

**Infrastructure in India:
The economics of transition from public to private provision ***

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Abstract

Indian infrastructure is in a state of flux. The provisioning of infrastructure services in India is steadily moving away from the realm of government to that of private sector. The critical issue has been getting economic structures right; in those sectors where there has been a recognition (and systemic implementation) of the principles of appropriate market structures, competition, and measured regulatory oversight, development has been rapid. The outcomes have varied by sector, with Indian telecom providing services that are globally cost-effective and electricity remaining a nightmare for consumers and a major bottleneck for India's continuing growth. While a few ports have significantly increased their efficiency, the ports sector overall remains behind international benchmarks. The initial remarkable spurt in the National Highways Development Project enabled (and probably to an extent, fuelled) growth, and brought in some of India's most innovative policy responses, but there has been a slowdown in momentum in expanding the programme. In recent years, there has simply not been the requisite (political) commitment to ownership of the innovation and motivation that is needed to sustain the pace of reform in key infrastructure sectors.

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Key words: infrastructure, risk, market structure, regulation.

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1. INTRODUCTION

Indian infrastructure is being refashioned. The provisioning of infrastructure services in India is steadily moving away from the realm of government to that of private sector. From telecom to ports, state-owned, monopolistic agencies are giving way to – widely varying degrees – private sector entities operating in a competitive environment, braided with economic regulation. Governments at the federal and state levels have been actively engaged in this transition by devising policy frameworks and by establishing new institutions such as independent regulatory agencies (as in power and telecom) and dedicated road funds.

Post independence, the Indian government adopted a top-down/state-centric approach towards infrastructure development (as indeed towards most modern economic activity), where infrastructure was predominantly conceptualised, built, owned and managed by the public sector. Initially, given the public good nature of infrastructure investments, these arrangements worked reasonably well, especially with regard to broadening access. However, after decades of poor productivity, low efficiency, lack of (adequate) financial return and high unmet demand for services, there was a clear need for augmenting capacity and improving efficiency across all sectors (Government of India [1996]). Faced with increasing fiscal constraints (exacerbated by public investment unable to “capture” the requisite direct or indirect return), the government, as part of a broad macroeconomic stabilisation and economic reform programme initiated in the early 1990's, has sought to attract private investment in the sector (Kilachand and Patel [2006]).

Infrastructure constraints are usually cited by local and foreign investors as a key speed breaker in India’s quest to sustain 8-9 percent growth of recent years. India’s ranking is low in this regard; for example, in (overall) logistics performance India is ranked 39 compared to China (30) and Hong Kong (8).¹ The distance that India has to traverse can be appreciated all the more when one considers that in 1980, India had higher infrastructure stocks than China, but China invested massively in infrastructure,

¹ <http://info.worldbank.org/etools/tradesurvey/mode1b.asp#ranking>

overtook India and is widening the gap. To draw along side to China's present levels of per capita infrastructure, India will have to invest 12.5 percent of GDP per year until 2015 – a multiple of what it is currently investing (World Bank [2006]). In fact, even the more modest objective of sustaining its current levels of growth and to spread the benefits of growth more widely requires additional infrastructure investment of 3-4 percent of GDP. Over a third of Indian firms surveyed in the 2004 Investment Climate Assessment of the World Bank cite infrastructure as a major or severe obstacle to business expansion. Power is the most critical bottleneck, with transportation a close second. Forty percent of firms in India have their own generators because of unstable power supply, and more than 40 percent of the population, mostly in rural areas, lacks access to electricity (Government of India [2006a]). India has practically no interstate expressways linking its major economic centers and only a small fraction of its national highways are four laned. The second largest rail network in the world, Indian Railways is still burdened with congestion, deteriorating quality of its rolling stock and out-of-date technology.² Over the years, the laudable objectives of universal service coverage of the original programmes have become vitiated, and instead have often become a fiscal burden for the government.

The task of increasing infrastructure investment since the early 1990s has not been successful in broad macro terms. Comparing the average ratios over two five-year periods (between 1990/91–1994/95 and 2002/03–2006/07), the infrastructure investment-GDP ratio has not changed much from 5.4 percent to 5.7 percent.³ It could be argued that the government should enhance its investment expenditure considerably (command and control mode) rather than wait for private financing; however, the wider challenge then is

² Railway tracks in India can tolerate axle loads of only 22 tonnes, while freight railways internationally have axle load of 25-38 tonnes, enabling a loaded weight of wagons of up to 150 tonnes against 85 tonnes on Indian Railways. Freight railways abroad regularly run trains of 8,000-40,000 tonnes utilising 100-300 wagons while Indian railway trains carry about 60 tonnes/wagon in a train of 58 wagons totaling around 3,500 tonnes. Therefore, to carry the same payload, Indian railways have to run more trains, thus adding to cost.

³ The share between sectors is lopsided. About 30 percent of investment in the second half of the 2000s is due to telecom, up sharply from less than 15 percent in the earlier period. Note that Indian national data on infrastructure includes investment in gas infrastructure in addition to the conventional segments, viz., transport, electricity, water and communications (Source of data on infrastructure investment-GDP ratio is Morgan Stanley [2009]; the Indian fiscal year is from April 1 to March 31.)

to maintain macroeconomic (fiscal) stability concomitantly with meeting the challenges of social (revenue) expenditure like basic health, primary education, direct income support in rural areas, and waiver of agricultural loans; it is noteworthy in this context that India already has one of the highest overall (national) fiscal deficits in the world (see Buitter and Patel [2006]). The recent evolution of Indian infrastructure is essentially an assessment of the success or otherwise in infusing private sector efficiency in the sector.

The critical issue in infrastructure today is in getting economic structures right; in those sectors where there has been a significant recognition of the basic principles of competition and measured regulatory oversight, development has been rapid and private provision and service quality is catching up to global standards (Bhattacharya and Patel [2005a]). Some parts, like telecom, are unrecognisable from as late as five years go; others like upgrading of national highways have made considerable progress in enhancing supply, but recently seem to be slowing down. Still others like urban services are not even remotely responding to the explosive expansion in India's growth nodes; it also happens to be an area where the application of thought has been relatively limited. While a financial turnaround (of sorts) is underway in Indian Railways, increase in capacity of the system has not kept pace.

The severe space limitations of a journal article forces us to use the following (admittedly *ad hoc*) two-dimensional touchstone to choose specific sectors from the infrastructure space for analysis:

- (a) Outcome: Where there has been a serious supply response.
- Or/and,
- (b) Strong (policy) initiatives (including institutional change): Where effort has been noticeable, and some time has elapsed to gauge success, or, failure.

Given these yardsticks, we focus on four sectors – telecommunications, electricity, ports and roads. The paper, *inter alia*, will argue that the (supply/quality) variation across these sectors of Indian infrastructure can, for the most part, be explained by the following factors (in part reflecting the authors' background in infrastructure project finance): market structure, allocation of risks to stakeholders who are best positioned to manage

them, and regulation that recognises the value of both maintaining a level playing field and giving play to competition (either *in*, or, *for* the market).

It is not that political economy considerations are unimportant and we deploy them selectively to explain the different trajectories of the four sectors analysed in the paper. Some aspects in this context are important enough to state upfront, especially for two sectors that are at the opposite end of the spectrum in terms of outcomes. The wide variance in changing market structures, for instance, the introduction of private sector competition in telecom but not in electricity distribution reflects, *inter alia*, most state governments' intention to retain strong control of sectors that are considered systemic for supplying social goods to "weaker sections", which engenders scope for populist measures like cheap power and turning a blind eye to politically-connected (or "chosen") consumers who don't pay bills. On the other hand, the public and political perception of telecom not being a social good or a guaranteed right, "made available" to the central government the requisite (political) leeway to follow up on the conviction that a supply response in such a technologically dynamic sector was only possible through entry of private players (and resultant competition) operating on commercial terms.⁴

The plan for the rest of the paper is as follows. In the next four sections (2, 3, 4 and 5), we describe, assess and explain the development of the four sectors of interest, viz., telecom, electricity, ports and roads. Each of these sections close with our observations and suggestions regarding outstanding issues and challenges that would need to be addressed for further sector progress. Finally, section 6 contains our conclusions.

2. TELECOMMUNICATIONS: GETTING IT RIGHT, EVENTUALLY

The telecom sector policy environment is one of the most progressive among Indian infrastructure sectors. The sector has metamorphosed beyond recognition; with over 450 million connections, India now has the third largest telecommunications

⁴ Another difference between telecom and electricity is that at the cash-generating distribution end of the latter, *each* individual state government is the decision-maker, while in the case of telecom the central government is the sole policy maker.

network in the world.⁵ It is the only segment of the infrastructure sector where India is understood to have a cost advantage compared to China (Telecom Regulatory Authority of India [2005b]). From the outset, the nature of telecom operations and policy latitude gave telecom service providers (even during the era of government-owned monopolies) the freedom to operate on broadly commercial terms, with non-payment resulting in cutting off of service, thereby ensuring manageable customer defaults (and control over the associated payment risk). The former bleakness typified by perennial underinvestment, outdated equipment and yawning unmet demand under government-owned service providers has given way to extraordinary growth and low prices in a competitive environment with substantial private participation (Patel and Tadimalla [2006]). However, the impressive transition in the sector over the last decade has been “discontinuous”, and when policy diverged from sound economic principles the sector was characterised by extended stasis, as was the case between 1994 and 1999, when India’s teledensity increased from a miniscule 1.1 to a paltry 2.3.

The New Telecom Policy (NTP) 1994, while ushering private sector participation, had several design infirmities: Firstly, it limited the number of private entrants to two per circle which were broadly contiguous with states (and the four large metros) to compete with the incumbent government-owned provider, and had separate licenses for different services (basic (wire-line) and cellular/mobile (wireless)). Secondly, limiting entry meant deployment of bidding (lump-sum) fees for (scarce) licenses to screen and choose among potential entrants (the outcome was characterised by the bidding of very high fees). Thirdly, absence of provisions for negotiating interconnection agreements (which allows users served by different service providers to be connected), meant high interconnection charges levied by the dominant public sector incumbent, Department of Telecommunications (DoT).⁶ Fourthly, absence of a durable and transparent mechanism for funding network expansion in rural areas, an avowed (and unexceptionable) aim of the government.

⁵ Eight percent of total Foreign Direct Investment (FDI) equity inflows into India between 1991 and 2007 have been in the telecom sector. The private sector share in the sector is 72.4 percent (Government of India (GoI) [2008]).

⁶ Private operators did not have anywhere to go since DoT then was also the sector regulator!

Over the next four years, beginning in 1999, when a new government found it easier to acknowledge flaws and make changes, outstanding issues impinging on market structure, license fees, level playing field, artificial distinctions between licenses for service provision, and high cross subsidy for the government incumbent to expand rural connectivity, were substantively addressed.

a. Market structure and competition

To alleviate the burden of high license fees, the government put in place a migration package, which shifted the basis for license fees from a fixed amount to a share of revenue (and the license period was extended); not surprisingly private operators accepted the migration package since by this time the burden of high (lump sum) fees had led to rescheduling of bank loans and exit of some operators. The revenue sharing approach in contrast to the erstwhile arrangement of lump sum fees, was not only less onerous but also facilitated some degree of risk-sharing between the licensor (central government) and licensees. The migration scheme (known as NTP 1999) was used by the government as an opportunity to liberalise entry (and inject further competition) into the sector; as *quid pro quo*, in exchange for the relief offered to them, operators were made to forego the exclusivity clause in their licenses, thus redefining the competitive nature of the industry, although separate licenses (and revenue share) for basic and mobile services continued.^{7 8}

b. Technology-agnostic policy

Ironically, NTP 1999, which enhanced the confidence of industry players to regroup their efforts and embark on the next phase of growth, also contained within it a seed that led to a major stalemate in the sector. This came in the form of a provision by DoT (in January 2001) which allowed basic service licensees to provide “limited” mobility within the Short Distance Charging Area (SDCA) in which the subscriber is registered, using Wireless in Local Loop (WLL).⁹ The cellular operators contended that

⁷ Unlimited competition in basic services and guidelines for inducting a fourth cellular operator in each circle was implemented.

⁸ In August 2000, the government opened up national long distance communication to the private sector without any restriction on the number of operators.

⁹ At the time it was perceived to be pro-consumer. Here, it is noteworthy that DoT had clarified that there was no such service as WLL-Limited Mobility (WLL-LM). This clarification was provided in response to a

basic service licenses should not be allowed to offer mobile services – a privilege for which they had paid substantially more (see IDFC [2003]). After almost three years of back and forth on, *inter alia*, legal challenges and unseemly lobbying, it became clear to the government that restricting unlimited mobility over the WLL platform was not only unsustainable but would also deprive consumers the benefit of greater competition (see Baijal [2004]).

The government, in November 2003, issued guidelines for Unified Access Services Licenses (UASL) under which all operators could offer wire-line and wireless access services including fully mobile, limited mobile and fixed wireless services. More significantly, while existing cellular operators were allowed to move to the UASL regime in their service area without any additional charge, basic service operators could also obtain a unified license, but only on payment of a fee, thereby deflecting criticism of the government that it was selectively violating previous license conditions.¹⁰ As a result, India is one of the few markets where there is active competition between the two major standards in mobile telephony, i.e., Global System for Mobile (GSM) and Code Division Multiple Access (CDMA). Resolution of this major (contestability) issue and continuing light handed tariff regulation by the sector regulator, Telecom Regulatory Authority of India, effectively gave free play to price competition, thus instigating a quintupling of teledensity from 6.6 in 2003 to 35.7 in 2009.¹¹

c. Regulation and level playing field

The government had constituted a sector regulator, Telecom Regulatory Authority of India (TRAI), in 1997, and vested it with powers to fix tariffs, ensure compliance with

request made by Telecom Regulatory Authority of India (TRAI) in the context of a submission by the government-owned service provider in Delhi and Mumbai, Mahanagar Telephone Nigam Limited (MTNL), for approval of tariffs for introducing a WLL-LM service based on a Code Division Multiple Access (CDMA) platform (see TRAI [1999]).

¹⁰ Basic service providers were required to pay the difference, if any, between the entry fees paid by them and the fourth cellular operator in their respective service area (and a penalty in case of operators who offered mobility in violation of the basic service license conditions).

¹¹ Number of wireless subscribers has increased at a compounded average growth rate (CAGR) of 87.7 percent since 2003. Telecom tariffs, which were among the highest in the world four years ago are now among the lowest. National Long Distance (NLD) tariffs that ranged Rs. 1.20 - Rs. 4.80/minute in 2003 for different distances are now as low as one Rupee/minute. International tariffs have also fallen, for example from Rs. 9.60 to Rs. 6/minute to the US, over the same period [GoI (2008)]. Mobile (or cellular) tariffs dropped 74 percent in the course of one year (2003-04).

license conditions, and facilitate competition and interconnection between operators.¹² Regrettably, in the first few years the Authority could not make much headway as its decisions on certain key issues were contested in courts and the resultant judicial rulings went against it. The government resolved issues pertaining to the regulator's powers by amending the relevant legislation in 2000, which, both imparted greater clarity to the role of TRAI and expanded its ambit to include: (a) determining the terms and conditions of inter-connectivity between operators; (b) ensuring effective compliance of universal service obligations; and (c) making recommendations, either *suo motu* or on request from the government, on a wide array of matters ranging from introduction of new service providers to efficient spectrum management.¹³ A sharp distinction was drawn between regulation and adjudication, by divesting TRAI of its judicial powers by establishing a separate Telecom Disputes Settlement and Appellate Tribunal to rule on appeals against TRAI's decisions, and settle disputes between service providers, licensor and licensee, and service provider and consumers.

TRAI has gone on to play a notable role in the evolution of the sector. Through its consultation papers (and consultative process) the regulator has been at the vanguard of interventions, including effective interconnection,¹⁴ unlimited competition in the International Long Distance Services segment,¹⁵ tariff rebalancing, transparency in consumer tariff plans offered by service providers, developing mergers and acquisitions

¹² As part of NTP 1999, the government acknowledged the inherent conflict of interest in DoT being both policy maker and player (as service provider). The Department of Telecommunication Services (DTS) was carved out of DoT and incorporated as Bharat Sanchar Nigam Limited (BSNL) in October 2000. The DoT/Telecom Commission was left with functions relating to policy formulation, licensing and research and development.

¹³ Lack of financial independence from the Government of India still afflicts TRAI, as indeed regulatory bodies across all sectors in the country.

¹⁴ In February 2004, TRAI sought to make the interconnect regime more fair by revising Interconnect Usage Charge (IUC) at 30 paisa/minute for all calls and increased slightly the carriage charges for certain long distance calls. The Access Deficit Charge (ADC) regime also been regularly modified on recommendations of TRAI, e.g., in 2004 the total access deficit estimate was reduced from Rs. 130 bn to Rs. 53.4 bn and ADC was imposed on all types of calls (thus spreading the burden) (see TRAI [2004]). Most recently, effective April 1 2008, ADC on domestic calls has been eliminated.

¹⁵ Effective April 1, 2002, which ended the monopoly of the government-owned Videsh Sanchar Nigam Limited (VSNL) two years ahead of schedule. The government eventually sold a majority stake in VSNL to the Tatas, thus privatising it.

guidelines¹⁶, and monitoring of quality of service parameters (see TRAI [2005a, 2006] and Bhattacharya and Patel [2005b]); equally importantly, it has developed a cooperative working relationship with the government, thereby enhancing its effectiveness. Over the years, as competition emerged as a reliable and effective means to drive telecom call charges towards (marginal) costs, TRAI could (and to its credit, it did) largely relinquish the onerous task of tariff setting except in case of basic services in rural areas.

d. Universal Service Levy

Enhancing rural telephony has been a longstanding objective of the Indian government. For the most part funding for rural network expansion was through a cross subsidy (called Access Deficit Charge (ADC)) in favour of DoT, and subsequently BSNL. Unfortunately, the subsidy to BSNL covered not only the capital cost of rural networks but also funded intrinsic inefficiency in its urban operations (symptomatic of public sector units in India).

The NTP 1999 paved the way for institutionalising a separate, transparent mechanism for supporting uneconomical telecom services in rural and remote areas by diverting a slice of the revenue-based license fee (christened the Universal Service Levy (USL)).¹⁷ Overall, efforts aimed at sustaining and enhancing rural telephony have often been highly segregated and marked by inordinate delays.¹⁸ For example, after recognising the need for garnering additional revenues through a USL, the government took three years to establish the non-lapsable Universal Service Obligation Fund (USOF), one more year to accord it statutory status and yet another year to frame the rules for its administration. Moreover, only about a third of the Rs. 150 billion collected through the USL over five years (2002-03 – 2006-07) has been deployed (Government of India (GoI)

¹⁶ TRAI played a lead role in M&A guidelines issued by the DoT. Presently, intracircle mergers are not allowed if: (i) the number of operators in a circle for any given service is reduced to less than three; or (ii) the market share of the combined entity would be 67 percent or more.

¹⁷ Presently, this levy is a part of the annual license fee and is fixed at 5 percent of the Adjusted Gross Revenue (AGR) of all telecom service operators except the providers of pure value added services like Internet, Voice Mail and E-Mail.

¹⁸ Following a minimum subsidy bidding approach, agreements were finalised for various services including (a) the operation and maintenance of Village Public Telephones (VPTs) established before 2002; (b) the replacement of more than 180,000 multiple access radio relay VPTs; (c) installation of Rural Community Phones (RCPs) in about 46,000 villages with a population of more than 2000; and (d) provision of new rural household Direct Exchange Lines (DELS) in 1,685 SDCAs.

[2008]). Interestingly, notwithstanding the aforementioned weaknesses in rolling out the universal access strategy, teledensity in rural areas increased in the last decade, albeit from a low base, several fold to 7.9 percent.¹⁹ This performance raises a question regarding the necessity for a separate, intricate intervention such as USOF for enhancing rural telephony (for an elaboration see Patel and Tadmilla [2006]).

e. Pushing the envelope

(i) Entry

It may be hard to deem that with a dozen (national) telecom service brands in India (even after some consolidation), there is scope to increase competition and drive tariffs lower to the benefit of consumers. With the extant high profitability of telecom operators – enjoying some of the most remarkable returns on equity in India over the last decade –, there is a perception that given the large capital requirements for rolling out a national network, incumbents are not particularly threatened with new entry (see Desai [2006]). We believe that there are two interventions that can enhance competition. On the regulatory side, TRAI should implement number portability far more aggressively than hitherto has been the case; this change will virtually eliminate (consumer) switching costs as subscribers can choose to retain their number even as they change service providers.²⁰ (On this particular aspect, TRAI has opened itself to charges of “regulatory capture” by all too easily (and for far too long) accepting industry arguments which mainly relate to “complexity” and costs.)²¹ On the policy side, the government should allow entry of Mobile Virtual Network Operator (MVNO) services which allows a service provider to deploy an existing operator’s infrastructure on lease, thus precluding high entry costs.²²

¹⁹ Urban teledensity is about 60 percent.

²⁰ Deadlines for introducing number portability are routinely pushed back, with December 2009 being the most recent one announced in April 2008.

²¹ One industry estimate that the authors are aware of (reported in the media) is that it would cost about Rs. 30 bn (US\$ 750 mn) to implement number portability, which given the size of the sector is hardly onerous.

²² An alternative model by Desai [2006] proposes creation of a common carrier corporation for inter-circle, long distance traffic that would lease capacity to smaller players operating at the local level and lowering the barriers to entry for new players to create a more competitive market.

(ii) Spectrum

Spectrum is the only limited resource in telecommunications, and inadequacy of bandwidth is emerging as a major constraint (at least in the dense urban areas), if the current growth rates in wireless subscriptions continue. Presently, spectrum is allocated administratively to operators broadly based on number of subscribers that are serviced; in other words, it is an entitlement bundled with the license. To start with, instead of the current practice of charging for spectrum on a revenue share basis, the existing spectrum allocations may be charged on a Rupee per MHz basis, to encourage efficient usage. Also, to mitigate the (potential) risk of spectrum hoarding by unscrupulous operators, a “use it or lose it” policy can be adopted. Finally, spectrum trading should be allowed to facilitate efficient redeployment of spectrum between various users and to elicit market-based signals regarding the spectrum’s scarcity value at different locations. Additional allocations (over and above the entitlements in respective licenses) should be made available in a manner that captures the economic value of this scarce resource. A non-discriminatory approach such as auction would appear to be the most suitable instrument for efficient allocation of bandwidth, particularly, of IMT-2000 spectrum.

3. ELECTRICITY: FAILURE TO CATCH THE BULL BY THE HORNS

The Indian power sector has about 150 GW of utility capacity, but its per capita electricity consumption is still among the lowest globally, for example, about a third of China's.²³ The sector is dominated by large government-owned utilities at both the national and state levels; 86 percent of utility-based power is produced by government generators (of which state government generating plants account for 60 percent), and the transmission network is almost entirely owned by the public sector.²⁴ The *cash-generating distribution segment* – where responsibility for supply, billing and collection lies – is almost completely under the ambit and ownership of respective state governments (through State Electricity Boards (SEBs) or state government distribution

²³ Source: Key World Energy Statistics [2007].

²⁴ India has the fifth largest installed capacity for electricity in the world. Jurisdictionally, on matters of policy and regulation, the sector is divided – but clearly demarcated – between the Union and the state governments.

companies (discoms))²⁵. Private distribution is limited to Delhi and some parts of West Bengal, Orissa, Maharashtra, Gujarat and Uttar Pradesh.²⁶

The government invited independent power producers (IPPs) as far back as 1992, but, private participation has been much below expectations (a share of about 14 percent in generation capacity),²⁷ and given the parlous state of much of the consumer-end of the sector under (state) government ownership, even public sector investment has not kept pace (see Table 1 below).²⁸

Table 1: Capacity addition in generation during 8th, 9th and 10th Plans

	8 th & 9 th Plans		10 th Plan (2002/03-2006/07)				
	Achievement	Shortfall	Target*	Commissioned		Under execution	Likely shortfall
	(MW)	%	(MW)	(MW)	%	(MW)	%
Central	12,661	49%	22,832	11,115	49%	2,610	40%
State	16,285	36%	11,157	5,460	49%	2,135	32%
Private	6,491	68%	7,121	1,931	27%	--	73%
Total	35,437	50%	41,110	18,505	45%	4,745	44%

*The aggregate target was revised downwards to 36,956 MW during Mid-Term Appraisal.
Source: Government of India (GoI) [2007], and previous years.

Energy shortfalls have increased with each passing year; presently, the country-wide peak shortage is 12.3 percent.²⁹ Nationally, power generation by utilities increased by 13.5 percent per annum in the 1980s (when average annual GDP growth was 5 percent), 9.6 percent in the 1990s (average annual GDP growth of 5.7 percent), and there was a sharp deceleration to 5.6 percent per year in the first seven years of this decade (average economic growth of 7 percent per annum).³⁰

²⁵ These are *de facto* an extension of the respective state government.

²⁶ Only the cities of Ahmedabad, Surat, Calcutta and Bombay, supplied by private distributors, can claim 24x7 power supply.

²⁷ The share of the private sector in units of power generated would be lower than its share in installed capacity since in recent years the private sector has contributed disproportionately to the increase in installed capacity of renewable sources such as wind, which intrinsically have lower plant load factor compared to, say, thermal plants.

²⁸ 78,577 MW of capacity is proposed to be added in the 11th 5-year plan (2007/08 - 2011/12). According to industry estimates, domestic and foreign private companies will need to invest around US\$ 100 billion to take India closer to the goal of self sufficiency in electricity.

²⁹ Source: Central Electricity Authority website.

³⁰ Power shortages are endemic across the country. Small and medium industries are the most affected since they do not have the requisite access to captive power and on the other hand pay very high tariffs for their electricity consumption, which impact their competitiveness.

Given the large and widespread failure of the state-owned utilities in catering to the needs of every class of consumer (industry, commercial, households and agriculture), consumers have either become super-efficient in their electricity usage, or, they are crafting solutions to deal with chronic shortages. In the last couple of decades, Indian industry has evolved a coping strategy centred on investment in captive generation; between 1986-87 and 2006-07, captive facility increased at an average annual growth rate of over 16 percent. Cost of captive power for small and medium enterprises (who often are in highly competitive export sectors) can be as high as two and a half times the cost from the grid; for example, firms that rely on diesel generators in India's important garment export cluster of Tirupur pay Rs. 11 to 12 per unit of power (Chatterji [2009]). Both high fuel cost and lack of economies of scale contribute to the elevated cost of small captive generation.

a. Payment risk: Persistent losses of monopoly buyers

The defining backdrop of the Indian power sector is the poor financial condition of the primary buyers (and distributors) of electricity, specifically, SEBs, which have been suffering heavy financial losses for an extended period of time (see Table 2 below).

Table 2: Overall state power sector fiscal and financial indicators

	Net cross subsidy* (Rs. billion) (as % of GDP in brackets)	Uncovered subsidy (% of GDP)	Commercial losses* (Rs. billion)	Financial losses* (Rs. billion)	TD loss (%)	ATC loss (%)	ATC loss (%)	Return on equity (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1966-67	--	--		--	15	--	--	
1989-90	--	--	--	--	23.3	--	--	
1991-92	52.8 (0.8%)	0.5%	41.2	--	--	--	--	-12.7
1992-93	60.4 (0.8%)	0.5%	43.6	--	21.8	--	--	-11.8
1993-94	79.4 (0.9%)	0.7%	50.0	--	21.4	--	--	-12.2
1994-95	80.0 (0.8%)	0.6%	63.3	--	21.1	--	--	-13.5
1995-96	106.2 (0.9%)	0.3%	83.2	--	22.3	--	--	-15.1
1996-97	123.0 (0.9%)	0.4%	94.5	--	24.5	--	--	-17.2
1997-98	154.6 (1.0%)	0.5%	118.2	--	24.8	--	--	-19.4
1998-99	234.7 (1.3%)	0.9%	180.8	--	26.5	--	--	-27.5
1999-00	295.7 (1.5%)	1.0%	249.2	--	30.9	--	--	-41.2
2000-01	309.9 (1.5%)	1.1%	254.0	--	--	--	--	-41.8
2001-02	308.9 (1.4%)	1.0%	240.6	293.3	34.0	37.2	38.9	-32.8
2002-03	257.7 (1.0%)	0.5%	213.8	211.9	--	38.6	--	-31.6
2003-04	270.2 (1.0%)	0.6%	203.8	192.4	--	37.8	--	-28.3
2004-05	298.0 (0.9%)	0.6%	235.6	240.0	--	36.8	33.8	-31.9
2005-06	273.0 (0.8%)	0.4%	227.3	201.3	--	35.2	--	-19.7
2006-07	347.8 (0.8%)	0.5%	288.3	274.5	--	33.1	--	-24.0

*Excluding subsidy.

Note: TD loss is transmission and distribution loss; and ATC loss is aggregate technical and commercial loss.

Sources: Columns (1), (2), (3) & (8): Economic Survey (GoI), various years; cols. (4) & (6): PFC [2005, 2006, 2008]; col. (5): Ministry of Power Annual Report, 2002-03 for 1966-67, 1989-90 and 1992-93 to 1999-00, and for 2001-02, Economic Survey, 2003-04 (where it is stated that for 1992-93 and 2001-02 the figure for TD loss includes energy unaccounted for). (The Ministry of Power Annual Report, 2003-04 does not have any TD loss estimate, but on page 11 alludes to ATC losses being in excess of 50 percent); and col. (7): Report on Restructuring of APDRP (GoI [2006b]).

A critical explanation is the state-mandated (cross) subsidy to some consumers (agriculture and households), and the attendant scope (indeed, incentive) for camouflaging outright theft for supply to these categories that a skewed tariff policy has engendered.³¹ Table 3 below illustrates the wide dispersion in tariffs in select states

³¹ Although tariff rebalancing is taking place through larger increase for agriculture compared to other users, the initial conditions are so skewed that this has had, at best, modest impact thus far. Between January 2003 and January 2007, according to GoI [2007], the cumulative (year-on-year) increase in tariffs

between the different categories of consumers, in particular between agriculture and supply to industrial and commercial enterprises.

Table 3: Tariffs/unit for various consumer categories in select states (for 2006-07, in Rs.)

	Industrial	Agriculture *	Domestic (households)	Commercial	Average
Maharashtra	4.16	2.13 (19.2)	3.42	5.33	3.71
West Bengal	3.94	1.47 (6.3)	2.69	4.44	3.52
Tamil Nadu	4.38	0 (20.8)	1.56	5.60	2.84
Bihar	4.48	0.54 (15.6)	1.65	4.83	2.75
Punjab	3.71	0.03 (29.5)	2.74	4.47	2.44

Source: Power Finance Corporation [2008].

*Note: The number in bracket is the *reported* share (in percent) of agriculture in electricity supplied by state utilities.

The microeconomic “dual” to the overall (“macroeconomic”) travails of the sector is captured by the gap between the average cost of supply (ACS) and the average revenue earned/realised (ARR) from selling a unit of electricity. It is noteworthy that the gap is large even after taking into account the subsidy payments to the state utilities from their respective state governments (see Table 4 below). The gap between ACS and ARR implies that, on average (assuming the same consumer mix), each extra unit of power that a state utility generates/buys and supplies to the consumer, the red ink increases.³²

were as follows: 13.9% (overall), 9.1% (for domestic use), 2.1% (for commercial use), 20.7% (for agriculture), 11.6% (for industry), and 4.6% (for railway traction).

³² This is why, to keep their heads above water (that is, try to ensure that *cash* losses are manageable), utilities are often not keen to enhance supply.

Table 4: Per-unit cost, revenue and subsidy indicators for electricity supplied by state power utilities (Rs.)

	ACS	ARR	Gap w/o subsidy	Gap with subsidy
2001-02	2.46	1.81	0.65	0.55
2002-03	2.38	1.95	0.43	0.31
2003-04	2.39	2.02	0.37	0.24
2004-05	2.54	2.09	0.45	0.31
2005-06	2.58	2.21	0.37	0.26
2006-07	2.76	2.27	0.49	0.36

Source: Power Finance Corporation [2005, 2006, 2008].

Key

ACS: Average cost of supply; ARR: Average revenue realisation (without subsidy); ATC: Aggregate technical and commercial losses.

Aggregate Technical and Commercial (ATC) losses are estimated at 35-40 percent of which about two-thirds is commercial.³³ The precarious financial position of the SEBs is not only placing a large burden on scarce public sector resources but has also made private and public investors, and lenders wary of supporting power projects that have to rely exclusively on financially weak SEBs for buying (and paying for) their power.³⁴ By 2002 unpaid dues (including interest and penalties) of SEBs to central government-owned generators (like National Thermal Power Corporation and National Hydroelectric Power Corporation), fuel suppliers like Coal India Limited, and Indian Railways had reached Rs. 415 billio (about 2 percent of 2000-01 GDP).³⁵ Only a debt securitisation package orchestrated by the central government prevented the sector from a default crisis which would have taken some Government of India public sector units down, financially. Since then while the rot in the power sector has been stemmed, the malaise is so deep that the threshold for the sector to be self sustaining is still far away,

³³ An ATC loss estimate (which is a physical measure) helps to gauge what fraction (percentage) of the units of electricity is not paid for. Transmission and distribution (TD) loss – a subset of ATC – is determined by the physical quality of the transmission and distribution infrastructure of a power system (a very good system would have losses on this count in the low single digit).

³⁴ Space constraints prevent us from providing more detail, however, a word of caution is in order, viz., that there is considerable unevenness in performance between states and distribution utilities (see Bhattacharya and Patel [2008] for a formal and extensive exploration in this regard).

³⁵ Thus underscoring the point that the payment risk entailed in supplying to state government-owned distributors is high, even for central government power suppliers.

and therefore market-based risk-assessed finance is limited. In contemporary coinage, many SEBs remain deeply sub-prime (Patel [2008]).

b. Cart before the horse

Governments in India have been busy, with several identifiable phases in attempts to reform the power sector. The first of these phases (decade of the 1990s) aimed at capacity addition, at the behest of government decision making. Faced with the reality of bankrupt government-owned single buyers' *alias* SEBs, developers and their creditors needed a panoply of financial security mechanisms, viz., power purchase agreements supported by escrow accounts, letters of credit, and guarantees to assure themselves of a return on investment.³⁶ Since the resultant contingent liabilities had to be recognised in determining the broad (macro) indebtedness of governments there was a limit to "financial engineering". Moreover, state governments that had backstopped SEBs to credit enhance IPPs could not, beyond a point, pay the bills (in Maharashtra the Enron-sponsored Dabhol Power Company went under receivership as a consequence).

c. Facing reality

As the first phase of reforms did not yield much success, a second phase was evolved towards the end of the last decade that shifted the reform contours to service and efficiency at least cost to consumers, with emphasis on markets and competition. It was recognised that the key for sustainable growth of the sector urgently required addressing the serious travails of the cash generating end of the business, specifically, distribution. Among the positive developments, constitution of state electricity regulatory commissions (SERCs) has played a key role in ushering transparency in the sector, especially related to tariff determination. Availability based tariffs, and unscheduled interchange of power, introduced in 2003, for inter-state exchange of power have reduced voltage and frequency fluctuations (that is, improved grid discipline). In 2004 the Central Electricity Regulatory Commission directed all new (investment) projects in the

³⁶ Escrows are ring-fenced "unencumbered" cash flows deposited directly into pre-specified bank accounts in bank branches located in particular distribution zones of the SEB. If the SEB fails to honour its commitment of paying for the power it has contracted to buy under a long-term power purchase agreement from the IPP (who in turn then is unable to fulfill its debt-servicing obligation) then the money deposited in the escrow account reverts to the creditors.

sector (generation, transmission and distribution) to be structured through tariff-based competitive bidding. However, it is still not mandatory for distribution licensees to procure power through competitive bidding.³⁷ Thirteen states have unbundled the respective SEBs into generation, transmission and distribution businesses, towards separation of the “hard” (wire) networks such as the electric grid from production and sales activities in the future.

The country has moved from denial to widespread recognition that theft of electricity was rampant (even in urban and industrial areas), and that supply to agriculture was not the only contributor to the financial travails of the sector (GoI [2002a]).³⁸ Task forces, working groups and committees constituted by the central and state governments have, for the most part, proffered well-argued policy alternatives over the 2000s (GoI [2002b]). The lacuna has been inadequacy in execution and unwillingness to acknowledge (and replicate) successful restructuring in bellwether pockets of the sector. Firstly, failure to implement with conviction policies and regulations (allowed under the law) that would broaden considerably the scope for competition in the sector. Secondly, a head in the sand approach towards privatising the distribution segment of the sector despite a notable turnaround after change in ownership of the utility serving the National Capital Region (NCR).

The financial and economic case for privatising state-owned distribution (and, indeed, generation) assets is unexceptionable, with returns on equity deeply negative. From a political-economy perspective, the case is not cut and dry, and, at any rate, the timing of fundamental reform of distribution is not. In addition to the standard valuation of capital that is relevant for the government’s (as benevolent custodian of public assets) decision on retaining public sector capital (from a public finance perspective), the cost and benefit (pecuniary and non pecuniary) of politicians and employees has to be incorporated in the calculus. The “benefits” include: graft for turning a blind eye to theft

³⁷ The relevant guidelines were issued by the Union Ministry of Power in January 2005. If a distribution licensee in a state chooses to procure power without competitive bidding, the tariff has to be approved by the relevant SERC.

³⁸ Report of the High Level Committee on Escrow Cover to IPPs prepared at the behest of the Government of Karnataka in February 2000 was probably the first official undiluted statement of the centrality of the distribution segment in restoring the sector’s health.

of power (say, by “dissuading” the state law and order machinery to apprehend and punish thieves), which eventually finds its way into funding political activity, and “extra” payment to employees;³⁹ rents (including political IOUs) inherent in rationing on account of acute shortage;⁴⁰ electoral bragging rights for policy of free power to categories of consumers;⁴¹ doling out jobs (*regium donum*);⁴² and payoffs for awarding procurement contracts on behalf of public utilities (many of which are still government departments)⁴³

(i) Competition and the Electricity Act 2003

The Electricity Act 2003 (EA) has been motivated to impart an economic structure for the Indian electricity sector, and provides a framework for legislative changes at the state level for undertaking reforms.⁴⁴ Although all aspects – distribution, tariff setting and market structure – of the problem end of the electricity business is under the ambit of state governments, the EA provides a blueprint for a market-based transparent regime through progressive introduction of competition and choice by incorporating impressive features comprising, *inter alia*, delicensing of captive generation, introduction of open access in transmission and subsequently in distribution, and the provision for issuing multiple distribution licenses in a given area. While most developed markets, and many emerging ones, have progressed quite rapidly from competition in the wholesale segments to retail competition, there has been little progress in India. The quantum of electricity traded is only about 3 percent of the total power sold.

³⁹ The number of employees in state-government owned power utilities (monopoly distributors of electricity in India) is about 900,000.

⁴⁰ Conceptually, a state-owned monopoly has a proclivity to cut price (or not raise it), because lower official prices for a given output simply raise the market clearing bribe. By curtailing output from the market-clearing level, the utility increases the value of rents it collects (Shleifer and Vishny [1998]).

⁴¹ Sugar cooperatives (which are politically powerful) in India’s most economically advanced state, Maharashtra, reportedly owe Rs. 160 bn to the government distributor in back payments since the cooperatives are presently honouring only 10 percent of their monthly bill of Rs. 200 mn (Economic Times [2009]).

⁴² A “benefit” that is particularly important in an environment of high unemployment. One only has to sit for a short time in the office of a state Minister of power and/or the chairman of a state electricity board to appreciate the number of requests for jobs (and transfers) from local area constituents and on behalf of political colleagues.

⁴³ The evidence on this aspect can, almost inevitably, only be anecdotal. The purchase of low voltage meters by the Maharashtra distribution utilities sometime back is apocryphal. “Meters” are bought on the basis of lowest-price bidding at about Rs. 200 each, which is ridiculously low by any standards; what, in fact, is being purchased are metallic boxes that only look like meters! Regarding transformers the story is that existing units on occasions are removed (usually at night) and sold back to the utility.

⁴⁴ State governments did not require formal legislative action at the centre to initiate reforms. Orissa and Andhra Pradesh established regulatory commissions and unbundled the sector under the purview of their own acts, prior to the EA.

A critically important change that the Act sought to encourage was replacing the present Single-Buyer model to a Multi-Buyer model, which would lead to a paradigm change in the environment whereby monopoly of the SEBs for buying/distributing power would cease, thus leading to a market determined price of electricity. State governments have been averse to meaningful changes to allow multiple buyers since SEBs risk losing their most credit-worthy buyers, and SERCs have been reluctant to be proactive in encouraging introduction of open access and third party sales.⁴⁵

(ii) A case study in change of ownership: privatisation of the Delhi Vidyut Board

Even by the standards of poorly run SEBs, the power utility in Delhi – owned and managed by the state government – was a basket case by the late 1990s. More than half of the power distributed by the Delhi Vidyut Board (DVB) was not paid for. The concomitant fiscal burden and a grim supply situation compelled the Delhi government to pursue a fast track approach to sector reform. (It can be argued with merit that restructuring was contemplated only when everything else failed.) The Delhi government unveiled its strategy in February 1999, and by July 2002 had not only unbundled the vertically integrated DVB into separate generation, transmission and distribution entities, but had sold majority stakes to the private sector in the distribution segment (in turn trifurcated into three distinct corporations serving different areas of Delhi).⁴⁶ According to an estimate, at the time of sale, 1.5 mn out of the total 2.6 mn electricity meters were either worn out or tampered! Moreover, the utility did not have audited financial results for several of the most recent years.

The design and implementation of Delhi power sector reform was a significant improvement in comparison over earlier efforts to restructure distribution in Orissa and Kanpur. The three private distribution companies (discoms) in Delhi have been steadily improving their performance; ATC losses are lower than what they had committed in

⁴⁵ The financial viability of projects (with total capacity of 78,577 MW including Ultra Mega Power projects) proposed in the 11th 5-year plan (2007/08 - 2011/12) will depend, according to sponsors and lenders, on third party sales (on a merchant basis) being ultimately permitted given the extant parlous situation of state-owned distributors (with whom power purchase agreements (PPAs) have been signed).

⁴⁶ At the time of privatisation, DVB was the largest urban power utility in the country serving consumers spread across 1,480 sq. km with a peak load of 2,879 MW.

their respective privatisation bids (see Table 5 below). Privatisation necessarily changed the incentive to increase revenue and induced efforts to make the business profitable, which is on account of the private distribution companies in Delhi being part of commercially successful publicly listed conglomerates answerable to their shareholders.

Table 5: ATC losses (%)

Discom/ licensee	Opening level	2002-03		2003-04		2004-05		2005-06		2006-07	2010-11
		Bid	actual	bid	actual	bid	actual	bid	actual	actual	target
BSES Rajdhani	48.1	47.6	47.4	45.0	45.1	42.7	40.6	36.7	35.5	29.9	17
BSES Yamuna	57.2	56.5	61.9	54.7	54.3	50.7	50.1	45.1	43.9	39.0	22
NDPL	48.1	47.6	47.8	43.4	44.9	40.9	33.8	35.3	26.5	23.7	17

Sources: GoI [2007] and Order on the admission of MYT petitions filed by Discoms [October, 2007], available at dercind.org (Delhi Electricity Regulatory Commission website).

The broadly positive outcome of privatising the distribution segment in Delhi was predicated on the design of the transaction (IDFC [2001]). To start with, the focus was not on increasing revenue for the government, but on reducing losses. Measurement of ATC losses was based on the only credible data points that were available, viz., energy input and actual cash collection within a distribution license area; the measure, therefore, eschewed the “need” for expending substantial effort in digging up (fabricating) dubious (non-existent data) and also reduced the scope for misinterpretation and disputes. Loss reduction targets for multiple years that were put in place *ex ante* incentivised aggressive pursuit of efficiency; the private discoms were allowed to benefit from superior performance for a longer duration unlike in a regime where targets are established annually (moving goal post effect). Furthermore, the government absolved the successor private entities from the past burden of accumulated losses and questionable receivables and took over the liabilities on account of employee retirement benefits. Finally, the government recognised the reality that the sector cannot become viable overnight and accordingly decided to continue support, albeit as a loan, to meet the deficits in the interim, which helped to mitigate tariff shocks in the immediate aftermath of privatisation.

Criticism of the privatisation has often been vocal, in particular, that it was a “juicy deal” – a mere two percentage point ATC loss reduction above the target would

increase the return on equity by about 7 percentage points.⁴⁷ What has been left unsaid is that in that eventuality a substantial part of the additional revenue would go towards reducing consumer tariffs and that the Delhi Government, with 49 percent of equity in the discoms, will get to share the balance of the financial benefits almost at par with its private sector counterpart. Moreover, at subsequent regulatory cycles, tariff changes can be easily structured by the regulator in a manner that “claws back” extraordinary profits earned by licensees in previous years.⁴⁸

While some of the criticisms against DVB privatisation are easily countered, the Delhi Government, admittedly, did seem to have lost an opportunity to entice deeper ATC loss reduction bids. Specifically, during the course of selecting potential private operators, the government offered to increase the quantum of financial support over the transition period and provided assurances pertaining to enactment of anti-theft legislation; however, the benefit of these “revised rules” was made available to only the two final bidders. In a “natural” monopoly segment like distribution “wires”, *competition for the market* is probably the most effective means for harnessing the benefits of competitive private players; hence, an opportunity for more aggressive bidding was, perhaps, not fully exploited.

d. Challenge

Supply of electricity to rural areas/agriculture has to transit towards deploying innovative mechanisms; the extant practise is essentially blunt since it does not distinguish between financial support for rural areas and paying for theft. In other words, better targeting is essential if subsidised power to rural areas is to be fiscally sustainable, and objectives of wider access are to be realised. Even for states whose electricity sector is relatively better run, for example, in Andhra Pradesh, fiscal support for the sector is higher than expenditure on public health. Thus far, India has been reluctant to experiment with novel schemes informed by international best practices in the area of

⁴⁷ The decibel level has dropped off in the last year or so.

⁴⁸ The downside of the “juicy” deal is that if the private investor misses the ATC target by two percentage points, the rate of return would *decline* substantially. Although private capital is expected to take such risks, one should also be mindful that it does so only for a comparable reward. For 2004-05, the regulator estimated that of the benefits accrued on account of exceeding the ATC loss targets by the three discoms combined, consumers benefited to the tune of Rs. 2,050 mn and the distributors would retain Rs. 370 mn.

rural power supply (as suggested in GoI [2002a]; also see IDFC [2001])). Private distribution of electricity in rural areas is not prevalent in most countries, although there are successful exceptions; this is not to say that non-urban distribution is undertaken entirely by the public sector. The key is to demarcate concentrated (urban-industrial/semi-urban) zones from rural areas. Rural zones have several distinctive features such as lower initial load and, for the most part, a large number of consumers with lower paying capacity and therefore modest scope to absorb overheads. The need is to approach this issue in a manner that addresses its special needs and also leverage the benefits of private and community enterprise to improve service in these areas. Internationally, supply of electricity to rural areas has not only been given special dispensation such as subsidies for capital investment in network expansion, but has also resorted to innovative institutional mechanisms. Cooperatives often provide an effective option for extending service to rural areas, especially with access to quality advice and help on technical, financial management, human resource development and other related activities. In Bangladesh, the Rural Electrification Board fulfils this role for the Palli Bidyut Samities, as does National Rural Electric Cooperative Association in the USA. In Chile and Argentina, the private sector has been involved through mechanisms such as minimum subsidy bidding.

4. PORTS: ENHANCING CAPACITY TO MATCH CARGO COMPOSITION

Although there has been little by way of cogently articulated policy objectives for the port sector – how best to provide cost-effective port services – the reform process has nevertheless managed to move operations at many large ports towards the desired outcomes. Shorn of nuances, most Indian ports now deliver services more efficiently than a decade ago, even though they generally still remain far behind in performance parameters compared to the best global ports.

Approximately 95 percent of India's trade by volume and 70 percent by value is moved through maritime transport. India has 12 major ports and 187 minor ports, with

major ports capacity at end-March 2007 of 505 million tonnes per annum.⁴⁹ Major ports handle the bulk (three-quarters) of total port traffic, although some of the “minor” ports developed by the private sector are relatively large (for instance, Mundra and Pipavav) and handle significant amount of cargo.⁵⁰

Growth of traffic at ports has essentially been driven by India’s increasing integration with the global economy, and any metric related to this integration has grown exponentially in the last half a decade. Despite this, growth in ports capacity in India has been virtually half of the expansion in merchandise trade. While trade has grown at a compounded average growth rate (CAGR) of 20 percent in the seven years over 1999-2000 to 2006-07, major ports capacity has increased at a CAGR of only 10 percent.^{51 52}

a. The reform process

(i) Inter- and intra-port competition

Indian ports used to be plagued by widespread inefficiencies in cargo handling, poor connectivity, a mismatch of facilities and type of cargo, and outdated labour practices. Sector reform has introduced competition and private participation in significant measure; the latter has only served to sharpen the effectiveness of the former.^{53 54} The basic ingredient in providing superior user services was increased inter- and intra-port competition, which has also led to significant investments in various forms. A few privately-operated greenfield ports have emerged, the number of terminals within major ports have increased, bulk cargo is gradually moving out of major ports to

⁴⁹ The Major Ports are administered by Port Trusts (which are autonomous bodies), except for the relatively new Ennore Port, established as a corporate entity.

⁵⁰ A small subset of the 187 minor ports is well developed, with all-weather berthing facilities; cargo handling is undertaken in about a third of the minor ports, with the rest restricted to fishing and passenger traffic. Modernisation of minor ports is being emphasised by some states like Gujarat, Andhra Pradesh, Maharashtra and Tamil Nadu which have constituted Maritime Boards (autonomous regulatory bodies). In 1996-97 the share of minor ports in cargo handling was 10 percent, which has since increased to a quarter.

⁵¹ Of course, over this period, private port capacity has come up in Pipavav, Mundra and elsewhere, but this is still a relatively small share of the total.

⁵² The discrepancy has become even more acute in last five years; while trade has increased at a CAGR of 29 percent over 2002-03 to 2006-07, capacity has grown at a much smaller 9 percent.

⁵³ The improvement in the efficiency of the government-owned terminals at Jawaharlal Nehru Port Trust (JNPT) following the success of the Dubai Port (DP)-World operated Nhava Sheva International Container Terminal (NSICT) is a case in point (see Box 1 later in the section).

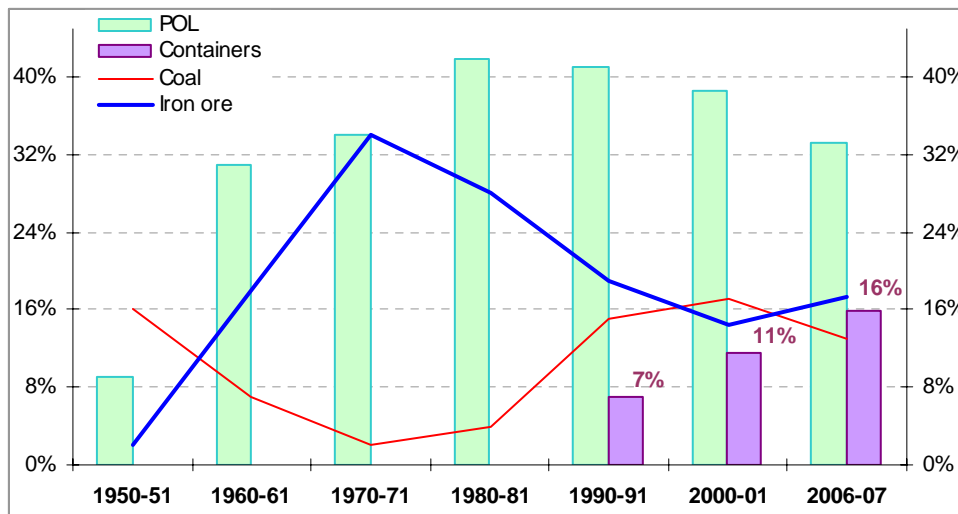
⁵⁴ About 9 percent of the operational capacity at the major ports has been built by the private sector.

dedicated terminals, and port connectivity has improved (partly due to the roads programme, as explained below).⁵⁵

In addition to the usual arguments for increasing efficiency, there is another attribute of services provided by the private sector, specifically, flexibility which is particularly relevant given inherent uncertainty about the changing structure of India’s trade and the need to adapt capacities to suit the particular requirements for that composition (IDFC [1999]). From a situation a decade back where existing port capacities were un-differentiated and were being developed by the Port Trusts in a “one-size-fits-all” manner, the current environment has emerged into a specialised structure that is more in conformity with the emerging patterns of merchandise trade.

The composition of India’s trade has changed since most of the ports were built. Today, the segments that are growing are: (i) container traffic, which is propelled by trends in global logistics, and (ii) liquid bulk imports, which are driven by rising industrial growth and declining domestic crude oil production (see Chart 1 below).

Chart 1: Trends in proportional share of selected cargo categories



Source: Economic Survey (GoI), various issues.

⁵⁵ Greenfield ports have often entailed development of existing minor ports, with some being developed with state governments and their maritime arms.

Containerised cargo is growing faster than total sea-borne trade, with many hitherto break bulk cargos now moving in containers.⁵⁶ Clearly, building capacity for handling container traffic is proving to be critical for future prospects of Indian ports. Only 13 percent of India's port capacity handles container traffic. Further, about 70 percent of containers flowing to and out of India are trans-shipped through the ports of Colombo, Singapore, Dubai and Salalah, thereby raising transaction costs of India's international trade.

The trends alluded above – containerisation and trans-shipment – are broadly exogenous (to India) and there has been some progress (albeit limited in scope) in adapting the strategy of ports development to accommodate these developments. Dedicated container terminals, separation of bulk cargo handling facilities, offshore Single Buoy Mooring facilities for liquid cargo, etc. have all resulted in a turnaround of services at Indian ports.⁵⁷ Modern logistics, better connectivity and superior storage systems have improved evacuation times.

(ii) Alternative operational models for ports

A short digression on the structures adopted for reforming ports might be in order. Globally, most ports operate via a landlord port model, whether the ownership is the private sector or the government. Common services like dredging, pilotage, etc, are provided by the port owners and individual terminal operations are concessioned out to third parties who are best suited to provide the specialised cargo facilities.

Most Indian ports operate as trusts, with all the concomitant hindrances arising from restrictions under the provisions (enforced by the central government) of the Major Port Trusts Act. Corporatisation, mooted as an alternative governance structure, is the process of converting the Trust into a company under the Companies Act, thereby imparting operational freedom to management. The board of directors would then be

⁵⁶ Such as rice, maize, glass, granite, garment, sand, soya, cement, banana, cotton, green coffee beans, and flowers. Container traffic has been growing at over 10 percent per annum over the last 3 years, reflecting the dominance of containerisation in international trade.

⁵⁷ Global port operators provide services at many Indian ports. DP World runs container terminals at JNPT, Chennai, Cochin and Vishakapatnam ports; the AP Moller Group operates another terminal at JNPT, besides the Pipavav Port; and PSA Singapore operates a terminal at Tuticorin.

empowered to take decisions without the need to seek permission from the central government. Corporatisation, however, has not made much headway since the sole corporatisation of Ennore Port, primarily on account of opposition from port labour trust unions.

b. Efficiency enhancement

The initiation of the (ongoing) reform process has resulted in improvement over the past decade (see Table 6 below); however, this is no where close to levels that are needed to further enable India's (seamless and efficient) integration with global merchandise trade.

Table 6: Indicators of Performance of Major Ports

Year	Average Ship Berth Output (ASBO) (tonnes)			Pre-berth waiting time (hours)	Capacity at major ports (mn tonnes)	Average ship turn around time (ASTA) (days)
	Minimum	Average	Maximum			
1984-85	--	2314	--	-11.9	--	--
1990-91	--	3372	--	--	163.5	8.1
1991-92	--	--	--	--	169.3	--
1992-93	--	--	--	--	166.6	--
1993-94	--	3990	--	6.9	--	--
1994-95	--	--	--	--	174	--
1995-96	--	4030	--	--	177	8.5
1996-97	1188	4249	8540	--	217.3	7.8
1997-98	1325	--	10446	--	218	6.6
1998-99	--	--	--	--	240	5.9
1999-00	--	--	--	--	258	5.1
2000-01	--	6701	--	--	292	4.3
2001-02	--	6972	--	--	344	--
2002-03	--	8455	--	6.9	363.8	3.7
2003-04	--	9079	--	4.7	389.5	3.5
2004-05	--	9240	--	6.0	397.5	3.4
2005-06	--	9267	--	8.8	456.2	3.5
2006-07	--	9725	--	10.1	504.8	3.6
2007-08 (Apr-Oct)	--	--	--	--	--	3.8

Source: Economic Survey (GoI), various years.

Furthermore, there is also some evidence of the slowing of momentum of efficiency gains in recent years. The average output per ship per day for all major ports taken together

doubled between 1996-97 (4,249 tonnes) and 2002-03 (8,455 tonnes). Since then the gains have been modest. The same broad (temporal) pattern can be discerned in another efficiency indicator, namely, the average ship turnaround time (Table 4).⁵⁸ India is still a long way from attaining international efficiency levels (for example, in the realm of logistics performance related to international shipments, India is ranked 40 compared to China (28) and Hong Kong (7)).⁵⁹ However, Jawaharlal Nehru Port Trust, JNPT (and particularly the privately operated container terminals), stands out in terms of enhanced efficiency that it has managed. JNPT handles 60 percent of India's total containerised trade cargo of about 6.5 million twenty-foot equivalent units, TEUs.

c. Case study: The JNPT experience

JNPT was commissioned in May 1989, with the existing Mumbai port unable to handle large volumes of traffic, owing to draught limitations and physical constraints. To accommodate the surge in container traffic, JNPT awarded a concession to P&O Ports, Australia, for a 2-berth container terminal (Nhava Sheva International Container Terminal, NSICT) in 1993, which was completed in 1999. By 2004, JNPT operated two container terminals, a bulk terminal, a liquid cargo jetty and a multipurpose berth. The bulk terminal was sought to be redeveloped into a container terminal following the continued growth of containerised cargo. A joint venture, Gateway Terminals India – a consortium of A.P. Moller-Maersk and the Container Corporation of India (CONCOR) – won the competitive bid in August 2004.

The terminals have achieved high productivity and faster turnaround times for vessel operations (see charts below); and JNPT has had the highest growth rate in cargo-handling among Indian ports.

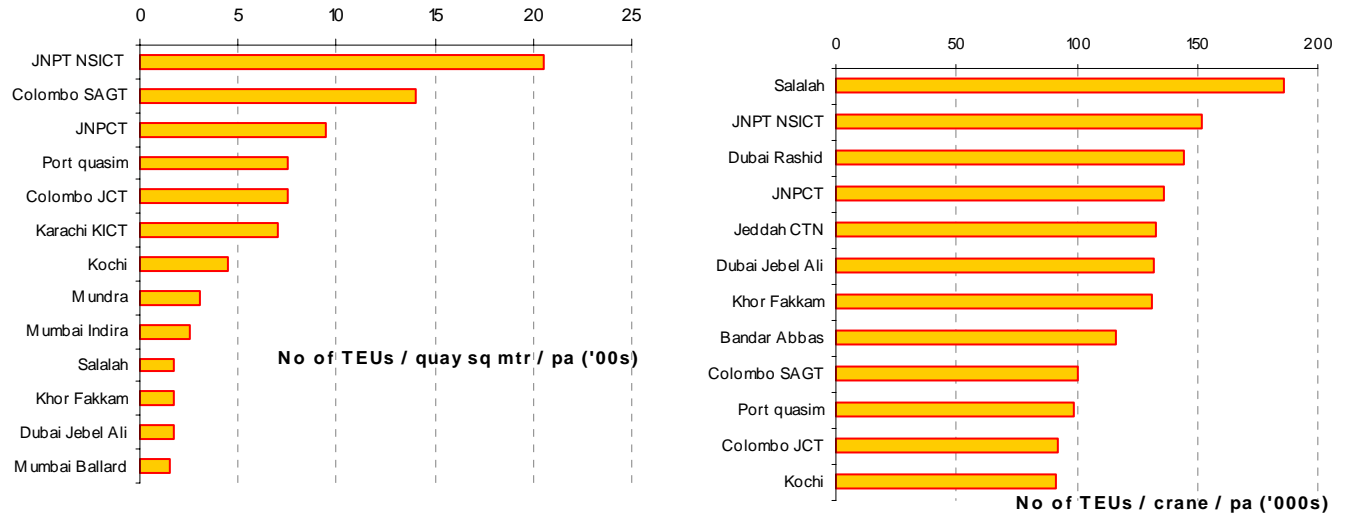
Several factors have contributed to the improvement. First, JNPT is a natural harbour. A draught of 14-16 m with a back-up area extending to 70 hectares provides an advantage in port operations. Second, the extent of connectivity by road, rail and sea to western India, especially Maharashtra and Gujarat, where a large part of manufacturing

⁵⁸ For the best ports in the world, turnaround time is measured in hours (e.g., Singapore and Hong Kong).

⁵⁹ <http://info.worldbank.org/etools/tradesurvey/modelb.asp#ranking>

activity and exports is located. Third, being new, JNPT had a relatively young and educated workforce and did not have to carry the baggage of huge labour supply (resulting in massive overstaffing) like Mumbai and Kolkata Ports, or, face problems of militant and unreasonable trade union activities. Unlike some of the other major ports in India, JNPT did not have a Dock Labour Board for recruitment of its workforce.

Chart 2:



d. Connectivity with the hinterland

While quay-side performance has improved at most of the large ports, the effectiveness of ship evacuation is constrained by land-side storage facilities. Improvements in port connectivity and the land transport network linking hinterlands to the existing major ports are ongoing, in various forms. Connectivity attained through the National Highways Development Project (detailed in the next section) is fostering inter-port competition by permitting users to decide upon a port of their choice based on service efficiency rather than access limitations. In addition, public-private partnership with railways is enabling rapid growth in capacities of some private “minor” ports, enhancing competition for the major ports.

Despite these developments, there has not been a marked improvement in congestion at some of the major ports, which account for a bulk of port traffic. Existing capacity in legacy terminals and ports are under-utilised compared to potential due to

outmoded practices, ill-maintained equipment and inadequate (albeit improving) logistics interface with the rest of the transport network.

e. Ports regulation

The rationale and mode of ports regulation has become an important issue, given the increasing competition between ports and between emerging capacities. While inter-port competition will necessarily be limited by the concentration of economic activity in the proximity of some of these ports, inter-terminal competition can serve to mitigate the pricing power of terminal operators to a degree. This reduces the scope of tariff regulation.

The Tariff Authority for Major Ports (TAMP) was constituted in April 1997 to regulate all tariffs, both vessel related and cargo related, and rates for lease of properties of Major Port Trusts (MPTs) and the private concessionaires operating at these ports. Originally, TAMP had been established with the intent of imparting confidence to private terminal operators that the MPTs – who are the entrenched incumbents in most cases – would “behave themselves,” and it has fulfilled this role. The role of TAMP is limited to tariff setting, even as the individual Port Trusts exercise all other regulatory functions. One view is that with rising competition in the sector, market forces can determine tariff.

With existing and proposed private participation, users now have a wider choice on the west coast at JNPT, Mundra and Pipavav, and on the east coast at Tuticorin, Chennai and Visakhapatnam. The choice will expand once the third container terminal at JNPT, the container transshipment terminal at Cochin Port, and the proposed terminals at Ennore, Kandla and Kulpi start operations.

In light of enhanced competition (both inter- and intra-port), there is a *prima facie* case for excluding container terminals from TAMP’s purview and for reviewing the rationale for the Authority’s continuance (Tadimalla and Patel [2005]). At the same time, increasing concentration of ownership of ports and terminals – a world-wide trend – along both the east and west coasts of India have increased concern of collusive

behaviour and predatory practices, which are more properly in the realm of the recently empowered Competition Commission of India rather than of a sector regulator.

f. Transition issues

Although there have been improvements overall in the ports sector in India over the past decade, these have not been uniform among the major ports, and even between individual terminal operators at specific ports. While some terminal operators like the Nhava Sheva International Container Terminal at JNPT have become virtually world class in their quayside performance, systemic efficiency is hampered by the storage and logistics support of the (government) port operator, as well as by inadequate connectivity to the hinterland.

Meanwhile, while the gap between port capacity and demand for port services keeps increasing, the major ports prepare 20-year perspective plans and the National Maritime Development Programme aims to channel Rs. 500 bn into ports infrastructure. There is simply no reason (except political inertia) that commercially feasible capacities cannot be rapidly expanded at *existing* ports; additional capacity will impart further effective competition, and reduce the need for port tariff oversight.

The biggest – but by no means an insurmountable – constraint for the next radical advance remains the issue relating to the legacy workforce. Indian ports still employ over 54,000 persons. In most parts of the world changes in port and shipping technology have led to a decline in the need for direct employment in the sector. Generous severance payments for extant labour coupled with increased flexibility in employment conditions have been the preferred (and usually successful) response in most countries.

5. ROADS: A START IN EFFICIENT PROCUREMENT OF SERVICES

Higher economic growth has been a major contributor to greater movement of goods and services and the inability of the other major mode of transport – railways – to accommodate this increased traffic has meant increasing congestion in the roads network. India's road network, stretching across 3.3 mn km, is the second largest road system in

the world;⁶⁰ however, a large part of this is rural roads in a bad state of repair (see Table 7 below). National Highways constitute only about 2 percent of the network but carry about 40 percent of the total road traffic.

Table 7: Distribution of roads by type (as on 31st January 2008)

	Length (in km)	Share
Expressways	200	0.0%
National Highways	66,590	2%
<i>Single Lane/Intermediate Lane</i>	21,309	32%
<i>Double Lane</i>	37,290	56%
<i>Four or more Lanes</i>	7,990	12%
State Highways	131,899	4.0%
Major District Roads	467,763	14.2%
Rural and Other Roads	2,650,000	80.3%
Total Length	3,300,000	100.0%

Source: National Highways Authority of India (NHAI) website.

There has been a modal shift of traffic onto roads. The share of roads in total traffic (measured in tonne-kilometres or passenger-kilometres) has increased steadily in India over the past few decades. While roads accounted for merely 15 percent of goods and passenger traffic in 1950, its market share has expanded to over 60 percent of goods traffic and as much as 87 percent of passenger traffic (excluding air traffic and inland waterways); this came, of course, at the expense of rail traffic, which lost the corresponding market share. With a rapid increase in motor vehicles and deceleration in development of road capacity, roads have become congested and the quality of road travel has deteriorated substantially.⁶¹ The problem became especially acute in the case of national highways.

a. The need for revamping the roads programme

Despite having a large network of roads, India has, *inter alia*, neglected maintenance of existing assets, with the focus on creating new assets. News reports of pot-holed and bad stretches of roads are still legion. The mode of constructing roads – through separate civil works and maintenance contracts by state agencies – compounded

⁶⁰ In comparison, the US has over 6.3 mn km and China under 2 mn km (Source: Deutsche Bank [2007]).

⁶¹ The number of vehicles has been growing at an average of 10.2 percent per annum over the last five years.

the challenge, resulting in badly built roads requiring high-maintenance and, consequently, substantial resources. Funds for maintenance have remained much lower than required in many countries (including India), since the hidden costs to the economy of extra fuel and stress on vehicles are often not fully factored in cost-benefit analysis.

In 1995, in recognition of the importance of the national highway network, the central government – which directs progress of the national highways – operationalised the National Highways Authority of India (NHAI), with a mandate to develop, maintain, and manage national highways and facilitate private sector participation in the roads sector.

b. The National Highways Development Project

In a reform environment predominantly characterised by timidity, procrastination and hysteresis, the roads sector stands out in terms of boldness of initiative. The National Highways Development Project (NHDP) marked a genuine discontinuity in systems and processes of the government, and in terms of the sheer size and ambitiousness of the scope of the project.⁶² Since roads are a network industry, a sector-wide (and not a piecemeal) intervention was necessary.⁶³ Commensurately, large funding was required, with even modest rules of thumb indicating Rs. 540 bn at 1999 prices for initial phased implementation.

(i) Prioritisation

The length of the national highway (NH) network implied that prioritisation was essential to sustain the programme. The responsibility for the NHDP, which envisaged 4-laning of over 13,000 km of high-density national highways (NHs), has been vested with NHAI.⁶⁴ Implementation of the NHDP in the first five years was limited to three broad parts: the first part was the Golden Quadrilateral (GQ) Project, which comprised the four-

⁶² At its peak in 2004-05, the pace of refurbishing the national highways was estimated to have reached almost 4 km/day.

⁶³ Roads are a network, and have to be looked upon as a sum much larger than the segments of which it is composed. Each segment of the network feeds into the other and, in turn, is fed by others.

⁶⁴ Most highways in India used to have two lanes. The NHDP envisaged their enhancement into separated dual carriageways, with two lanes each.

laning of 5,800 km of corridors linking the four major metros (as growth nodes), the second part covered the 7,300 km North-South and East-West Corridors (NS-EW) Project, and the third part was for improving connectivity of ports to the hinterland (see Table 8 below).⁶⁵ Since 2004, the scope of the project has been broadened to other parts of the NH network.

Table 8: Status of implementation of national highway projects

NHDP component	Total length (km)	Completed (km)	Under implementation		Balance for award of civil works (km)
			Length (km)	No. of contracts	
GQ project	5,846	5,629	217	25	--
NS-EW corridors	7,300	1,559	4,762	148	821
Port connectivity	380	163	211	8	6
Other NHs	962	337	605	16	20
NHDP Phase-III	12,109	274	1,801	32	10,034
NHDP Phase-V	6,500	-	148	2	6,352
Total	33,097	7,962	7,944	231	17,233

Source: GoI [2008].

With the near completion of the first phase (covering the GQ), the focus has shifted to the NS-EW corridors. Furthermore, Phase III has been initiated, which entails up-gradation of stretches of NHs connecting state capitals with NHDP Phase I & II network, and for providing connectivity to places of commercial and tourist importance. Phase V involves 6-laning of 6,500 km of NHs, most of which comprises the Golden Quadrilateral.⁶⁶

(ii) Life-cycle view of road assets

The NHDP marked a major advance in thinking on improving and developing the road network. For the first time, the focus shifted to a life-cycle view of roads rather than building new roads or repairing existing bad roads. The broader transformation in

⁶⁵ Phase I commenced in December 2000.

⁶⁶ The Indian government has recently approved construction of 1,000 km of expressways with full access control on new alignments at a cost of Rs. 167 bn under NHDP Phase-VI, and the construction of ring roads including improvement of NH links with cities, grade-separated intersections, flyovers, elevated highways, rail over bridges, underpasses and service roads under NHDP Phase-VII (at a further cost of Rs. 167 bn).

perspective was a move away from (only) constructing roads to providing road services to users, in line with trends emerging globally. The most crucial operational component of this change was the accent on a long-term concession structure in awarding road projects, away from the Engineering-Procurement-Construction (EPC) mode that had hitherto been prevalent. These composite concession contracts club construction and maintenance, and link payments (or penalties) to specific performance outcomes (or failures) over the contract period and provide a single point responsibility. This provides an in-built incentive for the operator to ensure quality of construction and proper maintenance over the entire duration of the contract, thereby motivating the use of technologies that reduces the total life-cycle cost of the project.

(iii) The distinctive characteristics of financing road projects

Financing of road projects by the private sector is challenging given that benefits from road projects are usually not easily amenable for full recovery through direct user charges, and they are characterised by large sunk costs and long pay-back periods. Among the infrastructure sectors covered in this paper, the roads sector possesses the most characteristics of a public good. Excludability – which is typical of other utilities like telecommunications and electricity – is difficult, which is reinforced by the widespread view that “roads are free” and are not part of the market economy.

Even now, despite increasing recognition of substantial cost savings and improvements in efficiency from private sector participation, completely privately funded road projects typically form a small percentage of the total highway network of most countries.⁶⁷ Worldwide, governments continue to play a substantial role in facilitating road projects in diverse ways, viz., budgetary allocation, concessional financing (France, in the 1960s) network-wide tolls (Austria, Japan, Korea and Switzerland), and underwriting of debt (Japan). In India too, a significant driver of the progress achieved through the NHDP is attributable to the government’s decisions to *indirectly* collect road user payments through a cess on fuel and to constitute a non-lapsable Central Road Fund (CRF), which broke the prevalent paradigm of using general tax revenues to fund roads

⁶⁷ Barring a few exceptions such as Argentina and Chile where (individual) toll roads with private participation respectively account for a third and two-fifths of the main roads.

(IDFC [1999] and GoI [2000]).⁶⁸ The CRF was ring-fenced by the government with a view to restrain itself from using these revenues for other purposes. The credibility regarding the sustainability of the revenue stream from the fuel cess has helped to catalyse funding for the NHs from other sources, including domestic and multilateral borrowing (see Table 9 below).⁶⁹

Table 9: Sources of funding NHDP projects (Rs. billion)

	Cess Funds	External Assistance		Borrowing	Budgetary Support
		Grants	Loans		
1999-2000	10.3	4.9	-	6.6	-
2000-01	18.0	4.6	1.20	8.0	-
2001-02	21.0	8.9	1.13	55.9	-
2002-03	20.0	12.0	3.0	-	-
2003-04	19.9	11.6	2.9	-	-
2004-05	18.5	12.4	3.6	-	-
2005-06	32.7	24.0	5.0	12.9	7.0
2006-07	64.1	15.8	4.0	15.0	1.1
2007-08	65.4	17.9	4.5	20.0	2.7

Source: GoI [2008].

NHAI's main source of finance is the fuel cess.⁷⁰ The present rate of cess is Rs. 2 per litre on both petrol and diesel, a part of which is allocated to NHAI to fund implementation of NHDP. The petrol cess together with half of the diesel cess goes to the CRF.⁷¹ Of this, the NHDP gets 57.5 percent, 30 percent is allocated to states' road programmes and the balance is for railway road over-bridges, track crossings and so on.⁷² During 2007-08, Rs. 81 billion (US\$ 2 billion) was made available for NHs and state roads.

⁶⁸ The CRF was established in November 2000.

⁶⁹ Ring-fencing cess revenues has made it possible for NHAI to embark on a much larger construction programme, by leveraging future cess revenues for issuing domestic bonds.

⁷⁰ The government introduced the cess (one Rupee/litre on petrol) in the Union budget of 1998-99, effective June 2 1998. The first year in which the cess was levied saw a 42 percent increase in allocation for highways.

⁷¹ Half of the diesel cess is allocated to the rural roads programme.

⁷² Despite heavy taxation of transport fuel in India, there has been political acceptability for collective revenue for improving roads through the cess. Networks other than the national highways have also benefited (a table on distribution of cess revenue is available from the authors).

(iv) Incentivising private financing in the roads sector: Concession structures

Private participation in the Indian road sector has highlighted several best practices (in conformity with international experience), viz., ring-fencing of resources meant for the sector into a dedicated fund; competitive procurement of road services; involvement of key road user groups in decision making; and ensuring allocation of funds for maintenance as a priority. The intellectual foundation of the NHDP lay in introducing novel Build-Operate-Transfer (BOT) concession structures that addressed risks associated with the new integrated contracts. In a BOT concession, the private operator is allowed to recover his investment and a reasonable return through a revenue stream, which can be based on direct tolls, shadow tolls, or annuities.⁷³

Most toll projects in India also use the amount of capital subsidy as a bid parameter. The government specifies toll rates and the concession period, and makes the award based on the lowest bid, with traffic risk borne by the road concessionaire.^{74 75} It is noteworthy that some stretches with high traffic density have attracted bids with a “negative capital grant”, i.e., the concessionaire being willing to pay for the concession rights.

The concept of direct tolling, however, is itself problematic and internationally has been applied only to very specific stretches of roads. Principles of equity and choice for road users complicate the imposition of tolls as user charges in many segments. The revenue stream of a direct tolling project is impacted by three inter-related risks, viz., traffic volumes, feasibility of tolling at the anticipated rates, and user willingness to pay. Economic logic suggests that in order to encourage usage, toll rates would have to be kept at marginal costs, which would leave a substantial portion of the costs uncovered. There is an inherent dilemma in tolling specific stretches of roads; the application of the concept of excludability, the cornerstone of user charges, is problematic in both moral

⁷³ The option of shadow tolling has not been used in India. See US Federal Highway Administration [2002] for more details on this structure.

⁷⁴ Globally, alternative formats include specifying toll rates and awarding bids on the shortest concession period or vice versa.

⁷⁵ A more complex variant – known as the Least Present Value of Revenue (LPVR) method – awards the project on the lowest bid for the present value of future revenues (see Engel, Fischer and Galetovic [1997]). In this structure, the traffic risk is transferred to the road users as the private developer would be allowed to operate (and toll) the road until the amount recovered from revenues equals the quoted present value.

and economic terms. Paying tolls implicitly assumes the availability of alternative “free” roads as a choice.⁷⁶ Tolling of long stretches of Indian highways is also likely to be highly disruptive to local communities (due to “ribbon” settlements). Tolls, then, can best be justified as a proxy of a congestion charge. Consequently, while high-density traffic sections are amenable to specific user charges most segments are unlikely to be commercially viable if tolled.⁷⁷

In the Annuity model, risks related to traffic are transferred away from private operators, thereby improving bankability for the concession.⁷⁸ The amount of risk capital needed for projects is reduced since annuity projects typically support a higher debt-equity ratio compared to tolled projects. All other (performance) risks relating to project completion and operation are retained by the operator, which include construction cost overruns, increased maintenance cost due to higher than expected traffic and higher cost due to faulty design. Annuity payments are linked to road “availability”; if availability is below norms, certified by an independent engineer, annuity payments are reduced. The credibility of this reduction is also high, since annuity payments are stretched over the entire period of the concession (as long as 17 years in India). Against the background of the above discussion, we feel that the annuity model has not been utilised to the full extent of its potential for the NHDP. As of mid-2007, out of a total of 62 concession contracts, only 12 annuity contracts have been awarded, accounting for 24 percent of total length.⁷⁹

⁷⁶ Internationally, private participation in roads through direct tolling alone is usually limited to small sections of a road network, mainly comprising of high-density corridors, bridges, new stretches (for instance, bypasses and expressways) wherein there are existing alternative routes (right of movement is a fundamental entitlement, one presumes), and where access can be controlled effectively and within reasonable cost.

⁷⁷ In India too, for example, traffic in case of Moradabad Toll Road turned out to be about fifty percent of the forecast, whereas the actual traffic in case of Noida Toll Bridge (NTB) turned out to be less than one fourth of the expected level (see Pargal [2007] for a review of problems in the concession structure for the NTB project).

⁷⁸ There had initially been some concern about this, related to the incentive compatibility with inducing efficient road operation. While there is some merit in this concern, the design of the annuity concession mitigates some of this, with road “availability” being monitored by an independent engineer. The operator of a road stretch also has some limitations on his ability to attract “business” (traffic), since the stretch is only a part of a larger network.

⁷⁹ See NHAI website for data on awards made through toll, special purpose vehicle (SPV), and annuity mechanisms.

c. Learning-by-looking by state governments

There has also been experimentation with dedicated road funds at the state level for development of state highways. A few states have already established road funds while some others are moving towards them (see Chart 2 below).

Chart 2: State Road Funds

In operation:	Under planning:
Gujarat, Rajasthan, Orissa, Tamil Nadu, Mizoram and Punjab	Uttar Pradesh, Assam, Kerala, Maharashtra, Madhya Pradesh, Karnataka

Source: Rajesh Rohatgi.

State road funds are financed from multiple sources – budgetary support from central government and state government, indirect road user charges from cess on fuel, motor vehicle taxes, fees, levy on agriculture products etc. Similar to CRF, these road funds are used for both development and maintenance of the network, except the one in Uttar Pradesh, which is dedicated for maintenance. In addition, some states have established road funds for the development and maintenance of district and rural roads.⁸⁰

d. The way ahead in financing projects

The momentum of the NHDP has slowed in the past three years. The second phase of the project is suffering from cost overruns due to increase in input costs, change in scope of projects, etc. The programme may also have been affected by lack of administrative continuity in recent times on account of the inordinate number of changes at the top of the NHAI management. In the NS-EW corridors, less than 1,600 km (out of a total of 7,300 km) have been 4-laned so far, against the first completion deadline of 2007. Similarly, in Phase-III, only 2 percent of the envisaged road length has been 4-laned, although the deadline is December 2009.

Thus far the private sector's share in overall risk capital in NHDP has been relatively small; the NHDP had started with a sprinkling of BOT methods like toll roads, annuity and special purpose vehicles (SPVs), but the majority of NHDP projects were awarded mainly through civil works contracts. The situation is likely to change with all

⁸⁰ Madhya Pradesh has the Farmer's Road Fund, and Karnataka has the Chief Minister's Grameen Raste Abhivrudhi Nidhi (CMGRAN)

projects of Phase-III to Phase-VII envisaged to be concessioned in a BOT (particularly toll) mode⁸¹. This would mean a rapid shift toward tolls being the dominant source of financing and, more importantly, a large-scale transfer of financing and traffic risk to the private sector.

Flexibility in structuring concession agreements

Given the scope of the NHDP, there is a case for standardising and templating the concession contract documentation and making the award procedure to the private sector more rule based. Towards this objective, a Model Concession Agreement (MCA) for national highways has been issued by the central government with a view to improve transparency, secure value for public money and adopt best practices. The MCA spells out, in great detail, a regulatory framework for concessions.⁸²

It is contended that given the long lags for arbitration and dispute resolution in India, a formula driven approach provides greater clarity to both operators and investors. There is some validity to the argument; however, this cannot be extended indefinitely. Excessive strait-jacketing might hinder the same investor interest that the MCA seeks to promote. Given the widely differing contexts of road projects, especially traffic projections, a fair amount of flexibility is usually called for in tailoring a concession structure that suitably addresses these risks. An over-prescriptive concession structure has a high probability of financial default, since most concession parameters are to be rigidly controlled. Alternative structures (such as the Least Present Value of Revenue (LPVR) concession mentioned in footnote 75) help distribute risks in a more flexible and efficient manner, while providing suitable incentives and disincentives to the road operator. Even if the MCA is used to guide road concession awards over a couple of years, it should be rapidly phased out in favour of more innovative mechanisms.

⁸¹ Of the entire NHDP (> 33,000 km) almost 45 percent is planned to be awarded through this method.

⁸² The framework addresses wide-ranging issues including "mitigation and unbundling of risks; allocation of risks and rewards; symmetry of obligations between the principal parties; precision and predictability of costs and obligations; reduction of transaction costs; force majeure; and termination", as well as dispute resolution.

6. CONCLUSIONS

The scale of changes seen in some of the infrastructure sectors has been unprecedented for India. It could even be described as a “giant leap for India”, but the achievements, in the perspective of those of peer countries remains modest. In the early years of this decade, India saw a series of far reaching policy changes in the infrastructure sphere. That momentum seems to have dissipated in the past few years, due to a variety of reasons, mostly political, some administrative, and the residual a mix of learning and stasis. Over the last few years, there has simply not been the same (political) commitment to ownership of the innovation and motivation that is needed to sustain the pace of reform in key infrastructure sectors. One sure sign of this is the diminished number of studies on the subject in recent years, compared to the early years of this decade, which produced a mass of intellectual output.

The outcomes have varied by sector, with Indian telecom providing services that are cost-effective by global standards and electricity remaining a nightmare for consumers and a major bottleneck for India’s continuing growth. While a few ports (and specifically, some privately operated terminals at major ports) have significantly increased their efficiency, the ports sector overall lags international productivity benchmarks. There is, *prima facie*, no reason (bar political inertia) why the JNPT experience cannot be replicated quickly and more private operators brought in at other ports. While the initial spurt in the NHDP enabled (and probably to an extent, fuelled) growth, and brought in some of India’s most innovative policy responses in infrastructure, there has been an almost inexplicable slowdown in momentum in expanding the programme to other parts of the network. Overall, the road network in India is still poor, even more so compared with competitor countries. There is now a sufficient understanding of market structures, competition issues, legal frameworks of complicated concessions, modalities of extending universal service and managing the transition from legacy contractual commitments, that a major initiative is feasible (it is, without doubt, the need of the hour!).

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