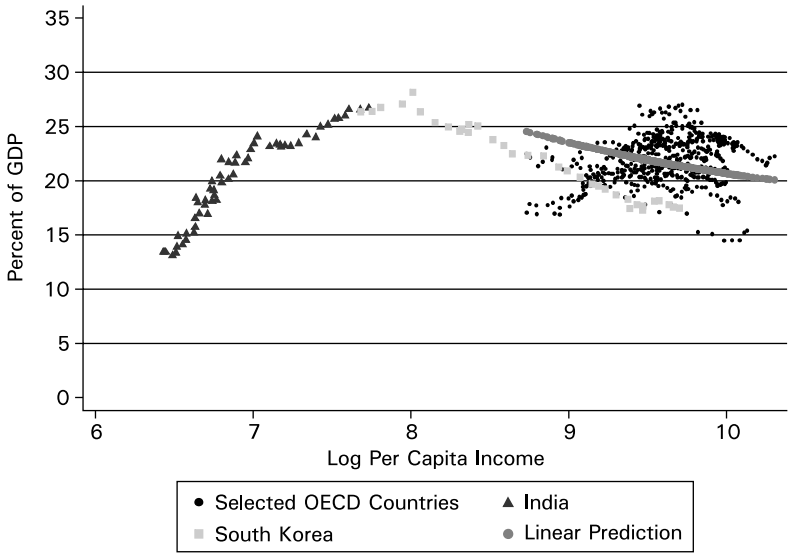
B. Group I



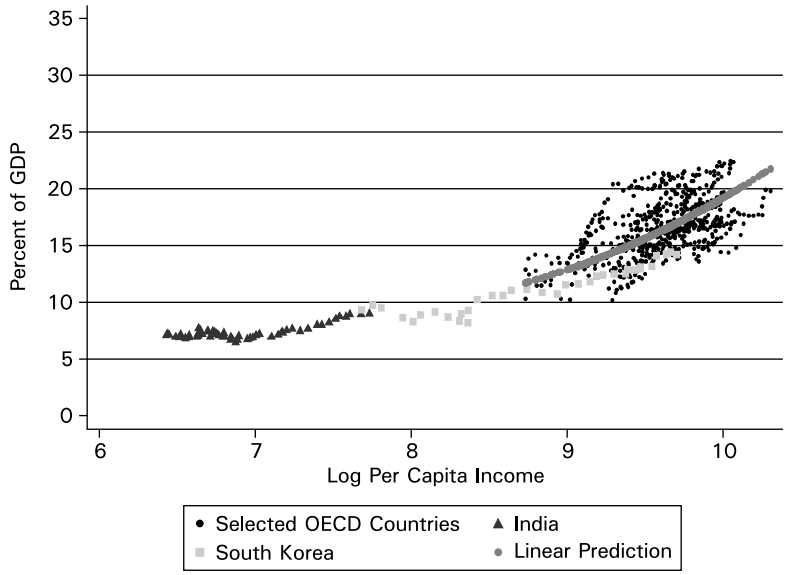
Source: Own calculations using the data from CSO.

FIGURE D-5. Size of Different Service Activities and Per Capita Income: Cross-country Experience and India

A: Group I



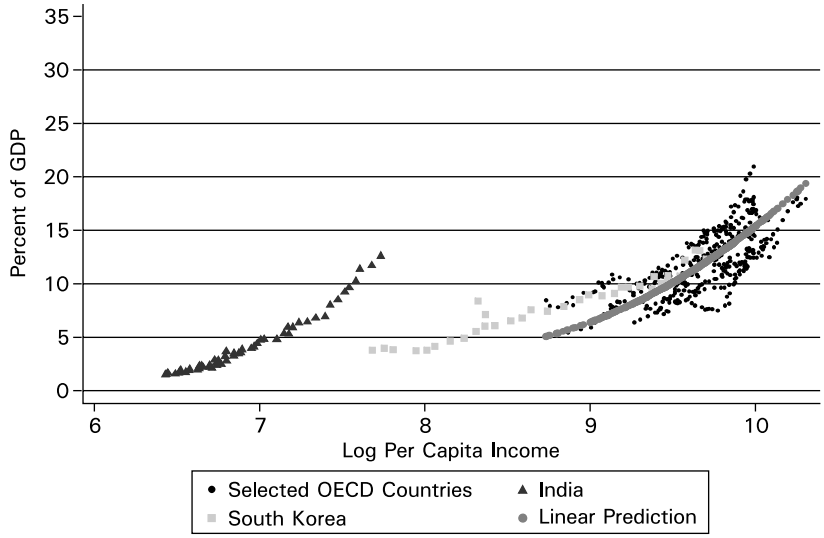
B: Group II



(*Figure D-5 continued*)

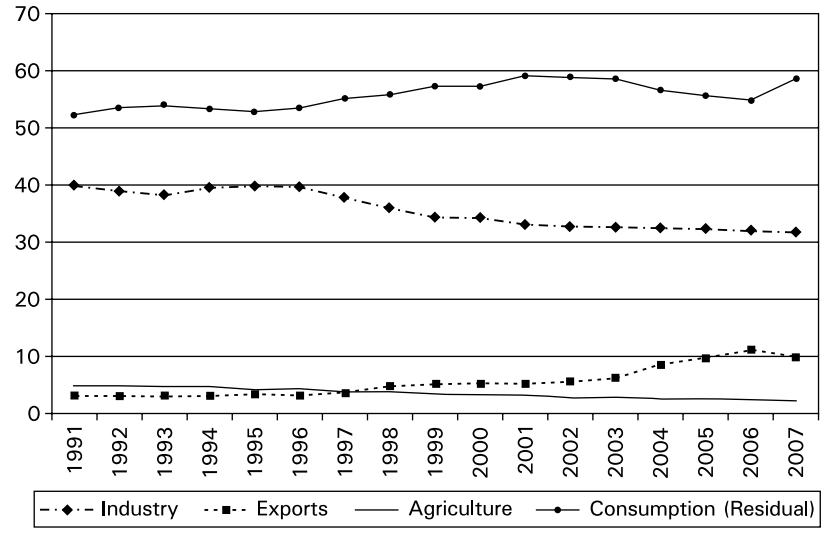
(*Figure D-5 continued*)

C: Group III



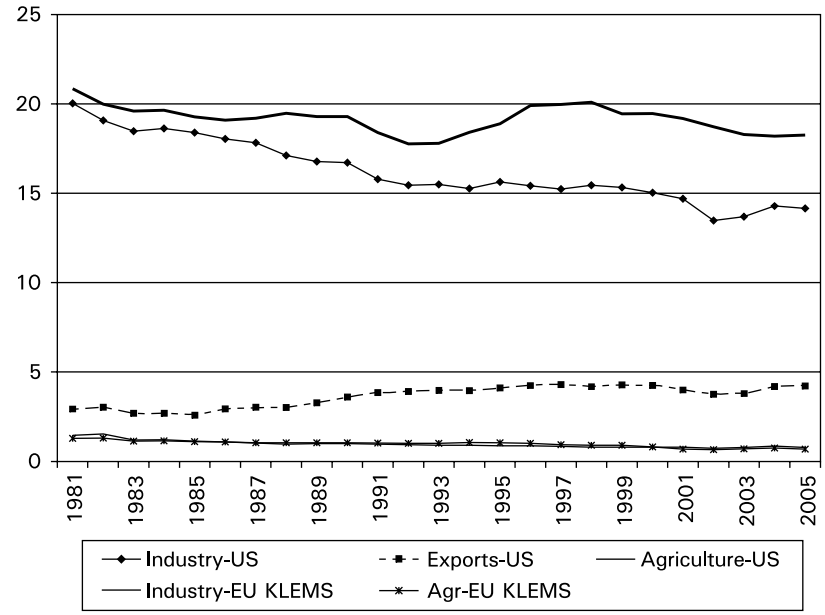
Source: Cross-country data is from the EU KLEMS database, and the data for India is from the CSO.

FIGURE D-6. Different Uses of Services as Percent of Total Services Value Added in India



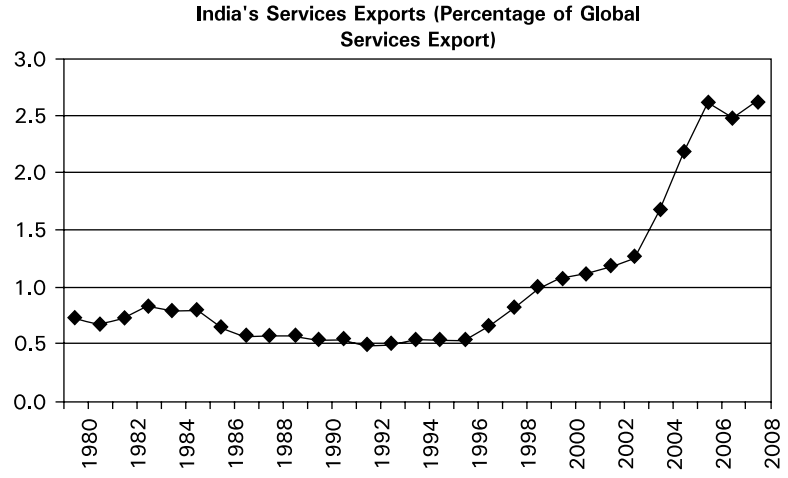
Source: Own calculations using the data from the CSO.

FIGURE D-7. Different Uses of Services as Percent of Total Services Value Added across Countries



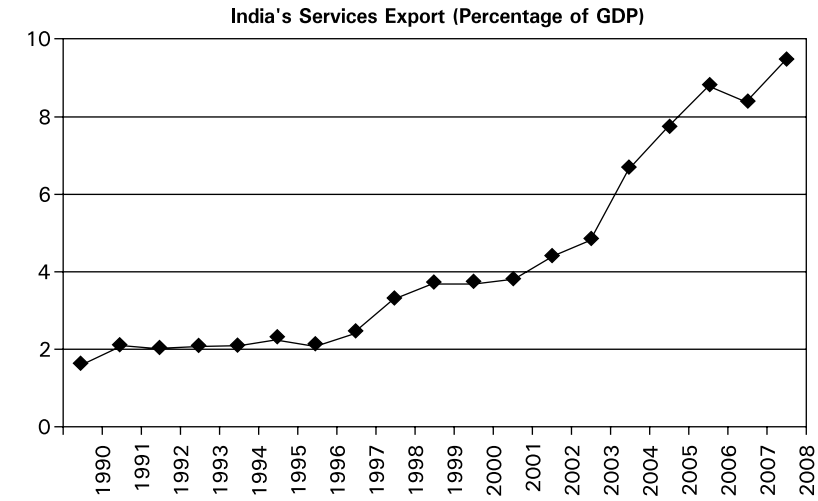
Source: Authors' estimates.

FIGURE D-8. Exports of Services



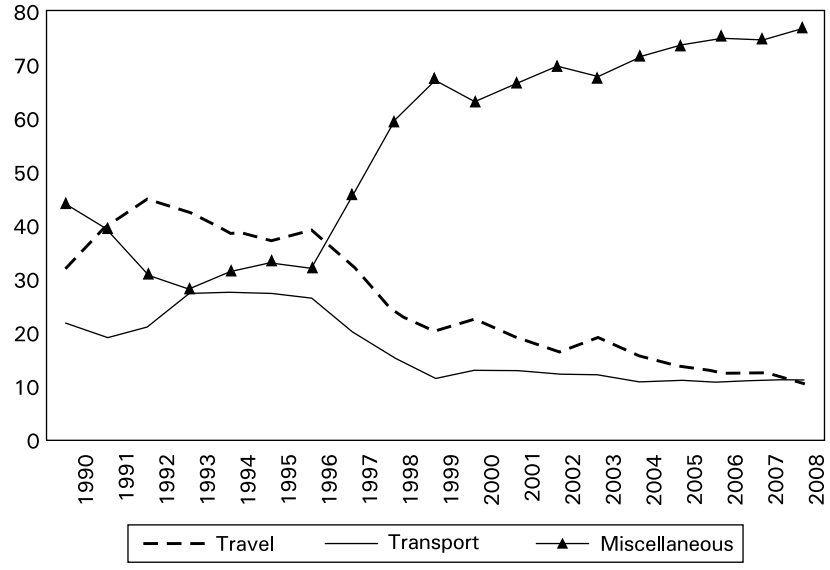
(*Figure D-8 continued*)

(*Figure D-8 continued*)



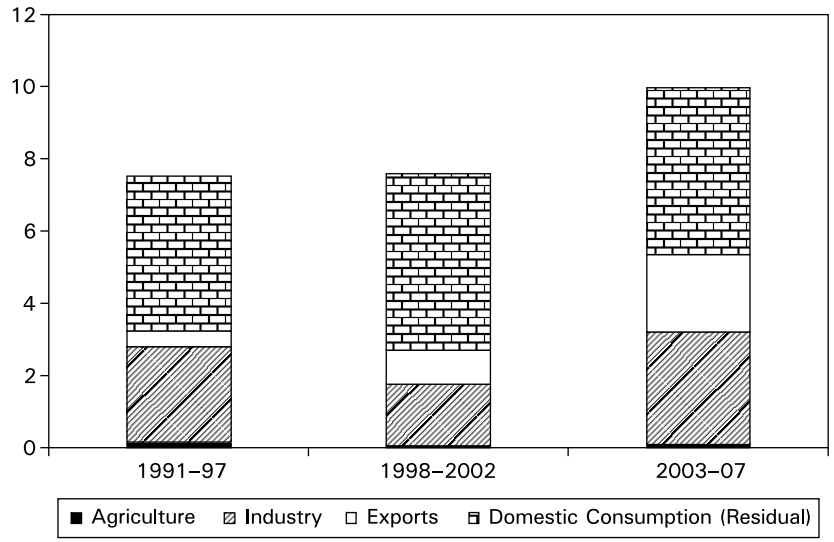
Source: World Development Indicators.

FIGURE D-9. Composition of Services Exports from India



Source: RBI, India.

FIGURE D-10. Services Growth in India Attributed to Growth in End Use



Source: Calculated using Equation 4 and as described in the text.

Comments and Discussion

Pronab Sen: I would like to address two critical issues in the paper. The first is concerned with the data in the paper. The authors discuss a two-wave pattern, with the waves being created by three distinct periods: 1950–69, 1970–89, and 1990–2005. These periods coincide rather suspiciously with a major statistical event: the revisions that took place in the system of national accounts (SNA) in 1968 and 1993, both of which altered the manner in which data has been collected and used. Therefore, there is a possibility that the wave effects in the paper might actually be a reflection of the broadening of definitions and the manner in which different activities were included in the SNA following the two revisions. One of the issues that the revisions of the SNA have addressed involves the categorizing of activities which are to be included as economic activities under the system of national accounts. This has led to changes in the definitions in each of the revisions. Hence, it is possible that those definitional changes are driving the waves seen in the paper, rather than anything inherent to the dynamics of the economy.

The second point is that I believe the idea of "splintering in services" was misinterpreted in the paper. The argument in the paper is similar to an earlier argument of mine, but it is not really an example of splintering as conventionally understood. Splintering relates to a process by which businesses start outsourcing increasing portions of their activities as they evolve. I believe that is a relatively new phenomenon, particularly in the developed countries.

Instead, the discussion as it relates to India focuses on the structure of the industrial sector and how, if it is dominated by very small firms, it may not be worthwhile to undertake some services in-house in the same ways as it was efficient for larger companies. It is similar to the phenomena in agriculture by which subsistence/small farmers will outsource more of the farm-to-market activities than in larger farming systems. I suggest an examination of the share of organized manufacturing to total manufacturing because, in the case of India, that share has changed over time. In the first period, organized manufacturing was a very small part of total manufacturing in the country, but this has grown significantly over time. In the case of agriculture, the share of marketed surplus to total production has also grown rapidly over the years.

Thus, the basic argument does not rest on splintering as such, but on the characteristics of the companies which make up the manufacturing sector and in the nature of the farming system. I suggest including a variable on the share of organized manufacturing to total manufacturing and one on the share of marketed surplus to total agricultural output in the equations in order to see their effect.

General Discussion

Significant portions of the discussion were devoted to concerns about the quality of the statistical data. T. N. Srinivasan noted that the revisions to the national accounts had been large in the past, with several important changes in definitions. He also stressed the importance of the distinction between organized sector and unorganized sector. Finally, he pointed out that the input-output tables incorporate some of the service industries on a value-added basis rather than the gross output concepts used for industry, and that can affect some of the comparisons. Sudipto Mundle made two comments concerning the data used for the Group III services (financial, business and communication services), which seem to be driving a lot of the effects seen in the paper. He noted that the Central Statistical Organization (CSO) does not collect data on communications but instead obtains it indirectly from National Association of Software and Services Companies (NASSCOM), and NASSCOM does not give any explanation or detail for the sources and methods that it uses to construct its estimates. Second, business and financial services are characterized by a large number of very small firms with limited information about their output and value added, which he believed reduced the reliability of the published estimates. He also agreed with Srinivasan about the fragility of the estimates for the unorganized sector. Pronab Sen noted that while there is agreement worldwide about how to measure services within the economy, there is still no accepted definition or principles for trade in services.

Willem Buiter asked whether the offset to the high services share of GDP was in agriculture or industry. Poonam Gupta responded that it appeared to be industry with a relatively low share of both GDP and employment. Rohini Pande asked whether the employment patterns reported in the paper were similar to those obtained by other authors using the survey data of the NSSO. She was interested in the policy aspect and whether the paper's finding of a robust demand for skilled workers supported an argument that the government should devote more resources to promoting skilled labor,

rather than continuing with the large investments in programs like NREGA, which focuses on unskilled daily labor.

Robert Lawrence thought that the paper provided a useful counterweight to what he thought was an overemphasis on industry and manufacturing in the explanation of economic growth in many other studies. He suggested an explicit discussion of some of those views and an exploration of what the evidence in the paper suggested for the case of India. Sujit Bhalla noted that the expansion of services was in part a response to past policies that discouraged the development of large-scale industry. Now that these policies have changed, it is possible that industry will perhaps grow even faster than services.

Barry Bosworth expressed puzzlement about the concentration of growth in modern services and those parts of manufacturing that use relatively high-skilled labor. Many articles have emphasized the poor quality of the Indian education system and appallingly high levels of illiteracy. There would seem to be a mismatch between the pattern of India's growth and its comparative advantage in unskilled labor. Where are the workers coming from? Poonam Gupta responded that there are signs of a skill crunch that may become more constraining in the future. However, there has been a rapid expansion of private institutions that provide training in English and computers. Esther Duflo said that she preferred to focus on the value of primary education, as compared to the emphasis on tertiary education in the paper. She noted that Indian education is characterized by an extremely bad education system for the vast majority of the people and an excellent one for a small group of people. She thought that there are two questions that should be considered: whether growth would be constrained by the lack of education, and also whether some people will not be able to benefit from growth due to their place of birth or background.

Alakh Sharma suggested a comparison between India and other Asian countries such as China, South Korea, Indonesia, and Malaysia where the shares of manufacturing in GDP and employment are similar to India. These countries differ from India, in that growth in the services sector was accompanied by an increase in the services share in employment. That has not occurred in India. He believed that one explanation is that the expansion of the Indian service sector has been mainly the result of productivity-led growth in Group III services. He also thought that the employment share of the service sector in India was somewhat hidden. Sharma alleged that services-led growth has produced large imbalances and inequalities in the economy, particularly differences in per capita income between those in

agriculture and services. Suman Bery noted that there are some differences in the international classifications of industries that may affect some of the comparisons, particularly as to whether construction is part of industry or services. He also noted that countries that are over-specialized in services are frequently considered to have real exchange rate problems, and it would be interesting to explore this aspect for India.

Dilip Mookherjee pointed to an earlier paper by Bosworth, Collins, and Virmani where they attributed much of the growth within the service sector to trade, transport, and restaurants. They argued that the IT sector was not large enough to account for a major portion of the growth, which seems to be different from the findings in this paper. Gupta pointed out that both studies used the same data, but that they had benefited from the addition of a few more years. Bosworth also noted that the first paper was more focused on business services, which is only a portion of the IT sector as used by Eichengreen and Gupta.

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Sources of Corporate Profits in India: Business Dynamism or Advantages of Entrenchment?

Introduction

It is widely agreed that economic liberalization in the second half of the 1980s and the early 1990s was associated with a more competitive environment for Indian firms and was a source of dynamism in the business sector. Liberalization worked in large part through changing the incentives of the corporate sector, unleashing new forces. But the behavior and achievements of Indian companies remain controversial. This paper offers a closer examination of the corporate sector's post-liberalization performance to help explore the controversies and sharpen our understanding of India's economic change as well as its political economy.

The analysis is motivated by two competing views. The first holds that liberalization fostered business dynamism through removal of entry barriers and competitive pressures. According to this view, competitive capitalism has been the source of India's structural change and growth. The other view, while recognizing the gains, sees the forces of capitalism as generating

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incentives to accumulate excessive market power accompanied by economic entrenchment of the winning firms. This in turn led to deepening inequality and concentration of personal wealth. Such entrenchment, which is reinforced by corporate influence over the state, creates a new rent-seeking environment and potentially saps business energy, with adverse consequences for growth in the medium to long term.

Much of the literature on the firm performance leans towards the second view. Thus, Alfaro and Chari (2009: 4) concede that liberalization has led to significant new entry but conclude that "… from closer examination, what emerges is not a story of dramatic transformation in India's microeconomic structure following liberalization. Rather, the data suggest an economy still dominated by the incumbents (state-owned firms and business groups)." Bertrand, Mehta, and Mullainathan (2002) focus on evidence for "tunneling," or the transfer of profits between firms within corporate groups. Such diversion of resources between firms presumably distracts management from more productive activities while damaging the interests of minority shareholders. By contrast, Aghion et al. (2008) postulate that "Technologically advanced firms and those located in regions with pro-business institutions are more likely to respond to the threat of entry by investing in new technologies and production processes." Using three-digit state-industry data from 1980–97, they conclude that "… delicensing led to an increase in within-industry inequality in industrial performance."

These questions are also related to the broader debate on whether the policy changes and growth accelerations of the past 25 years are best interpreted as a move toward a "pro-business" orientation or a "pro-market" position (see, e.g., Rodrik and Subramanian, 2004; and Kohli, 2006, on the "pro-business" interpretation, and Panagariya, 2008, for an example of the "pro-market" interpretation). Under the pro-business view, the government shifted its stance toward modern-sector productive activity through removing restrictions—and implicitly increasing assurances—on the large-scale private sector. This unleashed investment and growth, but essentially led to "oligarchic" capitalism. By contrast, the pro-market views the mix of reduced restrictions and external liberalization as the main drivers of changes in economic performance, working via heightened competitive pressures on firm behavior. A related view could be characterized as a Schumpeterian process of creative destruction, in which corporate firms, and especially those connected to the business houses (conglomerates that are typically still controlled by founding families and their allies), have sufficient market power or economies of scale to protect profits, but also face sufficient incentives from home or abroad to induce investment and innovation.

To inform this debate, this paper analyzes the correlates of profitability of firms listed on the Bombay Stock Exchange (BSE), covering a dynamic period—in terms of firm entry and growth—from the early 1990s to the late 2000s. The focus on profits is deliberate. Profits are intimately related to the issues at stake. Profits can be a reward and spur to creative change that, in turn, creates wealth, trade, and jobs for society. Or they can be a product of the exercise of market power and influence. The sources of profitability then guide the production, investment, innovation, market, and lobbying strategies of firms.

The core econometric analysis relates a firm's profit rate to its profit rate in the preceding year, other firm characteristics, key features of the industry in which the firm operates, and macroeconomic conditions. Earlier contributions using the Prowess database and motivated by similar interests include those by Khanna and Palepu (2000) and Bertrand et al. (2002).[1] Khanna and Palepu (2000) undertake a cross-sectional analysis on one year, 1993. Bertrand et al., 2002 cover the period from 1989 to 1999, and control for unobserved firm-level heterogeneity, which biases cross-sectional analysis. They, however, do not allow for the persistence of profits, which we find is significant, and requires special econometric treatment. Moreover, their focus is on testing a specific hypothesis regarding tunneling of profits and not on the broader correlates of corporate profitability.

Our approach is more akin to that used for the analysis of European and US firms' profitability, which allow for persistence in profit rates and deploy econometric techniques appropriate for that setting (Goddard, Tavakoli, and Wilson, 2005 and Tregenna, 2009). In similar spirit, we undertake both a descriptive and econometric analysis of the patterns of change over time. While this does not constitute a rigorous test of the three hypotheses, we are able to explore the consistency of the patterns in the data with the alternative interpretations.

Extensive firm entry would provide prima facie support for competitive pressures, but is not decisive, since the new entry could be of small, or follower firms, who do not threaten the power of incumbents. Similarly, while business houses may have greater capacity to exert influence of markets and government than stand-alone firms, they can also be a source of dynamism—it is a mistake to identify the business house form as being intrinsically anti-competitive, with stand-alone firms as intrinsically competitive. This is why we focus on actual profit behavior of all firms. We examine

1. Alfaro and Chari (2009) review the evolution of the corporate sector, but do not analyze the determinants of profitability.

in particular the persistence of firm-specific profits—a potential indicator of the capacity of firms to resist competitive pressures from firms in the same industry—and the influence of firm-level market shares and industry-level measures of concentration. However, while these relations carry additional information, they are also not decisive with respect to assessing the hypotheses: persistence of profits can also be an indicator of unobservable firm-specific advantages (of management, labor force, quality, etc.); an association between profits and market shares may reflect rewards to growth, especially in a dynamic formulation; and measures of both domestic market share and concentration are incomplete proxies for competitive pressures for import-competing industries.

For these reasons we also undertake a series of further explorations of how profit behavior varies across different groupings of the firms, dividing them with respect to industry size, tradable and nontradables, firm-level efficiency, and corporate structure (especially between business houses and others). In each of these areas, the hypothesis to explore is that the exercise, or abuse, of entrenched market power is more marked amongst larger firms, nontradables, and business houses, and not a product of greater efficiency. Conversely, the absence of such a pattern supports the view of more competitive behavior.

The results do not, in general, provide support for the systematic exercise of market power, but are rather consistent with a dynamic business sector with significant competitive pressures. However, there are also features of the corporate sector that could provide the basis for a change in the dynamic, away from getting ahead through competitive ability to one where market power and government–business relationships once again acquire increased importance. In particular we find:

- A marked overall profit cycle over the past two decades. Profitability was high just before the liberalization, stayed high for a few years afterwards, and then fell significantly till the early 2000s. There was then a significant recovery in profitability in the mid to late 2000s. This cycle affected almost all industries, with a similar pattern for firms in tradable and nontradable sectors, suggesting the primary drivers were domestic.
- We indeed find a significant link between profitability and macroeconomic conditions, in both the descriptive and econometric analysis. There, in particular, are influences of measures that proxy both "overheating" and underlying economic growth. However, the association with overheating seems to be confined to the earlier part of the period.

- There was substantial entry across virtually all industries in the early to mid-1990s. However, this virtually stopped after the late 1990s, with little new firm entry in the 2000s, despite the recovery in profits in this period. This pattern was associated with a fall in measures of market concentration for most industries in the 1990s. While the bulk of entry, in terms of numbers, was in the form of Indian stand-alone firms, business houses and publicly owned firms remain dominant throughout the period in terms of shares of sales and assets; firms linked to business houses actually slightly increased their share of total sales in the sample from 41 percent in 1989 to 42 percent in 2008.
- A firm's profitability tends to persist strongly from year to year. But the persistence declines when profitability is averaged over longer periods (up to four years), suggesting some "super normal" profits are whittled away over time. More efficient firms tend to have more persistent profits. Thus, some part of the persistence reflects greater efficiency, although because of the overlap between efficient and large firms, market power may also have a role in maintaining the profit rate over time.
- There was some reconcentration in the 2000s, affecting about a third of firms for which we have a long time series, indicating a process of consolidation. There is, however, no consistent evidence of a general influence of market concentration on profitability: if anything, firms in less concentrated sectors have higher profit rates. Moreover, firms in reconcentrating sectors have similar overall profit dynamics as other firms, again supporting the view that the exercise of market power is not a general phenomenon for this group.
- Firms with growing market shares do enjoy higher profitability, but the pattern of results is more consistent with causation flowing in the opposite direction, that is in success of dynamism. In particular, we find that this association is equally or more true of small firms and less concentrated industries.

Overall we interpret this as presenting a picture of a corporate sector that, in this period of major change, was characterized to extensive competitive pressures, inducing dynamism, as opposed to being typified by market power and entrenchment. More speculatively, the combination of support for competitive dynamics with structural continuity (especially of business houses), and of some profit persistence, could be indicative of a Schumpeterian dynamic of creative destruction of activities, with firms induced to discover rents through processes of innovation. However, exploring this

would require substantial further work on patterns of innovation and change that we leave to future research.

Moreover, while the overall assessment is supportive of a dynamic business sector, the results do caution that this process also shows signs that could change the direction of Indian corporate dynamics, especially with respect to the lack of entry in the 2000s and a reversal in the trend of declining concentration for some sectors. Further accentuation of these tendencies could create greater incentives for investment in entrenchment and a less dynamic corporate sector. Furthermore, those with opposing views can, with justification, argue that the analysis in this paper does not cover broader influences, such as corporate governance and state–corporate relations, which may paint a less flattering picture of the corporate sector's role. Recent years have seen a number of specific cases of malfeasance, corruption, or the apparent exercise of influence over the state. Our paper clears the ground for that further analysis.

The rest of the paper is organized as follows. The next section describes the data. There then follows an account of the descriptive patterns, focusing on trends in profitability, entry, market share, and concentration. The principal econometric findings are reported thereafter. A concluding section reflects on the findings, the broader political economy context, and further avenues for research.

Data

The analysis for this paper is based on the Prowess data, that is maintained by the Centre for the Monitoring of the Indian Economy (CMIE), and is the most comprehensive source of financial information on individual firms in India. A firm is included in the Prowess database if either of two criteria are satisfied, *(a)* the firm has a turnover of more than Rs 2.5 crores, or *(b)* if its annual reports are available for at least the two latest years prior to the year of updating. In practice, Prowess is dominated by publicly listed companies. Once a firm is in the database, an effort is made to include historical data, and in particular, includes information of the year of a firm's incorporation, that is an indicator of its birth as a formal firm. There is also information on ownership structure, between foreign, domestic private and public, and whether a firm is part of a business group. If a new firm is formed by a business group, it is treated as firm entry affiliated to that business group.

The data includes firms listed on the BSE, the largest exchange in India, as well as the variety of other exchanges in India. We confine our analysis in this

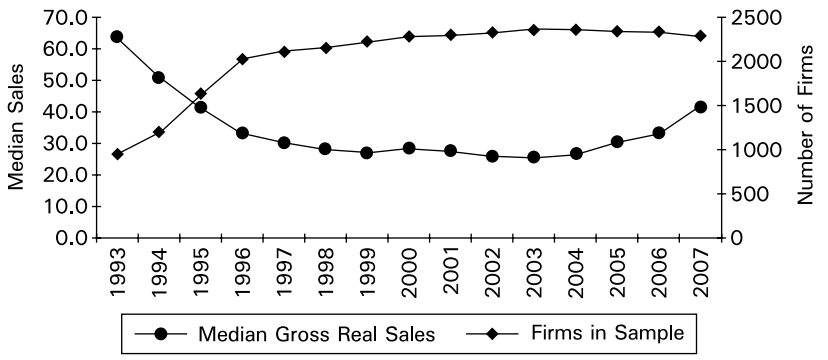
paper to the BSE firms: because of more comprehensive and better quality data for this group, most researchers focus on them. (Careful exploration of the whole database remains an important task for future research.) By 2007, BSE firms accounted about a third of all firms in the Prowess database, but some 70 percent of total sales and assets. Median sales and assets are much larger amongst firms listed on the BSE (see Table A-1).

Reasonably comprehensive financial data is available from the 1989 financial year until the 2010 financial year, but with still incomplete reporting for the last couple years. About 20 percent of the BSE firms do not have data on the profit rate—for which we use the ratio of profits before interest and tax to the reported value of assets—and these are excluded from our analysis. For some of the descriptive information on patterns we present data for all BSE firms with profit data the whole 1989–2010 period. This was a period of large expansion in the number of firms in the database, even for the BSE alone. For most of the analysis we use the full unbalanced panel of BSE firms with data on the required variables. There is balanced panel data from the 1989 to 2010 financial years for just under 160 firms: these had an average age of incorporation of 1957, with two as early as 1897. This constitutes a balanced panel, and we also present information on its profit rate in the next section.

The sample used for the econometric analysis involved two other other adjustments. First, we dropped a further 20 percent of the firms that do not report the right-hand side variables needed (see Table A-1). Second, we also confined the analysis for the period from 1993 to 2007: the period between 1989 and 1993 involved both a very large expansion and significant shifts in the economic environment. As noted, there is still significant underreporting after 2007 that could have distorted the results. We also dropped firms in the financial sector, whose assets (loans) and sales have completely different interpretations relative to the other firms. Our sample is thus likely to reflect the more established and better-run parts of the Indian corporate sector, a group that is in particular unlikely to face credit constraints. While not representative of the whole corporate sector, it is a particularly important and interesting group.

Between 1993 and 2007 the number of firms in our core sample more than doubled in number, rising from less than 1,000 to some 2,300 firms (Figure 1). This mirrored the overall growth in numbers of BSE firms, as well as all firms in the Prowess database. The dramatic increase in new listings in the early to mid-1990s appears largely to have been "greenfield" listing, implying genuine new entry rather than just a reclassification of a

FIGURE 1. The Number of Firms and Median Gross Sales for Sample Firms



Source: Authors' calculations based on data from CMIE.

firm as listed on the BSE.[2] In terms of numbers, the bulk of new entry was from stand-alone Indian firms, though there was also significant formation of new firms by business houses and some new business houses. From 1997 the number of firms in the sample is quite stable. With new entry, median real sales fell significantly, since new firms were much smaller (the sales of established firms continued to rise). Median sales then stabilized and started to rise after 2003. The median firm is of course changing in this period, owing to entry, exit, and shifts in rankings, but we believe that this captures an interesting pattern in the data.

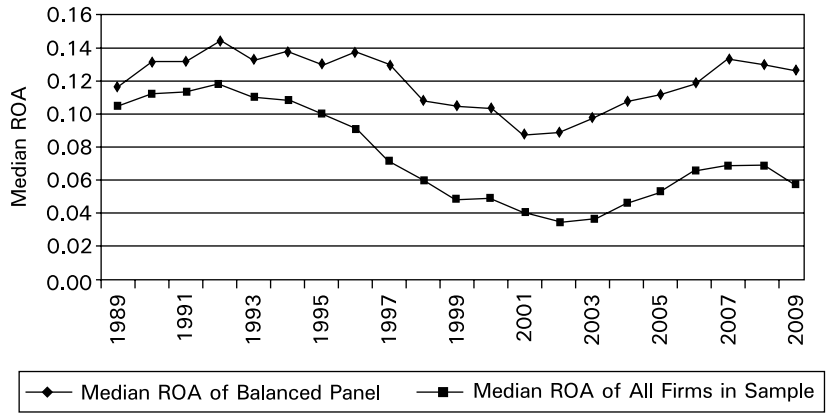
While our focus on a subset of the BSE firms is guided by data availability and the intrinsic interest in these relatively large firms, the levels and trends across the different samples are very similar in at least one key respect. The overall pattern of a fall in the return on assets from the early 1990s to the early 2000s that is analyzed in the next section, is a common feature of the core sample of firms used in the econometric analysis, the sample of all BSE firms with profit data, and of all firms with profits data in the Prowess database.

Corporate Profitability Trends: Change or Continuity?

The overall evolution of the profitability of BSE firms between 1989 and 2010 is shown in Figure 2. The median profit rate (the ratio of profits before interest

2. We are grateful to Ajay Shah for clarifying this for us. On entry, see also Alfaro and Chari (2009).

FIGURE 2. The Median Profit Rate for BSE Firms for All Firms with Data and for a Balanced Panel, 1989–2010



Source: Authors' calculations based on data from CMIE.

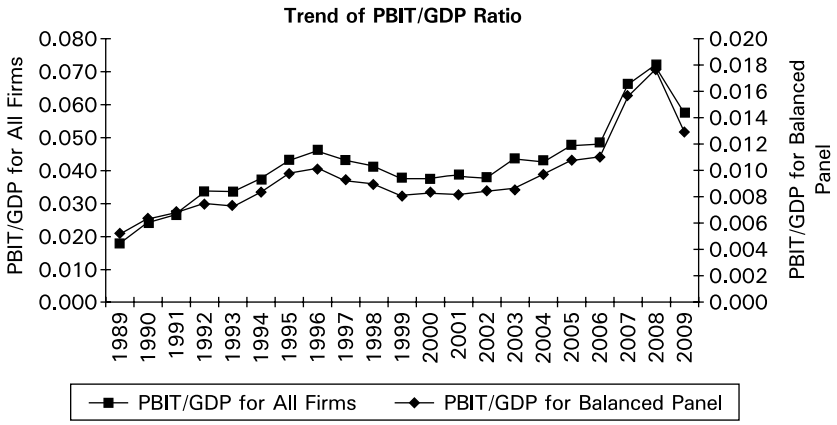
Note: ROA refers to the ratio of profits before interest and taxes to assets for the sample of firms in the Bombay Stock Exchange.

and taxes to assets) rose between 1989 and 1992, then experienced and steady and substantial decline until 2002, followed by a significant recovery, albeit to a profit rate that was less than the early 1990s level. 2009 then saw a fall in the context of the global financial crisis and domestic slowdown. Initial reporting for 2010 suggest a recovery is under way. This long cycle of a fall and rise profitability was experienced throughout the distribution of firms: to both more and less profitable firms and to both larger and smaller firms (see Figures A-1 and A-2). Similarly, the balanced panel of firms already established in 1989 experienced a cycle with a very similar rhythm, but with a less pronounced fall in profitability in the late 1990s. Both the balanced panel and large firms (with some overlap between these categories) were typically more profitable than other firms throughout the period (see Figure 3).

In contrast to the firm-level profit rates, the share of profits in national income of this part of the corporate sector rose substantially in both the early to mid-1990s and from the early 2000s, with a (probably temporary) fall in 2009 in the recession. While this is not the focus of this paper, it is a noteworthy phenomenon of the overall structure of the Indian economy.

The two most important parts of the reforms involved de-licensing, with major liberalization of entry in the late 1980s and 1991 (with a further liberalization in the late 1990s), and external trade liberalization, with a major initial opening in 1991. As Topalova (2007) argues,

FIGURE 3. The Ratio of Profits to GDP for All BSE Firms and the Balanced Panel, 1989–2010

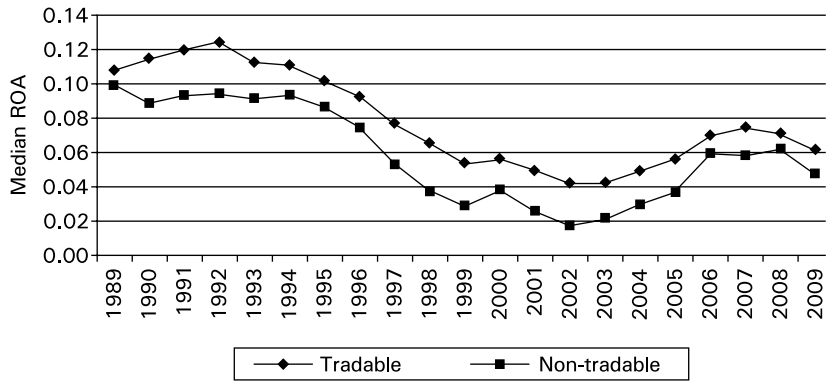


Source: Authors' calculations based on data from CMIE.
Note: PBIT refers to profits before interest and taxes.

the 1991 opening was a significant, and probably largely unanticipated, shock. De-licensing was an industry-by-industry affair that affected tradable and nontradable activities. External trade liberalization of course only affected tradables. Figure 4 presents the median profit rate for these two groups: this provides a striking additional result—the profit cycle looks very similar for both groups over the whole period, though the median tradable firm actually rose in profitability through 1992 (a similar pattern is found, if we take averages). This suggests common, and so primarily domestic, drivers of overall change between tradable and non-tradable industries.

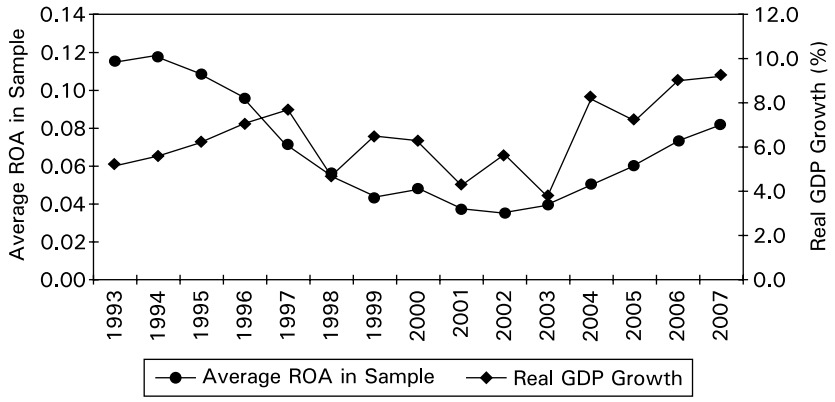
There were two developments that affected all, or most, industries: domestic macroeconomic activity and the experience of opening to firm entry. With respect to macroeconomic activity, apart from the early years, the profit rate indeed moved rather closely with the Indian GDP growth rate (see Figure 5). In the early years of our sample, firms may have been able to exploit the relatively high inflationary environment to raise prices faster than costs. But, thereafter, the link to short-run demand pressures diminishes and to GDP growth strengthens. Thus, through 2002, slow GDP growth and substantial entry of domestic firms and opening to foreign competition appears to have depressed profitability. By about 2001, market shares stabilized and GDP growth started increasing, which was reflected in the rise in the profit rate. The timing of the turnaround in profit rates is also consistent with Virmani's (2009) analysis of a new acceleration in Indian

FIGURE 4. The Profitability of Tradable and Nontradable Industries, 1989–2009



Source: Authors' calculations based on data from CMIE.

FIGURE 5. The Rate of Corporate Profits and Growth Rate of GDP, 1993–2007

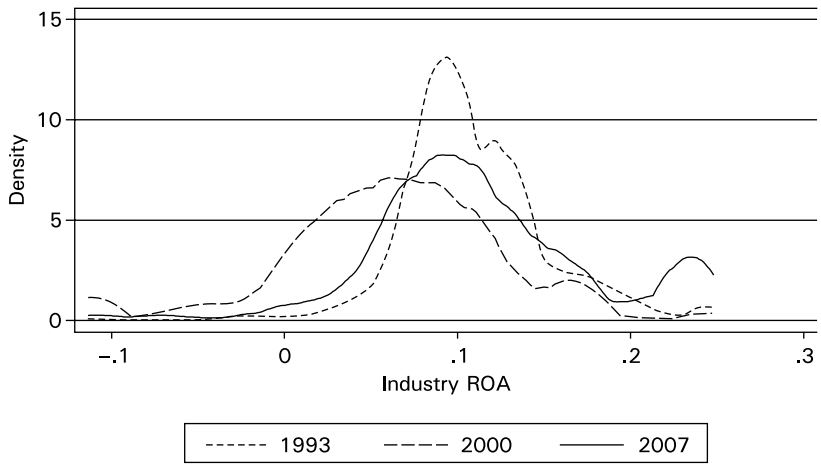


Source: Authors' calculations based on data from CMIE.

GDP growth through private investment. Thus, growth, investment, and profitability appear to have reinforced each other.

Before turning to patterns of entry, we highlight a further feature of the data. The changes in median, or average, rates of return hides large differences across firms. This is illustrated in Figure 6. The high profit rate in 1993 was also relatively narrowly distributed: most firms' profit rates were closely clustered. The declining profitability between 1993 and 2000 was

FIGURE 6. The Changing Distribution of Profitability across Industries, 2003–07



Source: Authors' calculations based on data from CMIE.

accompanied by an increased dispersion of profit rates. This may have been because the competitive pressures on profits from the liberalization were felt more acutely by some firms than others, or because of rising heterogeneity associated with the substantial firm entry. As profit rates increased, the distribution of profit rates shifted once again to the right. There was also some narrowing of the dispersion, but the distribution remained wider than in 1993, with a suggestion of a rise in the proportion of highly profitable firms (and this is after taking out outliers in the distribution).

So what did entry do in terms of market structure? This is determined by the number of new entrants, their size, and the subsequent expansion paths across firms. We look at three features of the structure: the composition of firms by ownership type, market shares, and measures of industry-level concentration.

The overall picture of substantial new firm entry in the early and mid-1990s reflects a surge in the numbers of Indian "stand-alone" companies. In our core sample stand-alones accounted for a 35 percent of total firms by 1993, but over 60 percent by 2007. However, this occurred within the context of the continued dominance of central government commercial companies and firms affiliated with business houses: in terms of the share of sales in BSE firms, there was some decline in the share of government companies, but a modest *rise* in the share of Indian business houses

(see Table 1; also Alfaro and Chari, 2009). Within business houses, the top 50 houses saw a more modest increase in numbers of firms, but maintained their share of sales—at just over a quarter. Whether the entrance of new stand-alone firms created a more competitive environment or whether the Indian business sector is essentially still dominated by government-owned firms and conglomerates with influence over market conditions (and government policies and regulation), is clearly an issue. We take this up in the econometric analysis.

TABLE 1. The Share of Sales across Ownership Type of BSE Firms, 1989–2008

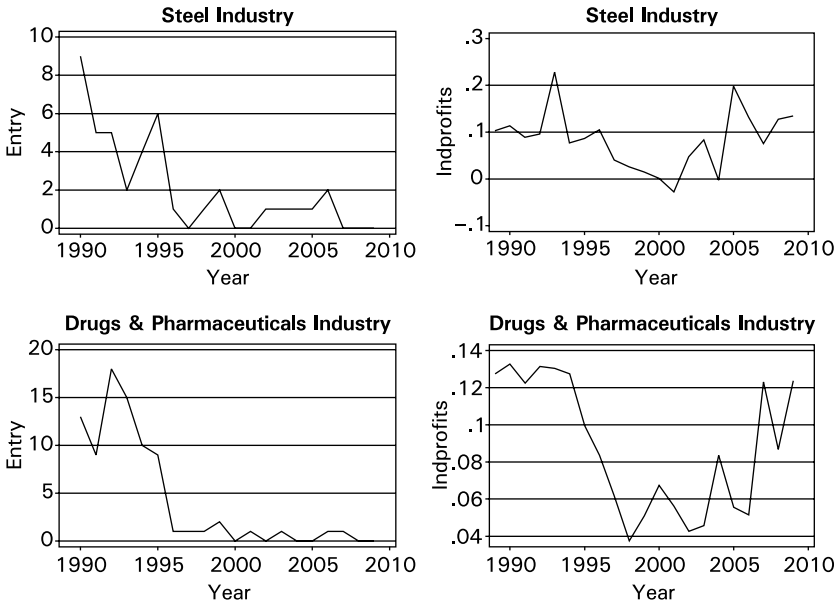
Ownership type	*1989*	*2000*	*2008*
Government commercial enterprises	44.6	39.4	36.9
Indian business houses	40.8	40.1	42.4
Indian private stand-alones	3.6	9.4	11.9
Foreign firms	9.3	9.5	7.4
NRI business houses	0.8	1.0	1.0

Source: Authors' calculations based on data from CMIE.

For the assessment of entry, market share, and concentration we turn to a sectoral analysis. The first striking result in the data is the consistency across the vast majority of industries of the pattern of substantial entry in the early to mid 1990s, followed by stability thereafter. We illustrate with two very different sectors: steel, a traditional industry with significant public presence, indeed central to Nehruvian industrial strategy, compared with pharmaceuticals, an iconic dynamic industry of the post-liberalization period. Yet, as Figure 7 shows, the dynamics of entry and the profit cycle is qualitatively very similar for both. Pharmaceuticals experienced a bigger fall in profitability than steel, but *also* had almost no entry into the BSE group after the mid-1990s, despite a major recovery in profit rates after the mid-2000s. This pattern is broadly repeated.

From an industry-level market structure perspective, we are interested in the consequences of entry for firm-level market shares and sectoral concentration. These are closely related, but can have different interpretations. An individual firm with a larger market share may earn higher profits because of greater market power or because of superior capabilities, often unobservable in the data. High sector-wide concentration can allow individual firms with large market shares to influence the market but can also support generalized excess profits in a sector. The extent of competition is also influenced by exposure to competition from imports, and it is an empirical question

FIGURE 7. Firm Entry and Profitability for the Steel and Drugs Industries



Source: Authors' calculations based on data from CMIE.

whether high market share and or levels of concentration provide the market power for anti-competitive behavior. In the econometric analysis we explore whether there are differences in results for manufacturing (essentially open to import competition) and services (that are not).

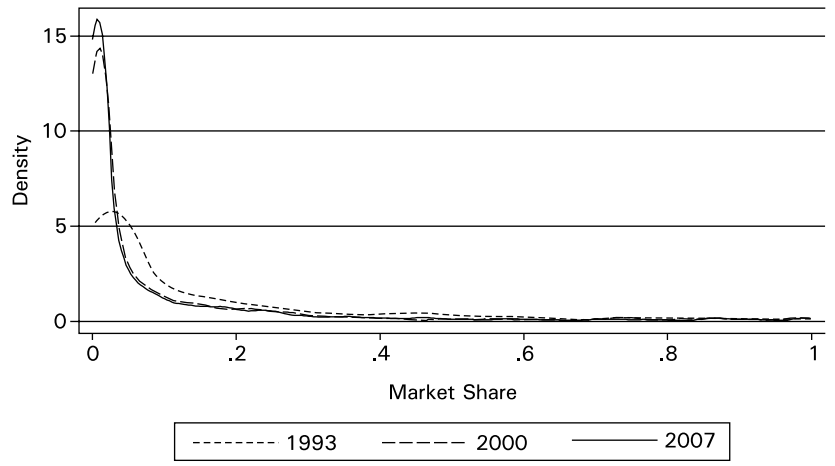
The quantitative analysis was undertaken for the core sample of firms with good data (as used for the econometric analysis). Market shares are calculated in terms of a firm's share of sales in its particular (five-digit) sector. This is an overestimate of true market share to the extent that firms outside the sample are also in the same sector, but is likely to be a good indicator of competition from the larger and more established firms. Sectoral concentration is proxied by the Herfindahl–Hirschman Index (HHI) for the five-digit sector in which the firm is recorded as operating. This again is calculated for firms in the database, so is an upper bound on the extent of concentration in the market.[3]

3. The Herfindahl–Hirschman index is given by the sum of the square of market shares, where the market shares are expressed as fractions, and ranges for close to zero (for a very large number of small firms) to one (for one monopolist producer); the index is often expressed in terms of the sum of percentage squares, in which case the range is from close to zero to 10,000.

Firm-level market shares are bunched at low levels, with a noticeable leftward shift in the density in the 2000s, compared with 1993, implying a larger proportion of individual firms have low shares (Figure 8). This is consistent with the entry of large numbers of stand-alone Indian firms noted above. Some firms do have high market shares, especially government-owned firms and those associated with larger business houses. However, these firms lost market shares over time: the median market share of central government-owned firms was 26 percent in 1993, falling to 17 percent by 2007. For firms affiliated to the top 50 business houses, the median market share fell from 13 percent to 8 percent in the same period, implying half the firms in this category had higher shares. These are not insignificant numbers. Overall, the picture is of a large number of firms with low market shares, but with a significant group with potentially influential market positions.

The measure of sectoral concentration also shows interesting shifts over time. The distribution is again skewed to lower levels of concentration, as would be expected from the market share data, and there was a leftward shift between 1993 and 2000, indicating a rising proportion of firms in sectors with lower levels of concentration. However, this was followed by a significant shift to higher levels of concentration by 2007. About a third of firms for which we have long time-series were in sectors that experienced significant reconcentration in the 2000s; the remainders were in sectors that

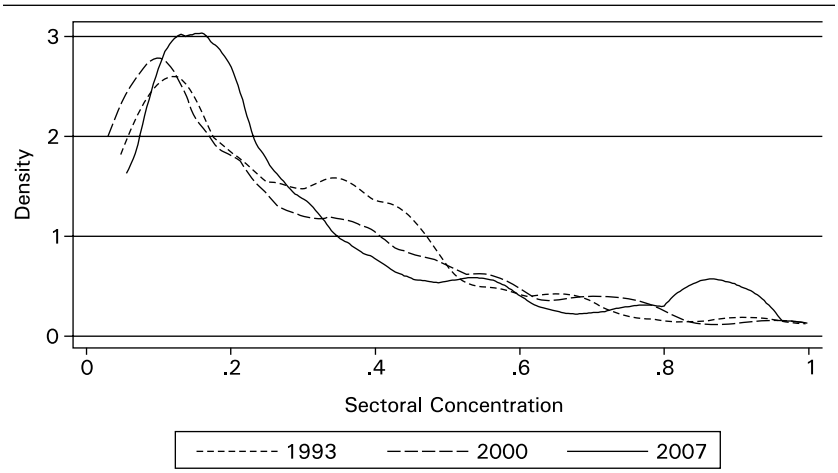
FIGURE 8. The Distribution of Market Shares in the BSE Sample of Firms, 1993–2007



Source: Authors' calculations based on data from CMIE.

had either stable or falling levels of concentration (see Figure 9). Note also that many firms are in sectors in which the measured concentration is quite significant: there is substantial density above 0.2. By way of comparison, the US Justice Department uses a cutoff of 0.1 (1,000 if the index is calculated in terms of the square of percentages, that goes from zero to a maximum of 10,000) as a critical cutoff for investigation of merger proposals. Measured levels may be distorted by the upward bias in the measured values noted above, but the changes over time are indicative of some action: this could be benign—if there is some efficient consolidation—or a potential source of market power.

FIGURE 9. The Distribution of Sectoral Concentration in the BSE Sample of Firms, 1993–2007

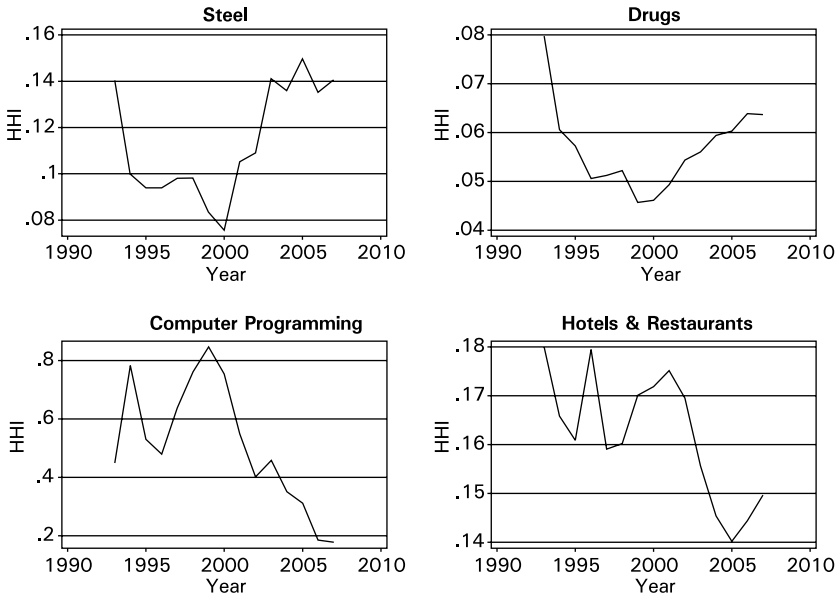


Source: Authors' calculations based on data from CMIE.

The pattern of increases in concentration in the 2000s is by no means uniform across sectors: some industries experience a marked reconcentration, while others undergo further reduction in the degree of concentration. Figure 10 illustrates for four industries: both steel and drugs/pharmaceuticals are cases of substantial reconcentration, while computer programming and hotels/restaurants became less concentrated in the 2000s.

Are there systematically different patterns between fast- and slow-growing firms? Table 2 provides summary measures for a partition of firms into three categories, by their average pace of real sales growth for the 1993–2007 period. Since there was extensive new entry, the period over which the

FIGURE 10. Patterns of Concentration for the Steel, Drugs, Computer Programming, and Hotel Industries, 1993–2007



Source: Authors' calculations based on data from CMIE.

TABLE 2. Patterns of Entry, Profitability, and Concentration for Fast and Slow-Growing Industries, 1993–2007

Category by growth rate	*Mean real sales (Rs. Crores)*			*Number of firm-observations*			*Average ROA (%)*			*Average HHI*		
	1993	2000	2007	1993	2000	2007	1993	2000	2007	1993	2000	2007
Fast	1.2	1.0	2.8	190	748	926	12.3	8.2	10.6	0.28	0.27	0.30
Medium	2.2	2.1	3.5	393	752	757	12.5	6.2	9.2	0.28	0.27	0.28
Slow	0.7	0.4	0.2	367	782	604	10.0	−0.9	2.7	0.30	0.29	0.35

Source: Authors' calculations based on data from CMIE.

averaging is undertaken varies across firms. This shows much greater firm entry amongst fast-growing firms, and an actual decline in numbers between 2000 and 2007 amongst slow-growing firms. This is aligned with patterns of profitability: fast-growing, experienced, a smaller decline in profitability between 1993 and 2000, from 12 percent to 8 percent, and then recovered to a 11 percent by 2007. Medium-growing firms experienced a similar pattern, but with somewhat lower profit rates in 2000–07. By contrast, slow-growing firms had a negative profit rate in 2000 and a meager 3 percent in 2007.

The mean size of fast-growing firms was half that of medium-sized firms in 1993, but only slightly below in 2007. Slow growers were much smaller. Finally, there is little difference in terms of sectoral concentration indices; though slow growers were in sectors with a larger increase between 2000 and 2007. This is overall a picture of substantial shifts reflecting the overall structure of profitability.

In sum, the Indian corporate sector represented in the BSE has experienced a marked long-term cycle in profitability over the past 20 years—with a substantial fall in profitability in the 1990s, but one that started a couple of years after the major liberalization of 1991, followed by a significant recovery from the early 2000s. This was broadly aligned with aggregate growth outcomes, but also with a pattern of substantial firm entry in the 1990s followed by quite notable stability in firm numbers in the 2000s. Structural patterns and shifts within the corporate sector can be read as evidence of change and dynamism or, alternatively, of continuity with potentially high levels of market power and entrenchment. Industry concentration fell in the late 1990s, but has shown some tendency to rise in the 2000s, albeit with highly varying experiences across sectors. Throughout, the traditionally dominant public sector firms and those from business houses maintained their visible presence, with the overall share of business houses actually rising slightly in the overall period, despite the surge in numbers of Indian stand-alone firms.

Empirical Strategy

To probe beneath the patterns presented in the previous section, and explore further the dynamics of this important phase of corporate development, we turn to an econometric analysis of the data on variation in profitability across firms.

For the core analysis we regress a firm's profit rate (π) on

- its lagged profit rate;
- firm characteristics—the contemporaneous growth of the firm's real sales (g), the share of the firm's sales in a five-digit industrial classification category (s), and lagged assets (a);
- industry characteristics—industry concentration measured by the Herfindahl–Hirschman Index (H) and the average profit rate of all other firms in that industry, following Bertrand et al., 2002 (πind); and

- macro characteristics—these are drawn from a principal components analysis of a number of macro and financial variables in which the first two principal components have a naturally appealing interpretation in terms of "overheating" (OH), that mainly reflects high inflation and interest rates, and an appreciated real exchange rate, and "sustained economic growth" (G), that mainly reflecting GDP growth and a benign global financial environment—see Table A-4.

The estimating equation is thus as follows, for firm i in industry j in time period t:

$$\pi_{ijt} = \alpha + \beta_1 \pi_{ijt(-1)} + \beta_2 s_{ijt} + \beta_3 g_{ijt} + \beta_4 a_{ijt(-1)} + \beta_5 H_{jt} + \beta_6 \pi ind_{jt} + \beta_7 OH_t + \beta_8 G_t + \varepsilon_{ijt}$$

This is a fairly standard specification, though an integrated analysis of structural and macroeconomic influences is not common. However, drawing inferences on the competitive process is not straightforward. For example, strong persistence of profitability may be read as evidence of weak competitive pressures to bid down above-normal profits—or weed out firms with relatively low profits. But it may also be indicative of underlying differences in efficiency across firms, associated with managerial or other sources of intra-firm performance, leading to sustained differences in profit rates. Similarly, a significant influence of market share could be an indicator of the role of market power, but the direction of causation could go the other way, with higher market share (and especially increases in market share) may also reflect superior firm-level performance.

Firm growth and lagged assets have more natural interpretations. While they do not directly speak to the issue of the competitiveness of the corporate sector, they are interesting in themselves and are introduced as control variables. Firm growth is a measure of performance, and we discussed earlier that there is some link between dynamism and profits, while lagged assets capture scale effects.

Amongst industry characteristics, we are particularly interested in any evidence of the influence of sectoral concentration, proxied by the HHI. While market share data may capture the market power of individual firms (with the interpretative caveats just noted), overall concentration could proxy the influence of sector-wide oligopolistic conditions—e.g., Tregenna (2009) finds such sector-wide oligopoly, rather than firm-specific market shares, to be the characteristic feature of the US financial industry.

The industry-wide profitability variable controls for specific supply and demand. However, a strong association with industry-wide profitability could either be due to competitive influences moving profits together, or to all benefiting from oligopolistic conditions (perhaps supplemented by strategic interactions between firms when numbers are low).

Finally, the descriptive patterns were suggestive of a relationship with macroeconomic conditions, but there could be different profit responses to overheating pressures (where there can be short-run opportunities to raise prices and increase profits) and long-term growth.

As discussed earlier, the main interpretative questions depend on whether any observed relationships with lagged profits, market share, industry-wide concentration, and industry-wide profitability are consequences of a market power or dynamic efficiency interpretation. We explore this through a strategy of analyzing the core profit equation over different horizons and, especially, through partitioning the firms into groups—small versus large, business house versus stand alone, more versus less efficient, manufacturing versus services—and examining comparative results across the partitions.

In addition to substantive issues of interpretation, there are important econometric questions that need to be handled. Control for firm-level heterogeneity can, in principle, be achieved through the use of firm fixed effects. However, where the lagged dependent variable is part of the specification, the fixed effects results are biased. There are two concerns. First, the coefficient on the lagged dependent variable will tend to be lower than the "actual," mismeasuring the degree of persistence. Second, as a consequence, the coefficients on the other variables will also be biased in a less well-specified manner. To deal with this concern, Generalized Methods of Moments (GMM) techniques may be used. However, recent analysis by Flannery and Hankins (2009) cautions that when there is second-order serial correlation of errors, as is the case in our data, GMM techniques can be seriously biased. Moreover, where there are gaps in the time series of an individual firm, as is common in firm-level data, and is the case in the Prowess data, GMM techniques are also inappropriate. Flannery and Hankins (2009) find that the so-called "Kiviet" correction, while also not perfect, performs much more consistently. Unlike the GMM approach, which uses instruments to deal with the fixed effects' bias, the Kiviet methodology directly measures the bias in the fixed effects' estimates and corrects for that bias. Our approach is to present the standard fixed effects results to motivate the discussion, but to rely primarily on the Kiviet correction for our findings.

Finally, as is customary in panel analysis of firm-level data, we "winsorize" the variables, in other words, we remove extreme values of variables to

minimize the effects of outliers. For the rate of profit itself, we drop the top and bottom 2½ percent of observations, given the pattern of extreme values at the two ends of the distribution. For all other variables we drop the top and bottom 1 percent of observations.

It is important to be clear what this analysis does and does not achieve. While we use a specification and econometric approach regarded as appropriate in the context and are, therefore, able to overcome a number of potential biases, we are unable to deal with issues of reverse causality. Thus, a firm's sales growth and market share could well be influenced by its profitability rather than the other way around, as is suggested by the way we present our results. Because it is not clear how the endogeneity problems can be resolved, the results we present should be treated as a refined descriptive analysis through partial correlations and associations.

Principal Findings

Table 3 reports the basic set of regressions on annual data for our full sample of BSE firms, covering the whole 15-year period. Fixed effect regressions are reported in columns (1) to (4), that sequentially add more variables, starting with a parsimonious specification and ending with all the variables used. Column (5) reports the Ordinary Least Squares (OLS) results. The core equation, utilizing the Kiviet correction is reported in column (6), with the full set of variables.

Note that the overall equation, including a blend of structural firm and industry-level factors and macroeconomic conditions, performs well, despite uncertainties over the quality of the underlying data, and the substantial rise in the number of firms in the period. Importantly, econometric theory says that the coefficient on the lagged dependent variable is overstated in the OLS specification, understated in the fixed-effects specification, and, hence, the coefficient in a valid Kiviet specification should fall between the two limits. It is reassuring that this is indeed the case.

The results indicated that the profit rate exhibits substantial persistence from year to year. Under the preferred Kiviet regression, after controlling for other factors, some 40 percent of the profit rate carries over to the next year.

The coefficient on the firm-level market share of industry sales is robustly positive and significant (though smaller in size for the OLS specification). It is important to be clear in what this result is saying. The fixed-effects and Kiviet regressions imply that an increase in market share relative to the firm's mean market share over the period is associated with an increase in

TABLE 3. Correlates of Corporate Profitability: Base Regressions, Annual Data, 1993–2007

	(1)	(2)	(3)	(4)	(5)	(6)
	Firm characteristics	*+Industry concentration*	*+Industry rate of return*	*+Macro factors*	*All variables*	*All variables*
Variables	*FE*	*FE*	*FE*	*FE*	*OLS*	*Kiviet*
Lagged profit rate	0.298***	0.297***	0.294***	0.298***	0.528***	0.403***
	[24.7]	[24.6]	[24.2]	[24.7]	[50.9]	[57.4]
Sales growth	0.061***	0.060***	0.060***	0.061***	0.071***	0.060***
	[25.8]	[25.6]	[25.5]	[26.0]	[32.0]	[33.0]
Market share	0.094***	0.097***	0.106***	0.111***	0.036***	0.096***
	[7.06]	[7.07]	[7.61]	[8.01]	[8.31]	[8.56]
Lagged assets	−0.018***	−0.018***	−0.019***	−0.020***	0.003***	−0.015***
	[−9.75]	[−9.79]	[−9.85]	[−10.8]	[7.25]	[−11.7]
Sector concentration		−0.018*	−0.021*	−0.018*	−0.006*	−0.013
		[−1.69]	[−1.96]	[−1.71]	[−1.67]	[−1.51]
Sector-wide profit rate			0.111***	0.144***	0.106***	0.131***
			[7.13]	[9.56]	[9.14]	[8.76]
"Overheating"				0.003***	−0.001	0.002***
				[4.99]	[−1.46]	[3.10]
"Economic growth"				0.009***	0.005***	0.007***
				[11.7]	[7.89]	[9.44]
Constant	0.028***	0.032***	0.019***	−0.009*	0.019***	
	[5.09]	[5.49]	[3.18]	[−1.90]	[12.1]	
Observations	26,477	26,477	26,477	26,477	26,477	26,477
R-squared	0.215	0.215	0.217	0.214	0.410	
Number of firms	3,096	3,096	3,096	3,096	3,096	3,096

Source: Authors' calculations from data reported in CMIE.

Notes: Robust *t*-statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the profit rate. This is, thus, a statement of changes "within" a firm. The fact that the OLS coefficient is lower implies that in the cross-section, a firm with a larger market share does not necessarily have a higher profit rate. Nevertheless, the question remains whether persistent profits and a positive association between *change* in the profit rate and market share reflect market power or differential firm efficiency. We explore this distinction in more detail below.

The coefficient on the sector concentration variable is insignificant in the Kiviet specification, and when (just) significant in other specifications it has a negative sign, implying higher measured concentration is associated with *lower* profitability.

The profit rate is robustly and positively associated with firm-level growth in sales—more dynamic firms are more profitable—whichever way the direction of causation goes. And firm-level profitability is also positively associated with the profitability of other firms in the industry.

A more intriguing finding is the negative relationship between the profit rate and lagged assets in the fixed effects and Kiviet specifications. Note that in the OLS specification, which also gives weight to the cross-sectional dimension, that coefficient is positive. And, indeed, the OLS specification mirrors the purely descriptive data that shows that larger Indian firms are, in general, significantly more profitable than smaller firms. What the results seem to be saying is that while historically larger firms have been more profitable, *increasing* a firm's profitability has not entailed increasing its assets. On the contrary, a more rational use of assets has helped raise the profit rate.[4]

Finally, profitability is positively associated with both the "overheating" and "economic growth" indices of macroeconomic conditions for this period. As we show below, higher profits during periods of relatively high inflation and interest rates was mainly a phenomenon of the early part of our sample. During those years, as Indian firms became less competitive abroad,

4. This finding is related to the observation that small and medium firms in India have traditionally operated at lower than optimal scales and this outcome was not just a matter of policies that reserved space for small firms (Banerjee and Duflo, 2005). The cross-sectional relationship between larger firms and higher profitability tends to support this view. However, our results caution that some of that observed cross-sectional relationship may have reflected strategic asset accumulation by large firms, who, by virtue of such strategic positioning, enjoyed high profit rates. Thus, large size was not necessarily an indicator of efficient operations in India. With increasing competition, more efficient deployment of assets has helped raise profit rates.

they were apparently able to exploit domestic shortages associated with the higher inflation. But an increasingly competitive and internationally open environment offset that effect over time. In contrast, growth and favorable international financial conditions were consistently associated with higher profit rates throughout the period.

The Persistence of Persistence?

To get further insights and explore the robustness of these results, we undertake a variety of alternative cuts in analyzing the data. As a next step we look at two time effects—any evidence of parameter changes over time, and the influence of averaging over longer intervals. How far we can go in these directions is limited by the fact that we are working with only 15 years of data. These are nevertheless helpful results, that support the overall robustness of the framework reported in the previous section. Where the results differ, they offer interesting insights.

First, are there changes over time, as we roll the sample forward from the 1990s to the 2000s? The descriptive figures presented earlier show that economic growth went through a decline and then a rise. There was also a big change in the entry patterns, with a surge of entry in the 1990s and stability in the 2000s, with associated shifts in market shares and industry concentration. The question is whether the responses to these variables also changed over time. We explore this by estimating the fixed-effects regression for the 1992–2003 period and then moving the sample one year ahead at a time, ending with the period 1996–2007 period (Table 4). Because the Kiviet estimation is computationally more demanding, we report those results only for the first and the last periods.

The results show a notable stability of results over time: in particular, the significance and size of coefficiencies on lagged profits, sales growth, market shares, industry-wide profitability and concentration all show little change. This is reassuring in light of the substantial entry of new firms between 1992 and 1996 period, leading to an effective doubling of the number of firms in the database. The only result of note relates to the "overheating" variable, which shifts from being highly positive and significant in the 1992–2003 period to being insignificant in the 1996–2007 period. The mix of indicators on which this is based—especially changes in inflation rates, interest rates, and the real exchange rate—were of falling significance in the shift from the 1990s and 2000s, probably reflecting the increasing importance of the 2000s boom on firm behavior. By contrast, the "economic growth"

TABLE 4. Profitability Correlates: Changes over Time, Annual Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fixed effects					*Kiviet*	
Variables	*1992–2003*	*1993–2004*	*1994–2005*	*1995–2006*	*1996–2007*	*1992–2003*	*1996–2007*
Lagged profit rate	0.275***	0.280***	0.289***	0.290***	0.274***	0.427***	0.411***
	[19.2]	[20.3]	[21.1]	[21.5]	[21.1]	[46.6]	[55.6]
Sales growth	0.061***	0.061***	0.059***	0.059***	0.056***	0.061***	0.058***
	[22.4]	[23.0]	[23.8]	[24.0]	[22.5]	[32.0]	[34.2]
Market share	0.128***	0.129***	0.130***	0.123***	0.117***	0.105***	0.095***
	[8.07]	[8.79]	[8.83]	[7.31]	[6.78]	[6.48]	[8.07]
Lagged assets	−0.019***	−0.019***	−0.020***	−0.023***	−0.026***	−0.016***	−0.018***
	[−7.16]	[−8.05]	[−8.03]	[−9.74]	[−10.6]	[−8.93]	[−10.8]
Sector concentration	−0.026*	−0.031***	−0.041***	−0.028**	−0.022*	−0.018	−0.017*
	[−1.88]	[−2.61]	[−3.43]	[−2.36]	[−1.82]	[−1.62]	[−1.80]
Sector-wide Profit rate	0.153***	0.150***	0.147***	0.143***	0.139***	0.132***	0.128***
	[8.25]	[8.77]	[8.73]	[8.63]	[8.32]	[6.63]	[6.77]
"Overheating"	0.005***	0.005***	0.004***	0.002***	0.002**	0.003***	0.001
	[5.21]	[7.02]	[5.53]	[3.32]	[2.52]	[3.00]	[0.93]
"Economic growth"	0.007***	0.007***	0.007***	0.008***	0.008***	0.006***	0.007***
	[8.40]	[9.69]	[9.67]	[10.6]	[9.93]	[6.80]	[6.96]
Constant	−0.008	−0.007	−0.006	−0.015***	−0.020***		
	[−1.40]	[−1.27]	[−1.15]	[−2.78]	[−3.43]		
Observations	17,730	19,918	21,203	22,248	22,881	17,730	22,881
R-squared	0.245	0.239	0.221	0.191	0.163		
Number of firms	2,850	2,941	3,013	3,049	3,057	2,850	3,057

Source: Authors' calculations based on data from CMIE.

Notes: Robust t-statistics in brackets; $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

variable—mainly reflecting economic growth and the international financial environment—remains highly significant and slightly rises in value. A speculative interpretation is that firms were doing less "profiteering" over time, in the sense of making use of episodes of overheating to extract more profits. Apart from this, the coefficient on industry concentration varies in significance level depending on the period, but is consistently negative.

Second, are results affected because they are based on annual data? This is explored by taking three- and four-year averages of the data (Table 5).[5] Here, the first finding of note is the substantial fall in the size of the coefficient

TABLE 5. Longer-run Profitability Dynamics

	(1)	*(2)*	*(3)*	*(4)*
	3-year averages:	*3-year averages:*	*4-year averages:*	*4-year averages:*
Variables	*FE*	*Kiviet*	*FE*	*Kiviet*
Lagged profit rate	0.009	0.293***	−0.12***	0.212***
	[0.38]	[18.1]	[−4.23]	[11.6]
Sales growth	0.079***	0.085***	0.094***	0.104***
	[12.8]	[21.9]	[11.4]	[20.3]
Market share	0.149***	0.114***	0.163***	0.122***
	[7.15]	[7.15]	[6.47]	[5.10]
Lagged assets	−0.037***	−0.037***	−0.035***	−0.037***
	[−11.2]	[−13.2]	[−9.73]	[−12.5]
Sector concentration	−0.038*	−0.023	−0.053**	−0.043*
	[−1.93]	[−1.34]	[−2.35]	[−1.84]
Sector-wide profit rate	0.177***	0.170***	0.156***	0.148***
	[5.56]	[5.80]	[3.81]	[3.57]
"Overheating"	0.004***	−0.004***	0.007***	−0.002
	[3.03]	[−4.06]	[5.30]	[−1.63]
"Economic growth"	0.022***	0.019***	0.014***	0.012***
	[9.54]	[7.93]	[8.91]	[6.66]
Constant	−0.027***		−0.010	
	[−3.16]		[−1.02]	
Observations	8,791	8,791	6,523	6,523
R-squared	0.205		0.241	
Number of firms	2,966	2,966	2,888	2,888

Source: Authors' calculations based on data from CMIE.
Notes: Robust *t*-statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Because the annual sample is 15 years long, the three-year averages give us five observations per firm. The four-year estimations have the first observation of three years length and the other two are averaged over four years.

on lagged profitability, from around 0.4 in the annual data to close to 0.2 in the four-year data. It remains, however, robustly significant in the Kiviet regression (though not in the fixed effects specification). There continues to be persistence over time, but its strength fades. In other words, while firms are able to maintain about 40 percent of their profit rates from one year to another, over longer periods, their ability to do so diminishes.

The coefficients on variables reflecting firm performance remain highly significant and rise substantially in value—this includes both firm-level sales growth and market share—while the association with profitability of other firms in the same industry also rises. The size of the negative relationship with lagged firm assets also rises, as does the negative relationship with industrial concentration. The coefficient on "overheating" turns negative (for three-year data) or insignificant (for four-year data) in these "longer-run" Kiviet regressions, suggesting that while overheating may briefly help exploit shortages, over a longer time span, associated gains for profits disappear. By contrast, the "economic growth" variable remains robustly significant and has a much larger effect than in the analysis from annual data.

Differentiating the Firms

In the previous section, we concluded that the persistence of profits tended to decay with time, indicating some tendency for super-normal profits to be competed away. In this section, we look at lagged profits and market shares by exploring various partitions of the data: business groups versus self-standing firms, by size classes of firms, by firms categorized by efficiency (measured as the sales-assets ratio of that firm in relation to other firms in that industry), the degree of industry concentration within which the firm operates, and by manufacturing or nonfinancial services sector (all other sectors have too few firms to be separately analyzed). The aim is to determine if there are systematic differences across these partitions to help resolve the conflicting interpretations of the lagged profits and market share variables remains. All estimations are based on the Kiviet correction with three-year data.

The first partition focuses on different categories of business houses in comparison with the rest of the sample that is dominated by free-standing firms. The business house is the dominant corporate form in terms of shares of sales and assets, with a long-standing view of its non-competitive tendencies (see, e.g., Bertrand et al., 2002). Business houses can either be a means of solving market failures, by, e.g., internalizing capital markets,

or of creating inefficiences through tunneling or greater influence.[6] It is possible that the aggregate results are being driven by the large number of self-standing firms. For this analysis we use the CMIE's classification of business houses into the "top fifty," "large houses other than the top fifty," and "all other."

The results (in Table 6), do not provide evidence for firms linked to business houses behaving differently from stand-alone firms. The top 50 business houses actually have a lower persistence coefficient than free-standing firms, while other large houses have a higher coefficient. The coefficient on market share is actually *higher* for free-standing firms. The result suggests that stand-alone firms need to increase their market share to advance their profitability. With respect to industry characteristics, the Herfindahl Index is again not robust—it is only significant, and negative, for "other business houses." The association with profitability of other firms in the same industry is highest

TABLE 6. Business Houses, Kiviet Estimation with Three-year Data

Variables	*(1)* *Top fifty*	*(2)* *Large houses other than top fifty*	*(3)* *All other business houses*	*(4)* *Non-business houses*
Lagged profit rate	0.218***	0.372***	0.244***	0.308***
	[4.01]	[6.38]	[6.18]	[14.9]
Sales growth	0.079***	0.092***	0.088***	0.084***
	[5.23]	[6.72]	[8.73]	[17.6]
Market share	0.096*	0.077**	0.100**	0.127***
	[1.78]	[2.24]	[2.42]	[4.90]
Lagged assets	−0.029***	−0.030***	−0.032***	−0.042***
	[−3.67]	[−4.14]	[−5.56]	[−12.2]
Sector concentration	−0.018	−0.016	−0.089**	−0.011
	[−0.37]	[−0.40]	[−2.20]	[−0.56]
Sector-wide profit rate	0.332***	0.263***	0.251***	0.116***
	[3.21]	[2.62]	[3.62]	[3.22]
"Overheating"	0.002	−0.009***	0.000	−0.006***
	[0.51]	[−2.85]	[0.081]	[−4.36]
"Economic growth"	0.013**	0.019***	0.010**	0.023***
	[2.20]	[3.02]	[2.03]	[8.48]
Observations	929	762	1,333	5,767
Number of firms	265	224	421	2,056

Source: Authors' calculations based on data from CMIE.
Notes: Statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[6] See Morck et al. (2005) for a review of the alternative channels of influence.

for the top 50 business houses. This might suggest that the largest business houses are operating in sectors that are amenable to oligopolistic behavior, allowing all firms to maintain high profit rates. But it could also be that those sectors have higher inherent profitability, making the information value of this result unclear. Finally on macro variables, notice that the overheating variable is either insignificant or negative whereas all categories of firms show a significant relation with "economic growth." For free-standing firms, "overheating" is actually bad for profits while "economic growth" brings particularly large dividends.

In general, then, while there are interesting suggestive differences, the profitability of business houses—including the largest business houses—behaves in a largely similar fashion to free-standing firms, with no evidence of greater capacity to use market power to get more profits.

Next we examine the difference between large and small firms, based on their real (inflation-adjusted) sales. Because real sales tended to grow in the later part of the sample period, we divided firms at the median in each year, classifying firms with sales above the median as "large." This, of course, means that the identity of the firm can change category over time. With these partitions there are some interesting differences (Table 7). There is in particular substantially more persistence of profits amongst larger firms. This might imply that larger firms have greater market dominance, which is reflected in their persistent profits.

To further explore this finding, we divided firms into "high" and "low" efficiency groups. The data available limits the nature of this classification. We take the sales-to-assets ratio of a firm *relative* to this ratio for its five-digit sector (to control for technological differences across sectors) as a metric of its relative efficiency. Again, in the partition "high efficiency" firms are those with relative efficiency above the median in a given year. It turns out that high efficiency firms have more persistent profits. Here, then, the pattern supports the view that is efficiency rather than market power that drives the persistence in profits. It turns out that there is considerable overlap between large and high-efficiency firms. To the extent that large firms have persistent profits, this could thus partly be due to higher efficiency.

Size and efficiency only makes a modest difference to the coefficient on market share, but there is a much larger association in sectors with *low* levels of concentration. This suggests that there is more scope to exhibit dynamism through increased market shares and higher profitability in low concentration sectors. The industry concentration variable itself is again not robust in value, though it is significant, and more negative, amongst larger firms and those in low concentration industries.

TABLE 7. Structural Differentiation, Kiviet Estimation with Three-year Data

	(1)	(2)	(3)	(4)	(5)	(6)
	Size		*Efficiency*		*Concentration*	
Variables	*Small*	*Large*	*Low*	*High*	*Low*	*High*
Lagged profit rate	0.240***	0.388***	0.251***	0.358***	0.314***	0.254***
	[10.7]	[18.0]	[8.64]	[18.0]	[12.7]	[13.7]
Sales growth	0.068***	0.120***	0.070***	0.113***	0.097***	0.070***
	[13.0]	[18.3]	[13.0]	[15.8]	[15.7]	[12.8]
Market share	0.094***	0.102***	0.123***	0.107***	0.346***	0.104***
	[2.86]	[4.37]	[4.28]	[4.21]	[5.24]	[4.74]
Lagged assets	−0.049***	−0.027***	−0.039***	−0.037***	−0.039***	−0.039***
	[−12.8]	[−7.72]	[−9.37]	[−10.6]	[−10.0]	[−9.74]
Sector concentration	−0.009	−0.040**	−0.008	−0.042	−0.112**	−0.008
	[−0.36]	[−1.97]	[−0.35]	[−1.52]	[−2.49]	[−0.42]
Sector-wide profit rate	0.074	0.272***	0.131***	0.204***	0.246***	0.133***
	[1.49]	[7.37]	[2.75]	[6.21]	[4.10]	[3.75]
"Overheating"	−0.003	−0.005***	−0.003	−0.006***	−0.006***	−0.003*
	[−1.59]	[−4.16]	[−1.57]	[−5.06]	[−3.20]	[−1.77]
"Economic growth"	0.028***	0.011***	0.023***	0.015***	0.019***	0.018***
	[7.83]	[4.92]	[6.24]	[5.27]	[5.37]	[6.76]
Observations	4,431	4,360	4,442	4,349	4,414	4,377
Number of firms	1,667	1,299	1,576	1,390	1,462	1,504

Source: Authors' calculations based on data from CMIE.

Notes: Robust t-statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

As with persistence, the relation with profitability of other firms in the same industry is much higher for large firms, for the more efficient firms and for those in less concentrated industries. Finally, "economic growth" affects all groups, but there is a larger coefficient for smaller firms and less efficient ones. By contrast, "overheating" has a stronger, and negative, relation with larger firms, more efficient firms, and those in low concentration industries.

Overall, there is no clear support in this data for the view that higher profitability is a function of greater market power. On the whole, we read this data to favor the view that higher profitability is a function of greater dynamism (through increases in market shares) and higher efficiency.

A final partition concerns potential differences between manufacturing firms and nonfinancial service sector firms. These two groups might be expected to exhibit different behavior since external competition mostly affects manufacturing (though some services, notably IT, are also traded). The services sector was a particularly dynamic source of growth during the period we investigate. We cross this partition with small and large firms, with results reported in Table 8. The sample size gets smaller here, especially for large, service sector firms, so results need to be interpreted with caution.

There is greater persistence for manufacturing firms. This is consistent with a more dynamic evolution of service sector firms. Larger firms again generally exhibit greater peristence than do smaller firms; but because of the overlap between size and relative efficiency, this is not very telling. The relation between market share and profitability is broadly similar for all partitions. Small service firms tend to have a marginally beneficial relationship with "overheating," suggesting they may operate in some instances as local monopolies. "Growth" is good for all categories of firms; however, for large service firms, there is a dominant relationship with the fortunes of the industry (profitability of other firms in the industry) that appears to overwhelm broader macro relationships.

Conclusion

This paper has undertaken what is essentially a structured empirical investigation of the relatively established part of India's corporate sector, listed on the BSE. Given the nature of the data, and the underlying challenges over identification, testing of sharply defined hypotheses was not possible. Nevertheless, the patterns are interesting and suggestive.

TABLE 8. Sectoral Differentiation, Kiviet Estimation with Three-year Data

	(1)	(2)	(3)	(4)
	Small firms		*Large firms*	
Variables	*Manufacturing*	*Non-financial services*	*Manufacturing*	*Non-financial services*
Lagged profit rate	0.325***	0.071	0.407***	0.282***
	[10.6]	[1.48]	[15.7]	[4.25]
Sales growth	0.094***	0.033***	0.120***	0.140***
	[12.2]	[3.28]	[15.8]	[7.43]
Market share	0.092**	0.120*	0.106***	0.108**
	[2.49]	[1.83]	[4.70]	[2.10]
Lagged assets	−0.063***	−0.027***	−0.030***	−0.017**
	[−9.44]	[−3.71]	[−8.17]	[−2.22]
Sector concentration	0.004	−0.037	−0.013	−0.105**
	[0.10]	[−1.07]	[−0.47]	[−2.28]
Sector-wide profit rate	0.044	0.072	0.209***	0.513***
	[0.77]	[0.84]	[4.37]	[3.83]
"Overheating"	−0.005**	0.007*	−0.006***	0.003
	[−2.25]	[1.85]	[−3.80]	[0.55]
"Economic growth"	0.025***	0.025***	0.012***	−0.004
	[5.32]	[3.05]	[4.64]	[−0.44]
Observations	2,871	1,065	3,720	425
Number of firms	986	433	1,077	152

Source: Authors' calculations based on data from CMIE.
Notes: Robust *t*-statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We interpret the findings to reveal a mixed, but largely positive, story for corporate expansion following the economic liberalization in the late 1980s and early 1990s. The corporate economy represented by the BSE firms looks more like an exemplar of dynamic, competitive capitalism than of concentrated market power and economic entrenchment, at least with respect to product markets. This is in spite of concerns raised by other authors over the continued importance of public sector ownership and of the business house organizational form—including specific evidence of tunneling in business houses. Problems of incentives and behavior in the public sector and in pyramidal groups may well exist, but there is not evidence that it is a driving overall patterns of profitability.

In particular, while firms experience substantial persistence from year to year, this is significantly reduced over a period of three or four years. And where profits do persist, they are in significant measure associated with relative efficiency. While our analysis does indeed provide support for a

robust, consistent relationship between *increases in* firm-level profitability and market shares, this is more a sign of dynamism than entrenchment. The fact that this relationship is similar for free-standing firms as well as established business houses, and for small as well as large firms, suggests that it is driven by the effect of better underlying firm performance, as opposed to the exertion of market power. There is no evidence of a profitability-increasing influence of measured industrial concentration, though we may be mismeasuring concentration by basing it only on firms in our BSE database.

However, the evidence is also consistent with contrary tendencies. First, the robust process of new entry seems to have stopped and, there may well have been some increase in industry concentration in the 2000s. Second, some part of profit persistence may reflect imperfections in domains outside product market structure: good candidates for such imperfections lie in the markets for corporate control, finance, and the management of talent. Third, there continues to be widespread variation in levels of efficiency in Indian corporate production processes, as found in other research (Hsieh and Klenow, 2009). Some firms, however, have been able to exploit this variation, through more efficient use of their assets and associated improvements in profitability.

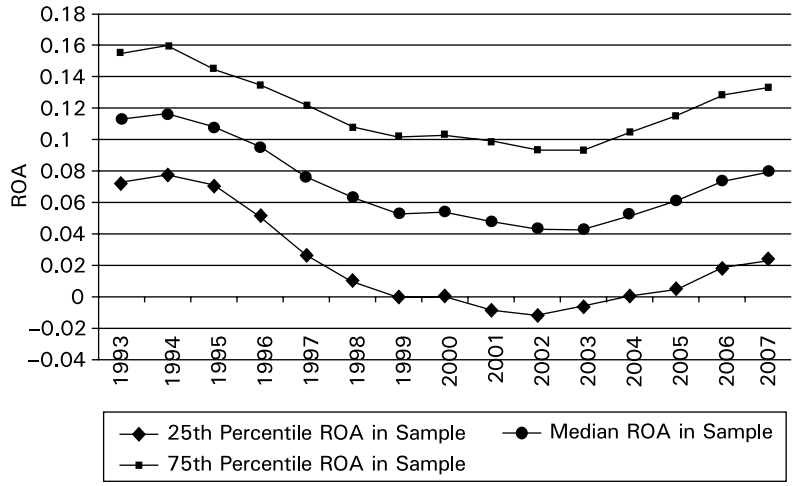
More speculatively, the coexistence of indicators of competitive dynamics, on the one hand, with limited entry, continued dominance of business houses and at least some profit persistence on the other, could be consistent with Schumpeterian processes, in which positions of advantage are channeled into creative destruction through new products and activities. This paper, however, does no more than recommend such issues for further research.

Finally, an econometric study such as this cannot identify state–corporate links between key firms and players that may have been influential in shaping profits, another worthy topic for future research. Thus, while this paper has positive news on capitalism in India, it does not imply that all is well. The striking dynamism in corporate profits and asset formation in this period contrasts with a surely slower pace of change in the functioning of the state. How these differential speeds will eventually interact may well fashion the next phase of corporate evolution in India.

APPENDICES

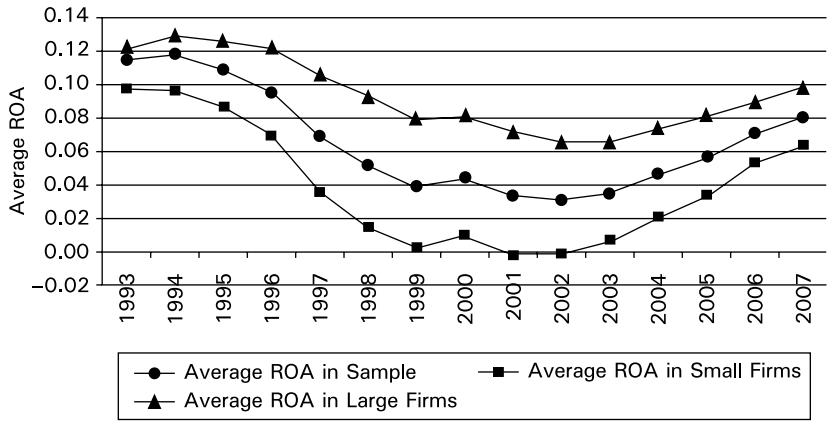
Appendix A

FIGURE A-1. The Evolution of Profitability across the Distribution



Source: Authors' calculations based on data from CMIE.

FIGURE A-2. The Evolution of Profitability by Firm Size



Source: Authors' calculations based on data from CMIE.

Note: "Small" and "large" are based on simply partition of the number of firms in the sample into two groups of equal numbers.

TABLE A-1. Descriptive Data from the Prowess Database

	Number of Firms				*Median Gross Real Sales*			*Median Total Real Assets*						
Year	*Firms in sample*	*All BSE firms*	*BSE firms with profit data*	*Firms in entire database with profit data*	*Firms in sample*	*Non-banking services BSE firms with profit data*	*Firms in entire database with profit data*	*Firms in sample*	*Non-banking services BSE firms with profit data*	*Firms in entire database with profit data*	*Share of BSE firms in TOTAL sales (%)*	*Share of BSE firms in TOTAL assets (%)*	*Share of sample in sales of all non-banking BSE firms sales with profit data (%)*	*Share of sample in assets of all non-banking BSE firms BSE firms with profit data (%)*
1993	950	1884	1,526	3,829	63.7	25.6	25.6	62.1	22.8	30.8	69.7	70.9	65.7%	79.8%
1994	1,200	2636	2,126	5,166	50.9	20.1	17.3	55.2	18.9	24.8	70.9	69.1	62.5%	79.3%
1995	1,628	3482	2,798	6,704	41.4	18.1	11.2	46.3	17.3	20.9	72.3	70.6	67.1%	80.0%
1996	2,031	3751	3,006	7,175	33.2	20.6	10.2	36.7	18.8	21.2	72.3	70.2	67.9%	79.3%
1997	2,111	3754	3,002	6,963	30.2	21.0	9.9	33.6	20.1	22.1	73.2	69.9	67.1%	81.1%
1998	2,153	3774	3,035	7,318	28.1	22.2	9.6	33.1	21.4	20.8	72.0	69.2	63.3%	80.4%
1999	2,227	3859	3,101	8,217	26.9	21.2	9.3	33.0	22.1	19.4	70.5	67.9	64.8%	80.5%
2000	2,282	3811	3,030	8,494	28.4	22.6	10.2	34.6	25.1	19.9	70.8	68.2	71.3%	81.2%
2001	2,296	3788	3,006	8,746	27.5	23.8	9.3	34.8	26.0	19.1	67.0	65.8	77.6%	85.0%
2002	2,326	4075	3,235	9,738	25.9	22.4	6.2	33.7	22.9	16.3	65.1	67.3	71.6%	84.6%
2003	2,365	4080	3,217	12,295	25.5	24.4	3.6	32.3	23.7	12.5	64.8	66.0	73.6%	85.0%
2004	2,363	4025	3,171	13,930	26.7	26.9	1.8	34.0	26.6	9.4	62.6	64.9	75.6%	88.1%
2005	2,340	4059	3,177	13,847	30.4	32.1	1.3	35.8	28.1	8.6	65.9	67.5	81.0%	88.6%
2006	2,336	4017	3,122	12,714	33.2	37.9	1.4	40.4	33.8	10.4	68.1	68.2	82.4%	86.0%
2007	2,287	3864	2,997	11,458	41.6	49.7	1.5	49.5	43.3	13.2	72.3	70.9	82.6%	85.9%

Note: Number of firms for All BSE Firms refers to the count of firms for which CMIE has Financial Data available.

TABLE A-2. Selected Characteristics of Firms in the BSE Sample, by Ownership Category

	1993					*2000*					*2007*				
Ownership	*Number of firms*	*Median ROA*	*Median efficiency*	*Median market share*	*Median HHI*	*Number of firms*	*Median ROA*	*Median efficiency*	*Median market share*	*Median HHI*	*Number of firms*	*Median ROA*	*Median efficiency*	*Median market share*	*Median HHI*
Central Government															
Commercial Enterprises	31	7.6%	0.86	0.26	0.40	37	8.4%	1.16	0.20	0.41	41	11.2%	1.05	0.17	0.41
Top Fifty Business Houses	183	10.9%	1.09	0.13	0.21	223	7.3%	0.93	0.09	0.21	222	8.7%	0.96	0.08	0.20
Large Business Houses	137	12.6%	1.12	0.08	0.24	176	7.4%	0.95	0.06	0.17	179	9.3%	1.06	0.04	0.19
Other Business Houses	179	11.5%	1.10	0.03	0.21	339	6.8%	0.94	0.02	0.18	321	7.9%	0.92	0.02	0.20
Private (Indian) Stand Alones	327	10.8%	1.17	0.03	0.27	1377	4.3%	0.93	0.01	0.19	1,395	7.0%	0.99	0.01	0.21
Private (Foreign) Stand Alones	59	14.2%	1.18	0.12	0.26	81	10.7%	1.19	0.10	0.28	88	12.6%	1.06	0.07	0.22
Foreign Business Houses	13	9.2%	0.86	0.34	0.41	17	13.6%	1.44	0.20	0.28	16	20.1%	1.07	0.12	0.23
NRI Business Houses	10	6.9%	0.69	0.03	0.20	14	3.8%	0.66	0.05	0.21	11	8.7%	0.77	0.05	0.15

Source: Authors' calculations based on data from CMIE.

TABLE A-3. Sectoral Distribution of Firms in the BSE Sample

	Year														
Industry	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Abrasives	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Air transport services			1	2	2	1	2	2	2	3	3	4	3	2	4
Air-conditioners & refrigerators		1	3	3	3	3	3	2	2	4	4	3	2	2	2
Alkalies	7	7	7	7	7	7	6	6	5	5	6	6	7	7	7
Aluminium & aluminium products	8	8	11	11	12	13	14	15	13	13	12	12	13	13	13
Animation content provider		1	3	3	3	2	2	3	3	4	4	3	3	4	3
Automobile ancillaries	52	59	67	74	75	73	76	74	78	74	73	75	77	75	75
Bakery products		1	2	2	2	2	2	2	2	2	2	2	2	2	2
Beer & alcohol	9	8	9	13	12	13	15	14	16	17	16	15	17	17	17
Books & cards	2	1	3	3	5	5	7	9	10	8	8	6	6	7	6
Brokers			1	3	2		1	4	5	4	4	2	4	2	3
Business consultancy	2	4	6	7	8	10	10	10	11	11	13	13	13	13	15
Castings & forgings	9	8	10	14	15	15	16	18	15	16	15	15	17	18	16
Cement	26	28	31	33	33	29	30	32	33	35	33	31	34	35	31
Ceramic tiles	8	9	8	9	10	9	8	10	11	12	12	12	12	13	13
Cloth	15	23	26	34	33	34	33	33	35	32	27	36	38	38	40
Coal & lignite			3	6	7	6	3	5	5	5	7	5	5	5	3
Cocoa products & confectionery	2	3	2	3	4	4	4	4	4	3	3	3	3	4	4
Commercial complexes	4	2	3	5	7	7	8	11	12	12	14	13	15	16	19
Commercial vehicles	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Communication equipment	3	4	6	8	8	7	6	9	9	8	9	8	6	6	7
Computer software	7	12	29	46	49	60	75	107	140	145	151	157	160	153	145
Computers, peripherals & storage devices	1	3	8	9	10	9	8	11	14	14	14	13	13	13	13
Construction equipment	9	8	8	11	11	10	10	11	9	9	10	9	9	9	9

(*Table A.3 continued*)

(*Table A.3 continued*)

	Year														
Industry	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Consumer electronics	4	6	7	8	8	8	8	7	7	7	6	7	8	8	8
Copper & copper products	3	4	5	5	6	5	6	6	5	6	7	6	7	8	8
Cosmetics, toiletries, soaps & detergent	3	4	7	8	10	12	12	12	14	12	12	11	11	11	11
Cotton & blended yarn	37	45	63	80	81	83	82	85	79	79	73	73	73	72	72
Courier services		1	2	2	2		1	2	2		1				
Crude oil & natural gas	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3
Dairy products	3	6	12	17	19	18	16	13	13	13	13	12	13	15	13
Diversified	24	23	24	25	24	25	26	23	23	25	25	24	23	24	22
Domestic electrical appliances	5	9	12	14	14	11	10	11	11	11	12	12	12	9	7
Drugs & pharmaceuticals	36	51	76	105	109	109	114	115	118	123	120	120	122	122	118
Dry cells	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Dyes & pigments	11	12	17	20	21	24	24	26	23	22	21	20	22	25	24
Electricity generation	3	3	3	3	3	3	3	3	4	5	6	6	7	7	7
Exhibition of films							1	1	1	1	1	3	3	3	3
Fertilisers	14	21	24	24	22	21	21	23	20	20	22	20	21	21	18
Financial institutions	1	1				1	1	1	2	1	1	2	2	2	2
Floriculture		1	2	3	6	9	9	8	7	6	6	5	6	7	6
Footwear	3	4	8	9	12	13	14	12	9	10	10	9	8	8	8
Gems & jewellery	5	7	14	24	23	21	23	21	22	22	24	23	24	24	23
General purpose machinery	18	20	20	22	22	21	22	24	22	22	23	20	20	22	22
Generators, transformers & switchgears	15	17	24	27	27	28	27	27	25	26	27	26	23	24	26
Glass & glassware	8	9	10	12	12	12	11	13	14	15	12	13	14	14	14
Granite	2	6	14	20	21	22	20	19	18	18	17	16	17	17	14
Health services	3	5	13	15	15	17	16	17	19	16	16	18	19	18	18
Hotels & restaurants	12	20	23	31	31	35	35	32	36	39	34	34	36	37	36
Housing construction	10	12	18	27	30	32	34	34	33	35	37	38	35	34	30

Housing finance services									1	2	2	4	5	4	5
ITES			1	2	2	2	3	6	6	8	9	9	7	6	8
Industrial construction	11	10	14	16	16	17	16	19	21	19	21	21	20	20	20
Industrial machinery	16	18	24	24	26	28	28	29	28	27	28	26	25	26	25
Infrastructural construction	7	10	11	12	13	12	15	16	17	18	20	20	18	19	22
Inorganic chemicals	10	9	13	22	23	21	20	19	20	20	20	21	20	20	19
LNG storage & distribution	2	2	2	2	2	2	2	2	3	4	4	4	4	5	5
Lubricants, etc.	7	6	8	10	8	8	8	9	7	9	9	9	8	7	7
Machine tools	11	12	13	15	15	15	16	16	14	13	13	11	11	12	12
Marine foods	2	8	9	11	12	13	13	13	14	11	9	9	6	7	5
Media-broadcasting							1	2	4	5	7	9	9	9	9
Media-content				1	2	2	2	4	7	7	10	12	13	13	13
Media-print		1	2	2	2	3	3	4	5	5	5	5	4	4	4
Metal products	22	26	37	43	41	41	38	37	39	41	38	34	35	35	36
Milling products		1	3	3	3	2		1	2	3	2	1	2	2	2
Minerals	2	4	3	5	7	7	8	8	7	8	7	8	9	7	7
Misc. electrical machinery	11	13	15	18	18	17	17	16	14	16	16	16	16	15	14
Misc. manufactured articles	2	3	6	11	9	9	11	10	6	8	8	8	6	7	6
Non-banking financial cos. (NBFCs)	6	10	10	15	12	13	11	12	18	27	26	29	27	27	29
Organic chemicals	22	27	42	46	47	48	48	43	44	49	45	47	43	42	41
Other agricultural products	1	3	9	16	19	19	22	17	18	18	17	18	18	21	21
Other chemicals	26	27	30	34	36	38	40	43	41	40	41	40	40	40	39
Other construction & allied activities	5	4	9	8	10	12	11	11	12	12	13	14	15	15	13
Other electronics	17	26	36	35	40	43	46	45	43	43	42	40	39	39	35
Other financial services	10	11	17	18	13	20	29	26	38	46	69	74	64	66	70
Other industrial machinery	2	2	2	4	2	3	4	5	3	3	4	4	4	4	4
Other leather products	1	1	2	4	4	5	5	5	6	6	6	5	5	5	5
Other misc services	2	4	3	6	8	11	10	9	9	11	9	11	12	11	10
Other non-ferrous metals	6	7	7	8	8	8	8	8	8	7	6	7	8	7	6

(*Table A.3 continued*)

(*Table A.3 continued*)

Industry	*Year*														
	1993	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*
Other non-metallic mineral products	3	5	6	6	6	6	6	6	4	4	4	4	4	4	4
Other recreational services		1	2	5	3	3	5	4	5	6	4	6	7	7	7
Other storage & distribution	3	3	4	7	8	8	9	7	5	5	5	6	6	6	6
Other textiles	13	18	28	39	40	43	48	44	45	40	41	40	36	37	36
Other transports equipment				1	2		1	3	2		1	2	2	2	2
Paints & varnishes	8	7	7	9	9	9	9	8	8	9	9	9	8	8	8
Paper	17	16	20	29	33	34	32	32	32	31	28	31	30	28	28
Paper products	3	5	5	8	5	5	8	6	1	2	5	5	4	3	4
Passenger cars & multi utility vehicles	3	3	3	3	4	3	3	3	3	3	2	2		1	2
Pesticides	12	16	15	18	19	21	22	22	19	19	20	21	20	19	18
Pig iron		1	2	4	4	3	3	3	3	3	4	4	4	4	4
Plastic films	8	9	12	13	14	13	15	15	15	16	16	14	14	14	14
Plastic packaging goods	11	19	32	41	41	43	44	46	46	47	48	45	44	44	37
Plastic tubes & sheets, other products	16	24	37	55	61	56	58	64	60	57	58	51	54	52	50
Polymers	8	9	12	14	12	13	14	17	19	19	17	16	14	15	15
Poultry & meat products			1	2	2	1	3	4	2	3	4	1	1	2	2
Prime movers	4	5	5	5	5	5	4	4	4	4	5	5	5	5	5
Processed/packaged foods	3	6	8	11	7	8	10	11	13	5	7	11	11	11	10
Production, distribution & exhibition of					1	2	2	3	4	5	6	7	7	7	6
Readymade garments	5	6	12	16	22	24	21	21	22	21	24	26	25	24	24
Refinery	7	7	7	7	8	8	8	8	8	7	7	8	8	8	8
Refractories	7	8	8	8	7	7	7	7	7	8	8	9	7	7	8
Retail trading									1	2	2		1		
Road transport services		1	2	3	4	3	3	4	4	4	4	4	4	4	4
Rubber & rubber products	5	9	14	18	15	17	18	17	17	16	15	15	15	15	14
Securities and stock traders	4	3	5	7	9	9	11	11	15	25	25	29	26	27	35

Shipping transport infrastructure services	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Shipping transport services	5	7	8	7	6	7	8	8	8	8	7	7	7	7	7
Sponge iron	4	5	5	5	6	6	5	5	3	4	6	6	7	7	6
Starches			2	2		1	2	2	2	2	2	2	2	2	2
Steel	30	38	56	70	68	64	67	69	66	58	64	67	67	70	64
Steel tubes & pipes	11	15	19	22	22	20	20	21	20	18	19	18	17	17	15
Storage batteries	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sugar	19	20	23	23	26	30	32	31	31	33	31	33	32	31	32
Synthetic textiles	27	32	37	46	45	47	49	46	45	46	42	41	40	40	40
Tea	11	11	16	19	19	19	20	19	18	18	17	18	19	17	18
Telecommunication services				1	3	4	5	5	6	7	9	11	11	10	9
Textile processing	15	27	35	43	40	38	38	38	32	36	34	31	30	31	28
Tobacco products	3	3	5	5	5	7	7	7	6	6	7	7	6	6	6
Tractors	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3
Trading	36	54	91	135	161	165	164	158	142	143	157	150	143	137	136
Transport logistics services	2	4	7	7	8	8	9	11	11	11	11	11	11	11	11
Two & three wheelers	5	6	6	7	8	8	8	8	8	8	7	6	5	5	7
Tyres & tubes	11	14	15	16	15	15	16	16	16	13	13	14	14	13	13
Vegetable oils & products	21	25	42	50	54	51	50	48	48	46	42	42	45	43	42
Wires & cables	7	11	13	17	21	22	23	27	24	22	25	22	20	23	21
Wood	1	5	8	9	9	9	9	10	9	9	10	9	9	10	9
Total	950	1,200	1,628	2,031	2,111	2,153	2,227	2,282	2,296	2,326	2,365	2,363	2,340	2,336	2,287

Source: Authors' calculations based on data from CMIE.

TABLE A-4. Principal Components Analysis: Correlation of First Two Principal Components with Underlying Variables

	pca	*pcb*	*Inflation*	*Real effective exchange rate*	*GDP growth*	*Bank rate*	*Yield on government securities*
First principal component (pca/"overheating")	1.00						
Second principal component (pcb/"growth")	0.16	1.00					
Inflation	0.68	0.48	1.00				
Real effective exchange rate	0.95	0.28	0.59	1.00			
GDP growth	−0.52	0.74	−0.07	−0.37	1.00		
Bank rate	0.91	0.42	0.59	0.91	−0.26	1.00	
Yield on government securities (short term)	0.91	0.08	0.48	0.88	−0.48	0.79	1.00

Source: Authors' calculations based on data from CMIE.

TABLE A-5. Cross-sectional Relationships

Variables	*(1)* *All*	*(2)* *Top-fifty Indian business houses*	*(3)* *Large Indian business houses*	*(4)* *Other business houses*	*(5)* *Small firms*	*(6)* *Large firms*
Sales growth (mean)	0.075*** [40.3]	0.090*** [12.9]	0.093*** [12.6]	0.092*** [18.9]	0.062*** [26.6]	0.102*** [33.2]
Market share (mean)	0.068*** [15.6]	0.090*** [7.65]	0.099*** [7.87]	0.075*** [6.87]	0.066*** [8.39]	0.076*** [14.8]
Lagged assets (mean)	0.011*** [22.8]	−0.003** [−2.13]	0.001 [0.50]	0.005*** [3.39]	0.011*** [11.7]	−0.002*** [−3.28]
Sectoral concentration (mean)	−0.024*** [−7.19]	−0.065*** [−6.24]	−0.043*** [−3.57]	−0.055*** [−5.65]	0.002 [0.42]	−0.048*** [−9.30]
Sector-wide profitability (mean)	0.271*** [22.0]	0.291*** [7.46]	0.563*** [13.4]	0.259*** [8.02]	0.204*** [11.9]	0.348*** [21.3]
Foreign firms	0.029*** [7.96]				−0.021** [−2.54]	0.036*** [10.5]
Foreign business houses	0.024*** [3.04]				0.014 [0.60]	0.030*** [4.05]
Joint-Sector	0.000 [−0.025]				−0.017 [−0.79]	0.005 [0.57]
Public Sector	−0.018*** [−3.47]				−0.003 [−0.20]	0.000 [−0.083]
Constant	0.054*** [30.6]	0.055*** [11.3]	0.028*** [5.64]	0.055*** [12.8]	0.045*** [13.0]	0.050*** [24.8]
Observations	12,253	1,212	997	1,792	6,520	5,733
R-squared	0.260	0.217	0.320	0.253	0.165	0.276

Source: Authors' calculations based on data from CMIE.

Notes: t-statistics in brackets; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

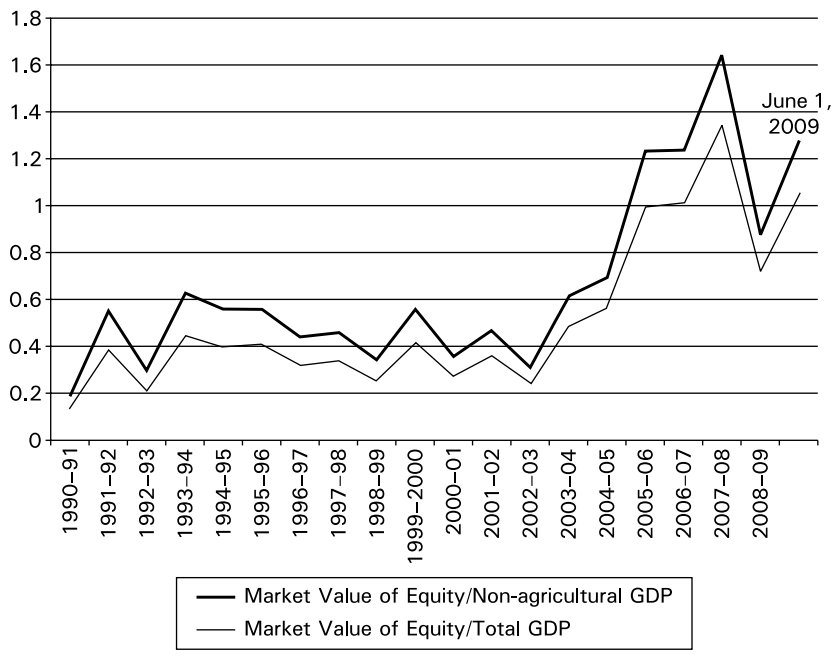
Comments and Discussion

Rajnish Mehra: I thank John Donaldson for his insightful comments. I am grateful to the participants of the India Policy Forum Conference for a stimulating discussion.

Introduction

I enjoyed reading this thought-provoking paper. The authors analyze the sources and distribution of corporate profits in India during the post liberalization period—a period characterized by a sharp increase in Indian Equity Valuations relative to GDP (Figure 1).

FIGURE 1. Market Value of Equity as a Share of GDP



Source: Mehra (2010).

In particular, they aim to distinguish between two competing hypotheses regarding to sources of economic rents:

1. Innovation due to increased competition resulting from the removal of entry barriers
2. Excessive market power resulting from economic entrenchment.

The authors provide evidence, while not conclusive, which suggests the success of the Indian corporate sector was largely as a result of increased competition rather than market power of the incumbents. My main concern with the paper is that it is a-theoretical, in that the authors do not provide a model to address the issues they raise in the paper.

I want to use this discussion to expand on some of the issues raised in the paper and provide a complementary perspective using stock market data that supports the conclusions reached in the paper.

The use of accounting profits as a proxy for economic rents may be misleading for a number of reasons including:

1. Differential tax treatment of tangible and intangible investments.
2. Part of the profits is just a return on capital. Hence, a plot of ROA (such as in Figure 1 in the paper), in the absence of data on the cost of capital, provides an incomplete picture of a firm's profitability.

I feel that a statistic such as the price earnings ratio is a better indicator of economic rents than the ROA since it incorporates three key variables:

1. ROA
2. The cost of capital
3. The amount of investment

Price Earnings Ratio as an Indicator of Economic Rents

To see that the price earnings ratio of a firm is a measure of economic rents, consider a stylized accounting statement for a firm.

Let

R_t be the firm's receipts from operations at time t;
W_t be the wages and other outlays at time t;
and I_t be the gross tangible investment at time t.

The market value of this stylized firm is:

$$V_0 = \sum_{t=1}^{\infty} \frac{E_t - I_t}{(1+r)^t} \tag{1}$$

where $E_t = R_t - W_t$ is the net operating cash flow.

Suppose that the investment I_t made at the beginning of any period t generates a uniform stream of earnings at the rate of r_t^* per period. We can view r_t^* as the average rate of return on the total investment budget I_t. (This corresponds to ROA in the paper.)

That is, we model the relation between current investment and future earnings as:

$$E_2 = E_1 + r_1^* I_1$$

or in general:

$$E_t = E_1 + \sum_{s=1}^{t-1} r_s^* I_s \quad t = 1, 2 \ldots$$

Substituting for E_t in the valuation equation of the firm (Equation 1) we get:

$$V_0 = \sum_{t=1}^{\infty} \frac{\left(E_1 + \sum_{s=1}^{t-1} r_s^* I_s \right) - I_t}{(1+r)^t}$$

This can be simplified to give:

$$V_0 = \frac{E_1}{r} + \sum_{t=1}^{\infty} I_t \left(\frac{r_t^* - r}{r} \right) \frac{1}{(1+r)^t} \tag{2}$$

or,

$$V_0 = \frac{E_1}{r} + \text{Present Value of Growth Opportunities}$$

Hence the price earnings ratio is:

$$P/E = \frac{1}{r} + C$$

It is clear from (2) that a high P/E is not simply a consequence of the fact that assets and earnings are expected to grow in the future. It is also necessary that the returns on the additional assets acquired by the firm (r^*) be greater than the cost of capital (r), i.e., the new investments must have a positive net present value (NPV). *A high P/E ratio is then an indicator of growth opportunities and economic rents*.

Distribution of Economic Rents Post 1990

Let us use the analysis above to examine how economic rents were distributed post 1990. To answer this question we split the firms listed on the BSE into two groups:

- Those that were incorporated before 1990
- Those that were incorporated after 1990

and examine the ROA and P/E ratios of the two groups.

TABLE 1. Mean ROA and Price-earning Ratios Conditional on Date of Incorporation

1990–2009	*Incorporated pre 1990*	*Incorporated post 1990*
Mean ROA	0.26	0.39
Mean P/E	17.99	45.77
Mean number of firms	2,307	1,104

Source: PROWESS database.

The mean price earnings ratio and ROA for the period 1990–2009 are reported in Table 1. Both means are substantially higher for firms incorporated post 1990 as compared to those incorporated before the reforms in 1990. This is consistent with the evidence in the paper, indeed provides orthogonal evidence that a large component of the rents *did not accrue* to the incumbents due to excessive market power. To the contrary, the evidence is consistent with growth due to innovation resulting in new patents and establishing new markets.

Quibbles:

- The threat of entry may be as potent a force in changing the incentives and behavior of existing firms as entry itself.
- Restricting the study to the BSE is likely to understate the number of new entrants as many new firms are unlikely to be listed on the BSE.

In summary, the authors make an important observation about the sources of corporate value in India. The orthogonal analysis presented in this discussion supports their conclusion.

Basanta Pradhan: This is an extremely interesting paper to me as it addresses an important issue in regard to the behavior of firms in India. Though the paper does not build any explicit theoretical model, the firm-level analysis has been made more interesting by incorporating macro variables. I also agree that the Kiviet estimation method is appropriate for this type of analysis.

However, the paper does not succeed in providing an answer in a definite/decisive manner to the very interesting and useful question it raises. This is understandable. Across sectors, it is difficult to draw conclusions for India. Profits in all the sectors in the Indian economy are not driven by the same set of variables. For some sectors it may be the market, in others it may be rent-seeking, and in some it could be both. So for India, for this period, a disaggregated analysis could have made a better approach. A conclusion covering firms in all sectors can at best lead to only speculative conclusions, as this paper does.

As appropriate, the paper does partition the firms into various categories. However, some further partitioning could have provided a better conclusion. Public sector firms and the rest is one. It is even more interesting to separate the firms which mostly depend upon the government contracts, and the ones that need a lot of government approvals from the rest. For example, many firms in sectors like mining, real estate, and telecom are under investigation for manipulating rules and procedures. Partitioning based on this principle could have helped to draw conclusions on involving corruption and rent-seeking. In the process, the answers to the principal question would have been sharper.

The key thing that this paper wants to address is that they are looking at two hypotheses which are orthogonal to each other. Whether Indian firms have come under increased competition after the liberalization, which started in mid-1980s, both internal and external, or are still their profits depend upon the economic entrenchment. They argue that the persistence of profits in Indian corporate sector was largely a result of innovations and improvements at the firm level under increased competition. However, their evidence is suggestive, not conclusive. For example, they argue the service sector is more dynamic when they find there is greater persistence for manufacturing firms.

To get further insights and explore the robustness of these results, they undertake a variety of alternative cuts in analyzing the data. They look at two time effects—any evidence of parameter changes over time, and the influence of averaging over longer intervals. I agree with them as they say these are nevertheless helpful results, that support the overall robustness of the framework reported in the previous section and whenever the results differ, they offer interesting insights. As far as the methodology is concerned, I agree with the first method of looking for evidence to show whether the parameters change over time.

However, I would like to differ with their test for their second "time effect" where they follow the three and four year averaging to test the fading away hypothesis. As results can get affected because they are based on annual data, the authors explored by taking three- and four-year averages of the data (see Table 5). Here, they find a substantial fall in the size of the coefficient on lagged profitability, from around 0.4 in the annual data to close to 0.2 in the four-year data. They find the persistence continues over time, but its strength fades. Hence, they claim while firms are able to maintain about 40 percent of their profit rates from one year to another, over longer periods, their ability to do so diminishes.

However, this type of methodology to draw this sort of conclusion is seriously flawed. Averaging for four years means impact of profit in a period over next is same as impact of profit in a year on profit of the fifth year, on average; obviously its strength will go down. Hence, this type of averaging is meaningless if one tries to draw the above conclusions as the authors are doing. What is the intention? Just averaging over a longer period or increasing the distance from one period to the other. If it is the first, then a moving average is a more appropriate approach for testing these "fading away of persistence" hypotheses. If the intention is to see how a year's profit affects the fifth year's profit, then no need to run these regressions after averaging over four years as that inference is obvious.

They conclude, overall, there is no clear support in this data for the view that higher profitability is a function of greater market power, and, on the whole, they read this data to favor the view that higher profitability is a function of greater dynamism (through increases in market shares) and higher efficiency. A reading of the literature in this area along with this paper offers a more plausible conclusion, which could have been that Indian markets are increasingly becoming more competitive than monopolistic and rent-seeking, though, presently, the three types of sectors behavior co-exist. In India, some sectors are dynamic and innovative under severe competition; some are still making big money through rent-seeking, and other sectors

include both types of firm behavior. With some more work, this paper could have been an even more excellent contribution to the literature on behavior of firms in India.

General Discussion

Anne Krueger (session chair) began by noting that she was astonished that the authors had defined the concentration ratio only with respect to domestic production, thus, altogether ignoring the fact that the opening and liberalization after 1991 had so much to do with removing protection, import substitution, and increasing incentives for exporting industry. In fact, competition obviously came in increasing measure for all firms from overseas as well as some other domestic firms. You would see a period during which the established firms would reduce profitability simply because their relative prices fell. You will find the exportables become more profitable; they will expand and also be subject to new entry in the initial phase. The authors' results were thus consistent with an opening of the economy model and what you would forecast would happen to profits in different lines.

T. N. Srinivasan echoed Rajnish Mehra by stating that the paper lacked a theoretical structure, making it difficult to interpret the results. If you want to think in terms of how liberalization or any policy change has affected competition, you would start first of all thinking about the nature of the competition in the industry. Suppose you think in terms of certain established houses and the competitive fringe being in the same pool, with liberalization encouraging entry in particular segments of the industry with particular market orientation [e.g., import-competing versus export oriented]. Now without bringing in an analytical way the entry process and exit processes and the link between these latter as through labor laws, it is difficult to assess the results. The authors' numbers are very interesting but what do they tell us?

Kenneth Kletzer added that it was important to understand how fragmented or imperfect financial markets were in India. The difference between rate of return on assets across new entrants and pre-1990 entrants (shown in the last slide by Rajnish) was entirely consistent with this market imperfection. It suggests the variation and the difference between the cost of internal finance and external finance for firms particularly across entrants and incumbents may be very different.

Suman Bery asked whether it was worth segmenting the panel between tradable and nontradable sectors. Anne Krueger added, however, that even

this separation was not good enough since within the tradable sectors you have the protected import competing group, where you would expect the relative returns to go down and the export group where the return would go up. So there would have to be a three-way split.

In response, Michael Walton stated that while they looked at manufacturing versus services, they did not split the sample based on tradability or import-competing versus exportable products. He totally accepted the point that the drivers of pressures on profitability are not only going to be different between imports and exports but also that there was a variable structure of liberalization within the import competing sectors. It will be an interesting exercise to link the data in the paper to indicators of liberalization in the next step. This said, Walton defended the market share variable as constructed on the ground that it could be constructed based on the database used for the entire exercise.

Abhijit Banerjee took issue with Rajnish Mehra arguing that the shadow price of capital could not be estimated. Once this is recognized, the case for looking at a reduced form equation is strong. The reduced form comes from something that one can actually understand. Banerjee went on to note that the authors could make a more effective use of shocks, however. Industrial-level shocks are obvious but there is relatively well-established methodology for identifying these shocks. One possible exercise is if there is a world market shock, which raises industry profits, do you see entry into that industry.

Dilip Mookherjee objected to the use of the term Schumpeterian by the authors on conceptual grounds. The Schumpeterian process goes hand in hand with higher concentration and higher profitability in the short run. Therefore, one cannot readily separate the effect of Schumpeterian process from that of crony capitalism. For instance, the disappearance of all kinds of protections for small-scale industries may be productivity enhancing while it simultaneously increases concentration. Srinivasan joined the issue and said the authors should avoid using terms such as Schumpeterian competition, monopoly capital, etc. If you do not have the precise specification of how Schumpeterian competition is going to affect in forward looking way in the Indian context, simply associating something with Schumpeterian competition or whatever is not an appealing exercise.

Srinivasan also returned to the issue of reduced form discussed by Banerjee and noted that he preferred having at least a rudimentary formal structural model in which you try to think through the mechanisms by which the various influences could potentially be seen in the data and then go to see whether these are seen actually in the data and that is where the niceties

come. Anusha Nath agreed that a little more structure would be useful and that the authors intended to get there in the second stage of their work.

Robert Lawrence said that the paper is positioned to assess the impact of reform but the real deficiency is the total absence of data from pre-reform era. The paper needs to give us a benchmark against which we could measure what has happened following the reforms. Rajnish Mehra joined stating that he did try to look at data from before 1990s. But the Prowess database did not have data going sufficiently far back to allow this exercise. Anusha Nath made the point that the authors used the Prowess/CMIE database due to its richness. The Reserve Bank of India (RBI) has a data starting from 1950 but a lot of variables such as the ownership categories are not very precisely tracked in them. The constraint with respect to the CMIE data is that it is available from only 1989 and really good financial data availability starts in 1992 only.

In his final response, Michael Walton stated that the objective of the research has been to find different ways to get into the nature of dynamics of Indian capitalism. The interesting question is how to frame this question so as to be able to test in the data differential responses to exogenous influences. The challenge is to measure and identify the response to liberalization as representing a dynamic process or entrenchment and exploitation of market power. The comments at the session suggest there are a number of areas requiring further analysis.

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Determinants of Cost Overruns in Public Procurement of Infrastructure: Roads and Railways

Introduction

Public spending on infrastructure constitutes a major part of the total expenditure of the Central Government of India.[1] During the last decade, an increasing amount of funds has been allocated for the provisions of infrastructure. The successive central governments have declared infrastructure to be a high priority area. However, instances of delays and cost overruns in infrastructure projects continue to be really large. At the same time, due to inadequate research on the subject, there seems to be a general lack of understanding regarding the causes behind cost and time overruns. This paper aims to contribute to the public policy by providing a better understanding of the factors responsible for delays and cost overruns in India. Though the combined set of projects from 17 infrastructure sectors is analyzed, the focus is going to be on the road and railways projects.

The existing literature on delays and cost overruns in India is a collection of very insightful case studies. There are some empirical works too.

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1. Calculations based on figures provided in Economic Survey for 2006–07 (pp. 55, 281–83) show that total public expenditure on infrastructure is 4.23 percent of GDP, and 14.4 percent of the total outlay of central, state government, and union territories during that fiscal. Public spending on infrastructure has increased since and currently is about 6 percent of the GDP. Under the XIth plan it is projected to increase to 6.8 percent of GDP in 2011–12.

The literature cites several reasons for the cost and time overruns. Such as, delays in land acquisition, shifting of utilities, environmental and inter-ministerial clearances, shortage of funds, litigations over land acquisition, and contractual disputes. See, e.g., Dalvi (1997), Thomas (2000), Sriraman (2003), Thomsen (2006), Jonston and Santillo (2007), Raghuram et al. (2009), and McKinsey and Company (2009), among others. Morris (1990, 2003) and Singh (2010a) are empirical works. Singh (2010a) based on a very large dataset of completed projects from 17 infrastructure projects shows the existence of strong and interesting correlations between the delays and cost overruns, on one hand, and several project related characteristics, on the other hand. However, the study does not offer insights on the sector-specific causes behind cost overruns. Indeed, infrastructure sectors are quite different from each other. Presumably, each sector has idiosyncratic factors that can cause delays and cost overruns. A combined analysis of all sector projects is very likely to miss out on at least some of the sector-specific causes behind cost overruns.

There is a large body of international literature on the subject, though it is of limited help in understanding the nature of cost overruns in India. It suggests that delays and cost overruns are generic to infrastructure projects and is a global phenomenon. This seems to be especially true of large transport projects, such as large projects in road and railways sectors. For instance, empirical studies by Flyvbjerg et al. (2002, 2003, and 2004), covering 20 countries across the five continents, show that transport projects often suffer from cost overruns. Merewitz (1973), Kain (1990), Pickrell (1990), Skamris and Flyvbjerg (1997), among others, have also come out with similar findings. In addition, there are numerous case studies depicting the extent and gravity of delays and cost overruns in infrastructure projects. However, these empirical works do not explain the causes behind delays and cost overruns, though several studies have demonstrated the correlation between cost overruns and other project attributes.[2]

The inadequacy of research on the subject notwithstanding, the government has been actively encouraging private sector to participate in the delivery of public goods and services, especially infrastructure. The private sector participation is enabled through what are called the public–private partnerships (PPPs). Generally, PPPs in infrastructure are formed with the help of the build-operate-transfer (BOT) contracts between the government and the private sector. For the last several years the railways, the

2. See Odeck (2004) and Flyvbjerg et al. (2002, 2003, and 2004).

roads and surface transport, and the finance ministers have been announcing measures to encourage PPPs in infrastructure. Here is an excerpt from the Railway Budget Speech, 2008–09:

> Railways would have to make heavy investments for the expansion of the network, modernization and up gradation of the technology and for providing world class facilities to the customers in the coming years. … we have started many PPP schemes for attracting an investment of ₹ 1,00,000 crore over the next 5 years… (Government of India, 2008)

The incumbent roads and surface transport minister has even more ambitious target of attracting ₹ 100,000 each fiscal through PPPs. The policymakers have come to believe that private sector participation can reduce delays and cost overruns in infrastructure projects. The following quote amply illustrates this:[3]

> … it was agreed that for ensuring provision of better road services, i.e., higher quality of construction and maintenance of roads and completion of projects without cost and time overrun, contracts based on BOT model are inherently superior to the traditional EPC contracts. Accordingly, it was decided that for NHDP Phase-III onwards, all contracts for provisions of road services would be awarded only on BOT basis…(Government of India, 2006a)

However, there is no empirical work to support or repudiate the official belief in the above claimed superiority of the private sector. This paper is a first attempt to address the issue, though only to a limited extent. A proper understanding of the causes behind delays and cost overruns, calls for across-sectors as well as sector-specific empirical analyses. The empirical analysis in this paper addresses these issues, among others, by focusing on road and railways sectors. Sector-specific approach taken here enables testing of several hypotheses which may not be possible in a general study, either for conceptual reasons or for the lack of suitable data. For instance, the following questions are addressed and answered: Between the roads and the railways, which sector has better infrastructure delivery mechanism? Can PPPs mitigate the problems of delays and cost overruns?

Coming back to the literature, the theoretical literature on the subject offers several explanations for cost overruns. For example, Ganuza (2007) attributes cost overruns to an underinvestment in designing efforts by the

3. This is an excerpt of a decision made on March 15, 2005 in a meeting (chaired by the Prime Minister) regarding financing of the National Highways Development Project (NHDP). See Government of India (2006a).

project sponsor; the sponsor underinvests in design and keeps the estimates less accurate so as to reduce the rent appropriated by the bidders. In Lewis (1986), contractor underinvests in cost reducing efforts towards the completion of the project. Indeed, many works, including by Laffont and Tirole (1993), attribute cost overruns to strategic reasons. Morris and Hough (1987), Gaspar and Leite (1989), Bajari and Tadelis (2001), and Arvan and Leite (1990), attribute cost overruns to imperfect information and technical constraints. According to these works, due to imperfect estimation techniques and the lack of data, the estimated and the actual project costs turn out to be different. That is, delays and cost overruns are claimed to be a manifestation of "honest" mistakes on the part of government officials.[4]

However, testable predictions implied by the theoretical literature are not in sync with the reality. For instance, if time and cost overruns are only due to the imperfect estimation techniques, then one would expect the estimation errors to be "small" compared to project cost, and unbiased with zero mean. Since, due to technological constraints or imperfect project design, underestimation of cost should be as likely as overestimation. On the contrary, many studies show that cost overruns tend to be positive in most cases and have positive bias. Moreover, these works cannot explain the varying degree of delays and cost overruns across sectors and across projects within a sector.

This paper is an attempt to explain the above discussed features of cost overruns. The proposed explanation in the paper offers several testable predictions. These predictions are tested with two large and unique datasets. Among other things, we show that: compared to other projects, civil construction projects have experienced higher cost overruns and longer delays; compared to the Indian Railways, the National Highways Authority of India (NHAI) has significantly superior project delivery system; compared to other road projects, PPP projects in India are experiencing shorter delays but higher cost overruns!

As far as policy implications are concerned, the analysis shows that the choice of the procurement contract has significant bearing on the project outcome. Ceteris paribus, contracts that club the responsibility of project maintenance with that of construction complete project sooner, as compared

4. Another strand of the literature attributes cost escalations to political factors, i.e., to "lying" by politicians. See, e.g., Wachs, 1989; Kain, 1990; Pickrell, 1990; Morris, 1990; and Flyvbjerg, Holm, and Buhl, 2002; Flyvbjerg et al., 2004, among others. According to these works, politicians understate costs and exaggerate benefits in order to make projects saleable.

to the contracts that do not do such bundling. Moreover, delays and cost overruns can be reduced by improving the incentive and resource allocation structures within the government departments. The analysis also suggests that incompleteness of project designs and contracts may be one of the leading causes behind delays and cost overruns. Therefore, a better initial designing may help reduce delays and cost overruns. The other findings and their implications are discussed in the last two sections.

The section "Infrastructure Projects" provides discussion on the life cycle of infrastructure projects, including project costs, design, contracts, and renegotiation processes. The section "Cost Overruns" provides a detailed discussion on the potential causes behind cost overruns. The section "Data, Empirical Frameworks, and Results" provides data description and presents an overview of the delays and cost overruns in infrastructure projects in India. It also introduces the regression model as well as empirical results. The section "Concluding Remarks" concludes with policy implications of the study.

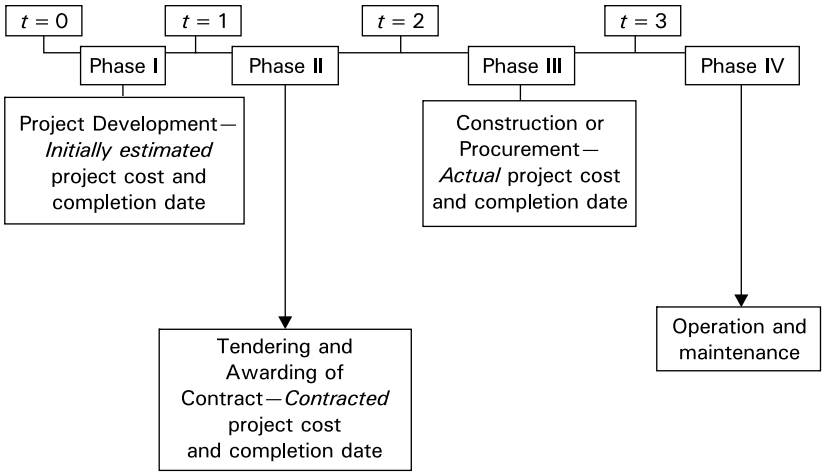
Infrastructure Projects

Life Cycle

A typical infrastructure project has to undergo several stages: from planning of the project, to its approval, to awarding of contract(s), to actual construction/procurement, and so on. More specifically, the life cycle of an infrastructure project can be divided into following four phases: development phase, tender and contract award phase, construction or procurement phase, and the operation and maintenance (O&M) phase. See Figure 1.

Planning and designing of a project is done in its development phase. In the beginning of this phase, a project sponsoring department prepares estimates of time and costs (funds) needed to complete the project. Based on the time estimates, a project schedule is prepared. For projects involving construction of assets/facilities, such as, roads, railways, airports, etc., project specifications and, in many cases, designs are prepared in this phase. The project design and specifications involve the following activities: *One*, the description of the scope of the project. *Scope* of a project is the description of the "output" features the project assets or facilities must possess. It also specifies the list of work-items or the tasks that need to be performed to build the assets. For example, for a road project the scope may specify the length of the project highway, number of traffic lanes, number and locations of

FIGURE 1. Four Phases of a Project



Source: Prepared by the author for this paper.

overpasses, underpasses, toll-plazas to be built-in, etc. *Two*, identification of tasks/work-items that need to be performed to build the assets, and estimation of quantities of the work-items. *Three*, a detailed engineering design and drawings, etc., specifying how the construction should be carried out.[5]

Once the estimates of time and cost along with the design have been approved by the appropriate authority in the department, the project is ready for tendering and award of contract(s), i.e., it enters the next phase.[6] At $t = 1$, the department invites bids for project works. The bid documents provide information on various aspects of project at hand. The provided information depends on the contract to be used. However, regardless of the contract to be used, bid documents provide information about the scope of the project and the cost estimates for project works. Bidders are required to submit the (asking) price-bids. The exact form of bids depend on the nature of contract to be used and, as is shown below, differs across contracts.

5. As a matter of fact, for infrastructure procurement, government engineers carry out all of the designing tasks. However, depending on the procurement contract to be used, the last two activities—finding out of the work-items and estimation of project cost—may be performed by the bidders, i.e., potential contractors. But, the scope of the project, i.e., the specifications of the good to be produced is always decided by the relevant government department.

6. In addition, a project generally requires approval from several other departments. For example, a typical civil aviation project needs clearances from the ministries of civil aviation, finance, environment and forest, and the Airports Authority of India.

A contract is signed between the sponsoring department and the successful bidder. Generally, the contractor is selected through competitive bidding; the lowest price-bidder wins the contract. Depending on the context and the activity, a contract can be for construction or for procurement of equipments, machinery, etc. At times, the cost and the time estimates get revised at the time of signing of the contract. The project enters the construction/procurement phase when the contractor(s) start construction at the project site or arrange to deliver the procurement items, as the case may be. During the construction phase, the project requires active cooperation from the sponsoring authority, the contractor(s), and several other ministries/departments. Whether a project can be delivered in time depends on how well the activities and efforts of the departments involved and the individuals concerned are coordinated. Due to several reasons, the actual date of completion of project works is invariably different from the expected, i.e., initially planned date of completion. The actual time and therefore duration of completion get known only at the end of the construction phase. The project facilities deliver intended services during the O&M phase.

Project Costs

Two definitions of project costs are important for the purpose of analysis in the paper, namely *expected costs* and *actual costs*. Besides, we will also discuss what are known as *contracted costs.* As mentioned above, during the project development phase, the sponsoring department provides cost estimates of project works, called the expected project costs. These cost estimates are based on the estimates of quantities of the work-items and their estimated costs. However, the actual values of quantities get known to the contractor and government engineers only at the end of the construction phase. As a result, the value of the actual project costs are realized only when the project gets completed at the end of Phase III. Due to the reasons discussed below, the actual quantities of work-items and consequently the actual costs invariably turn out to be different from their estimated values.

For the ease of concreteness and detailed exposition of the above issues, let us use some formal notations. Suppose, for a given project n tasks (work-items) need to be performed. Let q_i denote the quantity of the ith task/work-item. So, $q = (q_1, q_2 \ldots q_n)$ denotes the vector of quantities of work-items. Let $c_i(\omega)$ be the unit cost function of the ith work-item, where ω is a vector of input prices. For simplicity assume constant returns to scale. This implies that if the quantities in the vector $(q_1, q_2 \ldots q_n)$ are actually

delivered, the project cost will be $C(q, \omega) = c(\omega).q = (c_1(\omega), c_2(\omega) \ldots c_n(\omega)).(q_1, q_2 \ldots q_n)$, where $q = (q_1, q_2 \ldots q_n)$ is a column vector of the quantities of the deliverables. During the development phase, the sponsoring department arrives at the estimates of q, say, $q^0 = (q_1^0, q_2^0, \ldots, q_n^0)$, and of c, say $c^0 = (c_1^0, c_2^0, \ldots, c_n^0)$. As a result, the cost as estimated by the department is $C^0 = c^0.q^0$. Table 1 demonstrates actual description of project works by the NHAI.

TABLE 1. Example of a Project Design by NHAI

Description of work-item	*Unit*	*Quantity* q_i^e	*Per-unit cost* c_i^e	*Per-item amount* $q_i^e.q_i^e$
Dismantling of existing structures like culverts, bridges, retaining walls, and other structure comprising of masonry, cement concrete, wood work ...	cum	25.75		
Providing and applying tack coat with bitumen emulsion....on the prepared bituminous/granular surface cleaned with mechanical broom.	sqm	38,824		
Providing and laying semi dense bituminous concrete....using crushed aggregates of specified grading, premixed with bituminous binder @ 4.5 to 5 percent of mix....to achieve the desired compaction as per MoRTH specification clause No. 508 complete in all respects.	cum	1,067.6		

Source: www.nhai.org.

Let $q^a = (q_1^a, q_2^a, ..., q_n^a)$ denote the vector of quantities of work-items actually performed.

Denote the actual project costs by C^a. While the estimated project costs depend on the costs of estimated quantities, i.e., $(q_1^0, q_2^0, \ldots, q_n^0)$, the actual costs depend on the number of actual quantities delivered, i.e., $(q_1^a, q_2^a, \ldots, q_n^a)$. So, the actual construction costs are given by $(c_1^a(\omega), c_2^a(\omega), \ldots, c_n^a(\omega))$. $(q_1^a, q_2^a, \ldots, q_n^a)$. The definition of actual project costs is different for different parties, and is discussed below.

The actual quantities invariably turn out to be different from their initial estimates, i.e., $(q_1^a, q_2^a, \ldots, q_n^a) \neq (q_1^0, q_2^0, \ldots, q_n^0)$ holds on many occasions. This can happen because the actual work conditions (the state of nature) that arise during the construction phase can necessitate some changes in the project design, resulting, in turn, in $(q_1^a, q_2^a, \ldots, q_n^a) \neq (q_1^0, q_2^0, \ldots, q_n^0)$. To illustrate, the optimum mix of the concrete and bitumen, the type of foundations needed for flyovers, etc., depends on the quality of soil at the project site. If the work conditions at the project site turn out to be different from those for which

project was designed, there will be a change in the design and the quantities of work-items. Such changes in project design and quantities are result of imperfect estimation and design techniques. Simply put, $(q_1^a, q_2^a, \ldots, q_n^a) \neq (q_1^0, q_2^0, \ldots, q_n^0)$ can hold simply on account of measurement and design errors.

Moreover, at times the conditions at project site may even necessitate what is known as a *change in scope* of the project; i.e., a significant change in the number of project works. For instance, a road project originally could be designed to simply resurface the existing stretch without any changes in the undersurface. However, the actual site conditions may necessitate strengthening of the undersurface and shoulders. This clearly would mean that the initial scope has to be changed to accommodate new work-items and to revise the quantities of the existing work-items. On top of it, during the construction phase the government may discover that some relevant works are missing from the original scope. For example, for a highway project, the government engineers may discover the need for more of flyovers or underpasses. Similarly, for a railways project, the government may find that they have missed out on some safety measures in the initial design. Such realizations will also lead to renegotiations between the employer and the contractor to change the scope. At times, demand from local public can add to the list of work-items, thereby necessitating a change in scope. An inevitable consequence of a change in scope is that actual quantities and, therefore, the ex-post project costs are different from the estimated ones.[7]

The cost and risk-sharing arrangements differ across contracts. So, the interpretations of the contracted and actual cost differ across contract types. We discuss these issues in the following subsections.

Infrastructure Contracts in India

A procurement contract specifies the project works to be performed by the contractor along with the associated compensation schemes. The contract also specifies costs of the works, known as the *contracted cost*. The meaning and interpretation of the contracted amount vary across the types of contracts and are discussed below. As far as the project types are concerned, three types of contracts dominate the infrastructure procurement processes in India. These contracts are the *Fixed-Price* contracts, the *Item-rate/Unit-rate* contracts, and the *PPP* contracts.

7. Empirical studies suggest that a change in scope, generally, leads to increases in the quantities of the existing work-items as well as brings in new tasks under the scope of the project, leading to additional costs. See, e.g., Bajari et al. (2009).

As the name indicates, under a Fixed-Price (FP) contract, the procuring department promises a fixed payment to the contractor for the works specified in the contracts. Generally, FP contracts are employed in situations where there is little uncertainty about the feature of the good to be procured.[8] So, FP contracts are used for procurement of equipments and machinery such as locomotive engines, signalling equipments, etc. In some cases, these contracts have been used for construction works as well. Under an FP contract, a bidder submits bids of asking price at which s/he is willing to deliver the equipment or the works described in bid documents. The contract is signed with the bidder with lowest asking price-bid. When an FP contract is used for construction works, generally, the task of project designing is delegated to the contractor.[9] That is why such contracts are generally called design-and-build (D&B) contracts.[10] For these contracts, the price quoted by the contractor in his bid, say P^{FP}, is called the contracted cost/amount.

Item-Rate (IR) contracts are used for construction projects in our dataset. Most of the road projects and construction projects in railways, urban-development, civil aviation, and other sectors have used IR contracts. These contracts are used in situations wherein there is little uncertainty with respect to the tasks to be performed but lot of uncertainty regarding the quantities of the tasks. Under an IR contract, a bidder submits *per-unit* price (popularly known as IR) for each task/work-item at which s/he is willing to complete project tasks. The contractor is paid for the actual quantities of work-items at the contractually agreed IRs. Formally, when an IR contract is to be used, the bid documents provide information about the vectors $(c_1^a, c_2^a, \ldots, c_n^a)$ and $(q_1^0, q_2^0, \ldots, q_n^0)$ to the bidder along with other project details, specifically the project design. Each bidder submits the per unit price/IR for each of the tasks specified in the scope and design of project. That is, a bidder submits a vector of IRs. Let there be K number of bidders and $P^j = (p_1^j, p_2^j, \ldots, p_n^j)$ be the bid of jth bidder. The contract is awarded to the bidder whose bid requires lowest payment for the estimated work-items, i.e., jth bidder wins the bid if the bid $(p_1^j, p_2^j, \ldots, p_n^j)$ leads to lowest value of $(p_1^k, p_2^k, \ldots, p_n^k).(q_1^0, q_2^0, \ldots, q_n^0)$ for all $k = 1, \ldots, K$. So, if the jth bidder gets the contract and is expected to deliver $q^0 = (q_1^0, q_2^0, \ldots, q_n^0)$ vector of works, as a first approximation, he will

8. See Bajari and Tadelis (2001).

9. Even when the bid documents provide the design, the departments still allow the contractor to improve upon it.

10. In India, only the Delhi Metro Rail Corporation (DMRC) has used FP (D&B) contracts for construction projects.

be paid $P^{IR} = P^j.q^0 = (p_1^j, p_2^j, \ldots, p_n^j).(q_1^0, q_2^0, \ldots, q_n^0) = \sum_{i=1}^{n} p_i^j q_i^0$ In case of IR contracts, the amount $\sum_{i=1}^{n} p_i q_i^0$ is called the contracted cost.

Under FP and IR contracts, the contractor is responsible only for construction of project assets or facilities. Maintenance of the facility is not his responsibility. Therefore, the contractual relation between the parties ends with the construction phase at $t = 3$. However, there is one important difference between these two contract types. Under the FP contract, the contractor bears most of the construction costs–related risks. In contrast, under an IR contract the contractor shares construction costs–related risks with the government, especially those arising due to variations in quantities of work-items. We will discuss these issues in greater detail under the subsections on contract renegotiations and cost overruns.

Under a PPP contract, in contrast, the contractor is required not only to construct the project facilities possessing contractually agreed features but also to maintain it during the O&M phase. So, the contractual relation between the parties lasts till the end of the O&M phase at $t = 4$. The contractor bears most of the construction costs related risks and all of the maintenance cost related risks. In our datasets the use of PP contracts is restricted to the national highways (NH) projects.

The PPP contracts used in India have three essential and common features: one, the tasks of construction of project facility and its maintenance are performed by the same contractor (or the same consortium of contractors); two, most of construction related risks and all of the maintenance risks are borne by the contractor; three, the project designing, building, financing, and its O&M are the responsibilities of the contractor. That is, PPP projects are Design, Build, Finance, Operate, and Maintain (DBFO&M) contracts. This is especially true of PPPs in roads. The PPP contracts differ largely in terms of the degrees to which the usage or the commercial risks are borne by the contractor. Under BOT Annuity contracts, the contractor receives contractually agreed biannual payment from the government. Under BOT toll contracts, the contractor is granted concession to charge toll fee from road users.[11]

The contract price/amount in case of BOT annuity projects is the annuity payments agreed by the two parties. However, in case of BOT toll, it is the price paid by the government. For less attractive projects, where expected toll revenue is not very high, the contract price is positive. In contrast, for

11. For details see Anant and Singh (2009).

highly lucrative projects the contract price can even be negative, i.e., the contractor offers to pay the government for the right to charge toll, over and above promising to bear the construction costs. This attribute of PPP contracts brings out yet another major difference between the PPPs, on one hand, and the FP and IR contracts, on the other hand. The following remark summarizes this difference:

Remark 1: *While under the FP and IR contracts the contracted cost/amount is a reflection of the construction cost, under PPP it is a function of the expected revenue along with the construction cost. While the expected and contracted costs are likely to be highly comparable for IR and FP contracts, the latter costs can be negligible compared to the former in case of PPP contracts. In any case, one should be extremely cautious while comparing the contracted amount across contract types.*

For road projects in our (NHAI) dataset, the correlation coefficient between the expected costs and contracted costs is 0.93 for IR contracts. In contrast, for PPP contracts it is merely 0.32.

Since our focus is on cost overruns during construction phase, we consider a simple form of PPP (PP) contracts that capture the above-mentioned three attributes. Specifically, under a PP contract, the contractor/concessionaire is responsible for construction of the infrastructure facility with output features specified in the initial contract as well as for its maintenance during $t = 3$ and $t = 4$. And, the contractor is paid a mutually agreed fixed price, say P^{PP}.[12]

Contract Renegotiation

At times parties need to renegotiate the contract at the beginning of or during the construction phase. If the actual conditions at the project site turn out to be significantly different from those specified in the initial contract, renegotiation of the original contract may become necessary. For instance, the actual number and/or the quantities of work-items that need to be performed can turn out to be different from their initial estimates. As noted above, the actual quantities invariably turn out to be different from their initial estimates, i.e., $(q_1^a, q_2^a, \ldots, q_n^a) \neq (q_1^0, q_2^0, \ldots, q_n^0)$ holds on many occasions. In such cases, the parties may renegotiate the terms of the initial contract. Besides, contract renegotiation becomes inevitable if need arises for works in addition to those specified in the contract. In that case, parties renegotiate the terms of the original contract, including the number and quantities of

12. P^{PP} can be interpreted as the expected value of future revenue stream in case the usage or the commercial risk is borne or shared by the contractor.

additional work-items, and the compensation.[13] The events and implications of renegotiations differ from contract to contract.

Under an IR contract, the contractor is paid for the *actual* quantities delivered by him, as per the bid/price rates submitted by him. The rates remain unaltered as long as the actual quantities are in the range of ± 25 percent, regardless of whether the actual quantities are different on account of measurement errors or *change in scope*. Specifically, for the *i*th work-item the contractor will paid at the rate of P_i[14] as long q_i^a is in the range of $0.75q_i^0$ to $1.25q_i^0$. The compensation rate is renegotiated if q_i^a lies outside of this range. To sum up, under IR contracts, the cost risk on account of variations in quantities of work-items due to measurement errors is borne by the government department, as long as variations are small. If the variations are large, i.e., if q_i^a turns out be out of the range $[0.75q_i^0, 1.25]$, p_i gets renegotiated to say p'_i and the contractor is paid $p'_i \, . \, q_i^a$. So, in such a scenario, the risk is shared by the two parties though most of it is still rests with the department. However, the situation is somewhat different when a change in scope of the project is required. Since, it not only makes actual quantities differ from the estimated one, it generally adds to the list of task/work-items as well. In such an event, the contractor and the government engineer will negotiate the item-rate (IR) of the new work-items. The costs (benefits) of the additional (reduced) work-items due to the change in scope are borne [enjoyed] by the government department.

Under the FP contract, in contrast, regardless of whether the actual quantities differ from the estimated one or not, the contractor is paid the contractual agreed amount P^{FP}. Therefore, under FP contract, the cost risk on account of variations in quantities of work-items due to measurement errors is entirely borne by the contractor. The contract is renegotiated only if the government department demands a change in scope of the project. In that case, the contractor and government engineer negotiate the compensation for the changes in work-items necessitated by the change in scope. As under IR, the costs (benefits) of the additional (reduced) work-items due to the change in scope are borne [enjoyed] by the government department.

The PP contracts are very similar to FP contracts, as far as the compensation for construction costs are concerned. Under these contracts, again, the

13. In most cases, the contract renegotiation is triggered by the change in project scope demanded by the department. However, the contractor can also demand renegotiation under certain circumstances, such as, *force-mesure*.

14. Recall that $P = (p_1, p_2, \ldots, p_n)$, is the vector of per unit asking price submitted by the lowest bidder. It is also the vector of contracted IRs.

cost risk on account of variations in quantities of work-items due to measurement errors is entirely borne by the contractor. There is no provision for compensatory payments on account of variations in quantities alone. The contractor is compensated only for the works demanded by the change in the scope of the project. Before proceeding further another remark is in order.

Remark 2: *The IR and PPP contracts lie on the opposite extremes, as far as the delegation of decision rights and construction cost related risk to the contracts are concerned. Under IR (resp., PPP) contracts most decision rights regarding project design, financing, and maintenance, etc., rest with the government (resp., contractor), who also bear most of the construction cost related risks. The FP contracts lie in between these two extremes.*

Cost Overruns

One can think of cost overrun as the difference between the actual (final) project costs and the *contracted* project costs. However, for the purpose of comparing cost overruns across sectors and contract types, the first definition, i.e., difference between the actual (final) project costs and the *estimated* project costs is more suitable. Since, in our dataset only road sectors has completed PPP projects. More importantly, as we noted earlier, the contracted amount/costs figures for PPP contracts can be very small and even negative as they are more of a reflection of the expected revenue than of the construction costs. Therefore, contracted costs and as a result the cost overruns based on them are not comparable across sectors and contract types. We define the "cost overrun" as the difference between the actual (final) project costs and the initially expected project costs. This also happens to be the official definition of cost overruns and is also widely used in literature—both theoretical and empirical.

In official terminology, the expected cost at project approval stage is called the initial project cost. The actual costs become known only at the time of completion at the end of the construction/procurement phase, i.e., at $t = 3$. The percentage cost overrun for a project can be defined as the ratio of the cost overrun and the initially anticipated cost of the project (multiplied by hundred). Clearly, percentage cost overrun can be positive, zero, or negative.

Recall, under PPPs the actual project costs are borne by the concessionaire—except the cost of implementing the midway changes in scope demanded by the government department. It is important to emphasize that the final project costs do not refer to the actual construction costs incurred by

the construction contractor. It is the actual project cost borne by the procuring department in case of non-PPPs and by the concessionaire for PPP projects. We have already defined the initially expected cost as $C^0 = c^0.q^0$, where $q^0 = (q_1^0, q_2^0, \ldots, q_n^0)$ and $c^0 = (c_1^0, c_2^0, \ldots, c_n^0)$. These cost estimates are provided by the procuring department. The actual costs depend, among other things, on the type of contract used and whether the contract is renegotiated or not.

Under the IR contract the final cost to the department will be $p.q^a = (p_1, p_2, \ldots, p_n).(q_1^a, q_2^a, \ldots, q_n^a)$ plus adjustments on account of contract renegotiations if any. In contrast, under FP contract (resp. PP contract) the final cost to the department will be P^{FP} (resp. P^{PP}) plus adjustments payments on account of change in scope, if any.

Due to several reasons, the ex-post actual costs generally differ from their initial estimates. In the following subsections, I discuss the potential causes as well as their plausibility/applicability for our datasets.

Uncertainty

The uncertainty regarding the quantities and costs is surely one reason why the actual costs turn out to be different from the estimated ones. Due to imperfect estimation techniques and the lack of data, the estimated and the actual project costs turn out to be different.[15] In some cases this results in cost overruns. The same logic applies to the time estimates. Therefore, delays and cost overruns can be a manifestation of "honest" mistakes on the part of government engineers.

However, as we argued in the Introduction, if cost overruns are only due to the imperfect estimation techniques, then one would expect the estimation errors to be unbiased with zero mean. Since, due to technological constraints, underestimation of cost should be as likely as overestimation. As a result, in each sector negative cost overruns should be as frequent as positive cost overruns. Moreover, as more and more projects get implemented, the officials should be able to learn from the past mistakes and avoid them in future. Therefore, cost overruns should be "small" compared to project cost.

Purposeful Underestimation

Another strand of the literature attributes cost escalations to political factors, i.e., to "lying" by politicians. According to these works, politicians

15. A strand of literature indeed attributes cost overruns to imperfect information and technical constraints and the resulting measurement errors. See Morris and Hough (1987), Gaspar and Leite (1989), Bajari and Tadelis (2001), and Arvan and Leite (1990).

understate costs and exaggerate benefits in order to make projects saleable.[16] Competition for given funds among government departments may also lead to purposeful underestimation of the initial cost. If ministries have to compete for funds from say finance ministry or the planning commission, then in order to get the funding approved they may have incentive to understate projects' cost.

In our datasets, the national highways (road) projects do not seem to suffer from this phenomenon. The implementing agency NHAI does not compete with other ministries or departments within the ministry for funds. The internal revenue and market borrowings are the main sources of funding. Though some projects have been funded by international donors such as WB, ADB, and JICA, but cost estimates are scrutinized by the funding agency. However, the railways projects seem to be vulnerable to "lying" by politicians.

Trade-off between Construction Costs and Benefits during O&M Phase

If the construction contractor has also the concession rights to collect fees from users, he will have incentives to start fee collection sooner rather than later. However, the user-fee can be levied only during the O&M phase, i.e., after construction is complete. In such a scenario, the contractor may find it profitable to complete the project ahead of schedule even if it means incurring extra cost. This additional cost if incurred will increase the total construction cost, leading to cost overruns. However, this trade-off can arise only if the contract couples the construction and O&M tasks. This indeed is the case with the PPPs contracts for NHs in India. However, such a trade-off does not arise under IR and FP contracts.

Trade-off between Construction Costs and O&M Costs

If the same construction contractor is responsible for construction and subsequently the maintenance of a project, s/he will try to minimize the life-cycle costs rather than just the construction costs. In particular, the contractor may find it incentive compatible to make quality enhancing investment during the construction phase so as to reduce the O&M costs. Quality enhancing investment will increase the construction cost, resulting in cost overruns. However, only the PPPs provide incentives to the contractor to undertake quality enhancing investment. The IR and FP contracts, in contrast, do not create such incentives.

16. See, e.g., Wachs, 1989; Kain, 1990; Pickrell, 1990; Morris, 1990; Flyvbjerg, Holm, and Buhl, 2002; Flyvbjerg et al., 2004, among others.

Incomplete Design, Contract Renegotiation, and the Hold-up

Incompleteness of project design can also cause the actual project cost to be different from the initially estimated cost. Designing of infrastructure projects is a complicated task. It involves basic work and many supplementary works. The nature and quantities of the latter works varies depending on the actual conditions at the project site. The project design can be incomplete in the following two different senses. First, the initial design may provide engineering and quantity details only of the basic works but not of the supplementary works. For example, for a highway project government engineers may not include the engineering details of flyovers or underpasses that should have been part of the project. Similarly, for a railways project the government may find that they have missed out on some safety measures in the initial design. As a matter of fact, the need of supplementary works generally arises and their details are provided only during the construction phase of the project. Supplementary works cause an addition to the list as well as quantities of work-items. Additional works inevitably lead to an increase in the project costs, even if there is no increase in the price-rate of work-items. Formally speaking, if the initial design misses out on project works then $(q_1^a, q_2^a, \ldots, q_n^a) \geq (q_1^0, q_2^0, \ldots, q_n^0)$ will hold. In such a scenario the parties will need to renegotiate the contract. The renegotiated contract will specify the additional works to be performed by the contractor and the corresponding additional payment that the government will have to make to the contractor. This clearly would mean that $C^a > C^0$ will hold.

Second, the initial design may turn out to be inadequate for the actual project site conditions. To repeat an earlier example, the optimum mix of concrete and bitumen, the type of foundations needed for flyovers, etc., depend on the quality of soil at the project site. If the work conditions turn out to be different from those for which the project was designed, there will be a change in the quantities of work-items. As a result, the actual quantities and costs are bound to be different from the estimated ones.

It is important to emphasize that the contract renegotiation in itself puts an upward pressure on the project costs to the department, even if there is no significant increase in quantities of work-items. This is so because at the time of award of the initial contract, the contractor has to compete with other bidders. However, at the time of renegotiation, there are no competitors around. As a result of this fundamental transformation in the bargaining process, the contractor is in a position to hold-up the project and, therefore, is likely to get a better deal. Specifically, the payments by the department for changed works and quantities are likely to be higher compared to the scenario in which they are incorporated in the initial design and contract themselves.

Delays

As discussed in the Introduction, infrastructure projects in India suffer from long delays, i.e., time overrun. Several factors, such as, dispute over land acquisition, slow process for regulatory clearances, inter and intra-organization failures, contractual disputes, shortage of skilled manpower, etc., are the leading causes behind delays. Several reports, including the official ones, corroborate this claim.[17] A delay in project implementation affects the actual costs. This can happen simply on account of inflation itself. If there are delays, inputs will become more expensive and, in turn, will cause an increase in the project cost. Moreover, certain overhead costs have to be met as long as the project remains incomplete. Delays will increase these costs also. Also, a long delay may cause depreciation of project assets, necessitating expenses on repairs or replacements. Therefore, delay in implementation is very likely to cause cost overrun for the project.

Regional (State-level) Factors

Local infrastructure and capacity of local contractors may have bearing on actual project costs and therefore cost overruns. If a state/region has better transport, power, and telecommunication infrastructure in place, it is expected to be easier to execute projects in that state, perhaps leading to lower cost overruns. Similarly, availability of sufficient number of experienced and capable contractors has potential to execute projects at lower cost overruns.

Here it should be noted that if the data analysis shows regional/state level differences in cost or time overruns, the same cannot be attributed to the state level differences in terms of activities, such as, cost estimation, project designing, contracting and its monitoring. For all the projects in our dataset, these activities are performed by the central government department concerned.

Other Factors

In principle some other factors, e.g., corruption, if exists, etc., can also cause the actual costs to exceed the estimated costs. Besides, one may argue, in order to reduce tax payments the contractors may be inflating the actual costs. However, for our dataset such factors do not seem to be plausible

17. See Lok Sabha (2006), LEA International Ltd. (2008), and quarterly reports of MOSPI. Also see Singh (2010).

or significant. For instance, for IR contracts in our data, projects costs are costs for the department and not for the contractor. Since costs to the department are also income to the contactor; therefore, an increase in projects costs means increase in contractor's income. This should increase contractor's tax liability and not reduce it. As regards to the PPP contactors, in fact, they enjoy income and other tax holiday of as much as 10 years (see, Anant and Singh, 2009). So, inflating cost will not help them save tax payments. The government officials also don't seem to have any incentive to inflate actual project cost figures.

Remark 3**:** *Due to the factors listed in the sub-sections "Uncertainty" to "Delays" the actual project costs will be different from the estimated costs. However, on account of the factors discussed under the Subsections "Purposeful Underestimation" to "Delays," the actual costs are more likely to exceed than be exceeded by the initial cost estimates, i.e., the estimated costs. Moreover, the other factors, such as, initial design and estimated costs, etc., held constant, on account of factors discussed in the sub-section "Trade-off between Construction Costs and Benefits during O&M Phase" and "Trade-off between Construction Costs and O&M Costs," construction costs of a project are likely to be higher, if the project is implemented using a PPP contract, as opposed to an IR or an FP contract. Therefore, ceteris paribus, the cost overruns are likely to be higher for the PPPs than for IR and FP contracts.*

Now, we are in a position to predict whether cost overruns are likely to vary across projects, for any given contract type. Here, it will help to explore the implications of project complexity for the cost overruns. It will also help to be mindful of the project cost estimation techniques actually used by project planners. Discussions with several engineers involved in project designing for road and railways sectors suggest that estimates of construction costs at the project planning stage are arrived at in the following manner: first, the cost estimates of the essential work-items are made; second, additional allowance is made for the changes in the project works due to "commonly experienced" contingencies.[18] In terms of the terminology in the sub-section "Incomplete Design, Contract Renegotiation, and the Hold-up," the estimated construction costs are arrived at by adding the estimated costs of the basic works with the estimated costs of frequently encountered supplementary works. In such a scenario, incompleteness of the initial designs and of the initial contracts is likely to increase with the "complexity" of

18. The contingency allowance is about 10–20 percent of the cost of the basic good.

projects. Since, costs of supplementary works, relative to the basic works, is very likely to increase with project complexity. However, a basic-work focused initial design is unlikely to make enough provision for them. This means that more complex projects will have higher vulnerability to renegotiations. Therefore, in view of the arguments in the sub-section "Incomplete Design, Contract Renegotiation, and the Hold-up," more complex projects are likely to exhibit higher cost overruns. Two more implications follow from this conjecture. For instance, construction projects are inherently more complex than those involving simple purchase of machinery. So, the construction projects are expected to show relatively high cost overruns. Within the class of construction projects, the cost overruns are expected to increase with the complexity.

Next, we can discuss how cost overruns will vary over time, other factors such as contract type and project complexity held fixed. Intuitively, cost overruns should decline over time. Since the initial designs should improve as engineers become more and more experienced with project planning and implementation. After all, with experience project designers will become better educated about the possible states of nature and their requirements. As a result, they will be able to include increasing number of the states of nature in the initial design itself, reducing the incompleteness of the initial design as well as of the contract. This means that, ceteris paribus, the cost overruns should decline over time. The following proposition summarizes the hypotheses following from the above discussion.

Proposition 1: *Ceteris paribus*, *average cost overruns will:*

1. *decrease as the project designers become more experienced;*
2. *increase with the complexity of the project;*
3. *increase with the delay, i.e., time overrun;*
4. *be higher for PPP contracts than for IR and FP contracts; and*
5. *be higher for construction projects than for simple procurement projects.*

Data, Empirical Frameworks, and Results

Data Description

Two datasets of completed infrastructure projects are used. The first dataset includes 934 projects from 17 infrastructure sectors, completed during April, 1992–June, 2009. All projects in this set, with the exception of a few

road projects, have been funded and executed by the relevant department of Government of India. Each project is worth ₹200 million or more. This dataset has been compiled from quarterly reports of the program implementation division of the Ministry of Statistics and Programme Implementation (MOSPI). Projects are quite diverse in terms of the nature of activities covered. Given that projects are from 17 different sectors, ranging from Finance to Atomic Energy to Urban Development, the heterogeneity across projects is not surprising. In fact, in several cases projects within a sector are also quite diverse; e.g., some of the power sector projects are construction project while others have involved simple purchase of machines such as turbine. As is discussed in the section "Data, Empirical Frameworks, and Results," this heterogeneity means that different projects employ different contracts to complete project works. Yet, road, railways, and urban-development sectors make for a somewhat homogeneous group; most projects in these sectors are construction projects. Similarly, sectors telecom and atomic energy also make a homogeneous group in that a large number of projects in these sectors are for purchase and/or installation of equipments. In contrast, in civil aviation, ports, and power sector project activity varies from purchase of equipments to extensive construction; though many projects are predominantly construction based.

The second dataset has 195 road projects in India. These NH projects have been implemented by the National Highways Authority of India (NHAI). Source for this dataset is the NHAI. As regards road projects, there is an overlap between the two datasets. The second set includes most of the 169 road projects contained in the first dataset.[19] However, this is a larger set. Moreover, for highways projects the NHAI dataset is richer in terms of information on various project characteristics. For instance, for each project in this set we know whether it is a publically funded or a privately funded project; i.e., whether a project is a PPP or not. We also have information regarding date of award of contract for the implementation of the project, which obviously comes after the date of approval. The MOSPI provides information about the latter but not about the date of award of contract. So, this dataset enables us to explore the issues of delays and cost overruns

19. However, there are some road projects in the first dataset which are absent from the NHAI dataset, and vice versa. The difference arises because MOSPI gives information only on projects worth more than 200 million rupees and irrespective of their implementing agency. The NHAI dataset, on the other hand, includes all projects executed by NHAI but excludes national highways projects implemented by the Ministry of Roads and Surface Transport. There seem to be some reporting errors too.

during the project implementation phase by excluding the delays during the project planning stage, i.e., the delays in the award of contract.

For every project in either dataset, we have compiled information on the aspects mentioned in Table A-1. For tables and figures please see the Appendices.

Summary Statistics

Tables A-2 and A-4 provides summary statistics for the larger dataset. As is evident from the statistics, there are wide-ranging variations across sectors in terms of the number of projects, average percentage delays, and cost overruns, and their standard deviations. For analytical convenience, we have divided the MOSPI dataset into several sectoral and regional categories. The sectoral categories are: road, railways, and urban-development; civil aviation, shipping and ports and power projects; telecom and atomic energy; and, all other projects. The regional categories are: states of Punjab, Haryana, Delhi, Gujarat, and Maharashtra; states of Andhra Pradesh, Tamil Nadu, Karnataka, and Kerala; the states of Northeast and Jammu and Kashmir; and, the rest of the Indian states. Table A-3 provides the number of projects belonging to each category. The rationale behind these groupings is explained in detail later on.

As discussed in the Introduction, among other things, this paper aims to examine the road and railways sectors with respect to delays and cost overruns, as well as to compare the performance of these two sectors. Therefore, a closer look at the data on road and railways projects is called for. I must point out that while analyzing the road sector individually we will use NHAI dataset, given its more detailed information. For the study of railways projects we are restricted to use MOSPI dataset, since this is the only source of information for these projects. Moreover, when we compare the two sectors, in the interest of consistency, we will be working with the MOSPI dataset for both the sectors.

Tables A-5–A-7 provide summary statistics for the road and railways projects. Figures A-1–A-4 show the (non-linear) time-trends for percentage time overrun, percentage cost overrun, project size in terms of the initial project cost, and the implementation phase for road sector. Similarly, Figures A-5–A-8 show how these variables have behaved over time for railways projects. As is clear from Figures A-1–A-4, project size in term of the initial project cost has increased for road projects over time. The implementation phase has also increased over the years. While cost overruns have increased over time, there has been decline in delays in percentage terms.

As far as railways projects are concerned, the initial project cost has first increased but declined during more recent years. The trend for the implementation phase is just reverse of the trend for project cost. As far as the time (cost) overruns are concerned, initial years have witnessed a decline (an increase) in delays (cost overruns). However, in recent years cost overruns have come down but delays seem to have gone up.

Regression Models

The model presented in the previous section offers several testable predictions regarding cost overruns across contracts and projects; such as for PPP versus non-PPP contracts, construction versus simple procurement projects, etc. However, to test the predictions related to project complexity and experience of the planners, we need measures of these aspects.

As far as the experience with project designing is concerned, its proxy is easier to get. We can measure it in terms of number of months that have elapsed since the start of the first project in the sector or dataset under consideration. We call the duration as TIMELAPSE. We will denote its square by TIMELAPSESQ or $TIMELAPSE^2$. Ceteris paribus, the contractual incompleteness is expected to decrease with TIMELAPSE. As a result, the cost overruns are also expected to come down. But, what can measure complexity of a project? The project size seems to be a reasonable measure of complexity. Presumably the complexity increases with project size. Since, compared to smaller ones, bigger projects involve larger number of works that are also likely to be more complicated. The designing and coordination problems naturally increase with the number and magnitude of works, in turn, increasing the complexity. If so, the issue boils down to determining the measures of project size. The data provides two measures of project size. The first is the initially estimated project cost. Following the terminology in Singh (2010a), we will call the estimated project cost to be simply the INITIALCOST.[20] The second measure is the implementation phase; the duration in which a project is initially planned to be completed. We will term this measure as the IMPLEMENTATIONPHASE, or the IMPLPHASE for short. Plausibly, as the number of works or their intricacy increases, it will take longer to complete the project. Presumably, the project planners

20. The initially expected project cost, rather than the actual cost, is a better indicator of the size and incompleteness of the contract. Due to cost overrun, the final cost can be large even for small projects. The same argument applies to the implementation phase.

will increase the implementation phase in proportion to its complexity. In other words, the IMPLPHASE should be proportional to the complexity of the project. Indeed, implementation phase seems to be a better measure of project size, its complexity, and hence of the contractual incompleteness.

As argued above, arguably any delay in implementation will also cause cost overrun for the project. At the same time, it is pertinent to keep in mind that contract renegotiation is a time consuming and generally contested process. This means the contractual incompleteness is expected to cause not only cost overruns but also delay. Moreover, organization or interdepartmental failure during the construction phase can trigger delays as well as cost overruns. These arguments suggest simultaneity between cost and time overruns. However, as is shown in Singh (2010a), while there is simultaneity between the two, the causation runs from delays to cost overruns and not the other way around. To sum up, we have the following testable predictions:

Proposition 2. *Ceteris paribus, average cost overruns will*

1. *increase with INITIALCOST;*
2. *increase with IMPLPHASE;*
3. *increase with TIME OVERRUN;*
4. *decrease with TIMELAPSE;*
5. *be relatively high for PPP contracts; and*
6. *be relatively high for construction projects.*

The analysis presented above, in the Section "Infrastructure Projects" and in this section, suggests the following regression model for percentage COSTOVERRUNS or $PCTO_t$ for short:

$$PCTO_t = \alpha_0 + \alpha_1 TIMELAPSE_t + \alpha_2 TIMELAPSE^2_t + \alpha_3 INITIALCOST_t + \alpha_4 IMPLPHASE_t + \alpha_5 PCTO_t + \varepsilon_{1t} \quad (1)$$

For time overrun PCTIMEOVERRUN, or PCTO for short, we will estimate the following model:

$$PCTO_t = \beta_0 + \beta_1 TIMELAPSE_t + \beta_2 TIMELAPSE^2_t + \beta_3 INITIALCOST_t + \beta_4 IMPLPHASE_t + \varepsilon_{2t} \quad (2)$$

We will add several dummies while estimating the above equations. Dummies DRRU, DCSPP, DTA are used to test the last conjecture in Proposition 2. DRRU is dummy for road, railways and urban-development

projects, and DCSPP for projects in civil aviation, shipping and ports, and power sectors. As was discussed in the section "Infrastructure Projects," most projects in road, railways, and urban-development sectors are construction projects. Construction projects are typically more complex and therefore more difficult to plan and execute, than is the case with non-construction projects. Majority of projects in civil aviation, shipping and ports, and power sectors too involve construction and are complex even otherwise. The degree of incompleteness of the initial contract is higher for construction and complex projects. So, compared to other sectors, projects in road, railways, urban-development, civil aviation, shipping and ports, and power sectors should exhibit higher cost overruns. Separate dummies are used for two reasons: one, projects in the latter category are generally unique in terms of its requirements, so learning from across projects is limited; two, projects in road, railways, and urban-development sectors are more homogeneous, in that most projects involve construction. Dummy DTA is for telecom and atomic energy sectors. Most projects in these sectors are for procurement of equipments and machinery. Designing of such projects is expected to be fairly complete and therefore not vulnerable to cost overruns.

Apart from sectoral dummies, regional dummies have been included as well. The motivation is to capture the effects of local factors, such as, infrastructure and capacity of local contractors, on delays and cost overruns. Generally, richer states are assumed to be in possession of superior infrastructure and more capable contractors. In contrast, due to the law and order related problems as well as due to difficult terrain project implementation is likely to be difficult in the Northeastern states and Jammu and Kashmir. To check statistical validity of these conjectures, states have been clubbed in four categories. Five richest states, in terms of per-capita income, are grouped together. These are Haryana, Punjab, Delhi, Gujarat, and Maharashtra. Dummy DMRICH is used for these states.

In the next category, we have four southern states: Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. These states have well above average per-capita GSDP and are considered to be better governed; that is why a separate dummy is needed. For these states the dummy used is DRICH. In the third category are the Northeastern states and Jammu and Kashmir with dummy DNE. Dummy DSTATE has been used for interstate projects.

The above Equations (1) and (2) form the base model. Several close versions of this model have been estimated. The estimation has been undertaken for all of the 17 sectors taken together; for road and railways sectors combined; and for road and railways sectors individually.

Results

For each variant of the base model, the relevant dataset has been treated for outliers and influential observations.[21] For each version and every application of the model the two error terms are uncorrelated with each other. However, a significant number of observations get dropped as outliers. For instance, for all the sectors together we have 928 observations, out of which 131 have turned to be outliers.[22]

ALL SECTORS. The regression results for all of the 17 sector projects are presented in Table A-8. Model 1 is the same as the base model and is estimated using the OLS technique. For this model, most of the hypotheses have turned out to be correct. For both cost as well as time overrun equations, TIMELAPSE has a negative coefficient and is extremely significant at 1 percent for time, as well as, cost overrun equation. Besides, in both the equations, the coefficient of TIMELAPSESQ is positive and significant at 1 percent. That is, the downward trend for percentage cost and time overruns is statistically significant. However, the effect is U-shaped, which is not surprising. After all, as project planners move up the learning curve, additional learning is expected to come down. The coefficient of INTIALCOST in Equation (1) is positive and extremely significant at 1 percent. The coefficient of IMPLPHASE in Equation (1) is not significant! However, at a close look this outcome should not be entirely surprising, since both INTIALCOST and IMPLPHASE are picking up the same effect, namely, the project size. Result of Model 2 confirms this conjecture. If we drop INTIALCOST, variable IMPLPHASE becomes significant. Time overrun is one of the most important factors behind cost overruns. The coefficient of percentage time overruns, PCTO, is positive and extremely significant at 1 percent. Indeed, regardless of the underlying cause, delays in implementation are a major factor behind cost overruns. As predicted, variables DRRU and DCSPP have turned out to be positive and extremely significant for delays as well as cost overruns. That is, the other factors held constant, the road, railways,

21. In order to identify outliers, studentized residuals were predicted and observations having absolute value greater than two were dropped. To identify influential points STATA's in built command for calculating leverage of each observation, DFITS, DFBETA, WELSCH DISTANCE, and COVRATIO were used (see Belsley et al., 1980).

22. A close look at the dropped outliers shows that for many projects in the dataset the time and the cost overruns figures appear to be rather incredible. Several projects have experienced very long positive time overruns and simultaneously huge but negative cost overrun. There are many projects with time overrun of 20 percent or more and negative cost overruns of at least 70 percent! Most probably these are instances of reporting errors. For more on this issue see Singh (2010a).

and urban-development projects have experienced relatively long delays and high cost overruns. The same is the case with civil aviation, shipping and ports, and power sector projects. However, dummies DTA and DSTATE have not shown any consistency. Projects in Telecom and Atomic energy sectors have shown longer delays but lower cost overruns; the technological breakthroughs in these sectors could be one possible reason.

A robustness check has been done by estimating the model using Quantile regression on the entire dataset of 928 projects (see Table A-9). In view of a large number of outliers this check is helpful; compared to OLS, the Quantile regression is less vulnerable to the effects of outliers. Results are very similar to those reported in Table A-8.

ROADS. In this subsection, we take a close look at the performance of the projects delivery system for NHs, in terms of delays and cost overruns. Tables A-10 and A-11 present the relevant results. Of course the sectoral dummies are not relevant here. For projects we estimate the following equations:

$$\begin{aligned} PCTO_t = {} & \alpha_0 + \alpha_1 TIMELAPSE_t + \alpha_2 TIMELAPSE^2{}_t \\ & + \alpha_3 INITIALCOST_t + \alpha_4 IMPLPHASE_t + \alpha_5 PCTO_t \\ & + \alpha_6 DPPP_t + \alpha_7 DMRICH_t + \alpha_8 DRICH_t + \alpha_9 DNE_t + \varepsilon_{1t} \end{aligned}$$

$$\begin{aligned} PCTO_t = {} & \beta_0 + \beta_1 TIMELAPSE_t + \beta_2 TIMELAPSE^2{}_t \\ & + \beta_3 INITIALCOST_t + \beta_4 IMPLPHASE_t + \beta_5 DPPP_t \\ & + \beta_6 DMRICH_t + \beta_7 DRICH_t + \beta_8 DNE_t + \varepsilon_{2t} \end{aligned}$$

for cost overruns and time overruns, respectively.

First important observation relates to the effect of time overrun on cost overrun. Here effect is quadratic in nature. Informally and somewhat loosely speaking, this implies that short delays in implementation do not matter much for cost overruns. However, long delays do seem to contribute to cost overruns.[23] As far as variables TIMELAPSE, and TIMELAPSESQ are concerned, both are highly significant and the results are similar to those for all the sectors combined. That is, other things held fixed, the effect of TIMELAPSE is quadratic in nature for both delays as well as cost overruns, as before. However, results are different regarding variables INITIALCOST and IMPLPHASE. In contrast, now the variable IMPLPHASE in Equation (1) is positive and extremely significant at 1 percent. That is, when the effect of

23. If we estimate the base model without PCTIMEOVERRUN square, the PC-TIMEOVERRUN does not come out to be very significant. Value of R-square also suggests that it is a better model for road sector.

other factors is held fixed, cost overruns swell as IMPLPHASE increases. The result is as expected. However, the coefficient of INITIALCOST in Equation (1) is negative though not very significant. As predicted earlier, implementation phase seems to be a better proxy of contractual incompleteness. In Equation (1), the coefficient of INITIALCOST is positive and significant implying that delays increase with the project size. On the other hand, IMPLPHASE has negative and extremely significant (at 1 percent) effect. That is, ceteris paribus, time overrun decreases with implementation phase! However, on a closer look, the result makes sense. For illustration, consider two same-sectors (which indeed is the case here) with same-works and therefore same-cost projects. Between these projects, the one with the longer IMPLPHASE should show shorter percentage time overrun; since it has already got more time to complete the same number of works. While absolute time overrun may and is likely to increase with project size/IMPLPHASE, ceteris paribus, there is no reason to expect delays to increase in percentage terms with the IMPLPHASE.

What is the combined effect of the IMPLPHASE and INITIALCOST variables? It seems the implementation phase is driving the results. Since the implementation phase has gone up in recent years, as a consequence while there has been decline in the percentage time overruns, but cost overruns have increased. Figures A-1–A-4 depict these conclusions clearly; note that the implementation phase and the cost overruns have moved in the same direction.

As is clear from the results in Table A-11, the above discussed other variables continue to have the same signs and the levels of significance. However, the rich states do not show significantly and consistently superior performance. The results are robust to the choice of the datasets (with and without outliers) and regression technique used. However, the number of outliers identified by the STATA continues to be significant; it dropped 57 observations as outliers.[24] To confirm veracity of the above results, I have run Quantile regressions.

As far as PPP projects are concerned, as one would expect, PPP projects have experienced shorter time overruns. However, the results are very striking with respect to cost overruns. Controlling for the effect of several relevant project characteristics, compared to non-PPP projects PPP projects have exhibited significantly higher cost overruns. The coefficient of PPP

24. This disquieting feature is common to all of OLS regressions, regardless of the model used and the sector studied.

dummy is positive and extremely significant at 1 percent. These findings imply important policy lessons and are discussed in the last section.

While in view of the arguments presented in the sub-sections "Trade-off between Construction Costs and Benefits during O&M Phase" and "Trade-off between Construction Costs and O&M Costs" the result regarding relatively high cost overruns in PPPs is not surprising, nonetheless we need to discuss several other possibilities. May be the relatively high cost overruns in PPPs are a result of deliberate underestimation of the initial cost or of some strategic behavior on the part of PPP contractors. Besides, we need to be mindful of one potential source of endogeneity; there could be some factors which affect cost overruns as well as the PPP outcome, i.e., whether a project will attract PPP or not.

As regards to the first issue, the estimates of project cost (INITIALCOST) and time (IMPLEPHASE) are arrived at by the NHAI[25] for both PPP as well as non-PPP projects. Moreover, these estimates are arrived at before the outcome whether a project will attract private investment, i.e., become PPP, is known.[26] A priori there seems to be no reasons for deliberate underestimation of project costs for PPPs. As far as strategic exaggeration of actual cost by the contractor is concerned, as per the MCA—the contract document for PPPs—and other official documents, the contractor does not stand to gain by inflating the actual cost figures; VGF[27] is determined on the basis of the INITIALCOST and not on the actual cost. Moreover, the contractors are provided tax exemption for 10 years. So, it is difficult to attribute the above difference in cost overruns to strategic reasons, even if they are there. To guard against the endogeneity with respect to choice of projects for PPPs, in Equation (1) on percentage cost overruns, we have included most of the variables that significantly affect the likelihood of a project being taken up as PPP.[28] These variables are not correlated with the error term, so the OLS estimates are likely to be consistent.

Furthermore, it is relevant to point out that the relative high cost overruns in PPPs cannot be attributed to the "Trade-off between construction costs and income from the O&M phase" as discussed in the Subsection "Trade-off between Construction Costs and Benefits during O&M phase."

25. More specifically, the consultants hired by NHAI provide these estimates.

26. Most of PPPs in the data have been formed after 2005. Since 2005 NHAI has offered all projects on PPP basis. A project is implemented with IR contracts, only if it does not attract PPP.

27. Viability gap funding (VGF) is the official grant provided to contractor for unviable projects. For such projects, the bidders submit (asking) bids for this amount.

28. See Anant and Singh (2009).

To see why, note that the IMPLPHASE along with TIMEOVERRUN together are nothing but the total construction time. Therefore, we have already controlled for the total construction time, though indirectly.

However, there is one factor that can potentially increase cost of PPPs more than that of the non-PPPs. It is possible that the PPP contractors during the construction phase find it in their interest to increase the scope of projects. Since with additional/ supplementary projects works they may be able to provide better road services; which, in turn, will secure them higher revenue income. If so, PPP contractors are likely to put in greater effort to convince the department of the desirability of additional works. The IR contracts, in contrast, do not induce contractors to put in such efforts. Due to the reasons discussed in the sub-section "Incomplete Design, Contract Renegotiation, and the Hold-up" additional works lead to cost overruns. The nature of data available at present does not permit an across the board control of this effect.

To sum up, it does not seem to be implausible to attribute the relatively high cost overruns in PPPs to the factors cited in the sub-section "Incomplete Design, Contract Renegotiation, and the Hold-up" and, to an extent, to the quality investment as discussed in the sub-section "Trade-off between Construction Costs and O&M Costs."

RAILWAYS. The regression model used for railways projects is the same as our base model and the one used to study road projects. Again, the sectoral dummies are not relevant here. Now, instead of PPP dummy we have DCIVILENG dummy among the list of explanatory variables; railways sector has no completed PPP project. Railways projects have been clubbed in two categories, namely, civil construction projects and others. DCIVILENG is a dummy for the former category of projects; other projects are largely for procurement and installation of equipments, etc. Specifically, for railways projects we estimate the following equations:

$$PCTO_t = \alpha_0 + \alpha_1 TIMELAPSE_t + \alpha_2 TIMELAPSE^2_t + \alpha_3 INITIALCOST_t + \alpha_4 IMPLPHASE_t + \alpha_5 PCTO_t + \alpha_6 DCIVILENG_t + \alpha_7 DMRICH_t + \alpha_8 DRICH_t + \alpha_9 DNE_t + \varepsilon_{1t}$$

$$PCIO_t = \beta_0 + \beta_1 TIMELAPSE_t + \beta_2 TIMELAPSE^2_t + \beta_3 INITIALCOST_t + \beta_4 IMPLPHASE_t + \beta_5 DCIVILENG_t + \beta_6 DMRICH_t + \beta_7 DRICH_t + \beta_8 DNE_t + \varepsilon_{2t}$$

for cost overruns and time overruns, respectively. Tables A-10 and A-12 show the regression results for railways projects. As far as results are

concerned, variables TIMELAPSE and TIMELAPSESQ have shown results that are similar to those for all the sectors combined and for the NH projects. That is, the U-shape effect continues for delays as well as cost overruns. The coefficient of IMPLPHASE in cost overrun equation is positive and extremely significant at 1 percent. Moreover, the coefficient of INITIALCOST in the equation is also positive and significant. That is, when effect of other factors is held fixed, percentage cost overruns increase with IMPLPHASE as well as with INITIALCOST. As was the case with road projects, in Equation (2), IMPLPHASE has negative and extremely significant at 1 percent effect; i.e., other factors held fixed, percentage time overruns decrease with the implementation phase, perhaps due to the similar reasons. INITIALCOST has no significant effect on time overruns. As before, project implementation is not significantly better in rich states. As regards to the combined effect of variables INTIALCOST and IMPLPHASE, again, the implementation phase seems to be driving the results. Earlier years experienced a decline in delays and cost overruns due to declining implementation phase. In recent years cost overruns have gone up along with the implementation phase. Figures A-5–A-8 show these trends clearly; the movements of cost overruns and the implementation phase are in the same direction.

However, the result related to the dummy DCIVILWORKS is of special interest. Note that both in Equation (1) as well as in Equation (2), the dummy has positive and extremely significant coefficient. This means that, compared to non-construction projects, railways construction projects have experienced significantly longer delays and much higher cost overruns; clearly an outcome predicted in the section "Cost Overruns." So, this result is yet another confirmation of validity of our theoretical model.

RAILWAYS VERSUS ROADS. If we estimate the base regression model for roads and railways project combined (MOSPI data), results are similar to the above reported findings. The results are presented in Table A-13. Yet again results related to variables TIMELAPSE and TIMELAPSESQ are exactly similar to those for all the sectors combined. The results are somewhat different regarding variables INITIALCOST and IMPLPHASE. The coefficient of IMPLPHASE in Equation (1) is positive and extremely significant at 1 percent. However, the coefficient of INITIALCOST in Equation (1) is negative though not highly significant. That is, when effect of other factors is held fixed, cost overruns swell as IMPLPHASE increases. The result is as expected. On the other hand, ceteris paribus, increase in INITIALCOST has dampening impact on percentage cost overruns! In Equation (2), IMPLPHASE has negative and extremely significant (at 1 percent) effect; INITIALCOST has no significant effect on time overruns.

That is, ceteris paribus, percentage time overrun decreases with implementation phase. Again, in view of the arguments presented above, the results are not entirely surprising.

What can we say about the relative performance of these two sectors? The signs and significance levels of the dummy DRAILWAYS in Table A-13 provide a clear answer to this question. The dummy is used for railways projects. First of all note that the coefficient of DRAILWAYS in Equation (1) is not significant at all. More specifically, controlling the effect of delays, there is no significant difference in the cost overruns exhibited by the road and railways projects. But, in Equation (2) the coefficient of DRAILWAYS is large and statistically extremely significant. That is, the other things held fixed, compared to highways projects, railways projects have suffered from significantly longer delays. Since, delays in turn are an important factor behind cost overruns; therefore, railways projects are vulnerable to relatively high cost overruns as well. This effect becomes even more pronounced if we compare just the construction projects in the two sectors; recall within railways projects, the construction (civil engineering) projects show relatively long delays and high cost overruns. Moreover, if we drop the PPP projects from the set of road projects, the dummy DRAILWAYS also becomes significant with a positive sign in the cost overrun equation. Therefore, the railways project delivery system is clearly inefficient and inferior to the one for NHs. This result is yet another demonstration of preventability of delays and the resulting cost overruns to a significant extent.

Concluding Remarks

We have analyzed projects from 17 infrastructure sectors together. Besides, we have studied the data on the road and the railways projects in detail. The following findings have emerged from the econometric analysis of all projects taken together: since 1980s the delays and the cost overruns have declined. Cost overruns have systematically declined not only in absolute terms but also as a percentage of project cost. Similar is the case with delays. However, the effect is U-shaped; delays regardless of their source are one of the crucial causes behind the cost overruns; relatively big projects have experienced much higher cost overruns compared to smaller ones. Specifically, absolute as well as percentage cost overruns soar with the project size, measured in terms of the project cost; percentage cost overruns also escalate with length of the implementation phase—the longer is the implementation phase, the higher are cost overruns in absolute as well as percentage terms;

compared to other sectors, projects from road, railways, urban-development, civil aviation sectors, as well as those from shipping and ports, and power sectors have experienced much longer delays and significantly higher cost overruns; there are no consistent regional difference, though southern states seem to have done marginally better in terms of avoiding delays in project implementation.

The analysis suggests that incompleteness of project designs and contracts may be one of the leading causes behind delays and cost overruns observed in public procurement of infrastructure in India. The incompleteness of designs and contracts results in an addition to the list of project works in the middle of the construction phase. Additional works naturally add to the project cost and the execution time leading to delays and cost overruns. The cost overruns on account of additional works are not necessarily bad. However, the incompleteness of initial design and contract necessitates midway changes. Consequences of the changes in work-items are qualitatively different in nature. Changes in the ongoing works cause wastage of resources, apart from delays in implementation; which, in turn, lead to avoidable cost and time overruns. The wastage becomes increasingly pronounced with an increase in the project size or its complexity. For similar reasons and as is demonstrated by the empirical findings, compared to non-construction projects, those involving construction are more susceptible to cost overruns; and, compared to the other sector projects, road, railways, and urban-development projects are more vulnerable to cost overruns. Our findings suggest that a better initial designing may help reduce delays and cost overruns.

I must point out that the available data does not permit quantitative measuring of the changes in design and the consequent changes in work-items. Therefore, we cannot be completely sure of how the incompleteness of design and contracts adds to delays and cost overruns. Indeed, further empirical research is needed on this issue. Nonetheless, case studies cited in the Introduction suggest that our arguments are not quite unfounded. The MOSPI reports too cite the change in project scope as one of most important and frequent reasons behind delays and cost overruns. Moreover, empirical results with respect to our proxies for project complexity—the implementation phase and the project cost—also corroborate this belief. Cost overruns increase with project size, especially when measured as the implementation phase. Presumably, project complex increases with its size and so does the incompleteness of design, which, in view of the above discussed reasons, leads to higher cost overruns.

By the very nature of contractual relationship, there cannot be perfect alignment of a contractor's objective with the social objective. Moreover,

the nature of infrastructure projects and contracts is such that every desirable term cannot be put in black and white. This, among other things, allows a contractor to reduce his costs at the expense of quality without violating the letter of the contract. The presence of corruption can make this problem all the more serious. Nonetheless, our findings suggest that the choice of the procurement contract and its management subsequently plays very important role in aligning or misaligning of the incentive structure of contractors with the social objective.

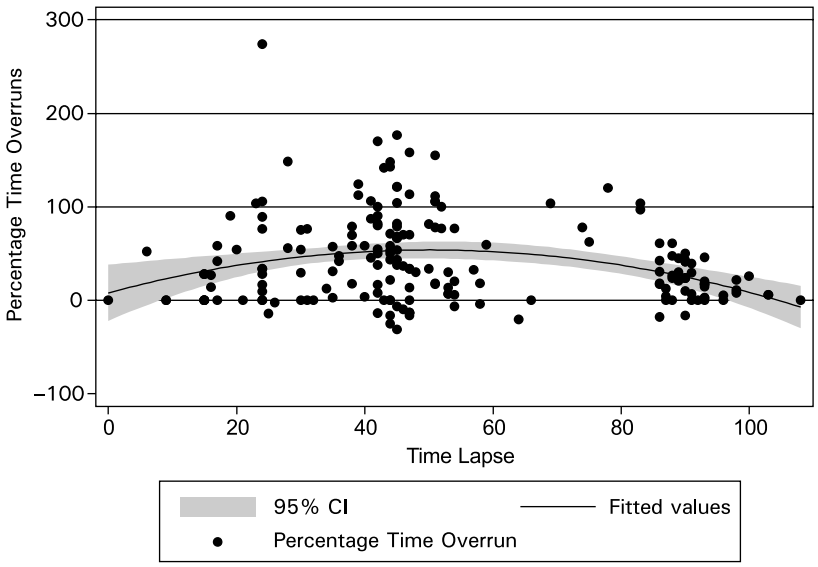
More specifically, the results show that the choice of the procurement contract has significant bearing on the level of delays. The traditionally used IR contracts do not provide right kind of incentives; under these contracts, the contractor does not have incentives to make quality investment or to avoid delays. The PPP contracts, by bundling the responsibility of maintenance with construction, motivate the contractor to desist away from quality shading efforts. In fact, he may have incentive to invest in quality in order to reduce his costs during the O&M phase of the project. Further research is needed to test the empirical validity of this conjecture. Moreover, the contractor has strong interest in completing the project as soon as possible. Since, the project revenue flows can start only after its completion. This line of reasoning is amply corroborated by the empirical finding regarding PPP projects on NHs. Compared to non-PPPs, PPP projects have experienced significantly higher cost overruns, but much lower time overruns. In view of the fact that delays are one of leading causes behind cost overruns, these findings on PPP projects imply interesting inferences and policy lessons. One, factors other than delays are largely responsible for cost overruns experienced by the PPP projects. Perhaps future research will indentify the relevant causes. Two, different contracts provide different incentive to the contractor regarding contract management and timely completion of the project. It goes to show that with a suitable choice of contract, it is possible to manage time better and lower the cost overruns (due to delays) in the process. I must emphasize that these merits of PPPs do not per se make a case for them; there are several relevant issues that have not been considered here. Three, the contracts are likely to deliver better outcome if they club the responsibility of project maintenance with that of construction, as is the case under PPPs.

Organizational factors, such as decision-making processes within the project sponsoring department, interdepartmental coordination, etc., also seem to be responsible for delays. Our comparison of road with railways projects confirms this belief. Most of the road as well as railways projects

(in MOSPI data) have used IR contracts; so presumably, the incentive structure for contractors in both the sectors is similar. Yet, instances as well as magnitude of delays are much higher for railways projects. As a result, the cost overruns attributable to delays are also higher for railways projects. This is mainly due to three reasons. One, the slow processing of railways projects during tendering and contracting phase. The available data indicates so, though the issue needs to be explored further. Second, the poor contract management by railways. While the NHAI awards most of works to one contractor, the railways award different works to different contractors. This inevitably complicates the coordination process for project works. Third, fund allocation procedure of adopted by the railways. Every railways project is allocated funds each year that too latter half of the year. NHAI procedures do not suffer from these limitations. These findings offer yet another policy lesson: there is need to improve the incentive and resource allocation structures within the government departments.

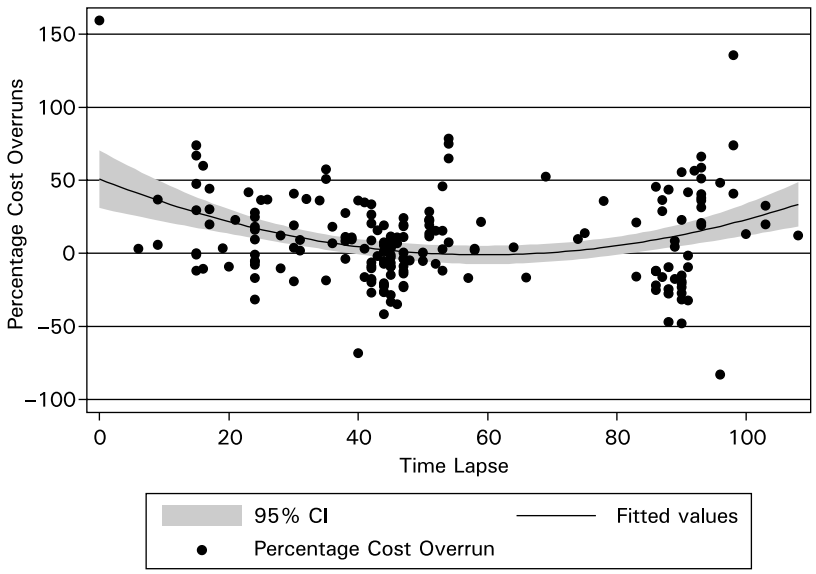
APPENDIX

FIGURE A-1. Percentage Time Overrruns Over the Years (Roads) (Nonlinear Trend)



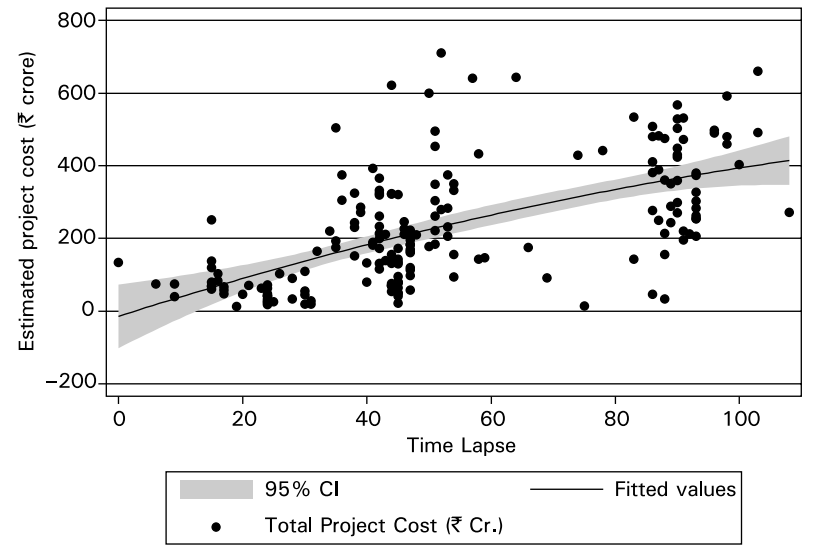
Source: Data discussed in Section 4.

FIGURE A-2. Percentage Cost Overrruns Over the Years (Roads)



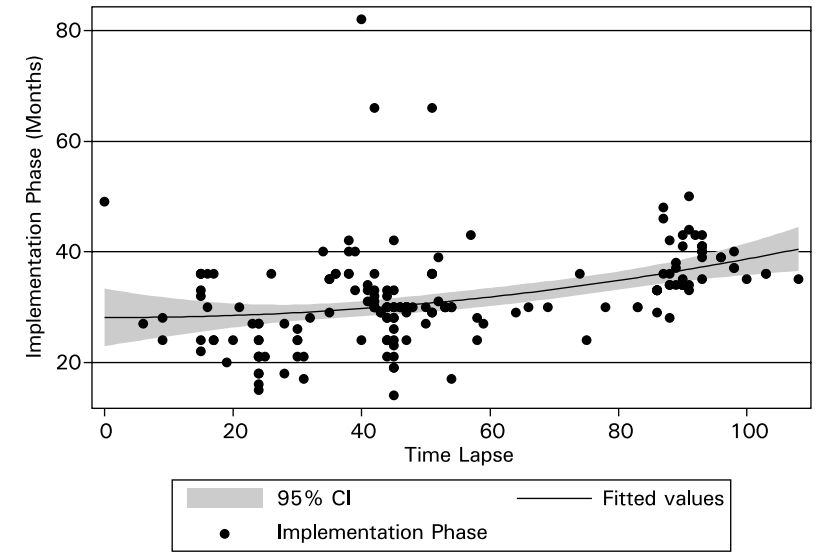
Source: Data discussed in Section 4.

FIGURE A-3. Initial (Estimated) Project Cost Over the Years (Roads)



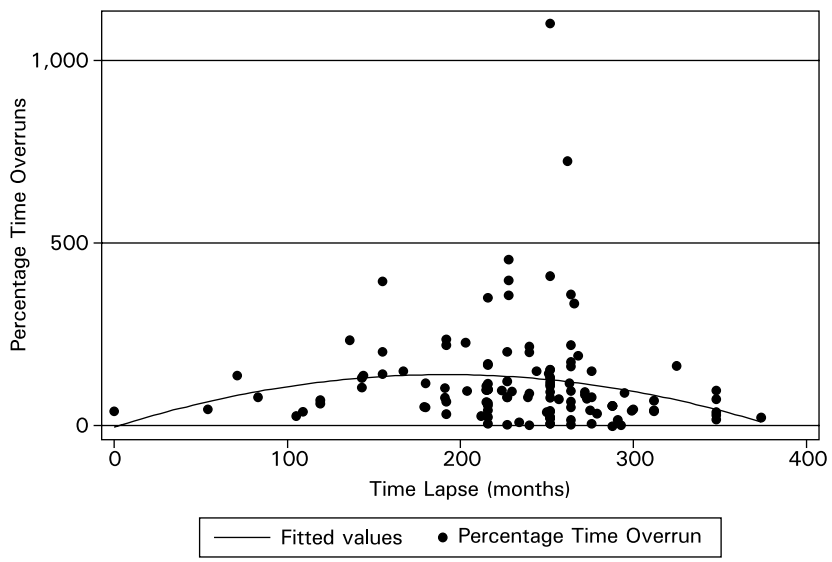
Source: Data discussed in Section 4.

FIGURE A-4. Implementation Phase Over the Years (Roads)



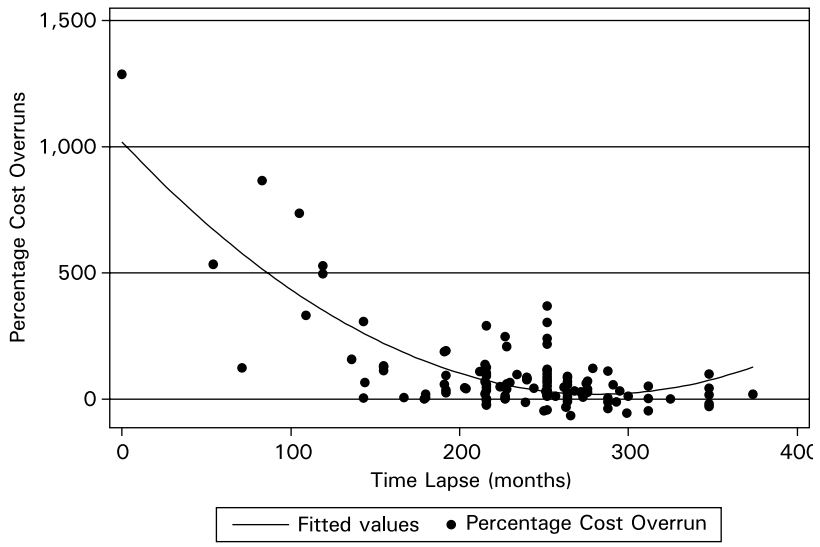
Source: Data discussed in Section 4.

FIGURE A-5. Percentage Time Overrruns Over the Years (Railways)



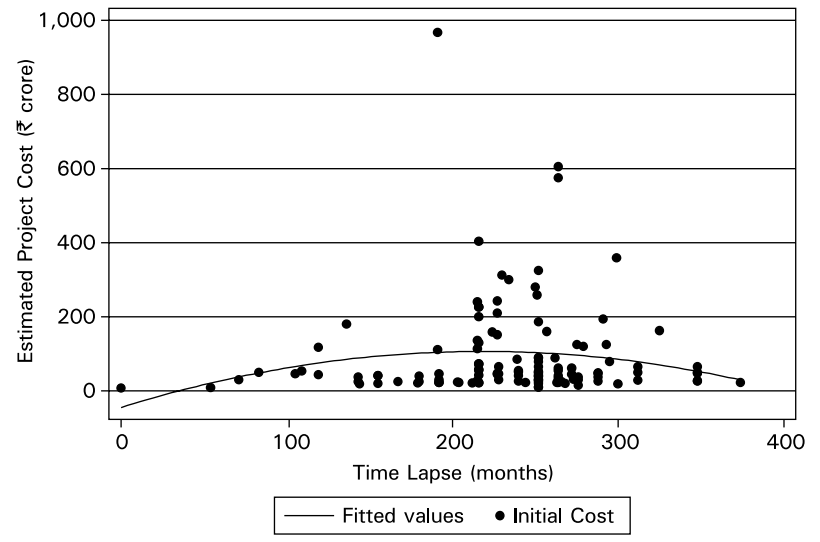
Source: Data discussed in Section 4.

FIGURE A-6. Percentage Cost Overrruns Over the Years (Railways)



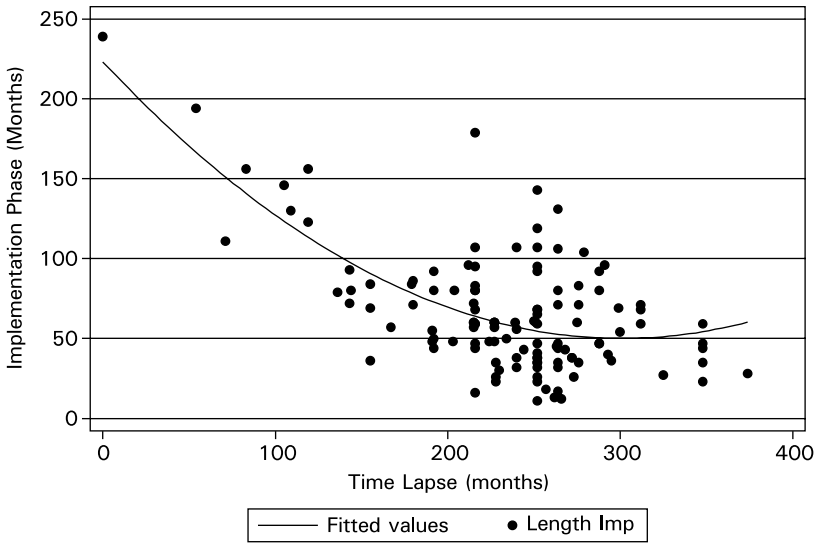
Source: Data discussed in Section 4.

FIGURE A-7. Initial (Estimated) Project Cost Over the Years (Railways)



Source: Data discussed in Section 4.

FIGURE A-8. Implementation Phase Over the Years (Railways)



Source: Data discussed in Section 4.

TABLE A-1. Data: Aspects and Sources

S. no.	*Aspect/variable*	*Description*	*Data source*
1	DATE OF PROJECT START	It is the date of approval of the project.	MOSPI reports and the NHAI.
2	INITIAL/EXPECTED DATE OF COMMISSIONING	It is the initially planned (i.e., expected) date of completion of the project.	MOSPI reports and the NHAI.
3	ACTUAL DATE OF COMMISSIONING	It is the actual date of completion of the project.	MOSPI reports and the NHAI.
4	TIMEOVERRUN	The time difference (in months) between the actual and the initially planned date of completion; Time difference between (3) and (2), above.	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.
5	IMPLEMENTATION PHASE (IMPLPHASE)*	The duration in which a project is planned to be completed, i.e., the duration between the date of approval of the project and its *expected* date of completion.	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.

(*Table A-1 continued*)

(*Table A-1 continued*)

S. no.	*Aspect/variable*	*Description*	*Data source*
6	PCTIMEOVERRUN (PCTO)*	The ratio of the time overrun and the implementation phase for the project (multiplied by one hundred).	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.
7	INITIAL/EXPECTED PROJECT COST (INITIALCOST)	The initially projected (i.e., expected) cost of the project.	MOSPI reports and the NHAI.
8	ACTUAL PROJECT COST	The actual cost at the time of completion of the project.	MOSPI reports and the NHAI.
9	COST OVERRUN	The difference between the actual cost and the initially projected (i.e., expected) cost of the project.	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.
10	PCCOSTOVERRUN (PCCO)	The ratio of the cost overrun and the initially anticipated cost of the project (multiplied by one hundred).	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.
11	TIMELAPSE	It is the time (in months) that has lapsed since the date of approval of the *first* project in the relevant dataset. For all sectors projects it is the time that has lapsed since May 1974. For the set of railways projects it is the same, i.e., May 1974. For the NHAI dataset on projects it is August 1995.	OUR CALCULATIONS based on the data collected from MOSPI reports and the NHAI.
12	SECTOR	The infrastructure sector to which the project belongs.	MOSPI reports.
13	STATE	The state in which the project is located.	MOSPI reports and the NHAI and publications of the Ministry relevant for the sector.

Source: Data discussed in Section 4

Note: *Definition for NHAI dataset is somewhat different and has been explained in the text.

TABLE A-2. Summary Statistics: All Sectors

Sector	Number of projects	% Cost overrun				% Time overrun			
		Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Atomic energy	12	15.05	113.12	–84.89	265.12	301.02	570.48	–3.13	2,033.33
Civil aviation	51	–2.07	38.97	–80.32	109.18	67.20	56.01	–12.20	289.29
Coal	102	–11.42	91.72	–99.73	466.23	30.42	69.70	–93.33	359.57
Fertilizers	16	–12.57	28.92	–67.75	50.13	26.53	41.80	–18.18	109.30
Finance	1	132.91	–	132.91	132.91	302.78	–	302.78	302.78
Health and family welfare	2	302.30	92.96	236.56	368.03	268.04	208.63	120.51	415.56
I & B	7	14.00	62.97	–34.60	134.64	206.98	140.57	101.67	491.43
Mines	5	–33.16	20.65	–62.78	–9.88	42.44	36.23	–2.78	98.11
Petrochemicals	3	–12.22	25.92	–28.40	17.68	74.43	3.05	70.91	76.19
Petroleum	125	–15.82	29.12	–80.87	106.77	38.52	50.31	–41.67	242.86
Power	108	51.09	271.36	–61.83	2,603.96	33.55	54.89	–50.00	202.08
Railways	130	94.06	178.33	–65.49	1,287.98	118.05	141.13	–2.17	1,100.00
Road transport and highways	169	14.50	61.09	–93.86	416.72	46.48	54.66	–28.26	317.39
Shipping and ports	61	–1.35	84.35	–90.37	574.38	118.64	276.79	–7.14	2,150.00
Steel	44	–15.41	47.32	–91.85	235.88	50.49	60.08	–25.00	305.56
Telecommunication	74	–33.82	56.22	–98.40	279.46	248.82	253.98	–18.18	1,200.00
Urban development	24	12.31	50.27	–48.81	144.00	66.44	44.58	3.60	166.67
Total	934	15.06	131.26	–99.73	2,603.96	79.46	152.98	–93.33	2,150.00

Source: Data discussed in Section 4.

TABLE A-3. Category-wise Distribution of Projects (All Sectors)

Sectors/States	*Number of projects*
Road, railways, and urban-development	316
Civil aviation, shipping and ports, and power	221
Inter-state; spanning across multiple states	91
Punjab, Haryana, Delhi, Gujarat, Maharashtra	252
Andhra Pradesh, Tamil Nadu, Karnataka, Kerala	222
Northeast and J&K	64

Source: Data discussed in Section 4.

TABLE A-4. Summary Statistics: Aspects Covered (All Sectors)

Variables	*Mean*	*Std. dev.*
PCGECOSTOVRRN	15.06	131.26
PCGETIMEOVRRN	79.50	152.98
TIMELAPSE	290.03	63.59
$TIMELAPSE^2$	88,153.83	34,162.54
INITIAL COST	291.46	619.20
IMPLPHASE	45.39	48.08

Source: Data discussed in Section 4.

TABLE A-5. Summary Statistics: Delays and Cost Overruns (Road and Railways)

	Road (NHAI data)			*Railways (MOSPI data)*		
Sector	*PPPs*	*Non-PPPs*	*All projects*	*PPPs*	*Non-PPPs*	*All projects*
Number of projects	50	145	195	0	130	130
Percentage of projects with positive Time Overrun	74	78.62	77.44	n.a.	97.69	97.69
Mean Percent Time Overrun	17.49	49.30	41.14384	n.a.	116.24	116.24
Percentage of projects with positive Cost Overruns	74	55.172	60	n.a.	82.31	82.31
Mean Percent Cost Overruns	21.39	5.98	9.93	n.a.	90.199	90.199

Source: Data discussed in Section 4.

TABLE A-6. Summary Statistics: Road Projects (NHAI Data)

Variable	*Mean*	*Std. dev.*	*Min*	*Max*
TIME LAPSE (MONTHS)	53.18974	26.17467	0	108
TIME LAPSE Sq (MONTHS Sq)	3,510.749	3,113.801	0	11,664
INITIAL COST	226.9915	164.0463	12.15	710
IMPLEMENTATION PHASE	31.69231	8.373848	14	82
COST OVERRUN (percentage)	9.92837	31.18886	–83.014	159.097
TIME OVERRUN (percentage)	41.68907	46.64695	–31.579	274.0741
TIME OVERRUN Sq	3,902.758	7,654.422	0	75,116.59

Source: Data discussed in Section 4.

TABLE A-7. Summary Statistics: Railways Projects (MOSPI Data)

Variable	*Mean*	*Std. dev.*	*Min*	*Max*
TIME LAPSE (MONTHS)	233.7642	61.07575	0	374
TIME LAPSE Sq (MONTHS Sq)	58,345.63	26,145.37	0	139,876
INITIAL COST	93.63854	130.8549	6.74	968
IMPLEMENTATION PHASE	65.78862	38.10065	11	239
COST OVERRUN (percentage)	94.06268	178.3289	–65.49	1,287.98
TIME OVERRUN (percentage)	118.0493	141.1263	–2.17	1,100
TIME OVERRUN Sq	33,690.33	121,846.7	0	1,210,000

Source: Data discussed in Section 4.

TABLE A-8. All Sectors

	Model 1		*Model 2*	
Variables	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*
PCGETIMEOVRRN		0.0854		0.0949
		[0.0224]		[0.0220]
		(0.000)		(0.000)
TIMELAPSE	–2.8993	–2.7328	–2.2846	–2.3500
	[0.3714]	[0.3662]	[0.3037]	[0.3782]
	(0.000)	(0.000)	(0.000)	(0.000)
TIMELAPSE Sq	0.0039	0.0043	0.0029	0.0037
	[0.0006]	[0.0006]	[0.0005]	[0.0006]
	(0.000)	(0.000)	(0.000)	(0.000)
INITIAL COST	–0.0016	0.0144		
	[0.0053]	[0.0033]		
	(0.758)	(0.000)		
IMPLPHASE	–1.8848	0.1430	–1.7513	0.2170
	[0.1565]	[0.1117]	[0.1449]	[0.1058]
	(0.000)	(0.201)	(0.000)	(0.041)
DRRU	52.4719	40.0284	51.1584	37.4532
	[5.3119]	[3.4134]	[5.1512]	[3.3739]
	(0.000)	(0.000)	(0.000)	(0.000)
DCSPP	23.1145	20.1239	21.7332	17.5595
	[4.7073]	[3.3279]	[4.6854]	[3.3167]
	(0.000)	(0.000)	(0.000)	(0.000)
DTA	155.6228	–29.5410	159.2271	–33.5075
	[17.3884]	[6.9564]	[17.5965]	[6.6734]
	(0.000)	(0.000)	(0.000)	(0.000)
DSTATES	–9.5303	3.9355	–12.2252	4.7312
	[6.1470]	[4.9466]	[5.6048]	[4.6512]
	(0.121)	(0.427)	(0.029)	(0.309)
DMRICH	–2.6099	–0.4604	–2.9584	1.6575
	[5.5619]	[3.2476]	[5.2901]	[3.2676]
	(0.639)	(0.887)	(0.576)	(0.612)
DRICH	–4.8560	–4.7192	–6.2061	–4.2426
	[5.0631]	[3.0916]	[4.9688]	[3.0811]
	(0.338)	(0.127)	(0.212)	(0.169)
DNE	–2.8802	14.1414	3.1680	15.5355
	[7.4362]	[6.3857]	[11.1237]	[7.9015]
	(0.699)	(0.027)	(0.776)	(0.050)

(*Table A-8 continued*)

(*Table A-8 continued*)

	Model 1		*Model 2*	
Variables	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*
CONSTANT	615.0301	383.9315	514.6568	324.6392
	[56.1885]	[55.8855]	[45.2008]	[58.0830]
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	797	797	793	793
R-squared	0.4856	0.4521	0.4698	0.4059

Source: Data discussed in Section 4.

Note: *White's heteroskedastic consistent estimates. Robust standard error in brackets. P-value in parentheses.

TABLE A-9. All Sectors Quantile Regression

	Model 1		*Model 2*	
Variables	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*
PCGETIMEOVRRN		0.0238		0.0210
		[0.0135]		[0.0108]
		(0.078)		(0.051)
TIMELAPSE	–1.6575	–3.3612	–1.6125	–3.3535
	[0.1667]	[0.1750]	[0.1631]	[0.1395]
	(0.000)	(0.000)	(0.000)	(0.000)
TIMELAPSE2	0.0019	0.0053	0.0018	0.0053
	[0.0003]	[0.0003]	[0.0003]	[0.0003]
	(0.000)	(0.000)	(0.000)	(0.000)
INITIAL COST	0.0003	0.0048		
	[0.0027]	[0.0030]		
	(0.923)	(0.112)		
IMPLPHASE	–1.3812	0.0511	–1.3557	0.0482
	[0.0389]	[0.0418]	[0.0381]	[0.0333]
	(0.000)	(0.221)	(0.000)	(0.149)
DRRU	42.0435	38.8320	41.5236	37.9306
	[4.3663]	[4.6669]	[4.2510]	[3.6947]
	(0.000)	(0.000)	(0.000)	(0.000)
DCSPP	21.3950	12.6426	21.2230	13.3243
	[4.8514]	[5.1749]	[4.7542]	[4.1366]
	(0.000)	(0.015)	(0.000)	(0.001)
DTA	126.6826	–20.3786	127.7805	–21.3393
	[6.6537]	[7.6012]	[6.5350]	[6.0619]
	(0.000)	(0.007)	(0.000)	(0.000)
DSTATES	–6.7338	9.6266	–7.0454	11.3310
	[5.9723]	[6.3671]	[5.8716]	[5.0564]
	(0.260)	(0.131)	(0.230)	(0.025)
DMRICH	–3.5019	1.7691	–4.4538	1.6225
	[4.3897]	[4.6549]	[4.3183]	[3.7226]
	(0.425)	(0.704)	(0.303)	(0.663)
DRICH	–7.1624	–1.3236	–7.1073	–0.8019
	[4.5287]	[4.7965]	[4.4368]	[3.8363]
	(0.114)	(0.783)	(0.110)	(0.834)

(*Table A-9 continued*)

(*Table A-9 continued*)

	Model 1		*Model 2*	
Variables	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*	*PCGETIMEOVRRN (% Time overrun)*	*PCGECOSTOVRRN (% Cost overrun)*
DNE	2.1731	14.7062	2.3591	16.0438
	[7.2072]	[7.6990]	[7.0501]	[6.1209]
	(0.763)	(0.056)	(0.738)	(0.009)
CONSTANT	404.0795	490.4227	396.2734	490.8609
	[22.5214]	[23.8009]	[22.1004]	[19.0289]
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	928	928	928	928
Pseudo R2	0.1851	0.2143	0.1851	0.2128

Source: Data discussed in Section 4.

Note: *Robust standard error in brackets. P-value in parentheses.

TABLE A-10. Time Pattern of Explanatory Variables

(a) **ROADS**—(Dropping Outliers by Inspection)*

	Time overrun (%age)		Cost overrun (%age)		Initial cost		Implementation phase	
TIME LAPSE (months)	–0.2181	2.0085	0.0249	–1.1738	3.7794	5.5607	0.1388	0.0187
Since first project started	[0.0938]	[0.4613]	[0.0864]	[0.3591]	[0.3272]	[1.5707]	[0.0153]	[0.0747]
	(0.0211)	(0.0000)	(0.7734)	(0.0013)	(0.0000)	(0.0005)	(0.0000)	(0.8028)
TIME LAPSE		–0.0191		0.0103		–0.0153		0.001
Sq (months		[0.0039]		[0.0030]		[0.0139]		[0.0006]
Sq)		0.0000		(0.0008)		(0.2727)		(0.0900)
CONSTANT	52.1228	0.7542	8.063	36.0355	25.9683	–15.0462	23.5376	26.3419
	[6.6649]	[10.5143]	[4.5329]	[9.3683]	[17.0114]	[34.1174]	[0.9854]	[2.0503]
	(0.0000)	(0.9429)	(0.0769)	(0.0002)	(0.1285)	(0.6597)	(0.0000)	(0.0000)
Observations	194	194	191	191	195	195	191	191
R-squared	0.0171	0.097	0.0006	0.0563	0.3636	0.3673	0.3004	0.3096

Note: *Robust standard errors in brackets. Robust *p* values in parentheses.

(b) **RAILWAYS**—Regression Analysis (Outliers Dropped by Inspection)*

	Time overrun (%age)		Cost overrun (%age)		Initial cost		Implementation phase	
TIME LAPSE (months)	–0.2159	1.1153	–1.8012	–7.1276	0.0941	1.1428	–0.354	–1.1845
	[0.1212]	[0.2979]	[0.4904]	[1.3761]	[0.0876]	[0.3320]	[0.0462]	[0.1377]
	(0.0773)	(0.0003)	(0.0004)	(0.0000)	(0.2849)	(0.0008)	(0.0000)	(0.0000)
TIME LAPSE		–0.0032		0.0128		–0.0025		0.002
Sq (months		[0.0007]		[0.0027]		[0.0008]		[0.0003]
Sq)		(0.0000)		(0.0000)		(0.0025)		(0.0000)
CONSTANT	154.2842	30.2869	511.9798	1,013.19	56.3142	–46.429	147.0883	225.2366
	[30.7402]	[31.4458]	[123.1152]	[171.0332]	[20.6245]	[30.8502]	[11.1512]	[15.0652]
	(0.0000)	(0.3373)	(0.0001)	(0.0000)	(0.0072)	(0.1349)	(0.0000)	(0.0000)
Observations	128	127	130	130	127	126	130	130
R-squared	0.019	0.0695	0.3841	0.6105	0.0046	0.0268	0.3148	0.4315

Source: Data discussed in Section 4.

Note: *Robust standard errors in brackets. Robust *p* values in parentheses.

TABLE A-11. Roads

	Ordinary least squares		*Quantile regression*	
Variables	*Cost overrun (%age)*	*Time overrun (%age)*	*Cost overrun (%age)*	*Time overrun (%age)*
TIME OVERRUN	–0.1744	–	–0.1215	–
(%age)	[0.1173]	–	[0.1245]	–
–	(0.1395)	–	(0.3303)	–
TIME OVERRUN Sq	0.002	–	0.001	–
–	[0.0012]	–	[0.0007]	–
–	(0.0866)	–	(0.1604)	–
TIME LAPSE	–2.1936	0.9171	–1.5213	1.2425
(MONTHS)	[0.4325]	[0.6971]	[0.4991]	[0.4690]
–	0.0000	(0.1906)	(0.0026)	(0.0088)
TIME LAPSE Sq	0.0166	–0.0095	0.0116	–0.0108
(MONTHS Sq)	[0.0035]	[0.0056]	[0.0042]	[0.0039]
–	0.0000	(0.0920)	(0.0057)	(0.0065)
INITIALCOST	–0.0214	0.064	–0.036	0.0287
(Rs Cr)	[0.0189]	[0.0268]	[0.0214]	[0.0202]
	(0.2580)	(0.0183)	(0.0947)	(0.1580)
IMPLEMENTATION	1.2234	–1.4963	0.7759	–0.8759
PHASE	[0.3130]	[0.6335]	[0.3457]	[0.2977]
–	(0.0001)	(0.0197)	(0.0260)	(0.0037)
PPP	24.4391	–17.5805	24.2055	–24.9968
–	[4.5762]	[7.5527]	[7.2033]	[6.6570]
–	0.0000	(0.0215)	(0.0009)	(0.0002)
DMRich	–5.9812	–35.0389	–5.8278	–14.9314
–	[4.1281]	[8.1718]	[7.1019]	[7.0723]
–	(0.1498)	0.0000	(0.4129)	(0.0361)
DRich	–3.1267	–9.3567	–3.284	–0.177
–	[3.8764]	[7.1885]	[5.9907]	[5.8975]
–	(0.4214)	(0.1954)	(0.5842)	(0.9761)
Constant	31.4254	68.8723	30.4993	39.2564
–	[15.2501]	[25.7870]	[16.5192]	[15.9488]
–	(0.0414)	(0.0085)	(0.0664)	(0.0147)
Observations	137	137	195	195
R-squared	0.4108	0.2694	0.1152	0.1503

Source: Data discussed in Section 4.

Note: Robust p values in parentheses; robust standard errors in brackets.

TABLE A-12. Railways Projects

	OLS regression		*Quantile regression*	
	Cost overrun (%age)	*Time overrun (%age)*	*Cost overrun (%age)*	*Time overrun (%age)*
PCGETIMEOVERRUN	0.1879	–	0.0676	–
–	[0.0995]	–	[0.0380]	–
–	(0.0615)	–	(0.0778)	–
TIMELAPSE	–6.2047	–1.6047	–3.9913	–1.3732
–	[1.0402]	[0.4244]	[0.4402]	[0.3310]
–	(0.0000)	(0.0003)	(0.0000)	(0.0001)

(*Table A-12 continued*)

(*Table A-12 continued*)

	OLS regression		*Quantile regression*	
	Cost overrun (%age)	*Time overrun (%age)*	*Cost overrun (%age)*	*Time overrun (%age)*
TIMELAPSE Sq	0.0114	0.0013	0.0069	0.0012
–	[0.0020]	[0.0009]	[0.0009]	[0.0007]
–	(0.0000)	(0.1327)	(0.0000)	(0.0855)
INITIALCOST	0.0108	0.0643	0.0805	0.0806
–	[0.1024]	[0.0716]	[0.0444]	[0.0412]
–	(0.9165)	(0.3714)	(0.0723)	(0.0527)
IMPPHASE	1.3053	–2.3793	0.8149	–1.7487
–	[0.3955]	[0.2875]	[0.2327]	[0.1825]
–	(0.0013)	(0.0000)	(0.0006)	(0.0000)
DMRICH	7.366	4.1014	12.2754	–3.8511
–	[22.2515]	[14.0262]	[14.1814]	[12.7301]
–	(0.7412)	(0.7705)	(0.3884)	(0.7628)
DRICH	–14.7929	12.9849	–13.1792	13.6612
–	[18.0243]	[18.6226]	[14.3895]	[12.6318]
–	(0.4135)	(0.4871)	(0.3616)	(0.2816)
DNE	65.4014	–10.3658	29.6939	–4.9475
–	[64.8897]	[38.9132]	[28.4047]	[25.6574]
–	(0.3157)	(0.7904)	(0.2979)	(0.8474)
DCIVILENG	72.0178	30.3371	63.7247	24.3983
–	[17.6513]	[10.8406]	[11.9872]	[10.7387]
–	(0.0001)	(0.0060)	(0.0000)	(0.0249)
Constant	724.786	527.8237	491.9026	432.3361
–	[145.2471]	[65.5411]	[66.1056]	[50.7798]
–	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	122	122	130	130
R-squared	0.76	0.5017	0.2762	0.2663

Source: Data discussed in Section 4.

TABLE A-13. Road and Railways Projects

	OLS regression		*Quantile regression*	
	Cost overrun (%age)	*Time overrun (%age)*	*Cost overrun (%age)*	*Time overrun (%age)*
PCGETIMEOVERRUN	0.2111		0.0748	
	[0.0682]		[0.0397]	
	(0.0022)		(0.0608)	
TIMELAPSE	–2.661	–1.5371	–4.313	–1.3811
	[0.8934]	[0.4691]	[0.3300]	[0.2834]
	(0.0032)	(0.0012)	(0.0000)	(0.0000)
TIMELAPSE Sq	0.0042	0.0016	0.007	0.0014
	[0.0015]	[0.0008]	[0.0006]	[0.0006]
	(0.0070)	(0.0440)	(0.0000)	(0.0145)
INITIALCOST	–0.0284	0.0511	–0.0132	0.0456
	[0.0245]	[0.0263]	[0.0263]	[0.0227]
	(0.2472)	(0.0534)	(0.6146)	(0.0453)

(*Table A-13 continued*)

(*Table A-13 continued*)

	OLS regression		*Quantile regression*	
	Cost overrun (%age)	*Time overrun (%age)*	*Cost overrun (%age)*	*Time overrun (%age)*
IMPPHASE	0.6902	–2.13	0.5561	–1.704
	[0.2075]	[0.2304]	[0.1995]	[0.1443]
	(0.0010)	(0.0000)	(0.0057)	(0.0000)
DMRICH	4.4121	–22.7683	1.0267	–10.0423
	[6.8747]	[7.0347]	[8.9337]	[7.8597]
	(0.5217)	(0.0014)	(0.9086)	(0.2024)
DRICH	3.3794	–8.6586	1.8697	–5.2196
	[5.4331]	[6.2490]	[8.1228]	[7.0547]
	(0.5346)	(0.1673)	(0.8181)	(0.4600)
DNE			18.7574	2.9748
			[20.2666]	[16.5987]
			(0.3555)	(0.8579)
DRAILWAYS	–7.974	42.2872	–0.8883	34.0317
	[7.9671]	[7.9934]	[9.3754]	[7.8898]
	(0.3180)	(0.0000)	(0.9246)	(0.0000)
Constant	386.6825	455.8811	635.6869	409.2738
	[130.8940]	[72.7784]	[52.9052]	[41.6311]
	(0.0035)	(0.0000)	(0.0000)	(0.0000)
Observations	229	229	292	292
R-squared	0.41	0.56	0.2363	0.2896

Source: Data discussed in Section 4.

Comments and Discussion

Shashanka Bhide: The paper is an important contribution towards sorting out and improving the efficiency of infrastructure development in India. I should say that my comments here are actually quibbles on a very good paper. I have three sets of comments on the overall perspective of the paper, conceptual issues, and empirics.

Overall Perspective

While at the micro or project level, the success or failure has a fatal implication to the project, at the aggregate level it translates into some successes and some failures. For example, there is addition to power generation capacity over the years. The capacity addition per year has increased from 308 MW in the 1950s to 6,770 MW in the first decade of the 21st century. This is admittedly the "glass half full" story. The "half empty glass" is that in the first two years of the Eleventh Plan, 2007–08 and 2008–09, the achievements in building power generation capacity were far below even the revised targets. For 2007–08, the target was 15, 000 MW but the realization was 9,263 MW of additional capacity. The performance has been one of improved but below par achievements. This perspective is missing from the micro level focus of the paper. The point is significant as it may provide an explanation for the inefficiency at the micro level.

If the objective of the "sponsor" is the "aggregate," chances are that there would be some prioritization of the portfolio in the presence of capacity constraints: capacity to plan, implement, and monitor. It is not clear if fewer projects were taken up, they may have been executed in time and cost. It is also not clear why certain projects get initiated when in fact there is a backlog of several projects in the portfolio. Is there an aggregate level performance indicator that allows continued poor performance when judged on the basis of individual projects? Further, there may be greater concern with the "cost overrun" as compared to "time overrun" in projects.

A second aspect of the overall perspective is the fact that the government is a party to the contract for the projects considered. Of course the peculiarities of infrastructure projects: land intensive nature or "first in development

activity" in any area are important distinctions. The fact that the government is a party to the contract may have different types of risks that the other party has to bear: delays in decisions, proneness to litigation, etc. In other words, the delays and cost overruns that we observe in infrastructure projects may not be any different from other government activity.

Some Conceptual Issues in the Framework of Analysis

The paper distinguishes four stages of project implementation starting from planning to O&M. Consider the reasons for delays in execution of power projects cited by *The Economic Survey (2009–10)*: it says that delays of non-sequential supply of material, shortage of skilled manpower, contractual disputes, delays in the readiness of "balance of plants," design problems, shortage of fuel, and so on were responsible for the delays in completing the projects on time. In the vector of quantities of the contract, there is a risk that is probably understated. The reason may well be deliberate to disallow exaggeration by the contractors. In this sense, the systematic "underestimation" of costs and time needed for the projects may be an outcome of the considerable uncertainty in the process of project execution.

A common cause of delay in the execution of infrastructure projects has to do with land acquisition. There have been changes in the process over the years to help expedite execution. In the national highways (NH) projects now it is expected that 80 percent of the land required would be acquired before the projects are bid. However, even the balance 20 percent can hold up completion of the project. These are uncertainties associated with the infrastructure projects. The paper is an excellent analysis of what has happened to the impact of these uncertainties on the project outcome over time. There seems to be significant learning as the time trend has negative coefficient on the inefficiency in project completion.

The negative trend coefficient, however, hides the other matters. For instance, the rising economic growth momentum has put pressure on available supplies of materials and other resources, particularly labor of all types. The inefficiency in execution performance may increase because of this deficit in key inputs.

At a conceptual level, the paper does not take up the impact of reputation risks either for the sponsor or for the contractor from the inefficiency of project execution. Poor execution record may attract only poor performing contractors who may not worry about reputation risks. The poor execution

record may also similarly attract only poor planners on the part of the government as well, unless there are incentives for better performance.

Empirical Analysis

The paper provides a number of valuable insights. But it also raises many other issues.

The estimated overall model of inefficiency in time and cost of execution provides results in line with the prior expectations of the paper. One unresolved issue which the paper refers in passing is the endogeneity of some of the variables on the right hand side. The reference is mainly to the PP dummy used in the analysis of inefficiency of execution in the NH projects.

For instance, in the main equation, the "Initial Cost" is taken as an indicator of "complexity" of the project. The potential for renegotiation may also be larger in the larger projects. But "Initial Cost" may also reflect greater care taken by the designers and planners, greater care taken in monitoring and so on affecting the performance and influenced by performance. Similarly the "Implementation phase" may also incorporate some responses to likely efficiency outcomes. Longer implementation phase may be provided to projects that are likely to face execution constraints.

There is also the issue of interaction between explanatory variables, particularly the dummy variables and the other variables. For instance, in the main equation the impact of Initial Cost or Trend may differ across sectors. This would have given some important insights. Does the inefficiency of railways increase as they handle large projects as compared to the NHAI? Or the power sector players? Have the railways learnt less than the road builders over time? Are the richer states able to handle bigger projects better than the economically weaker or poor states?

This issue of interaction terms is important because the regression equation includes a variety of projects. Even in the case of roads projects where comparison is only between PP and other roads projects, the paper argues that differences arise in the way contracts are structured: PP projects include O&M operations that potentially raise the costs in Stages 1 through 3 to derive benefits in the O&M Stage. If the larger PP road projects less inefficient than the smaller PP projects, the difference between PP and non-PP projects may be minimal in large projects.

Now to the quibbles. It makes more sense to normalize the initial cost to a constant price value rather than leave it at the nominal value. Secondly, there are macro-economic conditions that may affect project execution

performance. Since the data set includes projects that have been executed in different decades over time, they have gone through very different conditions of inflation, trade regimes, forex controls, and industrial licensing regimes to say very little about the fiscal pressures. All of this may have nothing to do with project performance. But it is worth a test. All the learning effect we see in the trend coefficient may be a result of improved macroeconomic conditions.

Kenneth Kletzer: Investment in infrastructure in India is widely viewed as lagging and has become an important policy concern. The Government of India has undertaken significant moves towards increasing the stock of public capital, and the share of infrastructure investment in the public sector budget has been growing. Ram Singh's paper on public procurement is a timely contribution to the IPF. As experience and theory demonstrate, incentives in public sector contracts are critical for performance and costs. An expansion in public investment in India increases the importance of understanding how well the procurement and contracting process works in India and whether or how incentives in public contracting might be improved. This paper makes a good start in this direction using recent data on construction projects to look at contract performance.

The empirical study is motivated by the extent of cost overruns and delays to completion of publicly funded infrastructure projects in India. A highlighted observation is that mean cost overruns and time delays are positive suggesting systematic errors in project design, contract specification, or cost estimation. The variances in percentage cost overruns and time delays are also very large and the distributions are skewed to the right. Singh argues that if deviations of costs and construction time were simply due to unforeseen events, estimates would be reasonably good predictors of expected costs and completion time. Systematic cost increases suggest that incentives in contracts or in the public sector proposal process are inadequate for eliciting unbiased estimates and bids. The paper explores the sources of these cost and time overruns that can be found in the data available.

A large share of the theoretical and empirical literature on public procurement concentrates on the problem of contractor performance and incentives. Another aspect concerns agency within the government side of procurement decision making and oversight. That is, public procurement is about imperfect information and incomplete contracting. Renegotiation of contracts during the period of construction or manufacture takes place as information about actual costs is revealed. A basic lesson of this literature is

that the assignment of responsibility for cost increases and input decisions between the procurer and contractor affects the magnitude of cost overruns and project quality. The choice of contract form (e.g., a fixed price or cost plus contract) will depend on the importance of contractor discretion over project quality, as demonstrated by Bajari and Tadelis (2001) cited in this paper. Singh uses this background in his estimation of what causes cost and time overruns in infrastructure projects in India. Variations in the excess of actual costs over projected costs can be caused by incompleteness in optimal contracting or by poor contract design, specification, and implementation. Suboptimal design includes such problems as vulnerability to corruption and fraud.

The paper does a really nice job of explaining the basics of public sector contracts in India. In the data used, IR contracts, which are a form of cost plus contracts, are prevalent for construction projects. Many of the road projects are PPPs which include post-construction operation by the contractor. Because the builder of a partnership project receives revenues and pays for maintenance of the finished roadway, the builder has an incentive to substitute higher quality construction for lower maintenance costs. It also faces a trade-off between construction expense and revenues by choosing to speed up construction and generate income sooner. These contracts internalize the benefits of completing a high quality project to the contractor. The test of this hypothesis is the primary result of the econometric model in the paper in my view.

The large (and significant) positive effect of a partnership contract on percentage cost overruns and negative effect on project completion delays are consistent with the theory of the incentives generated by these arrangements. As noted in the paper, most construction-related cost risks and all maintenance related risks are borne by the contractor under PPP projects. Ignoring the difference between "most" and "all" construction costs, this eliminates the wedge between the marginal construction costs and maintenance costs present in standard IR or FP construction contracts. The empirical test relies on the assumption that costs estimates by the NHAI do not take account of whether the contract includes post-construction operation and maintenance or not. If the planners estimate construction costs independently of whether the contract is a standard IR one or a partnership, then the positive coefficient estimate indicates that PPP contracts have an overall cost reducing impact. This seems to be a reasonable assumption, and the results indicate that these types of projects reduce overall costs.

A small issue is that planners probably form cost estimates on the basis experience of recently completed projects. As the composition of projects

changes with a shift toward internalizing maintenance costs, initial cost estimates should rise and projected construction completion delays decrease over time. If learning leads to differentiation in estimates and bids by project type, the effect on cost and time overruns would disappear even though the incentive effects of the contracts are still working. Data that directly compares maintenance costs for partnership and non-partnership roads would be useful for confirming the positive impact of these contracts.

In the model, the controls include the initial projected cost and completion time. Projected completion time (the implementation phase) has a positive effect on the percentage cost overrun for road and railroad projects (Tables A-11, A-12, and A-13) and a negative effect on time delays. Initial cost has a positive effect on road projects alone and in the combined railroad and road regression. The implementation phase is interpreted as a proxy for the complexity of the project and the initial cost estimate measures the size of the project. The theoretical hypothesis is that more complex projects are more difficult to estimate or create more opportunities for costs increasing surprises. The result can only be suggestive in the absence of a model of why mean overruns are positive to begin with. A more complex project could have a higher variance of the difference between actual and estimated cost, but why should the mean cost overrun be higher for these projects? Perhaps, complexity and longer project implementation periods are associated with more opportunities for renegotiation. In this case, the result could indicate an escalation of the costs of incomplete contracting for the government with implementation time. If the upward bias in mean cost overruns and time delays reflects inefficiencies of the procurement process taking into account information imperfections (i.e., contracts are not constrained efficient), then an increase in project complexity could raise the welfare cost of inadequate or distorted policies.

More is said in the paper about these variables. In particular, Singh explains that the negative effect of projected implementation time on completion delays is consistent with errors in estimation. With unbiased estimates of the time to build a road with some true cost, we should find that higher time estimates are associated with negative time overruns and conversely. Given that initial cost and implementation phase are highly correlated in the data, the estimated effects of both cost overruns and time delays on the implementation phase variable are some unknown combination of the effect of project characteristics it measures and of this simple error in estimation of uncertain future costs. That said, the coefficient would be negative in both the cost and time regressions if the estimated completion time were

uncorrelated to project characteristics that matter. The implementation phase does measure something about projects, but we have no idea what.

One of the major differences appearing in the data and regressions is that cost overruns and time delays are much more pronounced in railroad construction than in road construction. Indeed, it is worth emphasizing that the paper shows that the outcomes of project development, implementation, and contract administration are very different between road construction and railway construction in India. The empirical analysis in the paper demonstrates this difference, but the data do not allow the author to explain the sources of the difference between rail and road construction.

Two significant differences are revealed by the data. One is that the mean implementation phase (the estimated of time to completion) is twice as long for rail projects as for road projects. These are larger projects and expected to take longer to build. The raw data also reveals a substantial decrease in cost overruns in railroad construction over the sample period. The significance of this decline is verified by the econometric model for both cost and time overruns for rail projects (Table A-12) and for all road and rail projects (Table A-13).

First, the difference between railroad and road projects may hold a key insight into how the procurement process leads to cost and time overruns. In the paper, the rail sector appears to be the nexus of overruns, but the data does not offer measures that could explain why. Not only are overruns more frequent and larger for rail projects, but the decrease in overruns over time is impressive. This seems to me, to be the big question for understanding how contract negotiation and renegotiation, as well as project implementation and administration, affect performance in public construction procurement in India. The difference between the two sectors really suggests that procedures for putting out bids, accepting bids, and renegotiating contracts matter. I would strongly suggest trying to figure this out in future policy analysis.

The improvement in estimate accuracy over time arises for both railroads and roads in both datasets used. It might suggest experiential learning by procuring agencies, bidding contractors, and project engineers. This explanation is favored in the paper. The decrease in time could reveal procedural changes that are indirectly revealed in the data set by their effect on cost overruns and completion delays. It could be that the procuring and contracting parties are doing a better job as they learn how to build roads and railroads to expected standards. Experience can certainly lead to clearer understandings of how interim renegotiation of incomplete contracts proceeds enabling the negotiation of more sophisticated *ex-ante* incomplete contracts. I wonder if there are institutional changes that may be shortening the delays starting

and finishing projects that may apply across sectors or be specific to railroad construction procurement during this period. This is another empirical regularity in the paper that suggests that contractual innovation could matter that could be related to a more detailed look at whether and how contract negotiation and execution have changed.

As it stands, the only policy experiment in the econometrics is the comparison of outcomes for PPPs. The NHAI dataset allows that. The result on the time reduction of overruns and the difference between railroad and highway projects suggests that more policy implications might be uncovered with a closer look at procurement practices or cases. A major contribution to cost and time overruns in construction projects, especially transportation projects, in India is land acquisition. The cumbersome and burden legal system and the absence of uniform procedures for acquisition are frequently credited with responsibility for delays in the initiation of construction and completion leading to consequent cost increases. It is possible that differences in site acquisition procedures could explain the divergence between overruns for railroad and road projects.

Another aspect of the contracting process could also be considered in future work. This is the role of agency on the public sector side of the procurement process. The incentives provided to project planners and engineers who oversee private contractors and renegotiate project work and costs could help explain the frequency of cost overruns and the differences across sectors. This includes corruption in the procuring agent and contractor relationship, as well as more benign incentive concerns. The datasets available do not allow the investigation of these incentive effects.

It may be useful to place the cost overruns and completion delays in Indian infrastructure projects in international perspective. Overruns and delays are commonplace in public construction projects in advanced industrialized, as well as other emerging market, economies. Some of the references in this paper study cost overruns in public procurement in advanced industrialized economies. For the sample of public sector construction projects in 20 countries over a nearly 80-year period used by Flyvbjerg, Holm, and Buhl (2003), 90 percent of all transportation projects exceeded estimated cost. For the European countries in their sample, the mean cost overrun is 22 percent for road projects and 34 percent for rail projects. Underestimation also does not decline over time for that entire sample.

In the samples of Indian projects used in this paper, cost overruns are a bit less frequent: 60 percent of road projects in the NHAI data and 82 percent of the rail projects in the MOSPI data experienced cost overruns. Further, the average cost overrun for the Indian road construction projects was just

10 percent and for rail projects was 82 percent. Time delays are particularly large in the Indian data with nearly all rail projects overdue with an average time overrun of more than 100 percent. It is also interesting to note that over the eight-decade horizon, cost and time overruns do not decline for the industrialized countries but do decline significantly over less than two decades for the Indian data.

This could be a cause for optimism. Cost overruns and completion delays in highway projects compare very favorably. The empirical finding of the paper that PPPs in road construction reveal incentive effects consistent with cost reduction also suggest a positive policy outcome. Clearly, the cost overruns and delays in railroad projects deserve a closer look and could offer some insights into contract incentives that generate possible policy reforms.

General Discussion

Rakesh Mohan (session chair) opened by noting that it will be useful to have some international comparison of PPP performance and evaluate the performance in India against it. He also noted that since the PPPs are of a relatively recent origin, it would be useful to check if there is some learning-by-doing.

T. N. Srinivasan raised three issues. First, incompleteness is a catchall term but its forms with very different implications may differ greatly. Effort may be unobservable and therefore incapable of being contracted, leading to incompleteness. There are different forms of contingencies that may arise but they may be too many to be exhaustively incorporated into the contract, leading to another form of incompleteness. Second, if we think of the paper as an exercise in pure positive economics, then it can be seen as trying to predict cost and time delays for different forms of contracts. But if it is a normative, policy exercise, then we might ask why in each situation the chosen one is the right form of the contract? Finally, we have the issue whether we can use the data to reasonably predict the cost overruns for various forms of contracts. If yes, we can anticipate the cost overruns in the future contracts and build them into the initial cost estimates in the first place. This is an issue Robert Summers had once analyzed at the Rand Corporation with respect to the military contracts.

Rohini Pande cautioned against over emphasizing the complexity and incompleteness as the source of delays and overruns. She mentioned her ongoing work on the impact of e-procurement in road projects in India and Indonesia. In India, this research looks at all the rural roads constructed under

the PMGSY [Pradhan Mantri Gram Sadak Yojna] between 2000 and 2009. Over this period, 10 states moved to e-procurement at different points in time and for a subset of these states bidding data, allowing the observation of the entire tendering process, are available. What is found is that exactly the same road, if built under e-procurement as against traditional procurement holding everything else fixed, exhibits a significant decline in time overrun and better quality though no difference in cost overruns.

Abhijit Banerjee echoed Srinivasan stating that since the types of contracts are not randomly assigned to different projects, comparing outcomes without a theory of how the contracts are chosen is problematic. He also noted that cost overruns are the outcomes of the bidding process. Bidders typically understate the costs to win the contracts.

Dilip Mookherjee raised the issue that in evaluating the contracts, it is important to know the variable on which what the bidding is taking place. For instance, in the BOT type of projects, the bidding may be taking place on the eventual price the contractor would charge the customer. If so, cost overruns will impact the price charged and directly impact the customer. The social welfare implications of such cost overruns will be quite different from those on conventional projects in which the contractor bids on the delivery price only.

Suman Bery echoed Abhijit Banerjee suggesting that the overruns perhaps reflect underbidding by contractors to win the contract. Once they have won the contract, they are in a better position to renegotiate with the government since the game now becomes bilateral instead of one of winning the contract under competitive bidding against several other bidders. The fact that the negotiator at the other end happens to be the government perhaps works further to the advantage of the contractor in the bilateral bargaining.

Ritu Anand pointed out that the way to avoid the apples and oranges problem in doing the comparison would be to confine the sample to road, ports, and airports and then compare PPP and non-PPP projects. There now exist sufficiently many projects that one can obtain sufficiently large sample within each project category to make such comparison possible.

Urjit Patel pointed out that one of the reasons for establishing PPP contract in contrast with the EPC [Engineering, Procurement, and Construction] was that it gives you better value for money on a life-cycle basis. In comparing the PPP and non-PPP (e.g., EPC) projects, you need to consider the costs over the entire life cycle in both cases. In the case of PPP, costs automatically include O&M costs but the same is not true of the EPC-type non-PPP contract. The comparison must incorporate the O&M costs in the latter case. It is also useful to bear in mind that the PPP construction is

higher quality because the contractor has an incentive to do so to minimize the O&M costs.

Ram Singh responded that when analyzing the PPP projects, he had restricted the sample to road projects only, thereby minimizing the apples and oranges problem. Regarding the point by Abhijit Banerjee, he stated that cost overrun in his case did not represent underbidding since he had measured them by comparing the actual costs to the costs estimated by the government officials rather than the contracted cost. Banerjee contested this, however, noting that often the bidders use the estimated cost as the focal point leading to very high correlation between the estimated and contracted prices. Ram Singh disagreed saying that in his case the estimated and contracted prices were different. Finally, Ram Singh agreed with the point made by Suman Bery that part of the problem with overruns related to the government being one of the contracting parties. He supported this by noting that the overrun problem was more severe in the railway rather than road contracts and this was perhaps because the railway ministry was much larger and poorly managed.

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CAG: Various reports
CSO: Various publications
Economic Survey: Various issues
EPW: *Economic and Political Weekly*
MOSPI: Various quarterly reports and other publications.
NHAI: Various reports and other publications.

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Political Reservation and Substantive Representation: Evidence from Indian Village Councils

Introduction

Female presence in India's state and national legislatures hovers at 10 percent. Concerns that this limits the political voice available to women have led to the introduction and subsequent passage of a Reservation Bill in the Upper house of the Indian Parliament (*Times of India*, March 9, 2010). The bill seeks to reserve 33 percent of India's state and national legislature positions for women. If implemented, 181 out of the 543 National legislators and 1,370 out of the 4,109 State legislators will be women.

Several studies demonstrate that men and women differ in their political and policy preferences (Edlund and Pande, 2002; Miller, 2008). Furthermore, as voters are typically unable to enforce full policy commitment by their legislator, implemented policies often reflect policymakers' preferences (Besley and Coate, 1997; Pande, 2003). Political underrepresentation of women, thus, potentially biases policymaking away from female policy interests. These arguments provide important motivations for gender-based affirmative action policies. Consistent with this view, a number of studies find

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that increased female representation in politics is associated with significant changes in policymaking (see, e.g., Chattopadhyay and Duflo, 2004; Munshi and Rosenzweig, 2010; Figueras, 2007; Rehavi, 2007; Powley, 2007).

However, there are several concerns with using affirmative action to redress gender imbalances in politics. A first concern is the effectiveness of affirmative action in empowering women. If female underrepresentation in politics reflects a woman's low status within the household, then reservation may not affect genuine change. Husbands of elected female leaders may maintain power by controlling the actions of their wives, thereby leading by proxy. A second concern is equity. Reservation for women reduces political opportunities available for men, who are usually more politically experienced. It may also crowd out representation for other historically disadvantaged groups (presumably because women from these groups are less likely to stand for election) such that gains for one disadvantaged group come at the expense of another. Together, these arguments suggest that reservations may even reduce effective democracy by replacing men elected from a wide variety of backgrounds by powerful men governing by proxy through their wives.

Evidence on the functioning of existing systems of political reservation can help us gauge the relevance of these concerns, and shed some light on the potential impact of introducing political reservation in Indian legislatures. In this paper we, therefore, evaluate the Indian experience with political reservation in village councils. By focusing on data from India, albeit at a different level of governance, we are able to hold cultural and institutional contexts constant. Further, the electoral mechanism (plurality rule and single-member jurisdictions) at the local level parallels that used at the state and national level. Voter participation in local elections is high, and political parties invest significant resources in these elections. To evaluate the generalizability of our results we use several datasets, two of which encompass several Indian states. A final benefit of focusing on village elections is that the randomized introduction of political reservation across village councils allows us to cleanly identify the effects of female leadership, separate from other variables such as social attitudes towards women, local demand for public goods, and so forth. Below, we briefly describe the Indian context and our empirical strategy.

A 1993 constitutional amendment made it mandatory for Indian states to decentralize a significant amount of policy influence to a three-tier system of local governance. Our analysis focuses on the lowest tier, the village council or Gram Panchayat (hereafter GP). Villagers in a GP elect members of a village council and its leader, known as Pradhan.

The Pradhan enjoys significant policymaking powers. S/he has the final say in the allocation of public funds across different investment categories and in beneficiary selection. However, these decisions are supposed to be made in consultation with, and ratified by, villagers. To this end, the Pradhan is required to convene and conduct several village-level meetings during the year. These meetings (known as Gram Sabha [GS] meetings) are open to all villagers and are intended both as a forum for deliberation and as an opportunity for villagers to vote on decisions made by the village council.

The 1993 constitutional amendment required that one-third of the Pradhan positions be reserved for women, and that reservation be rotated between elections. While different states chose different ways of implementing reservation, in most cases the process was effectively random. This implies that the difference in average outcomes between reserved and unreserved GPs reflects the causal impact of female leadership.

The random assignment of female Pradhans, combined with our use of large datasets which cover several Indian states, lends our results significant generalizability. We provide evidence on three different aspects of the debate on gender quotas in politics—politician selection, citizen participation in politics, and policymaking.

On selection, we find no evidence that political reservation caused the crowd-out of another politically underrepresented social group—Muslims. We do, however, find evidence of differential selection and of different networks being used by female and male politicians. Relative to their male counterparts, female politicians are significantly more likely to state that their spouses encouraged them to stand for election and help them do their job.

However, help from a spouse does not necessarily preclude agency on the part of female leaders. If women have different opinions from their husbands, formal authority may still give them the power to take different policy decisions. In addition, female leadership may facilitate other women expressing their policy preferences. The latter suggests a channel through which female leader can influence policy outcomes, even if their husbands made all the decisions—changing how the political process aggregates villager preferences.

Our second set of results, therefore, relate to citizen participation in politics. During 2003 and 2004 we recorded 197 villager meetings across five Indian States.[1] The meeting transcripts provide a rare opportunity to

1. Ban and Rao (2008a) use a similar methodology to examine how individual and village characteristics influence the discourse in meetings in South India—our sample of transcripts partially overlaps with theirs.

examine whether female leadership changes the nature of policy discourse in villages. Villager attendance at meetings (for either gender) is unaffected by reservation. However, female villagers are significantly more likely to speak at meetings when the village council leader is a woman (Ban and Rao, 2008a report similar findings).

To examine leader responsiveness to female participation in village meetings, we identify the female friendliness of an issue by the fraction of words on the issue that were spoken by a woman. We observe no significant differences in how women's issues are treated in reserved or unreserved villages. In addition, relative to men, women are more likely to get a constructive response to a question they ask. This suggests that, given the low level of female participation in unreserved villages (women do not speak at all at half the meetings in unreserved village councils), the very fact that female leadership increases female participation can be important for policy outcomes.

The link between political reservation and policy outcomes has been widely studied. In this paper we extend this evidence in two important ways: across space and over time. We use two new data sources: an All India survey (known as the Millennial survey) which covers the large Indian states and data from West Bengal villages (Birbhum survey) which vary in whether they have been reserved once, twice, or never. In both cases, we find results consistent with earlier findings (Chattopadhyay and Duflo, 2004). Women leaders are more likely to invest in drinking water facilities across rural India and across electoral cycles, since access to drinking water is an important public good that is emphasized more by female leaders, relative to male leaders.

Some recent papers report public good investments by female leaders either on non-water related goods (Munshi and Rosenzweig, 2010) and that women's performance is sensitive to institutional features (Ban and Rao, 2008b). Neither paper, however, finds evidence of women doing a worse job in providing public goods. Bardhan et al. (2010) exploit within-village (over time) variation in reservation in West Bengal and find no impact of female reservation. One possibility to reconcile these findings is offered by our long-run Birbhum results. We find evidence of women maturing as leaders over time and expanding the scope of their investments (while continuing to emphasize drinking water). In addition, there is some evidence that the influence of reservation on public good provision persists even after reservation ends—this may explain why comparing outcomes within a village during and after reservation (as Bardhan et al., 2010 do) may understate the reservation impact.

Taken together, this body of evidence provides several insights that can help structure some of the ongoing debates on political reservation in India and other countries. First, it is inappropriate to extrapolate from political selection to actual policy outcomes. Women who are elected leaders differ from men in significant ways and have access to different social networks and support structures. However, this does not imply that they have no political agency. Second, there is significant evidence that women leaders make different policy decisions and increase female participation in the political process. That said, to the extent that female villagers and female leaders share the same preferences, we cannot completely disentangle the policy impact of greater female villager participation from the direct role of female leadership (in future work we hope to disentangle the two). This suggests that women's reservation at the state and national legislatures has the potential to empower women and improve the gender balance in policymaking.

The remainder of the paper is structured as follows. We first discuss our datasets and empirical strategy. Then we evaluate, in turn, the impact of reservation on selection, citizen participation, and public good outcomes.

Data and Empirical Strategy

Data

Our analysis makes use of several datasets which we describe below.

MEETING SAMPLE. We measure villager participation in the political process using data on 197 GS meetings collected during 2003–04. To ensure representativeness, we selected GPs from eight districts located in two North Indian and three South Indian states.[2] These five states differ substantially along economic and social dimensions, allowing us to capture significant heterogeneity in both the level of village infrastructure and female empowerment.

We collected meeting data via an observer in attendance, and a tape recording of the proceedings. Each recording was subsequently transcribed and then translated into English.[3] Transcripts were coded by hand to capture various kinds of information about the GS meetings. The average meeting

2. In Rajasthan and West Bengal our samples are drawn from a single district. In Andhra Pradesh, Kerala, and Karnataka we worked in two districts per state. Within each district our sample is stratified by block. Within a block we randomly sampled GPs.

3. The transcripts were typed up to follow a consistent format that identifies the speaker's title, his/her gender, and the actual dialogue.

lasted 112 minutes and the number of words spoken per meeting was 3,749 (but the variation was wide; standard deviation was 2,737 words, and the maximum was 18,387 words).

MILLENNIAL SURVEY. We obtain nationally representative data on public good provision from the "Millennial Survey." This survey was conducted by the Public Affairs Centre, and covered 36,542 households in 2,304 randomly selected villages in 24 states in the year 2000.[4] We restrict attention to the 11 major states that had an election between 1995 and 2000.[5]

The survey aimed to provide an independent assessment of key public services, using citizen feedback as well as direct evaluation of facilities. It focused on five basic public services: drinking water and sanitation, health, education and child care, road transport, and the public distribution system. It contains both subjective measures of the quality and objective measures of the quantity and quality of public goods provided in each village.

The household survey measured final users' subjective evaluation of public services: respondents answered questions about access, quality, reliability, and their overall satisfaction with public goods.[6] Several questions were asked about whether households found it necessary to pay bribes to obtain access to certain public services. As the provision of some of these services is the GP's responsibility, these questions present a measure of the incidence of corruption.

The household survey was complemented by independent site visits, which included assessments of select public facilities such as water sources, primary schools, clinics, etc.[7] For each facility, a detailed survey was completed. We use the survey to construct a composite index of quality (ranging between 0 and 1). To measure quantity we use either the number of available facilities (such as hand pumps, public taps, buses) or in the case of schools,

4. The Public Affairs Centre is a non-government organization in Bangalore which is credited for starting the "report card movement" in India. The analysis using the Millennial survey was conducted while one of the authors was an intern with the organization in Bangalore in spring 2003.

5. The term for a GP was set at five years after the 73rd Amendment, but in some states elections were not held on time. The 11 states included are Andhra Pradesh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.

6. Number of respondents varies by question, because citizens were only asked about services available in their village.

7. Again, number of responses for these questions varies from question to question because a type of public good could not be assessed in a particular village if the good was not available.

public health centers and fair price shops, an indicator of whether these public goods were available in the village.[8]

BIRBHUM SAMPLE. We supplement the Millennial data on public goods with data from a village survey conducted by the authors in 2005 in 495 villages in Birbhum district in West Bengal. This dataset covers all 165 GPs in the district. A key feature of this dataset is that it includes GPs which were randomly assigned to either never be reserved, be reserved once, or reserved twice. This allows us to trace the medium-term impact of political reservation. The public goods data was collected through a Participatory Resource Appraisal (PRA) survey while the data on bribes comes from a household survey which was designed to be identical to the Millennial survey (the data are described in more detail in Beaman et al., 2009).

RESERVATIONS DATA. In all cases we use administrative data on the reservation status of GPs, typically obtained from the district administration. For the Millennial survey villages, we collected information on reservations from visits to the State Election Commissions and Rural Development Departments for 11 states in February 2003. Since less than a year had lapsed between the 2000 election and the Millennial survey, we used the 1995–2000 reservation status in all states. However, for flow measures of quality of public services such as cleanliness, maintenance, etc., we use the reservation status of the current Pradhan, i.e., during the 2000–05 mandate.[9] For over two-thirds of our sample villages, we could both match the village to the GP and identify Pradhan reservation status.[10]

8. At the time we had access to the Millennial survey, data on quantity of public drinking water facilities had not yet been reliably entered for the states of Himachal Pradesh, Kerala, and Punjab. As Punjab and Kerala happen to be the two states where villagers overwhelmingly rely on private sources of drinking water, we do not believe the omission of these states affects our findings. While more than 90 percent of respondents in other states indicated that they rely primarily on public sources for drinking water, in Kerala and Punjab the share of people relying on public sources was only 46 and 21 percent respectively.

9. Information on Pradhan reservation as of the end of 2000 was available for eight states: Andhra Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Tamil Nadu, and West Bengal. Our sample thus consists of approximately 810 villages when analyzing household satisfaction and availability of public services, and 680 villages when analyzing the quality of public services.

10. Sample attrition is unlikely to bias our estimate of the impact of reservation, since the unit of reporting was not the GP, but rather the district, and the proportion of GPs with women in each district was identical (by design) to the proportion in a state, or in the sample. The main consequence of non-random sample attrition would be to over-represent wealthier districts, as well as those with more competent administrators. For Uttar Pradesh, we were able to match mostly large villages to GPs. The regressions control for state fixed effects and village class dummies (a dummy of whether the village is small, medium, or large).

Empirical Strategy and Randomization Balance Check

Our basic empirical strategy exploits the fact that the choice of GPs for reservation was randomized at the time of election, and rotated across election cycles. Therefore, when we use cross-sectional data we estimate the difference in outcomes across GPs reserved for women and those not so reserved. The canonical regression of interest for outcome y in g in state s is given in Equation (1):

$$y_{gs} = \alpha_s + \beta R_{gs} + \varepsilon_{gs}$$

where α_s denotes strata fixed effect and R_{gs} is an indicator variable for whether the GP is reserved for a female. The coefficient of interest β is interpretable as the impact of reservation for women on the outcome of interest. Since very few women are elected from non-reserved seats this provides a reduced form estimate of the impact of female leadership.

Before turning to the results we first examine whether the randomization of GP reservation status appears balanced across covariates. To do this, we analyze village characteristics from 1991 Indian census village data, since this census predates the introduction of reservation.

Table A-1 presents the randomization check for GPs that enter our meeting sample and Table A-2 presents this check for GPs in the Millennial survey (the randomization check for the Birbhum sample is available in Beaman et al., 2009). In Columns (1) and (2) we present the mean of each variable for GPs that are reserved and those that are not. Column (3) shows the difference in the means while in Column (5) we report the difference as estimated in a regression which includes the relevant strata fixed effects. Both tables show balance on covariates, demonstrating that reservation was effectively randomized across GPs.

Political Reservation and Selection

We start by examining the impact of reservation for women on politician selection. We ask whether reservation worsened the electoral prospects of Muslims and/or led to the selection of politicians who were more likely to rely on their spouses. Table 1 reports the regression results.

Many have expressed the concern that Muslim women may be particularly unlikely to stand for election and, therefore, reservation will reduce

TABLE 1. Pradhan Selection and Behavior

	Pradhan is Muslim		*Before elections Pradhan:*				
	Meeting	*Birbhum*	*Spouse suggested running*	*Knew responsibilities*	*Was aware of how Panchayat worked*	*Spouse helps with Panchayat work*	*Now feel competent to discharge duties*
Sample	*(1)*	*(2)*	*(3)*	*(4)*	*Birbhum (5)*	*(6)*	*(7)*
GP currently reserved for woman	0.015	−0.035	0.116	−0.181	−0.150	0.172	−0.098
	(0.054)	(0.064)	(0.048)	(0.080)	(0.077)	(0.083)	(0.075)
Number of observations	196	157	161	161	161	161	160
Unreserved sample:							
Mean	0.132	0.234	0.018	0.727	0.383	0.053	0.699
Standard deviation	(0.340)	(0.149)	(0.013)	(0.172)	(0.171)	−(0.120)	(0.171)

Source: Columns (2)–(7) use data from the Birbhum sample, while Column (1) uses the data from village meetings.

Note: All columns reflect linear probability model estimates. Column (1) includes block fixed effects, and Columns (2)–(7) include district fixed effects. Standard errors adjusted for heteroskedasticity are reported below the coefficients.

net Muslim representation. In Columns (1) and (2) we report regressions where the outcome of interest is whether the Pradhan is Muslim, and we use the meetings and Birbhum datasets respectively. In neither sample do we find evidence of crowd-out—there is no significant difference in the likelihood that a Muslim would stand for election from a reserved versus unreserved GP.

In Beaman et al. (2009) we found that those elected from reserved GPs are younger, less educated, and have less political experience. However, they are no more likely to be the spouse of a previously elected Panchayat councilor. Here, we examine whether spouses play an important role in prompting women to run for election and in helping them discharge their duties. Our analysis draws on detailed household surveys administered to Pradhans in the Birbhum sample. In Column (3) the outcome of interest is whether the Pradhan's spouse suggested that s/he run. Female Pradhans elected from reserved GPs are 12 percent more likely to state that this was the case, relative to their unreserved counterparts. Again, relative to these counterparts, female Pradhans from reserved GPs are 18 percent and 15 percent more likely to state that prior to the election they did not know their job responsibilities and were not aware of how the Panchayat functioned (Columns [4] and [5]). This is consistent with the evidence in Beaman et al. (2009) that these leaders are less likely to have held prior political positions. Perhaps, as a consequence of political inexperience, these female Pradhans are also more likely to state (relative to unreserved Pradhans) that their spouse helps them with job responsibilities, Column (6). Yet, two years into their job, Pradhans from reserved GPs feel as competent as Pradhans from unreserved GPs when it comes to discharging their duties.

Political Reservation and Citizen Participation

Next, we use the meetings dataset to examine whether female leadership directly affects villager participation in the political process.

We start by using regressions of the form given in Equation (1) to examine whether political reservation influences villager participation in GS meetings. The results are in Table 2. Columns (1) and (2) show that men are twice as likely to attend GS meetings as women. The average GS meeting in an unreserved GP has 86 men and 40 women attending. Attendance is unaffected by political reservation. In Column (3) we examine whether reservation influences participation by female villagers in the GS meetings. We measure villager participation by whether s/he spoke during the meeting.

TABLE 2. Panchayat and Villager Participation at Meeting

	Number of men attending	*Number of women attending*	*Do women speak*	*Fraction of issues with female villager participation*		*Fraction of words spoken by Panchayat*	*Pradhan chaired GS*	*Pradhan speaks at least once during GS*
				All	*West Bengal*			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
GP currently reserved for woman	−3.919	−6.727	0.129	0.075	0.030	−0.071	−0.358	−0.228
	(21.219)	(7.709)	(0.064)	(0.044)	(0.076)	(0.037)	(0.063)	(0.081)
Mean of unreserved	85.901	40.157	0.519	0.268	0.083	0.575	0.838	0.830
	(146.965)	(57.127)	(0.502)	(0.332)	(0.240)	(0.334)	(0.370)	(0.378)
Number of observations	197	197	172	172	44	172	190	134

Source: This table uses data from the village meeting sample.

Notes: All regressions include district fixed effects. Standard errors adjusted for heteroskedasticity are reported below the coefficients. Columns (1)–(4) and (6)–(7) include the full set of meeting data. Column (5) restricts the meeting data to only those meetings which occurred in West Bengal (all in Birbhum district). Column (8) excludes Karnataka due to missing data.

Overall, female participation in GS meetings is low, with female villagers speaking in roughly half the GS meetings. However, the likelihood that a woman speaks increases by roughly 25 percent when the GP leader position is reserved for a woman.[11] In Column (4) we examine whether increased female voice in a GS meeting translates into increased participation across multiple issues. Here, the results parallel our findings for whether a woman speaks at all—in the average unreserved GS meeting women participate in discussions on roughly a quarter of the issues raised during each meeting. This number increases by 25 percent when there is reservation, with the effect significant at the 10 percent level. In Column (5) we reestimate this regression for the sub-sample of GPs in West Bengal and find that the point estimate of the effect of reservation is smaller than in the full sample and not precisely estimated. However, it should be noted that the fraction of issues with female villager participation in unreserved GPs is lower in West Bengal than in the full sample, and there are only 44 meetings in West Bengal.

Columns (6)–(8) examine the actual participation by female leaders (relative to male leaders) in the meeting. Here the news is more disappointing. In GPs reserved for women, Panchayat representatives speak less often, the Pradhan is less likely to chair the meeting and is also less likely to have spoken at least once during the meeting. Interestingly, our data show that other GP officials, including the vice Pradhan, are more likely to chair the meeting in reserved GPs. It is not, however, the case that the Pradhan's spouse is more likely to chair the meeting. That said, it remains the case that reservation makes it 50 percent more likely that the chair of the GS meeting is a female.

One potential reason why women speak more in GS meetings headed by women leaders is that they believe women leaders are more likely to respond positively to their concerns. This could occur either because policy preferences vary across genders or because leaders discriminate against the opposite gender. To examine this we turn to an issue-level analysis of the GP data.

In the average meeting, six issues were discussed. For each issue we coded the public good or concern that the issue was related to, who initiated discussion on the issue, and the number of words on the issue spoken (separately) by male and female villagers and Panchayat leaders. We coded the kind of response the Panchayat gave to villagers who raised an issue. Our first coding was very detailed, and we then collapsed these categories into

11. Note there are only 172 observations since the 22 transcripts which were not readable are not included, though we have information collected from the observer on participation.

whether or not the leader said the Panchayat will take unconditional action on the issue at hand. Table A-3 shows our coding of leaders' responses. For instance, we code the response as unconditional if the leaders says the Panchayat will do what the villagers ask or provides the requested information. It equals zero if the leader claims it is not the Panchayat's problem. The following is an excerpt from a transcript, which falls in the negative response category:

> Villager: Let us pass a resolution stating that the persons cooking mid-day-meals are not being paid reasonably so instead of ₹ 5/- they may be paid ₹ 10/-."
> Pradhan: "Let me tell you that this is not a local issue. It has to be dealt with at the central government level."

Next, we create a measure of female friendliness of an issue. To do so, we average the fraction of words spoken by a woman on the issue across all transcripts. Table A-4 describes the female-friendliness of issues, as measured by the fraction of words on the issue spoken by a woman (across all GPs in our sample). Women speak the most on financial transfers followed by public works and water.

Let y_{igs} equal one for issue i if the leader states that the Panchayat will take unconditional action on the issue. (Most GP meetings are attended by government officials and GP representatives. We, therefore, consider two outcome variables—one where we only focus on the GP representatives' responses and one where we include responses by GP and government officials.) We estimate regressions using the following two specifications in Equation (2) and (3):

$$y_{igs} = \alpha_g + S_{igs} + S_{igs} \times R_{gs} + \upsilon_{igs}$$

$$y_{igs} = \alpha_g + W_{igs} + W_{igs} \times R_{gs} + w_{igs}$$

where we include a GP level fixed effect α_g . S_{igs} is a measure of the female-friendliness of the issue, and W_{igs} is a dummy which indicates whether the issue was brought up by a man or a woman.

With the first estimating equation, whose results are presented in Table 3 Columns (1) and (3), we simply examine whether leadership response across reserved and non-reserved GPs differs depending on the female friendliness of the issue. In Columns (2) and (4) we estimate the second equation, and examine whether or not the response given to women is, in general, more positive in woman-headed Panchayats. The results are very similar for the two outcome samples. In both cases we observe no significant differences in either how women are treated, or how women's issues are treated in

TABLE 3. Panchayat and Government Response: Individual Issues in Meeting

	Panchayat will take unconditional action in response to issue		*Panchayat or government will take unconditional action in response to issue*	
	(1)	*(2)*	*(3)*	*(4)*
Ranking: Average fraction of words spoken by women on issue	0.490		0.521	
	(0.454)		(0.453)	
Reserved * Ranking (fraction of words)	−0.869		−0.900	
	(0.816)		(0.816)	
Reserved * Woman spoke on issue		−0.019		−0.019
		(0.097)		(0.097)
Woman spoke on issue		0.103		0.103
		(0.057)		(0.057)
Number of observations	782	782	782	782
Unreserved sample:				
Mean	0.308		0.310	
Standard deviation	(0.462)		(0.463)	

Source: This table uses data from the village meeting sample.

Notes:

The * (asterisk) indicates that the indicated variables are interacted with one another.

1. All regressions include village meeting fixed effects. Standard errors adjusted for heteroskedasticity are below the coefficients.

2. The outcome variable in Columns (1)–(2) is an indicator variable reflecting whether a member of the Panchayat government responded that they would take action on the issue, and the dependent variable in Columns (3)–(4) indicates unconditional action if either a member of the Panchayat or any other government official, including MLAs or bureaucrats, made such a promise in the meeting. See Table A-3 for a detailed description of how the action variables are coded.

3. "Ranking: Average fraction of words spoken by women on issue" and "Ranking (fraction of words)" are both the average fraction of words spoken by women on each issue over all transcripts in which that issue was raised, and is our measure of the female-friendliness of the issue.

4. Reserved is an indicator for the GP currently being reserved for a female GP, as used in Table 1. "Woman spoke on issue" is an indicator variable which is 1 if any female villager spoke on that issue and 0 otherwise.

reserved or unreserved villages. Interesting, women are more likely to get a constructive answer to a question they asked, both in reserved and unreserved GPs. This suggests that encouraging women to participate may be the most important obstacle to getting women's policy concerns addressed (at least in these meetings). Our results suggest reservation can play a key role here. Below, we examine the link between reservation and policy outcomes and also provide some evidence on whether female participation in meetings appears to increase their policy influence.

Female Leaders and Public Good Outcomes

The facts that, relative to their male counterparts, female Pradhans are less politically experienced and rely more on family networks (especially their spouses) to conduct their work has led to the suggestion that they are, in effect, proxies for powerful men in the village. If correct, this view implies that reservation should not alter policies in the direction of what women want, and may lead to a worsening of democracy through elite capture (see Chattopadhyay and Duflo, 2004 for a model). On the other hand, women leaders do have different preferences, and as we saw, women are more likely to speak up in GPs headed by women. Thus, if women leaders enjoy political agency then these two channels could lead to the contrary outcome, namely, that female leadership leads to the implementation of policies that are (relatively) favored by women.

Existing evidence largely supports the view that reservation for women alters which public goods are provided. However, the evidence concerns specific places and relatively short term horizons. We revisit this issue using two datasets. The first dataset allows us to examine the average effect of reservation across villages located in 11 large Indian states. This helps address concerns that gender differences in public good provision found in earlier work may be locale specific and non-generalizable. Second, we use data from a district in West Bengal, Birbhum, where we are able to examine whether this policy influence varies across electoral cycles. This helps address the concern that women elected in the first cycle of reservation may be "special" in many ways and their policy activism may be very different from that undertaken by women elected in subsequent electoral cycles. We also investigate whether men elected after women reverse women's policy decisions.

Millennial Survey: Nationwide Evidence

We start by using data from the Millennial survey which, by virtue of its national coverage, provides significant generalizability of results (at least in the Indian context). Table 4 examines how women policymakers affect the quality and quantity of several public services. Panel B of columns (1) and (2) present the means of the quantity and the quality for five categories of public goods, and the coefficient on a woman Pradhan dummy in the following regression, run separately for each good k. See Equation (4):

$$Y_{jk} = \alpha_k + \beta_k R_j + X'_{j\gamma k} + \varepsilon_{jk}$$

TABLE 4. Effect of Female Leadership on Public Goods Quality, Quantity, and Satisfaction

	Quantity		*Quality*		*Satisfaction*			
						Reservation		
	Mean	*Norm. reservation*	*Mean*	*Reservation*	*Mean*	*All*	*Men*	*Women*
Dependent variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
A. Overall								
Weighted average	4.352	0.078	0.569	0.016	0.818	−0.020	−0.020	−0.017
		(0.041)		(0.011)		(0.010)	(0.010)	(0.013)
B. By Public Good Type								
Water	20.106	0.191	0.392	0.020	0.835	−0.024	−0.021	−0.027
	(33.462)	(0.098)	(0.189)	(0.014)	(0.297)	(0.018)	(0.022)	(0.021)
	633		611		6,802			
Education	0.938	0.130	0.892	0.015	0.855	−0.013	−0.010	−0.024
	(0.241)	(0.064)	(0.242)	(0.021)	(0.198)	(0.011)	(0.011)	(0.023)
	810		543		3,661			
Transportation	2.260	−0.020	0.306	0.006	0.747	−0.022	−0.026	−0.015
	(1.017)	(0.082)	(0.292)	(0.025)	(0.309)	(0.015)	(0.017)	(0.022)
	635		596		7,212			

Fair price shops	0.774	0.028	0.688	0.023	0.891	−0.007	−0.007	0.008
	(0.419)	(0.069)	(0.289)	(0.027)	(0.189)	(0.016)	(0.016)	(0.029)
	805		498		3,868			
Public health facilities	0.645	0.066	0.654	0.017	0.803	−0.063	−0.086	−0.027
	(0.479)	(0.072)	(0.352)	(0.036)	(0.366)	(0.033)	(0.039)	(0.053)
	809		355		741			

Source: This table uses data from the Millennial survey.

Notes:

1. Standard deviation and number of observations below the mean, and standard errors (corrected for clustering at the GP level) below the coefficients.
2. All coefficients expressed in number of standard deviations of the independent variables.
3. The standard errors of the weighted averages of the coefficients are obtained by jointly estimating the coefficient in a SUR framework.
4. Regressions control for state fixed effects and village class dummies.
5. The water quantity variable is the number of public drinking water taps and hand pumps in the village.
6. The water quality variable is a 0–1 index aggregating the responses to the following questions (by observations) drain around source, no leakage, washing platform, caretaker, public latrine, drainage.
7. The education quantity variable is an indicator of whether there is any education facility (school or non-formal education center) available in the village. The education quality variable is an index aggregating the answer to the questions: quality of school's playground, blackboard, toilet, and availability of drinking water.
8. The transportation quantity variables is the number of public transportation facilities the village (public and private buses, vans, taxis, etc.). The transportation quality variable is a 0–1 index aggregating the responses to the following questions: shelter at bus stand, information about bus, whether bus is new, whether the road repaired in the past 6 months.
9. The fair price shop quantity variable is an indicator of whether there is a fair price shop available in the village. The fair price shop quality variable is a 0–1 index aggregating the responses to the following questions (responses obtained by observation) prices displayed, prevalence of arguments and complaints, behavior of shopkeeper.
10. The Public health quantity variable is an indicator of whether there is a public health center available in the village. The Public health quality variable is a 0–1 index aggregating the responses to the following questions (responses obtained by observation) cleanliness of linens, floors, bathrooms and toilets, and availability of safe drinking water for patients.

where Y_{jk} is the quantity (quality) of goods of type k in village j, R_j is a dummy variable indicating whether or not the village was part of a GP where the position of the Pradhan was reserved for a woman as of the beginning of 2000 and X_j is a vector of control variables (state fixed effects and a dummy for the size of the village).[12] We also analyze the average effect of female politicians across all public goods in Panel A. We estimate it in Equation (5):

$$\beta = \left(\frac{1}{N}\right)\sum_{k-1} N_k$$

where N_k is the number of observations used in the good k regression and N is the sum of all observations in the five regressions.[13]

Consistent with the results in Chattopadhyay and Duflo (2004) reservation for women increases investment in drinking water infrastructure. There are significantly more public drinking water taps and hand pumps when the GP is reserved for a woman, and there is also some evidence that the drinking water facilities are in better condition (though this coefficient is not significant at the 5 percent level).[14] Overall, there are four positive coefficients and only one negative coefficient in the quantity regression. In the quality regression, all coefficients are positive. The average effect of reservation on the availability of public goods in a village is positive and significant (the coefficient is 0.078 standard deviations, with a standard error of 0.041). The average effect of the reservation on the quality of public goods is positive as well, but not significant (the coefficient is 0.016 standard deviations, with a standard error of 0.011). To summarize, women leaders do a better job at delivering drinking water infrastructure, and at least as good a job at delivering the other public goods.

Female Pradhans, however, receive systematically less favorable evaluation from villagers (including female villagers) than male Pradhans. The household module of the Millennial survey measured the final users' subjective evaluation of public services: respondents answered questions about access, quality, reliability, and their overall satisfaction with public goods.

12. For easy comparison across types of public goods, all the variables are expressed as standard deviations from the mean of the distribution in the unreserved villages.

13. The standard error for these averages is derived from the variance covariance matrix for the five coefficients obtained from jointly estimating the equations for the five public goods (see Kling et al., 2007).

14. Chattopadhyay and Duflo (2004) find that the effect of reservation on other public goods, including education and transportation, is either insignificant or opposite in sign in the two states they consider. Consistent with these results as well, there are no significant coefficients for the other public goods in the All India Millennial survey.

Using the estimation strategy as presented in Equation (2), Column (6) displays the impact of women policymakers on villagers' satisfaction with each of the five public services, as well as the average effect across all services. In contrast to the positive effect of female leaders on quantity and quality of public services, respondents are less likely to declare that they are satisfied with the public goods they are receiving in villages with female Pradhans. On average, they are 2 percentage points less likely to be satisfied. This number is significant at the 95 percent level, and it also corresponds to a large (25 percent) relative increase in the rate of dissatisfaction, since the satisfaction ratings are overall very high.[15] This is true for every good individually (though not significant when each good is looked at in isolation), and for female as well as male respondents. Particularly striking is the fact that individuals are less satisfied with water service, even though both the quality and quantity of drinking water facilities is higher in reserved villages. The coefficient on dissatisfaction is 2.4 percentage points, with a standard error of 1.8. Moreover, women are as likely to be dissatisfied as men. Interestingly, respondents are also significantly less satisfied with the quality of the public health services when the Pradhan is a woman. This is despite the fact that health services were centrally administered and not under the jurisdiction of GPs in the 11 states in the study in this period. There was thus no reason the quality of health services should be different in reserved GPs (indeed, our objective measures of quality and quantity are uncorrelated with the reservation variable).[16]

15. The fraction of respondents saying that they are satisfied is 82 percent, averaged across all goods.

16. One possibility is that women invest in the wrong kinds of repairs. For example, they may spend more public money repairing the water facilities and building new ones, but their repairs may not correspond to what villagers really need. To assess to what extent the quality and quantity variables we include correspond to respondents' concerns, and to get some sense of how controlling for these variables affects the evaluation of women, we have estimated the following regressions:

$$Y_{ijk} = \alpha_k + \lambda_k Q_{jk} + \mu_k Q_{ljk} + \upsilon_k Q_{jk} \times R_j + \psi_k Q_{ljk} \times R_j + X_{j\gamma k} + \upsilon_{jk} + \varepsilon_{ijk}$$

where Q_{jk} is the quantity of public good k in village j and Q_{ljk} is the quality of public good k in village j. Across all goods, we find that villagers' satisfaction is positively and significantly associated with quality, but not with quantity. The coefficient on the reservation dummy is still negative. The interactions between the quality and the women reservation dummy and quantity and the women reservation dummy are both negative, suggesting that women are given less credit for both quality and quantity. However, they are given some credit: the sum of the quality variable and its interaction with the women reservation variable is still positive and significant. It is interesting to note that in the regression across all public goods, the coefficient on the women reservation dummy is similar in magnitude but opposite in sign to the

A first possibility is that the higher quantity and quality of public goods provided by women Pradhan come at a higher price. To evaluate this hypothesis we examine the incidence of bribes in reserved and unreserved villages. We estimate the coefficient β_k in the regression in Equation (6):

$$Y_{ijk} = \alpha_k + \beta_k R_j + X_{j\gamma k} + \upsilon_{jk} + \varepsilon_{ijk}$$

where Y_{ijk} is a dummy variable indicating whether respondent i in village j had to pay a bribe to get good k. The regression is run at the individual level, and we correct for clustering of the standard errors at the GP level. Table 5 reports the mean value for whether the respondent had to pay a bribe, and the coefficient of the reservation dummy. For all types of bribes, respondents (both men and women in Columns [3] and [4]) are less likely to report that they needed to pay a bribe to obtain a service when the GP is reserved for a woman than when it is not reserved. Overall, both men and women are significantly less likely to have to pay a bribe to obtain a service if they live in a GP where the position of Pradhan is reserved for a woman. Women leaders are less corrupt than men, suggesting that the higher quantity infrastructure does not come at a higher price.

Given this, we hypothesize that two factors appear to contribute to the lower reported satisfaction with drinking water in reserved GPs. First, relative to their male counterparts, women receive less credit for investments. Second, the base level of satisfaction with women leaders (irrespective of quality or quantity) is lower to start with. This is consistent with Beaman et al. (2009) where we present evidence which suggests that this dissatisfaction reflects incorrect priors regarding the effectiveness of women as leaders. In West Bengal, prior reservation leads to an amelioration in this bias, however, which is another reason why quota may affect policy making in the long run (on this, also see Bhavnani, 2009).

Long-term Data: Birbhum in West Bengal

Our second source of data comes from a village survey conducted by the authors in 2005 in 495 villages in Birbhum district in West Bengal.

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coefficient on the quality variable. This implies that the effect of having a female Pradhan on satisfaction is as large as the impact of transforming the average quality of the public goods available in the village from entirely "good" to entirely "bad" (e.g., a water source with no drain, no coverage, some leaks, etc.) in this scale.

TABLE 5. Effect of Female Leadership on Corruption

		Effect of reservation					
		No controls			*Individual controls*		
	Mean	*All*	*Male*	*Female*	*All*	*Male*	*Female*
Dependent variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
A. Overall							
Weighted average bribes	0.102	−0.015	−0.026	−0.025	−0.016	−0.027	−0.032
		(0.010)	(0.016)	(0.016)	(0.010)	(0.016)	(0.015)
B. By Public Good Type							
1 if paid bribe for getting public tap fixed	0.105	−0.017	−0.041	−0.003	−0.019	−0.043	−0.004
	(0.306)	(0.016)	(0.030)	(0.015)	(0.016)	(0.030)	(0.015)
	4,713						
1 if paid bribe for ration card	0.058	−0.015	−0.013	−0.020	−0.015	−0.012	−0.027
	(0.233)	(0.012)	(0.012)	(0.027)	(0.012)	(0.012)	(0.027)
	3,761						
1 if paid bribe to police	0.340	−0.011	0.010	−0.359	−0.019	0.005	−0.510
	(0.474)	(0.048)	(0.051)	(0.133)	(0.049)	(0.053)	(0.105)
	423						
1 if paid bribe for medical services	0.178	−0.009	−0.019	0.005	−0.009	−0.017	0.030
	(0.382)	(0.032)	(0.037)	(0.060)	(0.033)	(0.038)	(0.062)
	749						

Source: This table uses data from the Millennial survey.

Notes:

1. Standard deviation and number of observations below the mean, and standard errors (corrected for clustering at the GP level) below the coefficients.

2. The standard errors of the weighted averages of the coefficients are obtained by jointly estimating the coefficient in a SUR framework.

3. Regressions in Columns (1)–(4) control for state fixed effects and village class dummies.

4. Regressions in Columns (5)–(7) control for state fixed effects, village class dummies, household size, property, religion, caste, education, occupation, and respondent gender.

Panel A of Table 6 estimates the effect of reservation where we compare public good investments in reserved and unreserved GPs in 2005 (in the middle of the second reservation cycle). In Column (6), we compare the investments across GPs that are currently reserved and GPs that are currently unreserved. The main results in Chattopadhyay and Duflo (2004) are replicated here: there are more investments in water infrastructure, sanitation, and roads in GPs reserved for women (all these results are significant). Moreover, there are three other results that are significant at least at the 10 percent level, all of which are positive: we see more investment in school repair, health center repair, and irrigation facilities. This is different from what was found after just one cycle of reservation, where there

TABLE 6. Effect of Female Leadership on Public Goods Quantity (Birbhum)

	N	Coefficients on: Only reserved 2003	Only reserved 1998	Reserved in 2003 and 1998	Mean of never reserved	Diff: Reserved 2003 vs not reserved 2003
Panel A						
At least one new tube well was built	495	0.152	0.073	0.160	0.365	0.131
		(0.066)	(0.063)	(0.088)	(0.482)	(0.052)
At least one new tube well was repaired	482	0.208	0.130	0.080	0.628	0.120
		(0.067)	(0.064)	(0.089)	(0.484)	(0.052)
At least one drainage/sanitation facility was built	495	0.053	−0.113	0.052	0.428	0.089
		(0.067)	(0.059)	(0.091)	(0.496)	(0.054)
At least one drainage/sanitation facility was repaired	396	0.150	−0.017	0.032	0.178	0.110
		(0.067)	(0.062)	(0.071)	(0.384)	(0.048)
At least one irrigation pump was built	495	0.137	0.005	−0.013	0.180	0.081
		(0.053)	(0.051)	(0.050)	(0.385)	(0.040)
At least one irrigation pump was repaired	319	0.110	−0.078	−0.005	0.417	0.103
		(0.092)	(0.086)	(0.123)	(0.495)	(0.072)
Number of metal roads built or repaired since 2003	495	0.274	0.046	0.079	0.118	0.189
		(0.117)	(0.070)	(0.065)	(0.448)	(0.084)
Number of transportation related infrastructure (bus stop, bus service, taxi)	495	0.074	0.250	0.303	1.302	0.075
		(0.175)	(0.160)	(0.225)	(1.201)	(0.138)
At least one educational facility was built	495	0.053	−0.030	0.026	0.117	0.053
		(0.042)	(0.036)	(0.055)	(0.322)	(0.032)
At least one educational facility was repaired	465	0.165	0.039	0.001	0.296	0.094
		(0.072)	(0.069)	(0.097)	(0.458)	(0.057)
At least one community education center	495	−0.007	0.030	−0.001	0.009	−0.015
		(0.010)	(0.023)	(0.009)	(0.095)	(0.008)

There is a NGO child center/crèche	495	−0.045	−0.039	−0.027	0.045	−0.026
		(0.016)	(0.021)	(0.023)	(0.208)	(0.012)
Number of health facilities (PHC, Health subcenter)	495	−0.025	0.027	−0.005	0.257	−0.027
		(0.049)	(0.052)	(0.084)	(0.468)	(0.044)
At least one health facility was built	495	0.011	−0.004	−0.018	0.014	0.002
		(0.015)	(0.014)	(0.009)	(0.116)	(0.009)
At least one health facility was repaired	495	0.061	0.016	0.047	0.009	0.051
(0 if no facility)		(0.023)	(0.016)	(0.024)	(0.095)	(0.018)
Number of trained Dais, untrained Dais and private doctors	495	−0.069	−0.158	0.384	1.014	0.146
		(0.232)	(0.226)	(0.423)	(2.012)	(0.215)
Panel B						
Average bribes	7404	−0.094	−0.045	−0.072		−0.072
		(0.031)	(0.038)	(0.029)		(0.027)

Source: This table uses data from the Birbhum sample. Panel A uses the village surveys of 495 villages. Panel B uses the household surveys.

Notes:

1. All regressions include block fixed effects. Standard errors corrected for clustering at the GP level are below the coefficients.

2. "First Reserved 2003," "Reserved 1998 and 2003," "Only Reserved 1998," and "Never Reserved" are indicator variables for GPs reserved for a female Pradhan for the first time in 2003, in both 1998 and 2003, only in 1998, and not reserved in either election, respectively.

3. Average bribes is the average number of households who paid a bribe for obtaining a BPL card or drinking water connection according to the household survey in Birbhum, normalized by the never reserved sample.

4. Panel B also includes: (*i*) Individual controls: age, age squared, household size, religion, caste dummies (for scheduled caste, scheduled tribe and other backward caste), years of education, a wealth index (based on a principal component analaysis using household assets) and dummy for land ownership; (*ii*) village controls: all variables in Table 1 by Beaman et al. (2009); and (*iii*) Survey year and surveyor gender indicator.

was no effect on any of these variables (and in fact a negative affect on the probability that the GP starts an informal school).

The interaction of reservations for Scheduled Caste and Scheduled Tribe and the reservations for women implies that some GPs are reserved twice in a row. To shed more light on the dynamics of the reservation effects, in Table 6 Columns (2) to (4) we present the investment results separately for newly reserved GPs, GPs reserved twice in a row, and GPs that are currently unreserved but were reserved before. In these columns, each cell reports the coefficient from a separate regression where the outcome variable is investment in the public good referenced in that row. The reported coefficient can be interpreted as the difference in investment outcomes in GPs with a certain reservation status relative to GPs that have never been reserved. As five years before, we find that newly elected women invest more in building and repairs of tube wells, roads, and sanitation and drainage. The difference from the earlier finding is that we now find that there is *more* investment in irrigation and schools, issues that are more "male issues." Women elected in the second cycle appear to do more across the board. The overall results were driven by these newly reserved GPs: for GPs reserved for the second time, the only significant difference is that women invest more in building tube wells. The coefficients on repairs are all positive but insignificant, perhaps because many of the repairs already took place.

Though public goods are mainly financed by state government funds, villagers may have to pay for these goods through means such as voluntary contributions and bribes. Panel B of Table 6 shows that on average, individuals in currently reserved GPs are less likely to have paid a bribe for obtaining a BPL card or drinking water connection. This is true for both GPs reserved for the first and second time. This echoes the results from the Millennial survey.

Overall, these tables show that the results that women leaders invest more than their male counterparts in water-related infrastructure are extremely robust across time and space. Both in newly reserved GPs and in GPs reserved for the second time, women are 50 percent more likely to build a new tube well. A concern might be that as soon as men take over, they undo these investments. Column (3) shows that this is not the case: Pradhans elected in previously reserved GPs are not investing less in building new tube wells. Moreover, they also invest *more* in tube well repairs than Pradhans do in GPs that have never been reserved, and as much as new leaders. Thus, the increase in water infrastructure availability seems to be a permanent step up, not a temporary phenomenon.

Women's Preferences: From General to Specific Concerns

Column (1) in Table 7 replicates the specification in Chattopadhyay and Duflo (2004) using the meetings data: we regress investment in each type of good on whether women care particularly on the issue, which is measured by the fraction of words regarding this issue that are spoken by women in the entire sample of unreserved GPs.[17] As before, we find that women invest more in goods preferred by women.

We have emphasized two channels through which having female leaders may lead to greater investments in goods women care about: through the fact that a woman leader has the opportunity to do what she feels is important, and also because women are more likely to express their opinion in GPs

TABLE 7. Investments in Birbhum

	Average quantity of public good provision	
	(1)	*(2)*
Ever reserved GP	−0.124	−0.243
	(0.132)	(0.388)
Ever reserved * average fraction of words women spoke on issue at GS	2.098	3.950
	(1.335)	(3.140)
Ever Reserved * fraction of words women spoke on issue at this GS		0.560
		(0.195)
Number of observations	2,475	390

Source: This table uses data from the Birbhum sample. Standard errors below the coefficients are corrected for clustering at the GP level.

Notes:

1. The asterisk (*) indicates that the indicated variables are interacted with one another.
2. "Ever Reserved" is 1 if the GP was reserved for a female Pradhan in either 1998 or in 2003, and 0 otherwise.
3. The outcome variable is the average quantity across infrastructure built or repaired since 2003 in the following areas: drinking water, public works (sanitation, roads, transportation), education, health, and irrigation. The table tests whether there is more investment in reserved GPs in goods mentioned more frequently by women, as measured by the fraction of words spoken by women on a given issue in the Gram Sabha meetings. See also Chattopadhyay and Duflo (2004).

17. This is the number of words spoken by female villagers divided by the total words spoken on that issue by all villagers, averaged over the unreserved sample. The issues included are: drinking water, public works (sanitation, roads, transportation), education, health, and irrigation. We exclude the issues financial help, rents and taxes, miscellaneous, and government which do not obviously correspond to specific public goods measurable in the PRA we implemented in West Bengal.

that are led by women. Though it is beyond the scope of this paper to try to distinguish between the two channels, we provide some relevant evidence in Column (2) of Table 7. In that table, in addition to the variable indicating whether a particular issue is pertinent for women *in general* we introduce the equivalent measure, but for women of this particular Gram Sabha: the number of words spoken by women of this GP on this particular issue, divided by the number of words spoken by both men and women. This allows us to examine whether women leaders are sensitive to the expressed needs of women in their GPs. The number of observations is severely reduced, because the variable is not defined when villagers have not said anything (which happens often). Despite this, there is clear evidence that, controlling for women's taste in general, women leaders are particularly responsive to the needs of women *in their* GP. Of course, the possibility remains that what women want in a GP also happens to be what the women leader wants (since she lives there as well). Nevertheless, this suggests that the needs of local women are better taken into account by women leaders.

Conclusion

Taken together, the results in this paper paint a consistent picture of female activism prompted by access to elected positions in village councils. First, we find no evidence of crowd-out of other disadvantaged groups (here, Muslims). Second, female leaders play two important roles—they increase female participation and responsiveness to female concerns in village meetings. Thus, they change the nature of policy activism across Indian villages. Whether the latter improves villagers overall well-being is, of course, an open question though the results on bribes are encouraging here. Also, the long-term data from Birbhum suggests that as women mature within the system their sphere of policy activism broadens. More broadly, our findings are also related to a growing literature on deliberative democracy (see Ban and Rao, 2008a and references within). This literature has emphasized the importance of increasing citizen participation in deliberative processes; here, we find evidence that political reservation increases female villagers' participation in such deliberative processes.

We would argue that these results both provide lessons for the ongoing debate on gender quotas in India and beyond, and also point to important areas for future research. First, our results on selection suggest that women and men differ in the political and social networks they have access to and

the extent to which they rely on family support. However, this per se does not determine the nature of their policy activism. Interestingly, evidence from other countries (France and Spain) suggest that a main concern with the selection associated with gender quotas relates to how parties manipulates quotas *not* the quality of available female leaders. Parties often choose to place women in relatively uncompetitive jurisdictions (Frechette et al., 2008) or in worse positions on the party list (Volart and Bagues, 2010). In that sense, use of the Indian village council method of random reservation of political positions may be a good way of limiting bias. Second, the results that female leaders increase female participation is intriguing and suggests that political reservation may have implications for female (and possibly male) turnout. Finally, the precise nature of female activism at the state and national level is harder to predict. Evidence from the United States (Miller, 2008; Rehavi, 2007) and India (Bhalotra and Clots-Figueras, 2010; Figueras, 2007) suggests that health and education may be important additional areas where women legislators make an impact. Whether, at the same time, the distributive concerns associated with female representation are accentuated is less clear but worthy of further investigation.

APPENDICES

TABLE A-1. Comparison of Reserved and Unreserved Villages in Meeting Sample

Dependent variable	*Mean unreserved* (1)	*Mean reserved* (2)	*Difference* (3)	*N* (4)	*Reservation effect with district fixed effects* (5)
Total population	4,038	3,364	−674 (719)	192	65 (509)
Literacy	0.409	0.406	−0.002 (0.025)	190	−0.010 (0.015)
Percentage of irrigated land	0.353	0.327	−0.026 (0.046)	186	−0.068 (0.032)
1 if village has a bus or train stop	0.788	0.725	−0.062 (0.059)	188	0.005 (0.051)
Has a pucca road	0.677	0.563	−0.115 (0.069)	188	−0.060 (0.063)
Number of health facilities	0.539	0.498	−0.042 (0.125)	195	0.012 (0.116)
1 if village has tube well	0.394	0.486	0.092 (0.074)	188	0.026 (0.050)
1 if village has hand pump	0.672	0.653	−0.020 (0.071)	188	0.031 (0.042)
1 if village has well	0.811	0.662	−0.149 (0.064)	188	−0.062 (0.056)
1 if village has community tap	0.346	0.220	−0.126 (0.066)	188	−0.056 (0.061)
Total number of schools	3.528	3.318	−0.210 (0.600)	188	0.191 (0.553)
Number of villages per GP	1.884	2.351	0.467 (0.304)	195	−0.073 (0.072)
SUR over all variables			−0.085 (0.069)		−0.030 (0.057)

Source: The authors used the raw data from the 1991 Census of India to generate the tables. The tables are not re-prints from a report labelled "Census of India".

Notes:

1. Standard errors below the coefficients in Columns (3) and (5).
2. Regressions in Column (5) control for district fixed effects.

TABLE A-2. Comparison of Reserved and Unreserved Villages in 1991 (Milennial Survey)

	Mean unreserved	*Mean reserved*	*Difference*	*N*	*Reservation effect with state fixed effects*
Dependent variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Total population	2,817	2,805	−12	938	66
			(229)		(120)
Literacy	0.396	0.378	−0.018	938	−0.012
			(0.012)		(0.010)
Female literacy	0.282	0.263	−0.019	940	−0.009
			(0.013)		(0.010)
Male literacy	0.502	0.486	−0.016	940	−0.012
			(0.012)		(0.010)
Percentage of irrigated land	0.282	0.342	0.059	642	0.034
			(0.032)		(0.023)
1 if village has a bus or train stop	0.627	0.554	−0.073	940	0.021
			(0.034)		(0.025)
Number of health facilities	0.604	0.685	0.081	809	0.126
			(0.121)		(0.122)
1 if village has tube well	0.335	0.308	−0.027	789	−0.031
			(0.040)		(0.031)
1 if village has hand pump	0.699	0.751	0.052	786	−0.009
			(0.034)		(0.026)
1 if village has well	0.724	0.703	−0.020	898	−0.032
			(0.032)		(0.028)
1 if village has community tap	0.393	0.373	−0.020	825	0.026
			(0.036)		(0.030)
Number of primary schools	1.857	1.780	−0.077	919	−0.004
			(0.135)		(0.106)
Number of middle schools	0.714	0.689	−0.025	839	−0.021
			(0.065)		(0.050)
Number of high schools	0.371	0.364	−0.007	808	0.026
			(0.046)		(0.036)
Total number of schools	2.832	2.726	−0.105	920	−0.012
			(0.201)		(0.142)

Source: Census of India, 1991.

Notes:

1. Standard errors below the coefficients in Columns (3) and (5).
2. Regressions in Column (5) control for state fixed effects and village class dummies.

TABLE A-3. Action Coding

Action description from transcript	*Code*	*Unconditional Panchayat action promised*	*Unconditional government or Panchayat action promised*
Will do what villagers ask for	1	1	1
No commitment on action but claim they will follow up	2		
Action conditional on higher up (money or sanction)	3		
Action conditional on villagers action	4		
No response	5		
Make unrealistic promises to appease villagers and end meeting	6	1	1
Other	7		
Insufficient funds	8		
Villagers instructed to attend meeting with NGO/ government officials	9		
Instructed villagers to pay taxes	10		
Threaten villagers with cutting services	11		
Claim not Panchayat's problem	12		
Villagers asked to repay loans	13		
Provided information requested by villagers	14	1	1
Not under Panchayat's jurisdiction	15		
Claim problem has already been solved	16		
Request villagers take action/solve problem on own	17		
Insufficient population for project to be approved	18		
Instructed villagers to contact other government agency	19		
Villagers request not allowed under scheme	20		
Service only to be provided by private sector	21		
Instructed to submit application	22		
Form women's association	23		
Action by official conditional on Panchayat's action	24		
Government official claims Panchayat must sanction work	25		
Work proceeding as quickly as possible	26		
Government official refuses to help but Panchayat claims will find solution	27	1	1
Claim they are evaluating applications according to policies	28		
Postponed gram sabha	29		
Instructed villagers to attend gram sabha	30		
Need land allocated for project first	31		
Implement rainwater harvesting	32		
Will provide alternative solution to what vill requested	33	1	1
Cannot solve problem (technically)	34		

(*Table A-3 continued*)

(*Table A-3 continued*)

Action description from transcript	*Code*	*Unconditional Panchayat action promised*	*Unconditional government or Panchayat action promised*
Suggested women's association take out loan for project	35		
Project/scheme has been cancelled	36		
Villagers decide to take action themselves	37		
Must wait until next year	38		
Need attendance of engineer	39		
Panchayat already funded project once; will not fund again	40		
Insist policy is appropriate as is	41		
New scheme available to solve problem	42		
Scheme not available to all eligibles due to lack of funding	43		
MLA claims can get gov't to solve problem	44		1
Asked villagers to obtain bank loan	45		
Action conditional on completion of other public works project	46		
Panchayat claims following all rules and regulations	47		
Panchayat agrees with problem but offers no solution	48		
MLA commits to solving problem while Panchayat hesistant	49		1
MLA encourages students passing exam in order to improve school facility	50		
Action requested by villagers still pending	51		
Action to be decided on in next meeting	52		

Source: This table was generated by the authors using the data from the GP meetings (i.e., the Meeting Sample) described in the main text of the paper.

TABLE A-4. Female-friendliness of Issues

Issue	*Fraction of words spoken by women*
Water	0.163
Public works	0.163
Financial help	0.225
Rents and taxes	0.139
School	0.122
Health	0.151
Agriculture	0.067
Miscellaneous	0.000
Government	0.082

Source: Appendix Table 4 was generated by the authors using the data from the GP meetings (i.e., the Meeting Sample) described in the main text of the paper.

TABLE A-5. Birbhum Household Outcomes

	Number of SHG with own bank account: PRA data	*Self-help groups: household data*				*Women's mobility*	
		Balance in savings account (with SHG)		*Normalized average*		*Normalized average*	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Panel A							
Ever reserved	1.086	202.71	246.72	0.017	0.019	0.037	−0.007
	(0.486)	(92.34)	(61.38)	(0.021)	(0.023)	(0.022)	(0.022)
Panel B							
First reserved 2003	0.624	191.59	438.11	0.033	0.034	−0.003	−0.011
	(0.637)	(129.18)	(120.56)	(0.037)	(0.034)	(0.031)	(0.031)
Reserved in 1998 and 2003	1.570	186.75	222.50	0.002	0.032	0.106	0.022
	(0.774)	(133.60)	(103.38)	(0.031)	(0.037)	(0.040)	(0.033)
Only reserved 1998	1.244	226.88	71.79	0.012	−0.004	0.031	−0.023
	(0.630)	(169.70)	(76.49)	(0.022)	(0.021)	(0.027)	(0.030)
Mean of unreserved	4.36	683.33	643.47				
SD of unreserved	(6.39)	(791.31)	(651.64)				

Test of only 2003 = both = only 1998		0.974	0.020			0.084	0.518
Test of only 2003 * FC = both * FC = only 1998 * FC							
N	495	1,153	1,282	6,652	6,780	6,652	6,780

Source: This table uses data from the Birbhum sample.

Notes:

1. The asterisk implies the multiplication sign, the common way of indicating the two variables are interacted with one another, since the variable used is the Reserved dummy variable interacted with the Ranking (fraction of words) variable.

2. The following variables were included in the normalized average. *Self-help groups*: participation indicator; outstanding loan from SHG; balance in savings; and last month's savings contribution. Teenagers' own aspirations: an indicator for not wanting to be a housewife; wish to have high education job (doctor, engineer, teacher, legal professional, or nurse); wish to be Pradhan; wish to marry after age of 18; wish to graduate or get higher education. *Women's mobility*: number of times a woman left the village or took a bus in previous 30 days; number of times a woman visited her parents in past 12 months; and whether a woman can go unescorted to her parents' village or to the next village.

3. Controls include (*i*) respondent-level variables: for children aspirations, age, age squared, illiterate, < 5 years of schooling, 5–10 years of schooling; for teenager aspirations, age and age squared; (*ii*) household-level variables: household size, SC, ST, OBC, landless, Muslim, wealth (quartiles 1–4), interviewer female, interview round; and (*iii*) village-level variables: total population, SC/ST share, sex ratio under age 6, percent literate, female literacy, percent of irrigated land, bus or train stop, pucca road to village, tube well, hand pump, well, community tap, number of schools, number of health facilities.

4. Block fixed effects are included and standard errors are clustered at the GP level.

Comments and Discussion

Devesh Kapur: The paper examines the effects of mandated group representation, in this case, women in Panchayat leadership positions and provides evidence on three different aspects of the debate on gender quotas in politics: politician selection, citizen participation in politics, and policymaking. It argues that the results from several surveys—a carefully designed methodology that sampled the records of 197 GP meetings recorded across 5 states; a survey conducted in 2005 survey of 495 villages in West Bengal's Birbhum district; and the nationally conducted Millennial survey which covered 36,542 households across 2,304 randomly selected villages across 24 states in 2000—all underline that access to elected positions in village councils results in greater female activism. The resulting shifts in political discourse lead to different policy outcomes: women leaders covered by these surveys are more likely to invest in drinking water facilities, and in the long run, in more public programs across the board.

Interpreting Political Context

The key findings of the paper draw from the analysis of 197 GP meetings. While the methodological elegance of randomized trials allows the authors to draw clear inferences, the small sample size raises questions on external validity of these results. This is by no means a representative picture for all of India; indeed, another study in West Bengal—covering the entire state as opposed to just one district (Birbhum) as in this study—did not find evidence of any impact of reservations for female panchayat leaders.[1] The authors explain this discrepancy by arguing that their results are over a longer time period and point to evidence of women maturing as leaders over time and (thereby) having an effect. More importantly they argue that by "focusing on data from India, albeit at a different level of governance, we are able to hold cultural and institutional contexts constant." Given the sheer cultural diversity across India the assumption that cultural context is constant across India seems heroic. Indeed the paper itself finds that the estimates for the

1. Bardhan et al., 2010.

likelihood that a woman speaks in a Panchayat with a woman Pradhan are much weaker for West Bengal. The cultural context for women in states like Rajasthan or Haryana is very different than in the southern states. Would the estimates by be lower there as well and if so, would they weaken or strengthen the normative case for mandated reservations?

Similarly, the assumption of a constant institutional context glosses over the reality that elections are fundamentally political and there is considerable political and institutional variation across India. For example, what might the findings of this sort of study be in areas affected by the Panchayat Extension to Scheduled Areas (PESA) Act of 1996?[2] Similarly the paper's findings that there is no evidence of crowding-out of other disadvantaged groups (here, Muslims) is based on evidence from southern states and West Bengal. Is this broadly applicable to North India where fears of crowding out of OBCs, have led political parties representing these groups to vociferously oppose mandated representation of women at the national and state level?

Technically, political parties are not allowed in Panchayat elections. In practice, they are very much involved. The role political parties play in different contexts would also illustrate whether co-partisanship matters, i.e., are the effects different if the Pradhan is a co-partisan of the MLA or the incumbent state government. Future work could attempt to weave the political landscape of different GPs into the analysis and perhaps draw more robust conclusions for specific contexts, rather than a few generalizations for India as a whole.

While the study demonstrated empowerment of female constituents as a result of reservations, it is unclear why female Pradhans in reserved positions were found less likely to chair meetings or speak at least once during a meeting. An exploration of possible explanations—e.g., why/how were meeting chairs selected, or why/how did female constituents voice issues of their concern (were they selected by the chair to speak in turn?)—might illuminate more about how female leadership translates to greater attention to issue areas of interest to women.

An inquiry into the managerial competence of female Pradhans might also indicate their ability to extract more resources or better encourage participation, relative to their male counterparts. As with any skill, political skills are partly a matter of practice and experience and are partly taught. To this end the Indian government has launched the Rashtriya Gram Swaraj Yojana

2. This act extends panchayats to the tribal areas of nine States of India (Andhra Pradesh, Chattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Maharashtra, Madhya Pradesh, Orissa and Rajasthan) to provide self-governance to and recognize the rights of indigenous communities (Government of India, 2010).

and the Panchayat Mahila Evam Yuva Shakti Abhiyan (PMEYSA), which aims at strengthening the capacities of elected women and youth representatives in Panchayati Raj institutions. The main objectives of the scheme are to build the self-confidence of women Panchayat leaders and enable them to articulate their problems as so that they overcome the institutional, societal, and political constraints that prevent them from active participation in Panchayats. It is unclear from the paper whether the authors controlled for this program and whether it has had any effects.

The evidence that women leaders are more likely to allocate additional funds to issue areas of concern to them, especially drinking water, supports findings from other studies. It is therefore puzzling that the paper finds that respondents are less likely to declare that they are satisfied with the public goods (water, health) they are receiving in villages when the Pradhan is a woman. Moreover, women are as likely to be dissatisfied as men. This echoes the findings of earlier work that female Pradhans in reserved positions and the programs they implement are viewed less favorably by constituents than their male counterparts.[3]

Why aren't people happy with female leadership? One possibility could be that the base level of satisfaction with women is lower. Understanding this issue would be helpful in evaluating whether, in fact, constituents generally give women less credit for investments and whether their baseline appreciation of women is lower than that of men, as suggested in the paper.

The paper's findings that constituents were found less likely to have to pay bribes to obtain services under female Pradhans in reserved positions is also consistent with findings that more political representations of women are associated with less corruption.[4] This could be either because women are intrinsically less prone to corruption, or because their relative political inexperience means that they don't know how to be corrupt—given enough time and experience there will be a reversion to the mean. Alternatively, reservations for women means that elections are less competitive and as a result the cost of Panchayat elections is lower which means that elected women Panchayat leaders from reserved constituencies have lower cost recovery targets. The link between election financing, reservations, and bribery levels needs further investigation.

An important finding of the paper is that reservations appear to not only improve the instrumental aspects of democracy but also the substantive aspects, namely, democratic deliberation by enhancing participation of

3. Duflo and Topavola, 2004.
4. Dollar, Fisman, and Gatti, 2001.

female constituents. The normative implications are obvious and needs highlighting. However, it seems to assume that more deliberation is an intrinsically superior outcome and does not examine how deliberation affects political dynamics. For example, studies examining deliberation over the Internet[5] and Biju Rao's research based on the same GP transcripts used in this study suggests that deliberation is the cause of heightened conflict at the village level.

Drawing Policy Conclusions

While the paper offers evidence that reservations have enhanced female participation in political discourse and increased delivery of certain public goods (particularly in drinking water infrastructure), the case for reservations as a policy mechanism to achieve this end is not evaluated; the authors found that the differences are explained by the leader's gender, not by reservations. A range of paths might be taken to improve women's empowerment and entry into leadership positions. Jensen and Oster have found that the spread of television in India has empowered women, for example.[6]

Yet from this data, the takeaways for Indian policymakers are not entirely clear. Is gender a political or a social identity and does mandated representation shift the balance from the latter to the former? If, as the paper argues, women Panchayat leaders learn political skills over time, the randomized method of selection of reserved Panchayats for women means that just when they gain experience their Panchayat becomes de-reserved. Is there a better alternative?

More analysis of the political context surrounding the paper's findings may help further isolate the role of reservations from a multitude of other factors, enriching the conclusions the paper draws. Enhanced participation in the deliberative process and increased investment in social programs can also be reached through avenues other than reservations for female leaders. Consequently, polices mandating representation must be subject to a cost-benefit analysis across contexts and time. Policymakers need to know the elasticity of the marginal impact of reservations on specific outcome measures. Only knowledge of these trade-offs would answer questions about the optimal percentage of positions to be reserved, when, and where. This also requires an understanding of what defines empowerment as a policy

5. For example, Sunstein, 2001. Specific studies include Spears et al., 2002.
6. Jensen and Oster, 2007.

goal, and how to judge its achievement. A sharper understanding of this goal would advance the debate on how appropriate reservations are as a solution, and at what point a sunset clause should be put in place to revert from such policies.

Hari Nagarajan: The literature on the impact of political reservation on women's welfare is growing. The evidence of impact suggested by this literature is varied. There is also this problem of the evidence being based on studies of specific villages or being germane to a particular political environment. A recent paper by Deininger, Jin, and Nagarajan (Forthcoming) has examined evidence from villages across India and found that the impact of political reservations is significant when it is related to political participation by women. This in turn leads to enhanced motivation on the part of women to actually contribute (financially even) to the development of communities. There is no impact on the quality of service delivery. Significantly, such effects persist even if the regime change is negative (i.e., a male is elected in place of a female).

This paper seems to be a synthesis of the work done by the third author and others. The paper shows that political reservations have several significant positive welfare outcomes. I feel that the jury is still out and contemplating on the matters being raised and purportedly proved. I will like to make a few remarks based on evidence that I have seen from the nationally representative Rural Economic and Demography Survey (REDS) datasets of NCAER. The reason is that the questions or the debates on women's reservations and women's empowerment are extremely difficult to articulate to the difficulties associated with separating out various causal factors. For instance, one of the issues that is being pointed out in the paper is that in villages where women participate more, or participate more effectively, or, women are leaders, there is better provision of public goods, particularly drinking water. What we have found however is that the magnitude of participation has increased. However, there is no significant change over time of the quality of provision of public goods (including drinking water).

Let me present evidence related to governance. Should we expect the patterns of allocation to match that of households' revealed preferences? We find over time that there is a degree of matching but there is also a significant degree of elite capture. We have also used vignettes to try and capture the degree of effectiveness of women leaders compared to male Panchayat Pradhans. Can women take maters related to governance to the Pradhan? One vignette went this way:

> Meenakshi, the four year old daughter of Rajesh, fell ill after eating the food provided by the noon-meal program and Lakshmi, the wife of Rajesh went to complain to the school. She was rebuked and was asked to talk to Pradhan. She has since asked Rajesh, her husband, to talk to the Pradhan. (REDS Survey, 2006–2008)

The question was will Lakshmi be able to get the Pradhan to intervene. The answers from both male and female respondents were inconclusive (even in Panchayats reserved for women). We rephrased the issue. Here is Rakesh, who is the son of Brij Mohan and has similarly fallen ill. Now, we want to ask how easy it is for Brij Mohan to hold elected representatives accountable. We still could find differences that could be directly attributed to the gender of the elected representative.

The channels of impact of such legislative measures need to be articulated with greater clarity and I am not convinced that this paper achieves this. One of the points made in this paper is that the identity of village's leaders matter. There is then an attempt to suggest that commitment to policies increases with the "correct" gender. I am not convinced by the relevance of the commitment problem in the current context of devolution. If policies can be independently evolved then commitment is an issue. However, much of local governance is mere "post office type economics." That is, the elected officials can at most play a role in identifying beneficiaries. All of the governance is mandated by the higher level Panchayats and the state and central governments. In fact, without being explicitly stated, programs are put together to benefit specific ethnic groups.

There is also the prevalence of parochialism in voting, clientelism, that this paper bypasses. What I am getting at is that the channel of impact is clouded because of all these factors. Hence your finding should be such a big surprise. Since identity is an overriding factor, other forms identities such as *Jati* are becoming important at the time of elections. The numerical sizes of both own *Jati* and of the competing *Jati* matter. In being able to access and participate in welfare programs.

The type, nature, and intensity of participation in the Gram Sabha meetings depend on a number of factors such as prevalent attitudes, inheritance patterns. It might be interesting to see whether this pattern of participation has changed over time. I am also a bit skeptical of your results owing to the methodology not being able to accurately separate out the channel of effects. You might want to run a treatment regression and compare it to a placebo regression to isolate the impact of reservations on villages. I have tried it elsewhere to test on impact of legislations on inheritance by women members of households.

Another point that I have concerns about is that you evidence on the fact that bribes are probably lower in women headed Panchayats. My work on this area using the REDS data sets seem to suggest that bribes are often used by households as a tool to access public goods or access welfare programs. Sometimes, bribes are successful, sometimes they are not. We found that in male-headed Panchayats payment of bribe does not guarantee participation but in women headed Panchayats bribe guarantees participation. This perhaps is there in your findings.

Another interesting point that I found quite fascinating is the quantity versus quality of public goods provision. The pattern of management seems to matter and I think that this is an extremely important part of the paper which unfortunately is moved on to the periphery. I think that these regressions can be conditioned on the level of satisfaction with the Pradhan.

General Discussion

Both T. N. Srinivasan and Ram Singh raised the question of voter preferences in determining both electoral and expenditure outcomes. T. N. Srinivasan noted that there had been a vigorous debate prior to Indian independence on separate electorates for Hindus and Muslims, where Mahatma Gandhi had argued that the entire population should be allowed to vote for candidates in reserved constituencies, not just Muslims as had been the preference of the British. Ram Singh made a similar point: even if the expenditure preferences of individual female candidates differed from those of male candidates, the fact that the electorate voting for them was of mixed gender, with a more assertive male segment should in principle have an impact on who was elected and subsequent expenditure preferences.

Ratna Sudarshan welcomed the paper's quantitative approach to issues that were more often explored qualitatively. On the basis of her observation of villages in North India, she believed that an important underlying factor was the existence of strong women's groups that had evolved to address practical needs (not just SHGs). In her experience, the presence of such groups both generated effective women leaders as well as energizing the village council (GS). It was also significant that access to water kept emerging as the central concern of excluded groups such as women (as shown here) or lower castes (in other studies). Improved access to water was clearly an important by-product of greater political inclusiveness.

Dilip Mookherjee noted that Pranab Bardhan and he had updated their earlier work in West Bengal, cited in the paper. Their findings on the impact of women's reservations were largely unchanged. More specifically, there was no significant effect on what the village as a whole received in women reservation villages, either in respect of public or private goods. However, women's reservation for the post of Pradhan (leader) did generate a significant negative effect on targeting to scheduled caste/scheduled tribe (SC/ST) households. This was in contrast to the outcome when the reservation is in favor of a leader from a SC/ST household.

Alakh Sharma cited the case of Bihar where 50 percent of gram panchayat leader positions are now reserved for women, and 55 percent of all such positions are now occupied by women. In his perception such strong female representation had not made an appreciable difference to priorities and outcomes in government programs. As indicated by Ratna Sudarshan, his work also found that access to drinking water dominated the agenda. By contrast neither sanitation nor early childhood nutrition (through the Integrated Child Development Services, or ICDS, program) seemed to be a major concern of the Panchayats.

On the basis of recent field research he also believed that reservation had been an important element in giving women confidence in a feudal, patriarchal setting, but their lack of confidence and experience often meant proxy control by their husbands. To overcome this would require an enormous program of training of women Panchayat leaders, much beyond current perfunctory efforts.

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Inelastic Institutions: Political Change and Intergovernmental Transfer Oversight in Post-Independence India

Introduction

The basic structure of India's fiscal federalism was in place within five years of the country's independence on August 15, 1947. India's Constitution came into force on January 26, 1950, specifying the division of responsibilities and broad assignment of taxes between levels of government, provisions for intergovernmental grants, and a mechanism, the Finance Commission (FC), for allocating central government tax revenues to offset the imbalance between revenues and responsibilities. The Planning Commission (PC), the second major institution involved in intergovernmental transfers, was created by a resolution of the central government Cabinet in March 1950 to draw up plans for national development. Although the PC's role in formulating plans did not inherently require it to have a role in implementing them or in independently determining the size and terms of intergovernmental transfers, in fact it became a vehicle for conditional, specific-purpose transfers alongside the FC's unconditional transfers.[1]

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1. The Cabinet Resolution explicitly stated that the responsibility for taking and implementing decisions would rest with the central government and the state governments. The Planning Commission was expected to make recommendations to the Central Cabinet but also to act in close understanding with the ministries of the central government and the state governments in framing this advice.

The fiscal federal arrangements, essentially assigning rights to sources of revenue and responsibilities for expenditures (including investment for development) across units of the federation, contained a number of centralizing features. The Constitution enabled rather than mandated the central government to share some of the most significant revenue sources.[2] It retained substantial central government control over many policy areas. The lists of responsibilities for exclusive state and central jurisdictions is similar to other federations around the world and consistent with the normative principles of federal design, but many functions that are commonly sub national in other federations are considered "concurrent" between center and states in India. The central government retains the final word in case of conflict between state and central policies in these cases. Residual powers remained with the central government.[3] The constitutionally created FC stands out among other countries' institutions for intergovernmental transfers as an independent mechanism explicitly designed (as much as intent can be inferred from the transcripts of the Constituent Assembly) to preserve states' autonomy in managing their budgets, but it is just one of two major institutions for intergovernmental transfers. The other institution, the PC, de facto has been able to allocate revenues as well as monitor their uses for specific purposes even when the programs they support are in policy areas that are constitutionally part of the states' domains.

The centralizing features in the "original position" of India's fiscal federalism are understandable in light of the economic and political context of the decade, but their persistence over the post-Independence decades is more difficult to explain.

India is widely seen as an example of "unitary federalism,"[4] but most observers have noted a steady decentralization, or at least deconcentration,

2. The original division of taxes in Articles 268 (taxes levied by the union but collected and kept by the states), 269 (taxes levied and collected by the union, but assigned to the states), 270 (taxes levied and collected by the union that must be shared between center and states), and 272 (taxes levied and collected by the Union that may be shared between center and states among other provisions) was later modified in 2000 to create a broader-based pool of taxes to be shared.

3. It is not clear that the framers of the Constitution considered the assignment of residual policy powers to be a centralizing feature. T. T. Krishnamachari, e.g., argued that this residuary power meant little "because we have gone to such absolute length to enumerate the powers of the Center and of the States and also the powers that are to be exercised by both of them in the concurrent field." Dr Ambedkar made a similar point emphasizing the extent to which policymaking powers had been assigned to states.

4. Wheare (1964) noted that India was only "quasi-federal." Stepan (1999) calls it a "holding together federation," noting that powers for sub national governments were granted by

of economic and political power over the decades since Independence. India's polity and economy have changed dramatically, generally in ways that one would expect to have created stronger demands for decentralization of fiscal power, yet its fiscal federal framework remains as centralized, if not more centralized, than it was when it was created. This paper documents the often-overlooked persistence of central government control over allocation of public resources for development and seeks to understand the reasons behind the slow structural response to India's evolving economy and polity.

Members of the Drafting Committee for the Constitution were discussing the framework for the nation in the shadow of Partition and fear of further disintegration. Members of the Constituent Assembly argued that sub national autonomy would exacerbate "centrifugal" and "fissiparous" tendencies and that a strong center was required to bring states into cohesion and consolidate the country after Independence.[5] Even those opposed to a strong central government couched their arguments in terms of the dangers of disintegration—from a diverse people being forced to submit to a "central oligarchy" rather than free to unite on the basis of the "solid foundation of India's past."[6] Similarly, the creation of the PC implemented the consensus across the political spectrum that had emerged in the pre-Independence era on the desirability of planning as a means for articulating national development plans to achieve the nation's intrinsic overall objective of eradicating mass poverty through accumulation and efficient utilization of the nation's natural, human, and physical resources to produce rapid and well distributed economic growth. Onlookers from around the world may have been amazed and impressed at the audacity of attempting planned development in a democratic federal setting (Paranjape, 1963), but the appropriateness of planning for development was not in question. The strong consensus on planning,

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the Constituent Assembly, not accorded to previously sovereign states that were in strong bargaining positions to carve out independent arenas. Outside the fiscal federal provisions, the Indian constitution does have some striking provisions reinforcing central government dominance. It gives the central government the power to dismiss elected state governments, e.g., if it determines that the constitutional machinery has broken down in those states. Dr Ambedkar did not anticipate that this power would be used extensively and justified it as a necessary provision for effective governance in emergencies, but the article has been used for political ends over the years.

5. Words "centrifugal" and "fissiparous" were used on 5th January 1948 by Pandit Lakshmi Kant Maitra, member elected from a general constituency in West Bengal. Available online at http://parliamentofindia/ls/debates/vol7p2b.htm (accessed on May 2, 2011).

6. "The words "central oligarchy" and "solid foundation of India's past" were used on 5th January 1948 by Shri Lok Nath Misra, member elected from a general constituency in Orissa (Ibid.)

the fact that the Indian National Congress (INC) Party was in control of all central and state governments, and the personal credibility and popularity of Prime Minister Nehru, Chairman of the Planning Commission, enabled the Planning Commission not only to achieve prestige but also substantial influence over economic issues involving the center and the states.[7]

The context has evolved. The single party political setting at Independence has given way to a multi-party democracy over the past six decades with regional parties not only coming to power in several states but also as partners in coalitions in power at the center. The economy has changed significantly, with the slow growth of 1950–80 being followed by progressively accelerating growth in the subsequent decades. Society has changed dramatically as well, particular with groups that had been economically, socially, and politically discriminated against for millennia coming into their own and acquiring an increasingly significant voice.

Yet the fiscal federal framework, and in particular the intergovernmental transfer regime at the heart of intergovernmental fiscal relations, remains as centralized, if not more so, as it was in the 1950s. India's constitution has been amended often, but none of these substantially changed the foundation for fiscal federalism. A few expenditure responsibilities were adjusted and more taxes were added to the pool to be allocated by the FC by the 80th Amendment, but the constitution's statements on the mechanisms for resolving the resource imbalances have remained essentially unchanged. The most notable amendments, the 72nd and 73rd Amendments of 1993, fleshed out and elaborated a third level of government in urban and rural areas, but did not alter the prior balance between center and states.

The two institutions overseeing intergovernmental transfers, namely, the FC and PC, still exist and continue to occupy more or less the same niches in the overall flow of resources. The PC has thrived, even though the rationale for the type of planning it practiced during 1950–90 no longer exists. It has become more rather than less intrusive in state domains. The FC's role, on the other hand, has remained limited and relative to its potential. It would have been natural for it to become a major player in discussions leading to fiscal reforms involving center and states, e.g., but it appears to have been sidelined in some of the most important of these debates. Major changes in the economy, polity, and society have induced only minor changes in the

7. Nehru had been the chairman of the Congress Party's National Planning Committee of 1938 and became actively involved in the functioning of the Planning Commission as its Chairman during the formulation of and presentation to the Union Parliament of the first three five-year plans.

frameworks of center–state relations in general and in fiscal federalism in particular. Although nothing in the Constitution or the polity in principle precluded the formulation and adoption of structural changes in intergovernmental relations more generally, nonetheless they were not adopted.

The section "Intergovernmental Transfers In Perspective" establishes that the absence of change in India's fiscal federal institutions is a puzzle worthy of examination. The institutions we discuss oversee a significant portion of the revenues that could be channeled into India's development. The dynamics of the institutions that determine the investment choices are therefore of interest for understanding the political economy of India's underdevelopment and the potential for changes in the future. The case that we document adds a new twist to the conventional wisdom that India is economically, politically, and institutionally decentralizing.[8]

The section "The Puzzle: Contextual Change, Institutional Stasis," the heart of the paper, documents the puzzle of glacial institutional change alongside rapid political change. We discuss changes in the economic and political context as well as two aspects of institutional evolution: the relative roles of PC and FC in overseeing intergovernmental transfers, and changes within the methods used by the PC to allocate funds. We focus in particular on the implications of institutional and policy choices for states' autonomy in fiscal decision-making. We establish that while the context has changed dramatically, and there have been significant public debates and calls for greater state autonomy in fiscal decision-making in the 1960s and late 1980s in particular, there have been limited actual changes.

The section "Why?" presents some possible explanations for the institutional persistence, focusing on the ways in which India's economic conditions and political structure discourage collective action by states. The concluding section contains a discussion of the implications of our analysis for India's economic and political development. Our comments are largely speculative at this point, but we find the continuing absence of incentives and a mechanism to deliberately move to a more balanced federation that encourages policymaking to be more responsive to citizens rather than central mandates troubling.

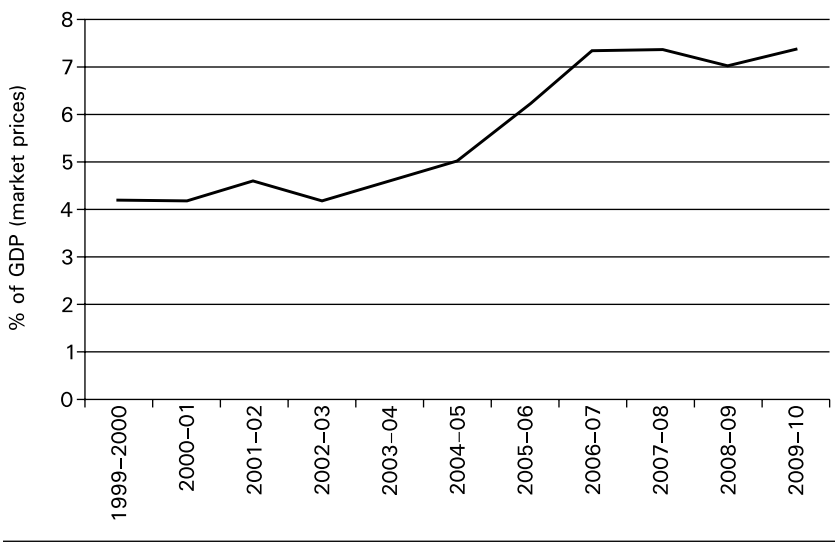
8. See, e.g., Ganguly, Sumit, Diamond, Larry, and Marc Plattner, eds, *The State of India's Democracy* (Baltimore: Johns Hopkins University Press, 2007). The essays contained within analyze developments in caste politics, the party system, media, economic policy, and other areas and nearly universally conclude that India's survival as a democracy is due to its ability to accommodate and provide space for these emerging voices.

Intergovernmental Transfers in Perspective

Much of our analysis in this paper focuses on the evolution of the institutions governing intergovernmental transfers and their uses. These institutions are of more than academic interest; governance of intergovernmental transfers affects control rights over public resources and their use for public expenditure. Transfers overseen by the PC and FC comprise a significant portion of GDP, as well as of sub national current expenditure.

Figure 1 shows the trajectory of total transfers[9] as a percentage of GDP at market prices, while Figure 2 shows these as a percentage of overall revenue expenditure. Intergovernmental transfers, even excluding subsidized loans, accounted for more than 7 percent of GDP and supported nearly 45 percent of state's revenue expenditure in 2009–10. Both graphs show a noticeable upward trend. The terms on which these funds are allocated, the purposes for which they can be spent, and the accountability of the authorities overseeing these funds obviously play important roles in the potential to convert public resources into public goods.

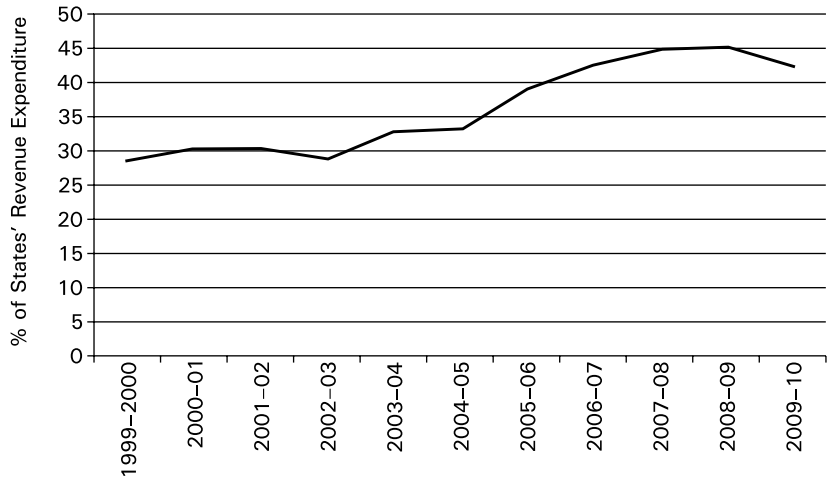
FIGURE 1. Total Transfers as % of GDP



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

9. Total transfers are calculated as states' share of taxes plus statutory and non-statutory grants.

FIGURE 2. Total Transfers as a % of State Revenue Expenditure



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

The Puzzle: Contextual Change, Institutional Stasis

India's polity, economy, and society have changed dramatically in the six decades since independence, while the institutions that govern allocation of a substantial portion of public expenditure have remained remarkably constant. This contrast is puzzling for several reasons. First, the de facto institutional framework for fiscal federalism is neither clearly specified nor firmly embedded in Constitution. The section "Intergovernmental Transfers: Intentions and the Original Institutions" discusses the discussions underlying the fiscal provisions in the constitution and highlights the ambiguity created by the Constituent Assembly's attention to fiscal autonomy and the practical realities implied by a national planning process. The FC's constitutional mandate was limited to fiscal issues including center–state resource transfers among the center, states and other units of the Federation and the imbalances thereof, while the PC's mandate as per the founding Cabinet resolution was to invest in national development through five-year plans for utilizing human and material resources efficiently for achieving the overarching objective of eradication of mass poverty within a reasonable time. It implied some need for broad national coordination between development investments and expenditure. Neither the Constituent Assembly that created the FC nor the Cabinet resolution that created the PC addressed the basic conflict at their birth between the two bodies' mandates, leaving the resolution of the conflict

to ad hoc future adjustments. Second, as discussed in the section "Changes in the Context," political and social changes have empowered groups that would plausibly be interested in a larger stake in decision-making, while economic changes have eliminated much of the rationale for planning. The section "Changes in the Institutions" documents the "stubborn center."

Intergovernmental Transfers: Intentions and the Original Institutions

The Constituent Assembly debates' emphasis on the importance of state fiscal autonomy and lack of attention to a central government role in planning are striking in light of subsequent institutional developments. The FC was explicitly designed to ensure that states would have a stable source of revenues with minimal central government interference, while the PC was not mentioned. The members of the Assembly must have been aware and part of the consensus on planning as a strategy for achieving development, but they did not discuss institutions for planning, much less any central government role in planning. They also did not address the challenge of coordination between the FC's work and any future planning organization. This failure to recognize the need for coordination and balance it with the desire for state autonomy within its constitutionally assigned jurisdiction left the formal roles of an relationship between the organization open to interpretation and adjustment.

The President of the Constituent Assembly had appointed an Expert Committee on Financial Provisions of the Union Constitution. Its terms of reference, inter alia, required it to "examine … the existing provisions relating finance and borrowing powers in the Government of India Act, 1935, and their working in the last ten years and to make recommendations as to the entries in the lists and sections to be embodied in the new Constitution." The Committee began its work on November 17, 1947 and forwarded its report to the President on December 5, 1947. The report was not discussed in the Constituent Assembly at that time, but its recommendations were discussed a year later when the financial provisions in the Draft Constitution were debated starting November 4, 1948.

The Expert Committee was charged with determining how best to divide resources to ensure that all levels of government could carry out their assigned tasks within the constraints of an arrangement being administratively feasible, in the national interest, and equitable. It is clear that the

members of the Expert Committee were fully cognizant that the pursuit of development required mobilization of fiscal resources at all levels of government, but they seemed to view the task of development as one for states rather than a subject for national coordination.

The Committee advocated a regime in which stable, predictable, and substantial flows of resources would be delivered to the states. It recognized that the needs of the provinces, in contrast to the stable, normal expenditures of the central government, are

> almost unlimited, particularly in relation to welfare services and general development. *If these services, on which the improvement of human well-being and increase of the country's productive capacity so much depend, are to be properly planned and executed, it is necessary to place at the disposal of Provincial Governments adequate resources of their own, without their having to depend on the variable munificence or affluence of the Centre.* The Provinces must, therefore, have as many independent sources of revenue as possible.[10] (Emphasis added)

The Expert Committee also advocated substantial autonomy for the states to make their own decisions about expenditure.

While the Committee recognized the need for specific purpose grants, it noted that these would be necessary "in the developmental stages of the country" from "time to time." These were mainly to be used for equalization, noted the Committee, "There is undoubtedly something attractive in seeking to bring up the backward units at least to 'average' standards, both in effort (severity of taxation) and in performance (standards of services)."

The Expert Committee's institutional recommendations followed these principles: by embodying the arrangement regarding the division of the tax bases between the central and the provinces as well as the distribution of proceeds of taxes in the Constitution, the Committee made its implementation automatic and free from interference as possible. It recommended a review of the principles for revenue distribution every five years by a neutral expert body, the FC, in order to address changing conditions and incorporate lessons from experience. The Commission's mandate was clearly stated, as was its status:

10. Taken from paragraph 28, ANNEXURE 1. Available at http://parliamentofindia.nic.in/ls/debates/vol7p1c.htm (accessed May 2, 2011). Colonial India consisted of Provinces and other units directly under the control of the colonial government and Princely States ruled by princes under the suzerainty of the colonial government. The provinces referred to in the debates and documents of the Assembly were to become states under the Constitution that was adopted.

> (a) To allocate between the Provinces, the respective shares of the proceeds of taxes that have to be divided between them; (b) To consider applications for grant-in-aid from Provinces and report thereon; and (c) To consider and report on any other matter referred to it by the President.[11]

It's status was defined as a "high level tribunal of five members including a Chairman who has been or is holding high judicial office not lower than that of a judge of a High Court."

The Expert Committee did not specify detailed membership criteria (these were later enacted by Parliament) but recommended that two should be selected from a panel of nominees of Units Governments and two others from a panel of nominees of the Central Government, the Chairman being selected by the President himself. One at least of the five should possess close knowledge of the finances and accounts of governments, while another at least should have a wide and authoritative knowledge of economics. It would be an advantage if one or more were public men with wide experience. It would be a further advantage, if a member possessed more than one qualification, and steps should be taken to secure the services of such individuals. The appointments might be made for five years and be renewable for another five years.

The Drafting Committee generally seemed to agree with the principles, although there was substantial debate about the exact limits of the FC's powers as well as to whom it would report. On the one hand, many members reiterated the importance of an independent authority for determining revenue sharing. Brajeshwar Prasad, later MP from Bihar, contended that the center must levy and collect all taxes and duties so as to prevent provinces from becoming financially autonomous and eventually seceding and becoming independent, but that collection did not imply decision-making over expenditure. In his view "there should be an independent authority at the Centre to allocate funds between the different units in accordance with the needs of each province."[12] Other members reiterated the importance of having an independent body and/or guaranteed assignment of some revenues to sub national governments. B. Das (Orissa) hoped that the provinces would not be treated as a "charity boy" of the North Block of the Central Secretariat in Delhi where the Finance Department of the Central Government was located and where the Union Finance Ministry still is.

11. The quote is from the Report of the Expert Committee on Financial Provisions of the Union Constitution, presented to the Constituent Assembly on Delhi, 5 December 1947 and recorded at http://parliamentofindia.nic.in/ls/debates/vol7p1c.htm (accessed May 2, 2011).

12. He noted that the Finance Commission could be this independent central authority.

R.K. Sidhva (C.P. & Berar) moved an amendment for ensuring that proceeds of the terminal tax be assigned to local authorities to add to their income from tolls and octroi. Upendra Nath Barman (West Bengal) recommended a formula and wanted the allocations to provinces be fixed without waiting for the FC to be appointed, in order to enable the provinces to launch their development schemes.[13]

The Expert Committee was also criticized by some as being too reticent with its recommended allocation of powers to the FC. T.T. Krishnamachari (Madras), one of the most severe critics of the Expert Committee, its competence, and its report[14] chastised the committee for not considering the implications of the constitutional allocation of expenditure responsibilities or thinking about any revolutionary changes in the financial structure established under British rule. He argued that the FC should have been given the power to change the assignment of expenditure responsibilities between levels of government. His colleague Sir Alladi Krishnaswamy Ayyar (Madras) was less vehement in his call for revolutionary change, but agreed with the recommendation of additional powers for the FC.

Most of the calls to make the FC more accountable to political oversight were based on the Drafting Committee's concerns that it would not necessarily represent both center and state interests. Shiban Lal Saxena (United Provinces) argued for an important role for Parliament in making final decisions regarding allocation of revenues between center and states, on the grounds that it has the power of decision-making by law and represents all actors in a federal democracy. H.V. Kamath (C.P. & Berar) also argued against centralizing the power to review and respond to the recommendations of the FC with the President. Saxena wanted a provision that the President should place his proposals for action to be taken on the recommendations of the FC before Parliament and that Parliament would have the right to

13. In anticipation of the Gadgil Formula(e) he suggested an allocation based on popultion (33 1/3 percent), on tax revenues collected (58 1/3 percent), with the remaining (8 1/3 percent) being distributed in such manner as may be prescribed.

14. During the debate on the Draft Constitution on November 5, 1948, he stated:

> Well, to my own mind, the way the [Expert] Committee worked was not altogether satisfactory, though the members of the Committee were eminent enough. I had the opportunity of giving evidence before the Committee and I did come away from that meeting feeling that the Committee was not seized of the seriousness of the matter they were entrusted with, nor were they competent to advise the Drafting committee in regard to the subjects referred to them. Sir, the proof of the pudding is in the eating. I have with me a copy of the report of the Expert Committee, and I am not satisfied with it.

amend the proposals by its resolutions. Thakurdas Bhargava (East Punjab) supported Kamath and Saxena on the ground that the report of the FC, whose membership qualifications would be set by Parliament and in which provinces are represented, will be a historic record and furnish the basis for those proposals that would affect the provinces vitally. He felt that provinces should have a say in the matter through their representative in Parliament, without the Central Cabinet or the President being the sole judge of those proposals of the FC. Surprisingly, however, there were no references to the state legislatures in the debate in spite of these misgivings about the preferences and influence of the central government and Parliament on determination of intergovernmental transfers.

In the end, the Draft Constitution left the distribution of taxes for the FC to recommend to the President, who would then submit a memorandum to the Parliament describing the action taken on these recommendations. The Constitution required the President's report to be laid before Parliament without stating whether this was to be for Parliament's approval or merely its consideration. Dr Ambedkar, the Chairman of the Drafting Committee for the Constitution, argued that the proposed amendments assigning more power to Parliament would have contradicted other already-approved articles assigning power to the President and defining division of revenues.

Following the Expert Committee's recommendations and the Draft Constitution, Article 280 of the Constitution provides for the appointment of a FC every five years to make recommendations to the President on the share of the revenue from the divisible pool of taxes it should transfer to states, and also how the share accruing to states ware to be divided among states and union territories. Article 280, 3(b) also orders the Finance Commission to make recommendations on the principles to be used in making certain grants (under Articles 275 and 282) and their amounts from the union government to states (and by one state to another) and also loans from the central government. The Constitution also notes that its deliberations should cover "any other matter referred to the Commission by the President in the interests of sound finance." States set up similar institutions to determine transfers to local governments after the 73rd and 74th Amendments gave these bodies constitutional recognition.

The PC emerged from the pre-Independence consensus on the responsibility of the state to eliminate poverty and on planning as a strategy to do so. The INC took the lead by establishing a National Planning Committee (NPC), under the chairmanship of Jawaharlal Nehru in 1938. As the war was coming to an end and independence seemed near, several groups besides

the NPC, including most prominently a group of businessmen of Bombay, the Indian Federation of Labor, and even the Colonial government had prepared and circulated other plans for India's post war reconstruction and development once the war was over (Srinivasan, 2000, 2007).[15] All of them had their own definitions of poverty, but each proposed argued that the state had a major role in eliminating poverty quickly. The 1950 Cabinet Resolution establishing the PC noted this consensus as well as the provisions in the constitution relating to directive principles of state policy as motivating factors. Drawing on these and on the economic trends and problems since independence in August 15, 1947, the resolution noted:

> [P]rogress has been hampered by the absence of adequate co-ordination and of sufficiently precise information about the availability of resources.… The need for comprehensive planning based on a careful appraisal of resources and on an objective analysis of all the relevant economic factors has become imperative. These purposes can best be achieved through an organization free from the burden of the day-to-day administration, but in constant touch with the Government at the· highest policy level. Accordingly, the Government of India has decided to set up a Planning Commission.[16]

The resolution set out the tasks, inter alia, as:

(i) to formulate a Plan for the most effective and balanced utilization of the county's resources after making an assessment of their availability in relation to requirements;
(ii) to set priorities, define the stages in which the Plan should be carried out and, propose the allocation of resources for the due completion of each stage;
(iii) to make such interim or ancillary recommendations as appear to it to be appropriate either for facilitating the discharge of the duties assigned to it, or on a consideration of the prevailing economic conditions, current policies, measures and development programmes or on an examination of such specific problem as may be referred to it for advice by Central or State Governments (Government of India, 1950).

15. Although it had done much of its work, the NPC could not complete its report before the end of the Second World War as its members were imprisoned by the colonial government in the early 1940s.

16. Government of India, 1950. Available online at http://planningcommission.nic.in/aboutus/history/index.php?about=funcbody.htm (accessed May 2, 2011).

As a creation of the Cabinet, the PC has no legal right to exercise powers other than those explicitly delegated to it by the union government.

In spite of the discussions about protecting the states' autonomy, and the fact that the Constitution lists economic and social planning as a concurrent subject (Item 20 in the Seventh Schedule), neither institution requires approval from the state governments to carry out its duties. Neither the PC's national and state plans nor the central government's actions on the recommendations of the FC require formal approval Parliament or state legislative assemblies. State government representatives have no formal role in either institution. The FC generally consults state leaders as part of its deliberations and often cites their views as justification for its recommendations to the central government, but the Constituent Assembly debates on state government representation on the FC did not lead to any provisions to do so. The National Development Council (NDC), a body consisting of chief ministers and members of the PC, was formed in 1952 to "review the workings of the National Plan from time to time, to consider important questions of social and economic policy affecting National Development, and to recommend measures for the achievement of the aims and targets set out in the National Plan."[17] It has never been seen as having an especially strong role in overseeing the Plan. The First Administrative Reforms Commission (ARC) (1966) noted that it was largely ceremonial and recommended reconstitution as well as more frequent meetings. An October 1967 Government Resolution implemented these recommendations, noting that it should meet "as often as may be necessary and at least twice in each year." However, as of 1999, the council had not met more than once a year on average. The Ninth Plan (1313 pages in two volumes) was distributed to members for discussion one week before the meeting (EPW, 1999).

Changes in the Context

Politically, the major shift has been the evolution from single-party dominance in center and state governments to multi-party coalitions in both levels of government. The INC, the party that led the struggle for independence, won a majority of seats and formed governments in the Union Parliament and all states in 1952, the first election after the Constitution was created. It retained this hegemony for the most part until 1967. The INC won more than two-thirds of the national Parliament seats in 1952, 1957, and 1962 as well as a majority of seats in all state assemblies with the exception of

17. Government of India Resolution 62/CF/50 of August, 1952.

a Communist government being elected in Kerala in 1957.[18] Two features of the electoral system helped sustain this position in an era of fragmented opposition parties: that a candidate need only have plurality of votes cast, not a majority, to win a constituency and that the national Parliament and state Assembly elections were simultaneous. The first helped the INC convert a plurality of votes (between 40 to 48 percent from 1952 to 1967) to a majority of seats, while the electoral coattails from the second helped local Congress candidates against regional rivals. The conventional wisdom is that conflicts between the center and states were articulated and resolved within the INC Party during this era.

This order began to break down in the 1970s. Congress lost power in eight of sixteen states in the 1967 elections in the wake of an economic crisis that led Indira Gandhi's government to seek assistance from the International Monetary Fund (IMF) and World Bank to tide over the crisis. The conditions attached to this aid—economic liberalization involving the devaluation of the rupee and reduction of trade barriers—were unpopular both with party leaders and the electorate. Although the party won about the same share of votes—40 percent—as before, its seat share in Parliament fell to 54 percent as the opposition consolidated around fewer, more viable candidates.

Party leader Indira Gandhi split the party into two in 1969 as internal party dissent increased. The wing she led, a much more centralized organization called Congress (I) for Congress (Indira), gained a two-thirds majority (again, with 43 percent of the vote) in the 1971 elections. It also won most of the state elections in 1972, but the political landscape had clearly changed. Most of the states were politically unstable during the 1970s, with non-Congress coalitions of national and regional parties holding power for brief periods of time. Stable non-Congress alternatives started to emerge in the late 1970s, however. West Bengal, in which a coalition of left parties have been in power since 1977,[19] and Tamil Nadu, in which two coalitions, one led by Dravida Munnetra Kazhagam (DMK) and other led by All India Dravida Munnetra Kazhagan (AIDMK) have alternated in power again since 1977, were the earliest to consolidate, but multi-party political stability including

18. Conflicts quickly appeared—the Congress government at the center dismissed it under Article 356 in 1959. Subsequently many state governments have been dismissed under Articles 356.

19. Interestingly, its hold on power in West Bengal considerably weakened in the parliamentary selection of 2009 and seems to be weakening further as the elections to the West Bengal's legislative Assembly in 2011 are approaching. In contrast, the hold of the ruling DMK in Tamil Nadu seems to be strengthening.

a role for regional parties became increasingly evident from the early to mid-1980s in other states. The fragmented opposition steadily coalesced into stronger challengers in state elections from 1967–1989, as evidenced by the increasing vote-shares of the top non-Congress party or coalition in state elections (Gowda and Sridharan, 2007).

The first challenge to the Congress's national leadership emerged with the short-lived Janata Party government, a coalition of parties united only by their opposition to Congress. It came to power in the wake of the 1975–1977 "Emergency" declared by Mrs Gandhi, but disintegrated quickly and Congress regained control of some states in 1978 and the central government in the 1980 election. It won a record vote share of 48 percent and three-fourths majority of seats in the subsequent 1984 elections.[20] However, the underlying dynamics of increasingly strong non-Congress options did not die out and the National Front alliance of left and regional parties was a significant challenger in the 1989 and 1991 elections. Congress lost its majority in 1989 (in part because of corruption allegations against Rajiv Gandhi) and political instability at the center ensued, with four different prime ministers governing in two years.

The Indian emergence of the Front marked the beginning of the current era of India politics, the era of coalition governments in which parties with regional bases and presumably regional priorities hold positions and influence over national policy. The Congress continued to win the most votes of any one party in every election, but it did not retain a seat majority. It had one last full term as a minority government formed in 1991 with Narasimha Rao as prime minister, after an election campaign in which its then-leader Rajiv Gandhi was assassinated, but coalitions have been in power since 1996. The Bharatiya Janata Party (BJP) won more seats than Congress in 1996, 1998, and 1999 and is currently the main national party challenger. A BJP-led, National Democratic Alliance (NDA) governed the country during 1999–2004. Both BJP and Congress, however, rely on alliances with state-specific parties for national leadership as well as state-level presence.

Similarly, economic policy has moved away from central planning toward more decentralized policies emphasizing the role of the market rather than any particular level of government. Prior to Independence there was an emerging consensus across the political spectrum for the adoption of central planning for articulating India's development strategy using its material and human resources efficiently and the mechanism of national five-year and

20. This reflects the "sympathy vote" after Indira Gandhi's assassination—and the assumption of power by her son Rajiv Gandhi.

annual plans. The consensus also extended to the need for the state to play a dominant role in the economy and for insulating the economy from the world economy. These consensuses were driven largely by the disastrous experience of the international trade and capital flows between the two world wars and the perceived success of the Soviet Union in transforming a largely rural and agricultural economy at the turn of the revolution into an industrial economy.

India's external environment, both for international trade and capital flows, improved dramatically after the second World War with the establishment of and India's founder-membership in the IMF and International Bank for Reconstruction and Development (the World Bank) in the early forties and the conclusion of the General Agreement on Tariffs and Trade (1947) for reduction of tariff barriers. World trade grew rapidly and faster than growth of World output after 1950 until the oil shock of 1973 and at a slower pace but still faster than output. Capital flows, (private and official) also expanded and accelerated particularly after 1980.

In the six decades after 1950, the international enthusiasm for planning, which some Western nations also practiced in the 1950s, also waned. Even some of the Eastern European countries in the Soviet Bloc and breakaway states such as Yugoslavia under Marshall Tito began experimenting with allowing the private sector and market forces to play a role in resource allocation. With the collapse of the Soviet Union and its system of Central planning for resource allocation in 1991 and the evident success in the acceleration of economic growth in China since Deng Xiaopins opened China to the world economy in 1978 and allowed for a greater role for market forces to play in the domestic economy, planning and insulation from competition lost their advocates.

India's domestic economy also has changed significantly since 1950. Although the average annual growth rate between 1950 and 1980 was only 3.5 percent per year, a diversified, albeit internationally non-competitive, industrial structure had developed with capacity to produce heavy equipment and industrial inputs including heavy chemicals. In spite of its role being heavily circumscribed by planning and a plethora of intrusive controls ostensibly for implementing the plan targets, the private sector's capacity to be innovative and dynamic did not disappear but lay dormant to be energized given the opportunity.

Transport and telecommunications infrastructure enabling a deconcentration of economic activity have expanded as well, the latter particularly after mid-1990s with the introduction of mobile phones. Although agriculture has always remained almost entirely in the private sector, there were many

government interventions in the market, in domestic and international trade and others, some of which were intended to support the adoption of newly available green revolution technologies and crop varieties in the mid- to late 1950s. The success of the adoption led to the elimination of India's dependence on concessional food imports by late seventies.

During the 1950s and 1980s in particular, the location of public and private projects that required significant investment, foreign exchange, their technology and input choices were, in effect, decided by the PC and the administrative agencies that awarded investment and import licenses. Regional development was a key goal of planning, but it is commonly believed that considerations other than economics or more generally social cost-benefit calculations largely determined choices about location of investment, particularly with respect to public sector investment projects such as integrated steel mills or in petroleum refiners, heavy chemicals. Interstate competition for location for a particular project took the form of (sometimes violent) demonstrations, statewide strikes, and *bandh*s. Since the mid-1980s and particularly after the systemic reforms of 1991, market forces play a greater role relative to the public sector in the economy as a whole. With large public sector investment projects no longer as dominant in total investment, private investors who are more likely to consider scale and agglomeration economies are making most of the location decisions.

Finally, social changes also reflected an increasing deconcentration of power from the traditional elites to new social groups. The era of planning also saw the expansion of primary education and also of institutions of higher education though less so in secondary education. Quota policies, unfortunately driven by electoral considerations as much as more noble goals, also expanded access to education for social groups long denied such benefits. More generally, the groups that were outside the political processes became increasingly assertive and vocal and are part of the political process.

These changes have led analysts of Indian political economy emphasize the trend toward decentralization and the increasing power and relevance of "voices from below" in shaping the national agenda. In that light, the increasing concentration of economic and fiscal power in the central government stands out.

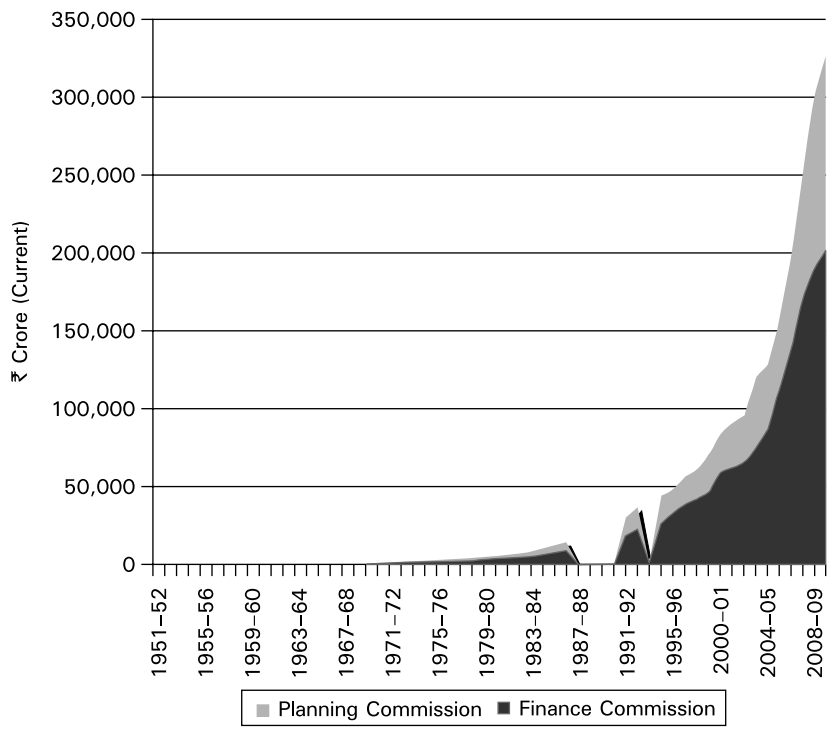
Changes in the Institutions

We focus on two aspects of institutional history: the observed roles of the FC and PC in determining the size and allocation of intergovernmental transfers,

and changes within the activities of the PC. In each section, we trace the evolution of institutional arrangements that affect the central government's discretion in allocating funds and states' autonomy in determining development expenditures and managing their budgets.

GOVERNANCE OF INTERGOVERNMENTAL TRANSFERS The fact that the PC has retained its significant role in governing intergovernmental transfers is one illustration of the persistence of centralizing aspects of India's fiscal federalism institutions. Figures 3a and 3b display the trends in grant allocation and the proportion of the overall grants awarded by the two bodies.[21] While there is variation—the 1960s saw an increase in the proportion of funds allocated

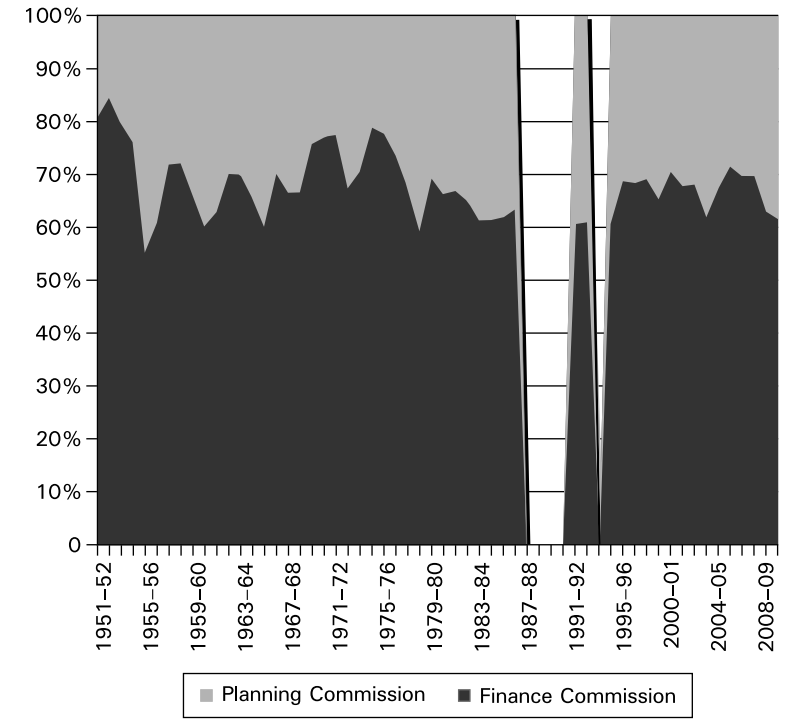
FIGURE 3a. PC and FC Transfers



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

21. The PC also provides loan support to the states, which is equivalent to the grant at least in part, if not whole, to the extent that loans are forgiven, deferred, or provided at below-market rates. We do not include this grant in our analysis since it would be difficult to calculate on the basis of available data and would not change the main point we emphasize—that the role of the FC has not increased over time.

FIGURE 3b. PC and FC Transfers (Proportion)



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

Note: FC transfers are calculated as the states' share of central taxes plus statutory grants. PC transfers are calculated as the total central grants less statutory grants for 1951–69 and as the sum of grants for state plan schemes, central plan schemes, centrally sponsored schemes (CSS), and North Eastern Council (NEC)/Special Plan schemes in years for which more detailed data on grants were available. It is therefore possible that our figures for PC transfers for the early years include some grants that were neither channeled through FC nor PC.[22]

by Planning Commissions, the 1970s a reversal of this tendency—the graphs do not show any noticeable trends over time.

The PC is nearly universally perceived as an instrument of the central government. Its members are political appointees who serve at the discretion of the government and have often been dismissed when governments

22. Determining the institutional oversight of various forms of grants was the main challenge in constructing this dataset, since detailed data on grants were not available from a single source for all years. Data on grants provided by the FC from 1951 to 1969 was obtained from Appendix IV to the Report of the Seventh Finance Commission, all other data are from the

change. Membership was relatively stable for the first decade and a half of the Commission under Congress-led governments but the turnover increased as factions within the Congress party developed and political competition intensified in the 1960s. Central government ministers often serve as members and civil servants have occupied increasingly senior positions over time, edging out technical personnel. Many of these features were conscious design choices to improve coordination between the Commission and the ministries in planning, but most analysts argue that they have also been vehicles for increasing politicization, especially after the Nehru era. Although a portion of the transfers is determined by a formula, the Commission has ample discretion in its decisions about awards to states through its ability to introduce new programs as well as review annual disbursements of even the formula-based allocations. Its grants are provided for specific purposes, including for policy areas that are constitutionally under states' domain.

The FC, on the other hand, is generally perceived as less politicized and the transfers made on the basis of its recommendations are not conditional. Once accepted, the committed transfers cannot be revised. Relatively vague appointment criteria do offer some opportunities to influence the Commission's decisions, but there is little evidence that this opportunity has been exploited extensively.[23] FC policy recommendations have been explicitly rejected as well as pocket-vetoed through relegation to consideration "as and when needed," but the central government has generally accepted the recommended transfers and must give a reason when it does not do so. Khemani's (2007) analysis of intergovernmental transfers between 1972 and 1995 brings out the difference between the two institutions: she finds that PC transfers often favored states that were politically important for the central government, while FC transfers showed no such patterns.

These distinctions are well known among policymakers as well as academics and the role of the PC has been challenged more than once. These

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Reserve Bank of India Annual Bulletins and yearly reports on "State Finances: A Study of Budgets." We are grateful for assistance from the State Finance team at the RBI for filling in some of the gaps in published data.

23. According to the Finance Commission Act of 1951, the Chairman was to have been a person with "experience in public affairs," while other members were to include people "are, or have been, or are qualified to have been appointed Judges of a High Court, or have special knowledge of finances and accounts of government, or have had wide experience in financial matters and in administration, or have special knowledge of economics." Thimmaiah (2002) argues that the "or" has created scope for politically motivated appointments, but does not present any systematic evidence that this has been exploited.

challenges could be seen as a turf war between two institutions operating in overlapping territory, but nevertheless, they are couched in the language of state autonomy.

The Third Finance Commission, appointed in 1960, was the first to challenge the role of the Planning Commission in allocating funds. Its Terms of Reference requested it to consider the needs of the Plan in recommending principles for grants-in-aid. The FC, however, took it upon itself to "obtain the views of the State Governments on the dual allocation of grants, under Article 275 of the Constitution on the recommendations of the Finance Commission and under Article 282 by the Union Government" in addition to its standard requests for state revenue and expenditure information.[24] Its report included a separate chapter "embodying [their] general observations on issues germane to a correct determination of Union-State financial relations *in terms of our Constitution* [emphasis added]."[25]

The Finance Commission claimed that it, not the Planning Commission, should oversee most of the grants in support of states' revenue expenditures. In doing so, it emphasized the importance of the mechanism through which grants were given, as distinct as the amount committed. It acknowledged that covering plan needs with FC grants would "render difficult" the annual reviews of the Plan, but argued that the Plan has been endorsed by the National Development Council and approved by Parliament, so that states should just be given the resources to "forge ahead." The report also invoked the constitution's emphasis on state autonomy as it argued that states should be given fixed grants that could potentially be reviewed by Parliament rather than commitments subject to annual review:

> It is suggested that devolution and grants-in-aid by the Finance Commission would be more in tune with the provisions of the Constitution and that it would inculcate a greater sense of responsibility in the States as the grants-in-aid would then become an integral part of their resources.

and

> While we appreciate that in a planned economy a measure of centralization and even regimentation is inescapable, it is no less necessary that the States should not feel that their autonomy is being unduly frustrated.[26]

24. Finance Commission, 2005.
25. Ibid., Chapter 2, para 15.
26. Ibid., Chapter 6, para 65–66.

The FC's proposal to the government that the 75 percent of the revenue portion of the state plans be covered under FC grants rather than PC grants was rejected, however. Member-Secretary G.R. Kamat's note of dissent and the eventual government rejection of the proposal also emphasized the impact of channeling funds through the PC on the central government's ability to influence states. The note of dissent argues that the measure would have "serious impact on the concept and mechanism of national planning" because the grants are untied and "virtually unconditional" even if the FC indicated the broad purpose for which they were made. Mr Kamat considered the existing system of dispensing grants on an annual basis after review of state performance as an essential tool for coordinating the plan and ensuring performance, especially given the constitutional division of powers that prevented the center from using anything other than these tied grants to influence state behaviors.[27] The government's explanation for rejecting the proposal echoed these points, arguing that the plan "provides sufficient assurance the revenues will be available if the states undertake the necessary efforts to mobilize resources and if there are no major surprises in the financial and economic situation," and that the annual plans are essential for "improving performance in all sectors, ensuring the fullest efforts to raise resources, and maintaining a satisfactory balance between different types of projects."

This tacit division of grants between FC and PC mechanisms was revisited in 1987 with the terms of reference for the Ninth FC, which contained two significant departures from past practice: first, no distinction between Plan and non-Plan parts of the states' fiscal status; and second, a call for the FC to adopt a "normative approach" in assessing states' revenue receipts and expenditures.

27. In a somewhat contradictory second line of logic, Kamat also argued that the conditionality of Plan transfers is actually fairly light. He pointed out that unconditional revenue support for the state plans would not really increase state autonomy since the capital requirements, which are a bigger part of the Plan requirements in any case, would still be allocated after consultation. Also, that while of course states find the consultations with the Planning Commission "irksome," in reality they include reasonable flexibility to reallocate funds to different purposes has been granted during the consultations and that these "informal" consultations are a reasonable way of effecting some degree of coordination and conditionality. He pointed out that the possibility of Parliamentary review of transfers under Article 275 might make for an even more cumbersome review process. Kamat argues that issues with the consultations can be resolved by adjusting procedural details and that to "displace that system by a system of statutory grants is like throwing the baby out with the bathwater." (Finance Commission, 2005)

The FC responded by reiterating its pre-eminent role in overseeing the devolution of resources from center to state. The discussion around the role of the FC and PC included some strong views about the unconstitutionality of the past practice of limiting the FC's grants to meet non-Plan revenue needs, although the actual recommendations were much milder.[28] The FC, however, was deferential to the PC's role in economic planning:

> Though the Finance Commission has therefore to assess both Plan and non-Plan expenditure, it was our decision made at an initial stage that the Finance Commission shall not disturb or weaken the planning process; economic planning must continue to be the prerogative of the Planning Commission.[29]

In the end, however, the grants-in-aid recommended by the FC represented 95 percent of the total grants-in-aid for State Plans in 1989–90, excluding externally aided projects; more than the 75 percent of Plan revenue that the Third FC had suggested be given under FC auspices. Given that the recommendation was just for one year, there was no practical distinction between PC and FC processes for transferring funds (guaranteed allocations versus annual consultations and adjustments). The arrangement could have set a precedent, but did not. The government's response was tepid: it agreed to "take the [recommendations of the first report] in view while finalizing the last year of the Plan allocations" in its Action taken Report.

The Ninth FC's second report also staked its constitutional claim to the right to oversee transfers in support of the Plan worked out by the PC:

> [W]e must make it clear that under [Article 275], the Finance Commission is obliged to recommend the grants-in-aid of revenue to States and, *therefore, the grants for financing the State Plan are very much within the purview of the Commission under the said article.* In fact there is a view that all grants to the States could be channeled through Article 275 only. Mr. K.K. Venugopal, an expert on Constitutional law opined before us that Article 282 is clear and unambiguous and unless the article is re-written with the additional and subtraction of words it would not be possible to arrive at the conclusion that Article 282 is an independent source of power vesting in the Central government a discretion to make grants to states for special purposes.[30] (Emphasis added)

28. The Ninth FC had consulted a number of constitutional experts regarding the interpretation of relevant articles (275, 280, and 282). Discussions are available in *The Ninth Finance Commission: Issues and Recommendations: A Selection of Papers presented at NIPFP Seminars held in February 1988 and May 1990*, NIPFP, 1993.

29. Finance Commission, 2005.

30. The paragraph goes on to cite the similar opinions of N.A. Palkhivala and D.D. Basu. Finance Commission, 2005.

The recommendations do not stray into evaluating the amount of Plan allocations:

> While thus determining the area of our work we have kept in view the traditional and important role played by the Planning Commission … We have attempted to work out an approach which, while enabling us to *perform our legitimate constitutional role,* would not prove detrimental to the planning process or to the role played by the Planning Commission in that process.[31] (Emphasis added)

Neither of these public challenges to the role of the PC has dislodged it from its place in channeling intergovernmental resources to the states.

The FC, on the other hand, continues to be sidelined not only in its constitutional mandate to oversee transfers, but also in its potential role as an arbiter in center–state fiscal discussions with significant distributional implications. It has emerged as a forum for discussing coordination on fiscal consolidation since the Seventh FC's terms of reference asked it to review the resources of the central government and the demand for expenditure on civil administration, defense and border security, debt servicing, and other committed expenditure or liabilities.[32] The Eleventh FC was asked for the first time to review the state of the finances of the center and the states and suggest ways and means by which the governments, "collectively and severally," might bring about a restructuring of the public finances in order to restore budgetary balances and maintain macro-economic stability, while the Twelfth FC was told to suggest a restructuring plan to achieve debt reduction along with equitable growth in addition to macro-economic stability. The terms of reference for the Thirteenth FC solicited its recommendations for a blueprint for fiscal consolidation that had eluded the central and state governments from completing since it was announced as a priority in the reforms of 1991.

The comments of Vijay Kelkar, Chairman of the Thirteenth FC at the India Policy Forum 2010 session in which an earlier version of this paper was presented underscore this view of the FC's role as an arena for center–state discussions: "Because of the nature of reforms happening in the Centre, the Finance Commission has been increasingly used by different arrangements as one more instrument to at least make unthinkable thinkable in terms of reforms." He cited three examples: First, the Twelfth Commission chaired

31. Ibid., Chapter 2, para 11.

32. Prior terms of reference had only referred to the resources of the states and their demand for expenditure and revenues.

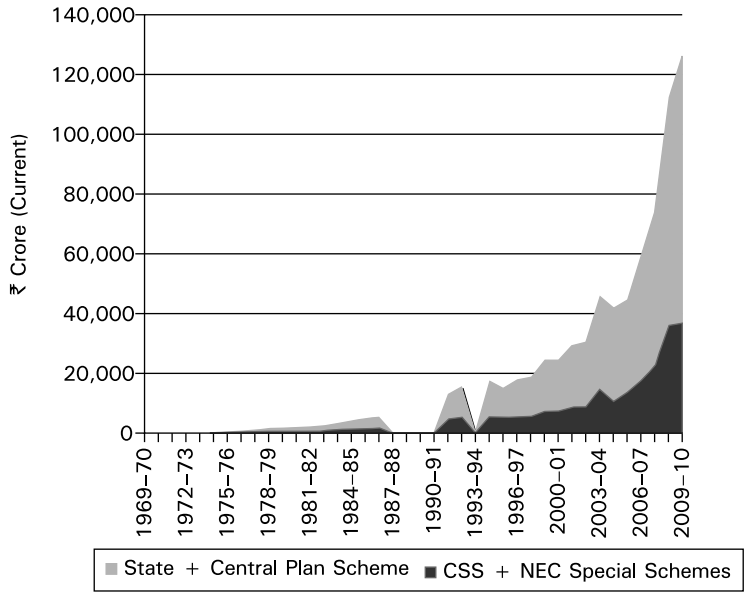
by Rangarajan "brought fiscal discipline at the State level and was very successful and now it has become part of the Indian political class' acceptance that … we require fiscal…discipline." Second, the Tenth Commission chaired by K.C. Pant changed the rule that gave the center the entire revenues from import duties, a change that, according to Kelkar, accelerated India's trade liberalization and reform since it weakened the center's incentives to preserve high import duties. Third, he went so far as to attribute India's survival as a Union to the "the sagacity of the First Finance Commission, headed by M. Neogi, which really laid out the framework of this devolution that was basically maintained by all the Finance Commissions." Finally, he commented that "the President can assign to the Finance Commission any issue which is important for sound public finance. So, under that rubric increasingly I think the reforms have been introduced by the system by using that as the instrument."

The limits of the Commission's role, however, are apparent in the ongoing debate about one of the most significant fiscal reforms under discussion today: the introduction of the Goods and Services Tax. The FC weighed in on the topic, commissioning research and offering specific recommendations as well as proposing a fund to support implementation in its report. Its Chairman, Vijay Kelkar, had been part of an earlier committee recommending the GST and discussing an implementation plan. Nevertheless, the GST modalities including the revenue neutral rate and the compensation to states for loss of various sales taxes are now being negotiated by an Empowered Committee of State Finance Ministers.

PLANNING COMMISSION: THE PERSISTENCE OF CENTRALLY SPONSORED SCHEMES This section documents a second aspect of the persistence of centralizing features in fiscal federal institutions: the resilience of CSS and similar specific-purpose programs in the PC' repertoire of processes for allocating funds to states for development. Figures 4a and 4b show the absolute and relative size of the funds that the PC has provided through the two main routes of Central Assistance for annual plans and CSS since 1970.[33]

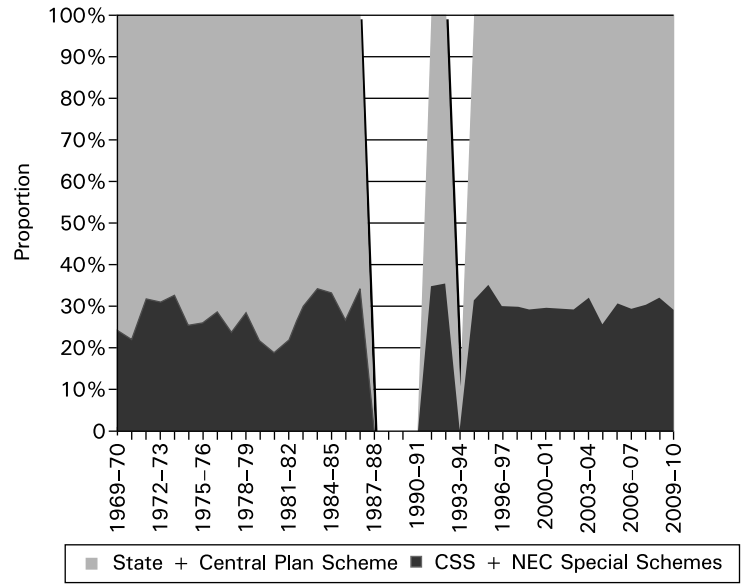
33. The breakup of Plan assistance is not available before 1970. The distinction between these two forms was not clear for the first two Plan periods, when the assistance to states was effectively the sum of requirements for particular development schemes defined in accordance with the Plan framework, but the two streams started to separate in the Third Plan period (1962–1967) and they became quite distinct after introduction of the Gadgil Formula and its successors for allocating Central Assistance in and after the Fourth Plan period starting in 1970.

FIGURE 4a. CSS and Plan Transfers



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

FIGURE 4b. CSS and Plan Transfers (Proportion)



Source: Calculated from Reserve Bank of India (various years) *A Study of State Finances*.

Central Assistance consists of block grants allocated according to specific indicators of state development and policy performance.[34] CSS are specific-purpose development programs focused on various sectors, including some that are constitutionally defined as state responsibilities. They are proposed and designed by central government ministries, ostensibly in collaboration with their state counterparts, and financed in whole or in part by the central government. They often include specific restrictions on how money can be spent, including detailed specifications for building materials, qualifications for employees, and pay scales. Money is obviously fungible, so the fact that states received grants earmarked for education, health, or other specific programs does not entirely constrain their ability to use their development budgets as they see fit, but the Centrally Sponsored Schemes (CSS) do create additional compliance costs for states. These schemes have played a significant role in determining overall transfers in spite of state-led efforts to ensure that more plan assistance comes as formula-driven block grants to support the plans that states themselves have proposed.

Given that there were no institutional restrictions on how the PC allocated funds and what strings would be attached, one might have expected a move toward more formulaic transfers as the states' political power increased and the economic rationale for coordinated planning faded, but this has not happened. CSS have persisted in the face of constant and critical discussion in the NDC and committees it has appointed to review the matter.

The first three plans (1951–1966) are generally seen as sincere, though somewhat opaque, efforts to coordinate investment in India's development. The early plans had no clear formula for disbursing aid; instead stating principles and then reporting on estimated gaps between states' resources and their intended investment.[35] The Plan size, or intended investment, was reportedly determined on the basis of discussions between state chief ministers and the PC as well as the resources required for development schemes proposed and designed by central government ministries (Vithal and Sastry, 2001).

34. Total Central Assistance falls into two categories: Normal Central Assistance, allocated on the basis of some version of the Gadgil Formula since the Fourth Plan period, and Additional Central Assistance. Support under Additional Central Assistance, including pass-through of international donor funds for development programs, is allocated according to a variety of criteria.

35. The process seemed to be quite flexible. Implementation of the First Plan, e.g., started before the transfers were finalized because the Commission was waiting for the recommendations of the FC to determine the resources that states had at their disposal. The Second Plan laid out some factors that the PC would consider in determining the size of the Plan, but these were somewhat vague and actual Plan assistance for the Annual Plans was determined only after further discussions between state leaders and the PC.

The First Plan did not distinguish between development schemes included in state plans and those that were outside the Plan but supported by PC transfers; the Plan document does not mention "Centrally Sponsored Schemes." The second plan started to distinguish between development schemes included as part of state plans and those that were outside the plan but eligible for support, but there did not seem to be a distinction in how transfers were determined for Plan versus CSS development programs.

The Third Plan (1961–1966) was the first to specify a quantum of assistance for states rather than determine the transfer amount by adding requirements for Plan and non-Plan development schemes. It still provided funding based on scheme requirements, but added a category of "Miscellaneous Development Loan Assistance" to make sure states received the amount promised in the discussions between PC and state leaders.

The implications of this bargaining process for state and central governments' authority and the implied balance of economic power in the federation were largely ignored. India's efforts to plan were regarded as an exciting development practice and eminent economists from around the world took part in determining strategies and principles. Nehru was closely involved in these, as an active chairman of the PC, raising the political and moral stature of the whole process. As late as the Third Plan, Nehru wrote at least part of the first chapter outlining the approach (Chakravarty, 1987).

The first challenges to the PC's discretion in Plan allocations came about in the NDC discussions during 1964–1966, in the lead-up to the Fourth Plan. Vithal and Sastry[36] (2001) preface describes the mood diplomatically: "[I]t was felt that, in the interest of better Centre-State understanding, plan transfers should also be regulated by an objective formula." In this round of discussions, states suggested various criteria for formulas in bilateral discussion and the August 1966 NDC meeting, which the PC aggregated to produce guidelines for the original Fourth Plan Period starting in 1966–67. The NDC discussions also criticized the CSS, and an NDC subcommittee composed mainly of state leaders recommended that 36 of the 92 schemes then in operation be transferred to State Plans to be aided by general Plan assistance.[37]

36. The authors are a former member of Finance Commission and a high-level staff member of the Planning Commission as well as Finance Commmission, respectively.

37. The subcommittee also outlined specific circumstances in which CSS were appropriate: matters of national policy, schemes for specialized research that would benefit more than one state or be of all-India importance, pilot projects for R&D, new schemes introduced after Plan finalized. Reported by Vithal and Sastry (2001) on the basis of agenda papers for the Committee.

These recommendations were never implemented since the Plan was replaced by a series of one-year plans (and new CSS), but the exercise was repeated in 1968. The PC again asked states for their views on the formula for distribution as well as on the development schemes. The views were discussed at the NDC meeting in May 1968, at which point a committee of chief ministers and the Deputy Chairman of the PC was appointed to suggest a formula. The committee meetings and NDC discussions were contentious, with most states proposing and defending formulae that would favor their interests, but Vithal and Sastry (2001) report an interesting example of inter-state collaboration that they argue was crucial in obtaining a consensus. The Chief Minister of Maharashtra, then the best-off state, agreed to a formula that left 10 percent of the total to be distributed to backwards states only, a concession that, according to the authors, set an example for other states to follow in determining a formula. The Committee's formula was adopted as an NDC recommendation and followed by the PC.

The introduction of the so-called Gadgil Formula for allocating Plan assistance is one of the only successful state-led efforts to alter the balance of fiscal power between center and states. The formula is similar to one discussed in the Expert Committee on Financial Provisions in the Constitution. Based on population, per capita income, tax effort, and (in early iterations) spillover in investment needs from previous plans, and "special problems," it still allows for some discretion in determining the "problems" and has been modified several times since its introduction but it was a major departure from the previous approach of providing assistance to fill the gap between states' resources and an investment plan determined in bilateral discussions between states and the PC. The grants provided under the Normal Central Assistance are also relatively fungible. The sectoral distribution of funds has to be approved as part of the Plan, but states can adjust spending across sectors and then notify the PC for formal approval in many cases. Some "earmarked" areas require changes to be proposed in advance and delays in utilization are penalized, but for the most part the Plan assistance allows the states to adjust its expenditure and investment between broad areas (Vithal and Sastry, 2001).

However, the formula's impact on the clarity of allocations and the autonomy states have in using them for plans that they formulate, has been limited by the continued use of CSS as a mechanism for transfers. The NDC and subcommittees appointed by it have considered the role of CSS numerous times over the past five decades and have recommended abolishing or limiting them to a specific set of areas in nearly every report, with almost no lasting impact on the volume of funding channeled through the programs.

The saga of repeatedly ignored recommendations to reduce scope of CSS is almost comical.[38] The Administrative Reform Commission (ARC) of 1966 noted that schemes were used too widely and recommended reducing their numbers and funding. A 1968 NDC Committee adopted the ARC's recommendation of a limited set of purposes for which schemes could be used and suggested limiting schemes to 1/6 of total central plan assistance to states. According to the agenda papers, states wanted the number of CSS to be reduced and have those that continued be funded 100 percent by the central government with fewer conditions on building codes, pay scales, and other aspects of the projects. Kerala suggested abolishing them, while Uttar Pradesh wanted to fix five-year outlays and then club annual outlays with the discussion of the annual plan outlays. Most central government ministries, on the other hand, wanted to continue the CSS, add more, and transfer schemes out of the State Plan sector (aided as part of Plan assistance) to be CSS.[39]

The number of schemes was actually cut from 92 to 47 in the beginning of the Fourth Plan, but ministries continued to introduce new schemes, many for purposes not on the list approved by the NDC over the Fourth and Fifth Plan periods. There were 116 schemes by 1978–1979.

A 1978 NDC Committee appointed to look at center–state relations, the Gadgil Formula, and the CSS, repeated the recommendations made a decade before. States again wanted the schemes to be included in the State Plans and to have more assistance from the center for the State Plans, while central government representatives argued that the CSS were innovative and that states' development efforts would be inadequate without them. The Working Group recommended reducing the number of schemes and transferring most of the savings to the states as additional block assistance (Planning Commission, 2006). The draft Sixth Plan (1980–85) cut 70 schemes, but the actual plan saw an increase in the number and the amount of funds going to CSS. The total amount was well in excess of the cap of 1/6 of total transfers that had been agreed to in 1968 and there were 201 schemes in place by the end of 1985.

The NDC appointed another expert committee under K. Ramamurti in 1984 for the Seventh Plan. This committee had to survey the ministries to even assess the number of schemes and their structure. The committee did a thorough analysis of the data, however, and found that the expenditure on CSS

38. The following paragraphs draw on Planning Commission (2006) and Vithal and Sastry (2001) as well as summary reports of the NDC discussions.

39. From Agenda paper III of May 1968 NDC meeting, reported in Vithal and Sastry (2001).

was highly concentrated: 13 of the 201 schemes accounted for 80 percent of the total transfers, which tended to be better for the richer states. Most of the schemes by this point were based on some kind of matching funding from states. Some of the poorer states got less money than they would have if the whole amount going to CSS had instead been allocated by the Gadgil Formula. As before, central ministries justified the schemes as important for achieving national goals, as a financial incentive for recalcitrant states, and as a way for the central government to monitor development expenditure since states did not provide information on implementation of Plan programs. The Committee disagreed and pointed out that ministries were inconsistent, only paying attention to schemes when they were CSS, and not when they were plan schemes even if they retained the same goals and should have thus also been of national importance. The committee's recommendations were similar to those of its predecessors: fewer schemes, more restrictive conditions for introducing them, etc.

The Ramamurti Committee report provoked yet another Committee, this time appointed by the Prime Minister and led by then-Minister of Human Resource Development P.V. Narasimha Rao. The Committee, a group of three Union Cabinet members, 11 chief ministers, and a member of the PC, reviewed the same issues as before: the number and modalities of schemes, which ones should be pruned, and what should be done with the savings. It decided to set up yet another Group of Officials, consisting of 7 Union Secretaries and 11 State Chief Secretaries to tackle most of these questions. This committee found schemes that the last group had overlooked, recording 262 compared to the 201 that the Ramamurti Committee had found.

The PC appeared to accept this report for the Eighth Plan, distributing a note called "Distribution of Central Budget Support for States' Plan Expenditure," (reproduced in Vithal and Sastry, 2001) that said that there should be a drastic revision of the CSS regime to "free the major part of the funds from strict regulation by the different Central Ministries." It also recommended that most of the schemes be transferred to the states to get regular Plan assistance as block grant/loan. The catch came up at the October 1990 NDC meeting, however, when the prime minister emphasized that this change would only take place if the funds saved were channeled to Panchayats, stating, "Therefore, the commitment from the Chief Ministers has to come that this will be further decentralized to the Panchayat level or the appropriate level with a particular scheme of improvement."[40] Regardless of the merits of the proposal, this was clearly an example of

40. Summary Record of the NDC Meeting, paragraph 118.

the central government using its fiscal powers to influence states in their constitutionally provided jurisdictions. According to the Seventh Schedule of the Constitution, "Local government, that is to say, the constitution and powers of municipal corporations, improvement trusts, districts boards, mining settlement authorities and other local authorities for the purpose of local self-government or village administration" is a state subject. In any case, the Schemes remained the same.

The topic arose yet again at the January 1997 NDC meeting, with the request from some chief ministers that some CSS and the associated funds be transferred to states. The PC discussed these points in an internal meeting and circulated a note offering to transfer some of the scheme resources to states using the Gadgil Formula, while others would be transferred with funds earmarked for local bodies and some "in a phased manner." States disagreed on which ones to be transferred as well as the way in which the transfer would take place in their response to the note and a new Committee of the NDC on Transfer of CSS was created. The Committee's recommendations on reducing redundancy, improving monitoring, and creating more flexibility for states to tailor expenditure and implementation patterns were delivered in 2006. These have yet to be implemented.

WHY?

The contrast between the rapid evolution of India's economic and political milieu and the glacial change of fiscal federal institutions is striking. Public debates about the PC and FC and their effects on state fiscal autonomy have occurred, yet these have not had any significant impact on the functioning of the institution. The institutions have changed, but not in a direction that enables more state autonomy. What explains this phenomenon? We argue that although change in the framework for fiscal federalism is possible, India's economic and political context and its institutional framework pose significant barriers to state collective action to enact such reforms.

There are three possible explanations for the stubborn center: institutional change is impossible, states and their representatives are uninterested in systemic change, or states cannot or will not cooperate to effect systemic change.

The first is not true. Altering the FC's foundations would require a constitutional amendment and thus the assent of a super-majority in both houses of Parliament and ratification by states, but this has not been a significant barrier in other policy areas. The Indian constitution is one of the

most-amended constitutions in the world. The PC was created by a Cabinet Resolution and thus could be altered by the same—basically, an agreement by the government to change its position. It has the anchor of a sizeable bureaucracy and historical inertia, but neither of these confers any formal institutional foundation. Its position could also be altered relatively easily on the President's order. Article 263 of the Constitution states:

> If at any time it appears to the President that the public interests would be served by the establishment of a Council charged with the duty of—(a) inquiring into and advising upon disputes which may have arisen between States; (b) investigating and discussing subjects in which some or all of the States, or the Union and one or more of the States, have a common interest; or (c) making recommendations upon any such subject and, in particular, recommendations for the better co-ordination of policy and action with respect to that subject, it shall be lawful for the President by order to establish such a Council, and to define the nature of the duties to be performed by it and its organisation and procedure. (Government of India, 2005)

The 1988 Report of the Sarkaria Commission in fact recommended that the President use this power to create a stronger NDC.

The second reason, that states do not want systematic reform is plausible, but not entirely convincing given the written record of state protests about not only the amount of transfers but also the mechanism of transfers over the years. While there are reasons to believe that systemic change in the federal framework may not be on the top of states' agendas, such incentives to maintain the status quo seem to be weakening.

States may avoid pressing for systemic change for several reasons. First, because it is not necessary—they can achieve their goals without altering the federal balance of power. Sinha (2005), for example, documents the many ways in which regional leaders have stalled, subverted, and altered development agenda and programs being promulgated by the central government. The "sub national strategic choices" that she shows have contributed to regional variation in economic outcomes take place within the system without a strong rebellion against central government policies. Some analyses also imply that state leaders may not need the autonomy to experiment and deliver better outcomes in order to survive politically. Singh and Verney (2003) and Wilkinson (2000), for example, argue that the evolution of the party system towards a greater variety of regional, linguistic, caste, class, and ideological issues has created an outlet for many of the social changes to be expressed in the political process without any change in the formal institutions. By giving these interests a voice in national political debates

and an opportunity to claim some of the spoils from public programs, the party system has absorbed the social changes without passing the resulting pressures on to change the deeper institutional structure of fiscal federalism. Stepan (2010) argues that this has created a new politics of inclusion, in which previously marginalized groups focus on securing their political rights, rather than a politics of delivery, in which groups agitate directly for economic and social objectives. Ethnic and linguistic groups as well as disadvantaged groups within Hindus have increasingly demanded recognition as distinct groups and the advantages that come with such recognition.

Second, the central government's role in designing development programs also may offer a foil for state failures, a way to pass on the blame for poor development outcomes. Rajaraman (2008), for example, argues that unpredictability in transfers has contributed to states' in ability to invest effectively in health, education, and other social infrastructure. Her paper takes this as a motivating assumption rather than proving a causal link between the design of transfers and economic outcomes. To the extent that state leaders can convey this "theory of blame" to their constituents, they are absolved of having to deliver. Survey data and the voting record, however, suggest that people are starting to hold states accountable for their performance. Nearly three quarters of the people surveyed as part of a nationally representative sample in 2001 view the states as responsible for providing electricity and education facilities as well as controlling crime.[41] About 70 percent of the people surveyed held states responsible for public rations and medical facilities, and over half saw states as the providers of roads, pollution control, and drinking water (Chhibber et al., 2004). Gupta and Panagariya (2010) show that voters pay attention to states' economic performance: in the 2009 election, they rewarded candidates from ruling parties when states grew more than average and tended to vote against candidates from ruling parties when state economic performance was poor. In such an environment, states would plausibly want the freedom to respond to these voter demands.

Finally, the benefits that come from state political representation in central government decision-making through participation in ruling coalitions at the center—the level at which constitutional and significant institutional changes would have to be made—may also create strong incentives for

41. The survey was conducted for a carefully selected sample of more than 8,300 people as part of the State and Society Project, jointly coordinated by Bangalore University, Ohio State University, and the University of California, Berkeley, with Dr Pradeep Chhibber, Dr Sandeep Shastri, and Dr Richard Sisson as principal coordinators.

individualistic behavior by states. Sinha (2005) argues that sub national regional leaders who have better access to central government decision-makers have an advantage relative to their competitors in securing support for investment projects or gaining advance knowledge of schemes that may have openings for private investment or affect private returns. In the fiscal arena, state parties who come to power as members of central government coalitions in Parliament can wield substantial influence over the central government machinery for delivering benefits to their states. Any state anticipating continued access to this power would have little incentive to dismantle or curtail the PC's discretion.

Beyond the mixed political logic of states' incentives to press for systemic change in the transfer regime, the record of states' inputs into national committees examining the fiscal framework suggests that states are interested in the mechanism as well as the amount of transfers. Every time states are on record in discussions of fiscal federal arrangements, they argue for not only larger transfers (as would be expected), but fewer conditions on these transfers. The section "The Puzzle: Contextual Change, Institutional Stasis" above discussed state positions as recorded by the FC and in the NDC debates. The First Administrative Reforms Commission (ARC) reports from 1966–71 contain similar sentiments. It is telling that the one period of discernible shift in fiscal control, the creation of the Gadgil Formula, coincided with the emergence of non-Congress parties in power at the state level.

States' inputs into the Sarkaria Commission's work (1983–88) reiterate the need to return to constitutional principles of autonomy. Chapter 10, Paragraph 3.4 of the report states:

> It has been pointed out by a State Government than the heavy dependence of States on the Union for financial resources has resulted in a progressive erosion of the jurisdiction, authority, and initiative of the States in their own constitutionally defined spheres. Further, it has manifested in a gradual decline in the relative share of States' Plan outlay in the total, growing outlay of the Union on State subjects, proliferation of Centrally Sponsored Schemes and the Union's tight control over planning in the States.

Paragraph 3.25 goes on to note:

> Closely related to the issue of vertical imbalances is the alleged inadequacy of the mechanisms provided in the Constitution to rectify the same. Almost all the State Governments have pointed out that resource transfers outside the channel of the Finance Commission, have increased year after year and now overshadow the statutory transfers.

The Commission also reports the states' "allegations" that "the expectations of the Constitution-makers that the devolution of resources from the Union to the States through mechanism devised by them, in an impartial and 'automatic' manner free from 'interference,' has suffered change (Chapter 10, para 7.01)."

Political parties and state leaders have continued to issue public statements decrying the central government's fiscal incursion into state policy jurisdiction. Saez's (2002) book on center–state relations takes its name *Federalism without a Centre* from a defiant statement issued by a group of chief ministers and regional leaders after a 1996 meeting in Hyderabad. Bihar's government (led by a regional party in alliance with the national BJP) held an international meeting on poverty statistics in 2007, in part with the aim of discrediting the central government's definition of poverty and its implications for transfers and social programs meant for the state. Even national parties have evoked states' rights. BJP passed a resolution at its June National Executive Meeting 2010 meeting complaining that the Sarkaria Commission's recommendations "had been thrown to the winds," that BJP governments in states were being "systematically harassed financially," and that "Steps initiated by the [Congress-led] Governments at the Centre are aimed at surreptitiously seizing powers vested with the States and concentrating them in the hands of the Government in Delhi."[42] These statements probably reflect political posturing as much as real concern for the Constitution, but they are consistently calling for decentralization of effective control over development expenditure.

We argue that the survival of the stubborn center is rooted in the difficulties of collective action by states. States were in some ways created to be distinct political actors: acting on the recommendation of the States Reorganization Committee, the post-Independence Parliament created states covering contiguous areas with a majority of population whose mother tongue was the same.[43] This was an effort to create shared interest, as commonality of languages of the majority had long been presumed to imply cultural homogeneity and commonality of other interests, but it seems to have been more effective in reinforcing interstate divisions than reinforcing intrastate harmony. Many of the most active intergovernmental debates

42. Resolution on Centre's Assault on the Federal Structure of the Indian Union passed in BJP National Executive Meeting, Patna (Bihar). June 12–13, 2010. Available online at http://www.bjp.org/content/view/3354/394/ (accessed November 15, 2010).

43. "India" after Independence consisted of British India that did not go to Pakistan during partition and Princely States that acceded to India or were annexed.

and federal political tensions have in fact been about preserving ethnic and linguistic distinctions among states.[44] However, the split of the unilingual states into new states and the agitation for such splits in other states suggests that the presumed commonality of interests within linguistic groups was also not realistic.

Interstate differences in development also complicate collective action on autonomy, as central coordination is required for redistribution. Autonomy in economic matters might have greater appeal to richer or better performing states than for poorer states that might prefer a strong central involvement in redistributive transfers as well as in accelerating their economic development. As Vijay Kelkar pointed out in his comments at the India Policy Forum Session, India's horizontal imbalance is one of the highest among federations:

> The per capita income difference between the poorest states and richest states of India is 9 to 1 if you take all the 28 States, the highest being Goa and lowest being Bihar, but even if you take out these two outliers, still the difference is still 6 to 1 and compared to Australia it is 1.2 to 1 or and in Canada it is 1.5 to 1 and US must be something similar.[45]

Saez (2002) notes that in addition to being unequal, states are also increasingly competitive with each other, as economic liberalization has unfolded. The Maharashtra Chief Minister's concession regarding extra allocations to poorer states in the Gadgil Formula seems to have been a rare political moment.

Divergence of fortunes also seems to have interacted with the underlying ethnic and linguistic tensions as groups use ethnic or linguistic identities to demand preferential access to opportunities and economic divides exacerbate dormant caste, linguistic, or other social divides. The Telengana separatist movement in Andhra Pradesh, for example, is at least in part a demand for job quotas to help interior regions of the states claim economic opportunities available to the better educated, richer coastal areas. Weiner (1978) also highlights the economic impetus behind politicization of caste identities: Madigas in Andhra Pradesh accepted categorization as part of the general Scheduled Caste group when affirmative action was first introduced

44. For example, in the anti-Hindi agitation of the 1960s non-Hindi speaking Bengal and the southern states were united in demanding the continuation of the use of English as a link language for interstate communications rather than Hindi alone.

45. This is a quote from a comment made by Vijay Kelkar at the India Policy Forum Meeting held on July 16, 2010, Delhi at which an early version of this paper was presented.

in Andhra Pradesh, but were demanding separate recognition by 1998 so that their share of the overall quotas for SC could be guaranteed.

Third, the political insulation built into India's federal institutions is likely to be a factor slowing the pace of institutional change. India has the institutions that federal countries in other regions such as Latin America, or at least analysts of Latin America, aspire to have—transfers are overseen by a constitutionally defined expert body and a somewhat arms-length, somewhat expert body (PC), rather than just a series of laws to be negotiated between politicians representing party and regional interests. However, the unresponsiveness of these institutions to the reforms proposed in public debate also creates a cautionary tale of "be careful of what you ask for, lest it come true" in that creating independent and at least distinct entities also makes them somewhat immune to the pressures of representative democracy that are supposed to push institutions to evolve to meet changing circumstances.

India's version of federalism has been called "executive federalism," since center and state leaders interact through consultative bodies such as the Interstate Council and NDC rather than through the legislature as in many other federations (Singh and Verney, 2003). These bodies have reportedly become more active in recent decades (Sinha, 2005), but they still appear to wield limited clout in the political changes that would be required to alter the institutional structure.

The impetus for change in intergovernmental transfer institutions would have to come from the Parliament, which has not functioned as a forum for center–state discussions. Parliamentary debates are largely structured along party lines and parliamentary procedure places smaller parties outside of the ruling coalition at a disadvantage in representing their constituencies (Wallack, 2008). The national party system is also highly fragmented, which, according to standard political theory, limits the extent to which voters and politicians' choices can be channeled into confronting national-level problems.[46]

The public statements discussed in the section "Changes in the Institutions" have created reference points in the public debate about federalism, but have had little impact. The 1988 report of Sarkaria Commission on center–state relations is widely cited, but almost none of its proposals have been implemented. The 2002 report of the Venkatachaliah Commission

46. Sartori, 1976, 1986 makes the general argument about the value of having a few parties to form platforms and channel politics into larger issues; Nayar (1999) and Saez (2002) discuss the specific challenges and consequences of coalition government in India.

raised many of the same issues and its consultation papers have been made public online, but no significant group of politicians has advocated action on these points.[47]

These explanations imply that we will see little change in the intergovernmental transfer system. Even if individual state's demands for change strengthen as citizens start to focus more intently on outcomes and hold states responsible for failure to produce these, the most powerful state parties who have achieved representation in coalitions in the central government are unlikely to advocate a reduction in the powers of the central government that would reduce the options they have at their disposal unless they start to fear that these powers would be used against them if they were no longer in the coalition. The separation between the Parliament and the other forums for intergovernmental discussions seems unlikely to change.

Conclusion

Conventional public finance theory favors decentralization of decision-making with respect to the financing and provision of public goods and services. This is based on the presumed heterogeneity across localities, districts, states, or regions within a country, both in the constraints they face for their provision and above all in the preferences of their residents reflecting the trade-offs among the various goods and services they would like to see provided, as well as, their shares in the financing of their provisions. It is argued that the local decision-makers are very likely to have more information (or at least better information) on the preferences of their residents as well as on constraints. With this asymmetry in information, even if the central and local decision-makers agree on the ranking of the outcomes of public policy for the locality, centralized decision-making in which the centralized decision making based on limited (and/or lower quality) information on national and local policies and transfers to localities, would in general lead to worse policies and transfers compared to decentralized decision-making in which the center sets the transfers and local decision-makers choose the policies that would maximize local welfare, given the local constraints and preferences.

In the Indian context, the conventional argument for decentralization and local autonomy based on information considerations suggests that decentralization should extend beyond the state level to local governments. The

47. Venkatachaliah, 2002.

arguments about the information advantage that sub national governments have loses its salience if the local units are very large, and most states in Indian state are large in area and population. Political and other differences within localities (on states or regions) among social groups about their weight in local welfare cannot be ruled out.

The persistent centralization of authority over a substantial portion of resources that could be directed toward investments in India's development is therefore troubling. India needs to exploit the benefits of federalism as a laboratory for social and development policy, but the centralized decision making inherent in the transfer system currently precludes many regional experiments. The fact that decisions about resources are made in Delhi, albeit under some oversight from and in conversation with representatives of various states, means that valuable information and pressure for accountability is being lost. The "voices from below" are increasingly valuable as an information source about what is needed in a fast-changing world and are still valuable as an incentive mechanism to improve state performance.

Comments and Discussion

Dilip Mookherjee: T. N. Srinivasan and Jessica Wallack's document poses an interesting puzzle—despite significant deconcentration of political and economic power of the central government over the past three decades, the institutional framework of center–state financial transfers in India has remained relatively unchanged. The relative importance of transfers via the two principal mechanisms, the FC and the PC, as well as their powers and responsibilities have changed little since the 1950s. Why haven't the states demanded shrinkage in the role of the PC which lacks any direct constitutional authority, is appointed by and reports to the cabinet of the central government, and continues to direct large flows of plan expenditure throughout the country in the form of an ever-growing number of CSS?

They examine three possible explanations: institutional change is not possible in India; the states do not want the change; or the states face a collective action problem in enforcing such a change. They dismiss the first, pointing to the large number of amendments to the Indian Constitution over the past 60 years. Some arguments in favor of the second hypothesis are discussed: state governments like to pass the buck for poor performance on the stepmotherly treatment of the central government, and some in proximity to the party in power at the center have gained by being able to influence central plan expenditures to their states. Yet states are being held increasingly accountable by voters for poor performance, and have been vocal critics of the inordinate power wielded by the center by virtue of its control over transfer of plan expenditures. So they side mainly with the collective action hypothesis, explained in turn by ethno-linguistic diversity and extraordinary interstate economic inequality. They conclude by foreseeing little change in center–state fiscal relations in the near future.

Some additional speculations for the institutional persistence may also be put forward. First, the economic decentralization embodied in the rise of private-investment-led growth over the past two decades has already transferred significant power to state governments. Gone are the days when decisions on large investments were made or regulated by the central government. Now the states have to attract private investors, and much of the regulatory authority has passed to state governments. The stakes involved

are perhaps not that high for the states anymore in trying to bend center–state financial institutions in their own favor.

Second, the fact that PC transfers are discretionary allows considerable elasticity of interstate transfers to shifting needs and political influence. The process of decision-making is highly nontransparent; state chief ministers exercise influence through the NDC formally and perhaps also informally behind the scenes. There is considerable empirical work on center–state transfers that bear this out (Arulampalam, et al., 2009; Rao and Singh, 2007; Khemani, 2010). FC transfers being formula-bound do not allow such elasticity. So a state that has a compelling need or is in a position to make a strong political demand can simply lobby for PC transfers, rather than pursue the arduous task of building a sizeable coalition of other states to demand a constitutional change. The latter option would take a lot more effort and time. Even if it were easy to accomplish, expanding the powers of the FC would diminish the leverage this state would be able to extract. This explanation overlaps and interweaves the second and third hypotheses proposed by the authors, with a bit more weight on the former than they are willing to place.

One question that Srinivasan and Wallack do not address head-on is the normative consequence of the persistence of the current set of institutions. But they seem to regret it, by pointing to the lack of democratic accountability it entails. This is an issue that also needs to be debated. While granting there may be some advantages in terms of greater decentralization, my own view is that there are a number of advantages of retention of central government powers which should not be overlooked.

First, there is no overarching a priori argument that democratic accountability is greater at the state compared with central government level, as Pranab Bardhan and I have argued elsewhere (Bardhan and Mookherjee, 2000, 2005, 2006). James Madison and Babasaheb Ambedkar, designers of the US and Indian constitutions respectively, made compelling arguments for potential for greater elite capture at the local level, motivating the powers accorded to the central government in both constitutions. There is likely to be considerable diversity with regard to the quality of governance across different states, which tends to be highly correlated with economic performance. Greater decentralization would then be likely to increase interstate inequality, which is already high and tending to increase over the past two decades. There is a real danger that the more backward states will fall further behind.

Second, the principal responsibility of the government nowadays in the economic arena is provision of infrastructure, environmental regulation,

development of legal and financial institutions, promoting human development, and insuring against large covariate risks. Many of these involve significant scale economies, technical expertise and require interstate coordination. Dwindling control of the central government may result in a setback on many of these dimensions.

Third, to return to the issue of growing interstate inequality in one of the most ethnically and linguistically heterogenous countries in the world, there is a potential danger of states wanting to secede. The central government has made significant investments via various CSS in various border states, something that will become more difficult if the PC were to be dismantled or its wings significantly clipped.

Finally, it needs reiterating that CSS are just that: a significant portion of the funds are provided by the central government, but matching contributions are made by state governments who have considerable say in their disbursement and implementation through the Panchayats. This is in line with concurrent responsibilities of the central and state governments in many of the concerned areas defined by the Constitution. While it is difficult to defend the bewildering proliferation and patchwork nature of these schemes, or various details concerning the way they are implemented, the overall structure seems in line with the constitutional division of responsibilities.

Sudipto Mundle: In this paper Srinivasan and Wallack trace two contrasting patterns of evolution in Indian federalism. In the political sphere the distribution of power has evolved from monopoly of power by a single party, the INC, both at the center and in the states to a sharing of power by different parties or coalitions in different states, and ultimately by coalitions of different parties even at the central level. This plurality has meant considerable decentralization and redistribution of political power from the federal government to the states. However, the institutional arrangement for intergovernmental transfer of resources has remained highly centralized despite some evolution in the roles and shares of the two main institutions, i.e., the Finance Commission and the Planning Commission. The authors present a tight yet well-documented account of these two contrasting patterns of evolution and then ask the question why. Why has the institutional arrangement for intergovernmental resource transfers between the center and the states not matched the decentralization of political power?

In an earlier version of this paper Srinivasan and Wallack attempted to answer this question within a transactions-cost politics framework. That attempt has now been abandoned, presumably because the framework was

found unsuitable for addressing the issue under consideration. However, the authors do not replace that framework by any alternative theory to explain the outcome. Instead they offer their judgment on what provides a possible explanation for their empirical puzzle.

One possible explanation is that such decentralizing institutional change was simply not possible. Srinivasan and Wallack reject this explanation for compelling reasons. Another possible explanation is the states or their representatives were not interested in such systemic change. The authors also reject this explanation, documenting that the states did seek such decentralization of resource transfer arrangements on many occasions. They conclude that the main reason why transfer arrangements did not get decentralized is that the horizontal conflict of interests and competition between states prevented collective state action vis-à-vis the central government.

This is certainly a plausible explanation. However, the paper does not offer any means for testing or rejecting other competing explanations. Two in particular should be mentioned. One alternative explanation is the emergence of different parties in power in different states, some states being governed by the same party or coalition that rules at the center and others by parties or coalition that are in the opposition at the center. Discretionary transfer powers of the central government give the party in power at the center a powerful instrument to keep the opposition ruled states in check, and also to tilt the vertical transfers in favor of its own states. When there is a change of guard at the center, the new party or coalition in charge of the federal government maintains the centralized arrangement for the same reason.

Another possible explanation is that decades of centralized transfer arrangements may have created powerful stakeholders with a vested interest in retaining central control over the transfer of resources to the states, in particular the bureaucracy. Senior bureaucracy and police, even those serving in the states, belong to All India service cadres that are centrally controlled, apart from the numerous central service cadres. Though serving their political masters, the bureaucracy is also an autonomous interest group, a strong centralizing force counter posed to the decentralization of political power. This is the "iron frame" that the founding fathers of the country established as an insurance against the possible balkanization of India in its formative years. Though bureaucrats serving in the federal government and the state governments represent their respective governments in resource allocation negotiations, the Indian bureaucracy as an institution is on balance a centralizing force.

Thus, there are possible explanations other than that offered by Srinivasan and Wallack for their puzzle, and those alternatives need to be tested and

rejected if their hypothesis alone is to be maintained. It is also possible that the correct answer to their question is not one exclusive explanation but a combination two or more of those on the table.

General Discussion

The presentation of the paper at the conference generated a very lively discussion that ranged well beyond the subject of the paper to include many aspects of fiscal federalism. In addition, the final paper represents a substantial revision of the conference version that limits the comparison between the published paper and the prior discussion.

Abhijit Banerjee stressed the importance of discussing the theory of coalition building as it relates to the topic, and the importance of talking about who colludes with whom and how the coalitions play out during key negotiations. Do the coalitions cut across party lines and are they stable over time? He went on to say that it is important to consider two layers: first, how do the institutions' rules influence and constrain the process of coalition building. Here it would be interesting to contrast the operations of the Planning Commission and the Fiscal Commission because the objectives and rules are different. Second, the institutional rules need to account for the wide differences among the states in their willingness and ability to take advantage of the schemes. The center needs some powers to pull in the recalcitrant states, but not so much power as to completely undermine the process of coalition formation.

Robert Lawrence argued that the central question is the optimal level of government, and that there are strengths and weaknesses of centralized and local government. Thus, the optimal approach would vary depending on what is to be accomplished. He argued that the Planning Commission and the Finance Commission can best be understood by first considering what they are trying to achieve. Devesh Kapoor pointed to other fiscal transfer mechanisms, such as the Agricultural Prices Commission, and suggested that the same issues that are discussed in terms of the Planning and Fiscal Commissions also arise in these other situations.

According to Pronab Sen, the central issue is the political economy of fiscal federalism, and he pointed to three specific major sources of tension. The first is that some part of the transfers, particularly from the Finance Commission, are meant to be redistributive transfers, which causes tension between the logic of redistributive transfers and the logic of efficient development. The second tension is that while it seems that politically power

seems to be moving away from the center to the regional formations, fiscally the opposite is happening, with the states becoming increasingly dependent on the center for fiscal transfers. The final source of tension he described is that certain mineral and forest resources are greatly increasing in value, and yet they are largely concentrated in certain areas where the governance structure is particularly weak, and in some cases collapsing.

Urjit Patel observed that there is a perception of the center using ad hoc measures to reward its friends among the states. That perception is reinforced by the large amount of revenue that the center collects as taxes or fees, but which it is not obliged to share. This causes resentment among the states, but it also gives the center a source of revenue with which to reward its partners in the region who are needed to support the coalition. Patricia Annez pointed out that the role of the federal transfer system underwent a lot of change in the United States during the 1980s, and the research that was done to explain these outcomes might be helpful in considering the case of India's federal transfer system.

Vijay Kelkar emphasized the large vertical and horizontal imbalances in the federation. There is a very large horizontal imbalance, demonstrated by the per capita income difference between the poorest and richest states in India of 9 to 1. There is also enormous vertical imbalance in the taxation policies of the states and the center, although this is changing rapidly with the new tax reforms, with the VAT and the GST. He also noted that there are now three tiers of government—center, state, and local. Kelkar also stressed the gradual rate of change: large changes are not acceptable; therefore, each Finance Commission has been able to only do small subtle changes at the margin, although taken as a whole, the cumulative change has been substantial. He concludes that the Finance Commission is one of the reasons why India has survived as a union, especially the first Finance Commission which laid out the framework of this devolution that was maintained by all of the Finance Commissions that followed.

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