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The Unofficial Economy and Economic Development

ABSTRACT In developing countries, informal firms account for up to about half of all economic activity. Using data from World Bank firm-level surveys, we find that informal firms are small and extremely unproductive compared with even the small formal firms in the sample, and especially relative to the larger formal firms. Formal firms are run by much better educated managers than informal ones and use more capital, have different customers, market their products, and use more external finance. Few formal firms have ever operated informally. This evidence supports the dual economy ("Wal-Mart") theory of development, in which growth comes about from the creation of highly productive formal firms. Informal firms keep millions of people alive but disappear as the economy develops.

In many developing countries, unofficial economic activity—that conducted by unregistered firms or by registered firms but hidden from taxation—accounts for between a third and a half of the total. This share declines sharply as the economy develops. Despite the sheer magnitude of unofficial activity, little is understood about its role in economic development, and in particular about how important "officializing" this hidden activity and the resources devoted to it might be for economic growth.

In this paper we attempt to shed some light on these issues by presenting some new facts about the unofficial (also called "informal") economy and interpreting them in light of various theories. We begin by reviewing the basic stylized facts: that the unofficial economy is huge, that it shrinks sharply in relative terms as the economy develops, and that various policy variables that determine the costs and benefits of becoming and staying official influence its size. This evidence is consistent with the generally

accepted view that unofficial firms avoid paying taxes and adhering to regulations, but lose access to public goods and other benefits of official status, such as external finance. Much of the existing literature on the unofficial economy emphasizes these public policy aspects of the problem.[1]

Yet crucial as this perspective might be, it says little about the role of unofficial firms in development. There are three broad views of this role, which we refer to as the romantic view, the parasite view, and the dual economy ("dual" for short) view. According to the romantic view, which we associate with the work of Hernando de Soto,[2] unofficial firms are either actually or potentially extremely productive but are held back by government taxes and regulations, as well as by lack of secure property rights and access to finance. Pending the necessary legal reforms, "four billion people around the world are robbed of the chance to better their lives and climb out of poverty, because they are excluded from the rule of law."[3] If the barriers to official status were lowered and capital supplied through microfinance, unofficial firms would register, borrow, and take advantage of other benefits of official status, and by doing so expand and spark economic growth. The key aspect of this optimistic view is that unofficial firms are fundamentally similar to official ones but are kept down by policy. In particular, unofficial firms should look similar to official firms with respect to characteristics not affected by government policies, such as the characteristics of their entrepreneurs (for example, their education).

The other two views are more skeptical about unofficial firms and in particular see them as quite unproductive, not just because they are deprived of the benefits of official status, but also because they are run by entrepreneurs with lower human capital. In these alternative views, development comes about not so much from the unleashing of informal firms as from their displacement by efficient formal firms, usually run by totally different people. This is the "Wal-Mart" theory of development.

The latter two views differ in what they see as the benefits and the harms of the unofficial sector. The parasite view, associated primarily with the excellent empirical studies by the McKinsey Global Institute, sees unofficial firms primarily from the perspective of their illegality. These

1. This literature includes de Soto (1989), Loayza (1996), Johnson, Kaufmann, and Shleifer (1997), Friedman and others (2001), Djankov and others (2002), Almeida and Carneiro (2006), Dabla-Norris, Gradstein, and Inchauste (2008), and Russo (2008), as well as the recent work on Brazil by De Paula and Scheinkman (2008), Monteiro and Assunção (2006), and Fajnzylber, Maloney, and Montes Rojas (2006).

2. De Soto (1989, 2000).

3. United Nations (2008, p. 1).

firms need to stay small to avoid detection and therefore lack the necessary scale to produce efficiently. However, the "substantial cost advantage that informal companies gain by avoiding taxes and regulations more than offsets their low productivity and small scale."[4] This cost advantage allows unofficial firms to undercut the prices of official firms. Informal firms, then, hurt growth both because their small scale makes them unproductive and because they take away market share from bigger, more productive formal competitors. According to one McKinsey report, "The high proportion of small firms in service industries makes them particularly likely to operate informally, ignoring tax requirements, employee benefits, and other regulations. This is a much larger barrier to growth than most policymakers in emerging—and developed—economies acknowledge. Steps to reduce informality in local service sectors will be rewarded by rapid increases in their productivity, growth, and employment."[5] The first step in redressing the problems created by informal firms is to "add resources and beef up a government's audit capabilities."[6] More broadly, government policy should aim to eradicate informal firms by reducing tax evasion and increasing the enforcement of government regulations.

The dual view, associated in our minds with traditional development economics,[7] likewise emphasizes the inherent inefficiency of unofficial firms. This view is intimately related to the "big push" models of development economics, which see the coordinated transition from the informal, preindustrial economy to the formal, industrial one as the crucial strategy of economic development.[8] The earliest formal model of the unofficial economy is that of James Rauch,[9] who uses the framework of Robert Lucas to consider the allocation of talent between the unofficial and the official sectors.[10] In Rauch's framework, workers with lower human capital work in informal and smaller firms and receive lower wages, whereas those with higher human capital are allocated to the larger and more productive firms and receive higher wages.[11]

Unlike the romantic view, the dual view predicts that unofficial firms should look very different from official firms in their characteristics not

4. Farrell (2004, p. 28).
5. Baily, Farrell, and Remes (2005, p. 18).
6. Farrell (2004, p. 34).
7. Harris and Todaro (1970).
8. For example, Rosenstein-Rodan (1943); Rostow (1960); Murphy, Shleifer, and Vishny (1989).
9. Rauch (1991).
10. Lucas (1978).
11. See also Amaral and Quintin (2006) and de Paula and Scheinkman (2008).

affected by government policies. Productive entrepreneurs are willing to pay taxes and bear the cost of government regulation in order to advertise their products, raise outside capital, and access public goods. Such entrepreneurs find it more profitable to run the bigger, official firms than the smaller, unofficial ones. In contrast, the increase in firm value that less able entrepreneurs or managers could generate by operating formally is not large enough to offset the additional costs from taxes and regulations. The strong prediction of the dual view is that managers and assets are matched through a sorting process that results in low-ability managers being paired with low-quality assets.

Unlike the parasite view, the dual view does not see the unofficial firms as threatening the official ones, because they are hugely inefficient and hence unlikely to be able to charge lower prices for the same products. Indeed, official and unofficial firms operate largely in different markets and have different customers. The dual view sees the unofficial firms as providers of a livelihood to millions, perhaps billions, of extremely poor people,[12] and it cautions against any policies that would raise the costs of these firms. This view sees the hope of economic development in policies, such as human capital, tax, and regulatory policies, that promote the creation of official firms, letting the unofficial ones die as the economy develops. The official firms thus created will be new firms run by new people, not previously unofficial firms.[13]

To shed light on these alternative views, this paper follows the presentation of basic correlations with a comparative analysis of the characteristics and productivity of official and unofficial firms in several developing countries. We use three sets of surveys of both official and unofficial firms conducted recently by the World Bank. The first set, known as Enterprise Surveys, covers small, medium-size, and large registered firms in nearly 100 countries. We use these surveys largely for comparison. The second set, known as Informal Surveys, covers primarily unregistered, but also some registered, small firms in about a dozen countries. The third set, known as Micro Surveys, covers primarily registered, but also some unregistered, small firms in about a dozen countries (mostly different from those covered by the Informal Surveys). These surveys enable us to make comparative

12. Tokman (1992).

13. The sharp distinction we have drawn between the parasite and the dual views is too extreme. For example, informal firms may compete with formal ones in some industries and not in others, and they might pose a greater competitive threat at higher levels of economic development, when they perhaps become more similar to formal firms. We will return to the discussion of the relevance of the two views after presenting some of the data.

statements about the size, inputs, management characteristics, and—in a rough way—productivity of both official and unofficial firms.

We note from the start that the data we use have many problems, not least because we focus on firms that are by definition avoiding the government's notice. Nonetheless, our findings tend to favor the dual view over the romantic and the parasite views. The unofficial firms in the surveys tend to be small and unproductive compared even with the small but registered firms (which themselves are much less productive than larger registered firms). The unofficial firms also use lower-quality inputs and have less access to public goods and finance. Extremely few of the registered firms have ever operated as unregistered, again suggesting, as argued by Rauch,[14] that the two groups are very separate animals. The evidence points to a substantial difference between the registered and the unregistered firms in the human capital of their managers and suggests that this gap in human capital drives many other differences, including the quality of inputs and access to finance. The unregistered firms pay sharply lower wages to their employees, again consistent with the dual model.

As a final step, we consider how firms perceive their obstacles to doing business as reported in the three surveys. Informal firms see lack of access to markets and finance as their biggest problems. Formal firms also emphasize those, but taxes, tax administration, and problems with electricity supply as well. The legal system, regulations, and registration procedures rank lower as obstacles to doing business among both formal and informal firms. Finally, the surveys offer little evidence that the unregistered firms pose much of a competitive threat to the registered ones: the latter do not treat such competition (or unfair competition more generally) as a serious problem. This last result does not support the parasite view of the unofficial economy, which focuses on price undercutting by informal firms.

Over all, the evidence paints a relatively consistent picture. There is very little support for the romantic view, and indeed the differences in productivity between formal and informal firms are so large that it is hard to believe that simply registering unregistered firms would eliminate the gap. On the other hand, there is little support for the parasite view either, and the evidence suggests that subjecting unofficial firms to stronger enforcement would devastate the livelihood of millions of people surviving near subsistence. The evidence rather points to the dual view, with the fairly standard implication that the hope of economic development lies in the creation

14. Rauch (1991).

of large registered firms, run by educated managers and utilizing modern practices, including modern technology, marketing, and finance.

The Size of the Informal Economy and Its Determinants

Measuring the informal economy is inherently difficult. To start with, the informal economy encompasses very different phenomena. One is hidden firms. Such firms hide all of their output from the police, the tax authorities, or the regulators. Another phenomenon is hidden output. Output may be hidden even by registered firms to reduce their tax liability. Both phenomena occur in all developing countries. Indeed, the face of informality may change as the economy develops, from near-universal informality at earlier stages to mere tax avoidance as the economy grows richer.

Beyond these conceptual issues, there are serious practical problems in measuring hidden firms and output. Nevertheless, a variety of methods have been proposed. Since each method has its strengths and weaknesses, we gathered data on seven measures of the informal economy based on alternative methodologies and sources. All these measures of the informal economy are, if anything, likely to understate its true size.

Surveys are the most direct, although necessarily subjective, measure. We assembled data on two survey measures. The first is an indicator of unofficial or unregistered business activity from the World Economic Forum's *Global Competitiveness Report 2006–2007*.[15] Top business leaders from 125 countries were asked to estimate the size of the informal sector using a 1-to-7 scale, where 1 indicates that more than 50 percent of economic activity is unrecorded and 7 that all of it is registered. For comparability with the other measures, we rescaled this index on a scale from 0 to 50 percent of GDP. The 50 percent cutoff adopted by the *Global Competitiveness Report* is arbitrary and introduces a downward bias in this measure. The second survey measure is the percentage of total sales that a typical establishment reports for tax purposes, from the World Bank Enterprise Surveys. The respondents are the top managers of registered businesses in (mostly) developing countries. Accordingly, this measure of tax evasion likely understates the size of the informal economy, as entrepreneurs in the informal sector are not surveyed. This measure of tax evasion is available for 95 countries. Most countries have been surveyed twice, and we average the available observations between 2002 and 2006.

15. World Economic Forum (2007).

An alternative method infers the size of the informal economy from observable variables, such as the incidence of micro- and small enterprises, the male participation rate in the labor force, the fraction of workers contributing to social security, electricity consumption, and currency in circulation. We gathered data on three such indicators.

The first is the percentage of the active labor force that is self-employed, where self-employment is defined by the International Labour Office to include "jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced,"[16] but not work by unpaid family workers, although the incidence of informality among the latter is probably high. This is admittedly a crude measure. In most developing countries there is a strong association between self-employment and informal activity, as most self-employed tend to be low-skilled, unregistered workers.[17] Of course, self-employment in developing countries may be high not only because informality is prevalent, but also because self-employment is common in agriculture. For this reason our second objective indicator is the percentage of workers in the nonagricultural sector who are self-employed. Other interpretations of self-employment are also possible. In particular, self-employment has been used as an indicator of entrepreneurial activity in the United States. However, the vast majority of self-employed workers in our data are, in fact, "own-account" workers who do not hire persons to work for them. Camilo Mondragón-Vélez and Ximena Peña-Parga show along these lines that the self-employed are rarely business owners in Colombia.[18] Data on self-employment are collected through population censuses as well as through household or labor force surveys.[19] Data on total and nonagricultural self-employment are available for 133 countries and 96 countries, respectively, from the International Labour Organization.

The third objective indicator is based on electricity consumption. For each country the ratio of electricity consumption to GDP for a base period is calculated and then extrapolated to the present, assuming that the elasticity of electricity consumption to GDP is one.[20] The size of the informal sector is then computed as the difference between GDP as estimated from

16. International Labour Office (2007).

17. Loayza and Rigolini (2006).

18. Mondragón-Vélez and Peña-Parga (2008).

19. There are two known biases in the self-employment data. First, OECD statistics relate to civilian employment and, as such, leave out the armed forces. Second, self-employment statistics in most Latin American countries relate to urban areas only. Both biases tend to understate the true size of self-employment.

20. Johnson and others (1997); Ernste and Schneider (1998).

this ratio and official GDP. This measure of the informal economy understates its size to the extent that informal activities are less electricity intensive than formal activities, and to the extent that technological progress allows for increased output per unit of electricity. This indicator is available for 57 countries from Eric Friedman and coauthors.[21]

Still another approach to measuring the informal economy models hidden output as a latent variable, using several indicator and causal variables. This is the approach followed by Friedrich Schneider to estimate a multiple indicators, multiple causes (MIMIC) model.[22] The indicator variables include the labor force participation rate among persons aged 18–64, annual GDP growth, and the change in local currency in circulation per capita. The causal variables are the tax-to-GDP ratio, the Heritage Foundation index of economic freedom, the unemployment rate, GDP per capita, and lagged values of the latent variable. This measure of the informal economy, which is available for 145 countries,[23] is only as good as the model that supports it. Later in this section we present evidence that the correlation between the size of the informal economy and variables such as tax rates is not particularly robust.

As a final robustness check, we gathered data on a direct measure of the *formal* economy: the number of registered businesses per 1,000 inhabitants. This measure, too, has problems. The number of firms per capita may increase with development, for example, as product variety expands. It may also be affected by cross-country differences in entrepreneurship. Finally, the data on total registered firms may be biased upward, especially in developing countries, because of underreporting of firms that have closed or exited. Data on the number of registered businesses are available for 83 countries from the World Bank's World Development Indicators dataset.

We group the determinants of the size of the unofficial economy into three broad categories: the cost of becoming formal, the cost of staying formal, and the benefits of being formal. As a proxy for the cost of becoming formal, we use the logarithm of the number of procedures required to legally start a business, from the 2002 paper by Simeon Djankov and coauthors and the World Bank's *Doing Business 2008*.[24] The costs of staying formal include paying taxes and obeying government regulations; we use six proxies for these costs. First, we use two measures of the cost of

21. Friedman and others (2001).
22. Schneider (2007).
23. Schneider (2007).
24. World Bank (2007); Djankov and others (2002).

paying taxes, from a 2008 paper by Djankov and coauthors:[25] total taxes (except for labor taxes) payable by businesses after accounting for deductions and exemptions; and the time it takes to prepare, file, and pay (or withhold) corporate income tax, value-added tax, and social security contributions, in hours per year. Second, we capture the cost of complying with labor laws with three variables: an index of the difficulty of hiring a new worker; an index of the difficulty and expense of firing a redundant worker; and the nonwage labor costs (payroll taxes and social security payments) associated with hiring a new worker as a percentage of the worker's salary. Data on complying with labor laws are from Juan Botero and coauthors and *Doing Business 2008.*[26] Third, we capture the cost of red tape using the percentage of senior management's time spent in dealing with requirements imposed by government regulations (such as taxes, customs, labor regulations, licensing, and registration); this includes time spent interacting with officials, completing forms, and other tasks. This variable is from the World Bank's Enterprise Surveys.

The benefits of being formal include expanded access to both public goods and finance. Regarding public goods, registered business may find it easier than unregistered ones to use the courts to enforce property rights and adjudicate disputes. We use two proxies for the efficiency of courts: the log of the number of steps required to collect on a bounced check, from the 2003 paper by Djankov and coauthors and *Doing Business 2008;*[27] and the efficiency of the bankruptcy procedure, from a recent paper by Djankov and coauthors.[28] We measure the quality of property rights using indices of corruption and the rule of law from Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi.[29] In addition, we use the density of the paved road network from World Development Indicators as a rough proxy for the scope of the domestic market. Finally, we measure the benefits of access to finance using three indicators of the size of financial markets. The first two indicators are standard: private credit and the market capitalization of domestic firms, both as a ratio to GDP. These two variables are also from the World Development Indicators. The third measure of the size of financial markets is a subjective indicator of the ease of access to credit, from the World Economic Forum's *Global Competitiveness Report 2006–2007.* The index ranges from 1 (impossible) to 7 (easy).

25. Djankov and others (2008b).
26. Botero and others (2004).
27. Djankov and others (2003).
28. Djankov and others (2008a).
29. Kaufmann, Kraay, and Mastruzzi (2005).

Table 1 presents our measures of the size of the informal economy. Countries are grouped into quartiles based on average income per capita at purchasing power parity (PPP) over the period 1996–2006. In practice, measures of the informal sector based on multiple indicators, energy consumption, self-employment, and the World Economic Forum survey are highly correlated with each other (see the correlation table in the appendix). In contrast, tax evasion and the number of registered businesses are less correlated with these other four indicators.

Two facts stand out. First, the informal economy in the average country in the sample is large, ranging from 22.5 percent of the total economy according to the tax evasion measure to 34.5 percent according to the multiple indicators approach. These numbers are especially large in light of the fact that our measures are likely biased down. About 26.5 percent of a country's workers, on average, are self-employed. That figure rises to 30.8 percent in the nonagricultural sector. Respondents to the World Economic Forum survey estimate that 27.6 percent of output is informal. Estimates based on electricity consumption suggest that 29.0 percent of output is informal. The various estimates thus suggest that, in an average country, roughly 30 percent of the economy is informal.

Second, the size of the informal economy is strongly negatively correlated with income per capita. Figure 1 illustrates this relationship, using the multiple indicators variable to measure the informal economy. The other measures also show the informal economy to be very large in poor countries, ranging from 29.0 percent according to the tax evasion measure to 57.3 percent according to the nonagricultural self-employment measure. The measure from the World Economic Forum survey suggests that the informal economy is 18 percentage points larger in poor countries than in rich ones. Estimates based on electricity consumption and multiple indicators suggest that the informal economy is between 21 and 24 percentage points larger, respectively, in poor countries than in rich ones. Even tax evasion by registered businesses—which is likely to understate tax evasion in poor countries—is 21 percentage points higher in poor countries than in rich ones. The self-employment statistics show that the fraction of self-employed workers rises from 13.3 percent in rich countries to 46.4 percent in poor ones. (Figure 2 illustrates the striking relationship between self-employment and income per capita.) The pattern for nonagricultural self-employment is even more extreme: self-employment as a share of nonagricultural employment rises by 44.8 percentage points as one moves from rich countries to poor ones. Consistent with this pattern, the number of registered businesses rises from 3.2 to 41.8 per thousand inhabitants as

Table 1. Size of the Informal Economy by Alternative Measures[a]

Percent except where stated otherwise

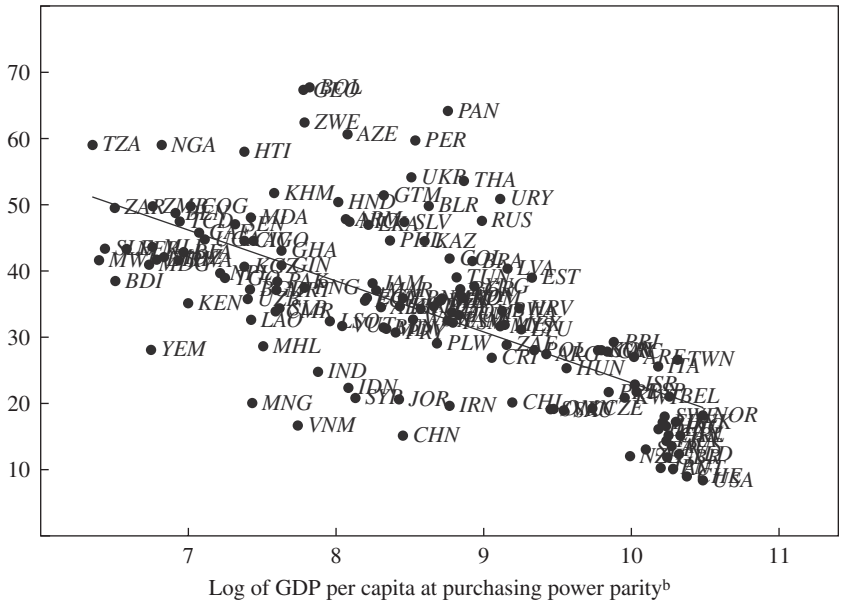
		Measure of informality						
Income quartile[a]	*GDP per capita at PPP (dollars)*	*Informal share of GDP as estimated by business leaders (WEF survey)*	*Tax evasion*[b]	*Self-employed as share of labor force*	*Self-employed as share of nonagricultural labor force*	*Informal share of GDP as estimated from*		*No. of registered firms per 1,000 population*
						Electricity consumption	*Multiple indicators*	
Bottom	429	35.4	29.0	46.4	57.3	38.9	42.3	3.2
Second	1,362	33.7	23.3	35.7	37.1	42.7	39.8	8.2
Third	4,002	27.6	19.7	23.1	24.6	31.3	34.1	28.7
Top	20,348	17.3	8.2	13.3	12.5	17.6	18.3	41.8
Sample mean	10,015	27.6	22.5	26.5	30.8	29.0	34.5	24.7
Difference between top and bottom quartiles	–19,919***	–18.1***	–20.8***	–33.1***	–44.8***	–21.4***	–23.9***	38.7***
No. of observations	185	125	95	133	96	57	145	83

Sources: World Bank, World Development Indicators; World Economic Forum (WEF; 2007); World Bank Enterprise Surveys; International Labour Organization; Friedman and others (2001); Schneider (2007).

a. Countries are grouped into quartiles by GDP per capita at purchasing power parity (PPP). Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

b. Calculated as 1 minus the share of sales reported for tax purposes.

Figure 1. Size of the Informal Economy and GDP per Capita



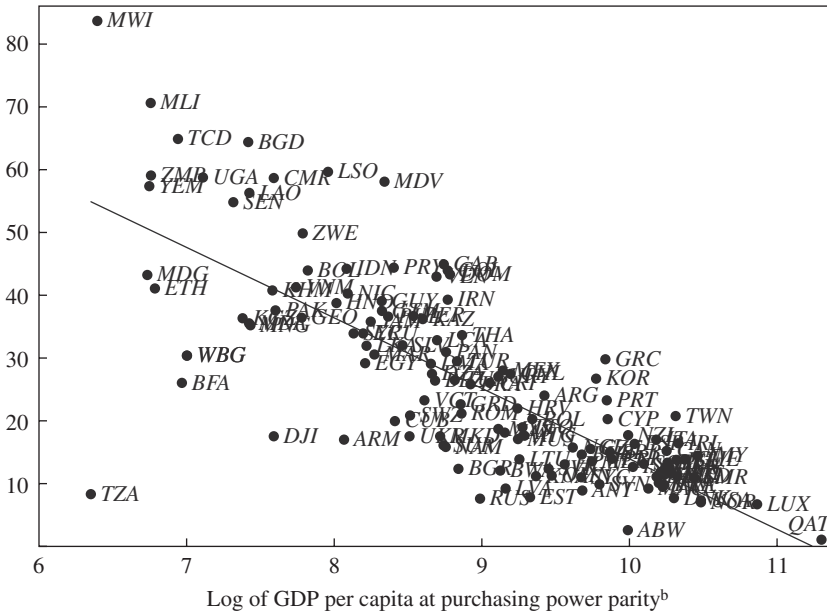
Sources: Schneider (2007); World Bank, World Development Indicators.
a. Average of the observations available for 1999–2004.
b. Average for 1996–2006.

one moves from poor to rich countries. These findings suggest that understanding the decline of informal firms as countries grow richer may be central to development economics.

Table 2 examines the determinants of the size of the informal sector. We present results first without (top panel) and then with GDP per capita (bottom panel) in the regression. The dependent variables are five of the above proxies for the size of the informal economy as well as the number of registered businesses per capita. (We omit the results using nonagricultural self-employment as they are qualitatively similar to those for total self-employment.) The independent variables are proxies for the cost of becoming formal and the costs and benefits of operating in the formal sector. Each cell in each panel presents the results from a single univariate regression (we do not report the constant).

The results in the top panel show the influence of policy variables. First, our proxy for the cost of becoming formal—the number of procedures necessary to start a business—is consistently associated with a larger

Figure 2. Self-Employment and GDP per Capita



Sources: International Labour Office (2007); World Bank, World Development Indicators.
a. Data are as of the most recent year available.
b. Average for 1996–2006.

informal sector as well as with fewer registered firms. However, the economic effect is modest in size. For example, a 1-standard-deviation (equal to 0.4) increase in the log of the number of procedures is associated with a 4.8-percentage-point rise in the multiple indicators measure of the informal economy.

Second, the results for proxies for the cost of staying formal are mixed. All six proxies are statistically significant when the dependent variable is the measure from the World Economic Forum survey (first data column). On the other hand, none of the explanatory variables is significant when using the tax evasion proxy. Results for the other dependent variables are in between these two extremes. Among the explanatory variables in this category, the most consistently significant one is the time required to comply with taxes, which is significant for all dependent variables except tax evasion. Even then, increasing the time required to comply with taxes by 1 standard deviation (0.75) is associated with an increase of only 4.8 percentage points in the multiple indicators measure.

Table 2. Regressions Explaining the Size of the Informal Sector[a]

	Dependent variable					
				Informal share of GDP as estimated from		
Independent variable	*Informal share of GDP as estimated by business leaders (WEF survey)*	*Tax evasion*[b]	*Self-employed as share of labor force*	*Electricity consumption*	*Multiple indicators*	*No. of registered firms per 1,000 population*
	Regressions not controlling for GDP per capita					
Log of no. of procedures required to register a business	10.1815*** (1.2958)	14.7558*** (3.3801)	13.9296*** (2.6355)	11.3482*** (3.3149)	11.9328*** (2.1122)	−23.8551*** (4.4736)
Total taxes as percent of profits	0.0426** (0.0173)	0.0599 (0.0524)	−0.0408 (0.0995)	−0.1107 (0.0774)	0.0579*** (0.0182)	−0.2745** (0.1361)
Hours per year needed to comply with taxes	5.9038*** (0.8215)	−0.4877 (2.3969)	7.4048*** (1.8772)	8.4290*** (2.5841)	6.4492*** (1.4057)	−13.2818*** (3.4070)
Percent of management time spent dealing with regulations	0.5087*** (0.1069)	0.3931 (0.2941)	0.6275*** (0.2175)	0.4452 (0.3513)	0.3928 (0.2411)	−0.2511 (0.5630)
Index of difficulty of hiring a new worker	0.1096*** (0.0280)	0.0274 (0.0660)	0.0614 (0.0526)	0.0809 (0.0716)	0.1638*** (0.0387)	−0.0859 (0.0875)
Index of difficulty and expense of firing a worker	0.0942** (0.0371)	0.0079 (0.0599)	0.0996* (0.0574)	0.0558 (0.0971)	0.1147** (0.0530)	−0.2565** (0.1206)
Nonwage costs as percent of salary	0.1583*** (0.0494)	−0.2358 (0.1553)	0.0880 (0.0794)	0.0273 (0.1159)	−0.1008 (0.0980)	−0.2031 (0.1359)
Log of no. of steps required to collect on a bounced check	3.2047*** (0.8214)	1.3864 (1.5126)	3.3703*** (1.1305)	4.4214*** (1.5261)	5.4614*** (1.3257)	−5.0812 (3.2976)
Efficiency of bankruptcy procedure	−0.2207*** (0.0252)	−0.1832** (0.0757)	−0.2537*** (0.0347)	−0.2686*** (0.0677)	−0.2981*** (0.0352)	0.3117** (0.1175)

Log of paved roads per km^2	−0.0090***	−0.0334**	−0.0112***	−0.0137***	−0.0163***	0.0297***
	(0.0019)	(0.0130)	(0.0020)	(0.0023)	(0.0018)	(0.0109)
Corruption index	−7.4778***	−7.1143***	−10.8238***	−8.5364***	−9.4626***	11.9029***
	(0.3604)	(1.8722)	(0.9804)	(1.6594)	(0.5970)	(1.9284)
Rule of law index	−8.0286***	−6.0779***	−11.6845***	−9.1701***	−9.9850***	13.3112***
	(0.3697)	(1.7659)	(0.9440)	(2.0373)	(0.6170)	(2.0744)
Private credit as percent of GDP	−14.3709***	−14.8612***	−19.2173***	−11.7983***	−19.7457***	25.4301***
	(1.5940)	(5.2608)	(2.8056)	(3.5882)	(2.3164)	(8.9047)
Stock market capitalization as percent of GDP	−9.3152***	−6.9204	−10.5142***	−9.4449***	−13.8049***	10.2845**
	(1.7191)	(5.8906)	(2.5057)	(2.5483)	(3.0358)	(4.2383)
Access to credit	51.5059***	32.8132***	60.4548***	71.4457***	62.0713***	−13.1594
	(1.6596)	(5.3360)	(4.8082)	(7.8939)	(3.1555)	(9.7251)
	Regressions controlling for GDP per capita					
Log of no. of procedures required to register a business	3.9083***	12.1526***	1.4158	1.7380	3.6917*	−13.1812**
	(1.1217)	(3.5141)	(2.0266)	(3.2263)	(1.8926)	(5.2796)
Total taxes as percent of profits	−0.0039	0.0283	0.0389	−0.2306**	−0.0049	−0.3029***
	(0.0170)	(0.0563)	(0.0648)	(0.0866)	(0.0196)	(0.1019)
Hours per year needed to comply with taxes	3.1399***	−0.5181	2.6988*	2.5281	3.3539***	−6.9528**
	(0.6296)	(2.3814)	(1.5122)	(2.6397)	(1.2687)	(3.2654)
Percent of management time spent dealing with regulations	0.3950***	0.2007	0.2610	0.2312	0.2400	0.3767
	(0.0725)	(0.3011)	(0.1829)	(0.3418)	(0.1962)	(0.4977)
Index of difficulty of hiring a new worker	0.0485***	−0.0033	−0.0388	−0.0201	0.0777**	0.0537
	(0.0182)	(0.0631)	(0.0397)	(0.0526)	(0.0342)	(0.0682)
Index of difficulty and expense of firing a worker	0.0311	−0.0294	0.0170	−0.0469	0.0274	−0.1100
	(0.0275)	(0.0547)	(0.0420)	(0.0752)	(0.0470)	(0.1007)
Nonwage costs as percent of salary	0.0806**	−0.1075	−0.0405	−0.0966	0.0917	−0.0579
	(0.0311)	(0.1649)	(0.0571)	(0.0714)	(0.0769)	(0.1090)

(*continued*)

Table 2. Regressions Explaining the Size of the Informal Sector[a] (*Continued*)

	Dependent variable					
				Informal share of GDP as estimated from		
Independent variable	*Informal share of GDP as estimated by business leaders (WEF survey)*	*Tax evasion*[b]	*Self-employed as share of labor force*	*Electricity consumption*	*Multiple indicators*	*No. of registered firms per 1,000 population*
Log of no. of steps required to collect on a bounced check	1.7096***	2.2855	0.5051	−1.9308	3.3370***	−2.0003
	(0.5891)	(1.5024)	(0.8129)	(1.3614)	(1.0474)	(2.8724)
Efficiency of bankruptcy procedure	−0.0560	−0.0491	−0.0252	0.2044**	−0.0356	0.0752
	(0.0395)	(0.0863)	(0.0545)	(0.0895)	(0.0417)	(0.1736)
Log of paved roads per km^2	−0.0025	−0.0168*	−0.0029***	−0.0044**	−0.0051***	0.0175
	(0.0016)	(0.0088)	(0.0010)	(0.0018)	(0.0016)	(0.0119)
Corruption index	−5.6768***	−3.4956	−1.8315	0.3169	−6.9316***	3.8139
	(0.6844)	(3.0779)	(1.9129)	(3.1140)	(1.1440)	(3.7512)
Rule of law index	−6.4793***	−2.1094	−2.5183	1.6005	−7.7984***	4.9209
	(0.7095)	(3.0715)	(2.2886)	(3.9196)	(1.3920)	(3.3668)
Private credit as percent of GDP	−5.6811***	−6.1499	2.7131	9.3552**	−8.1961***	6.2312
	(1.6812)	(6.1198)	(2.3110)	(4.5279)	(3.1009)	(12.5764)
Stock market capitalization as percent of GDP	−3.3739***	−1.1785	0.5142	0.6396	−5.3196***	−3.5914
	(1.0313)	(5.7787)	(1.4782)	(2.0652)	(1.8352)	(8.0838)
Access to credit	68.5488***	−0.3639	125.7942***	164.0424***	99.0417***	−82.9238***
	(4.2760)	(1.7380)	(17.0908)	(21.0187)	(7.5245)	(14.1297)

Source: Authors' regressions.

a. Each cell reports the estimated regression coefficient for a single univariate regression. All regressions include a constant (not reported). Robust standard errors are in parentheses. Asterisks indicate statistical significance at the *10 percent, **5 percent, and ***1 percent level.

b. Calculated as 1 minus the share of sales reported for tax purposes.

Third, the proxies for the benefits of being formal are consistently associated with the size of the informal sector and the number of registered firms: the only two exceptions are court formalism (the number of steps necessary to collect on a bounced check) in the regressions for tax evasion and registered firms. The economic impact, in terms of the multiple indicators measure, of increasing these variables by 1 standard deviation ranges from 5.8 percentage points for court formalism to 9.6 percentage points for the rule of law. In sum, without controlling for income per capita, both the cost of becoming formal and the benefits of operating in the formal sector have a reliable but modest impact on the size of the informal economy. Our proxies for the cost of operating in the formal sector also have a modest effect but are less often significant.

Next, we rerun the previous regressions adding GDP per capita as an independent variable. The motivation is that the extent of the informal economy may be correlated with a country's development level. In poor countries the informal economy may provide subsistence income for workers unable to find formal employment. To the extent that informal firms avoid labor laws, the benefits of informality may be larger in the labor-intensive activities common in poor countries than in the capital-intensive activities common in rich countries. Along the same lines, informality may decline as more transactions are intermediated through the financial system. Finally, tax compliance may rise with income per capita as governments become more efficient at collecting taxes.

The bottom panel of table 2 shows the coefficients for the variables of interest when we control for GDP per capita. (As in the top panel, we do not report the constant. Nor do we report the coefficient for GDP per capita, but it is strongly significant in all regressions.) Most of the estimated coefficients fall in value and lose significance compared with the regressions without GDP per capita. Indeed, the coefficients remain consistently significant (11 of the 15 regressions) only for the World Economic Forum survey. Results for the other dependent variables are mostly insignificant. Our proxy for the cost of becoming formal remains significant in four of the six regressions (World Economic Forum survey, tax evasion, multiple indicators, and registered firms). Among the proxies for the cost of operating in the formal sector, the strongest variable is the time to comply with taxes, which is significant in four of the six regressions. Yet in contrast to the results on tax rates, nonwage costs are significant in only one regression. Finally, among the proxies for the benefits of operating in the formal sector, the strongest variables are road density (significant in four regressions) and the subjective assessment of access to credit (significant in five regressions).

The results using objective measures of the development of financial markets are mixed: private credit remains significant in three regressions, but market capitalization does so in only two regressions.

In sum, GDP per capita is the most robust predictor of the size of the informal economy. The most straightforward interpretation of the results in this section is that the informal economy is a manifestation of underdevelopment. It recedes as the economy develops, perhaps because public goods become better and financial markets larger, or because avoiding detection becomes harder. It remains a crucial, and open, question whether this decline of the informal sector results from the conversion of informal firms to official status, or from their death and replacement by formal firms.

An alternative interpretation is that we are overcorrecting by including GDP per capita. In particular, GDP per capita is strongly correlated (70 percent or better) with the efficiency of bankruptcy procedures, private credit, corruption, and the rule of law (see the correlation table in the appendix). Interestingly, variables that explicitly capture a country's economic structure (such as the share of agriculture in GDP; results not reported) leave much of the explanatory power of GDP per capita unchanged. Although GDP per capita is strongly correlated with some of the determinants of the size of the informal economy, multicollinearity is unlikely to explain why tax rates, nonwage costs, and labor laws work so poorly when we control for GDP per capita. We return to this issue below when we examine the productivity of informal firms, using micro data.

Although the cross-country evidence reveals some interesting patterns, it is merely suggestive and does not discriminate among the three views of the role of the informal economy. For this we need micro data, which we analyze next. Accordingly, the remainder of the paper is organized as follows. The next section describes our data on informal and formal firms. We ask such questions as: Are informal firms engines of growth as the romantic view would hold? For example, do informal firms grow quickly and over time join the formal sector? Is there evidence that—consistent with the parasite view—formal and informal firms operate in the same markets or that formal firms fear competition from informal firms? What evidence is there that—as predicted by the dual view—informal firms have inferior assets and management?

The third section is the heart of the paper. It presents evidence on the relative productivity of formal and informal firms. We ask five questions. First, are our data on productivity reliable? Second, how big are the differences in productivity between formal and informal firms? We want to know whether the prediction of the parasite view that informal firms have a cost

advantage is borne out by the data. Third, what views of the informal economy are consistent with the observed differences in productivity? We want to examine whether it is plausible to believe—as in the romantic view—that all that is holding back informal firms are high taxes and bad government regulation. Fourth, what accounts for the difference in the productivity of formal and informal firms? The goal is to see whether differences in productivity can be traced to differences in inputs. Finally, what evidence is there that more-able managers run firms with better assets? Evidence of a strong selection effect would support the dual view and cast doubt on the prediction of the romantic view that relieving informal firms from oppressive taxes and regulation would put an end to poverty as we know it.

The fourth section focuses on obstacles to doing business, as reported by firms in all three surveys. We ask which of several problems, such as market access, financing, taxes, and regulations, but also unfair competition, are perceived as principal obstacles to doing business. These results shed light on the alternative theories but perhaps bear most directly on the parasite theory. The final section concludes with some implications of the evidence.

Characteristics of Informal Firms

In this section we describe our data and present simple descriptive statistics. Our basic approach is to compare, country by country, the relative performance of formal and informal firms. To do so, we combine data from three World Bank surveys of individual firms. The first survey—the Enterprise Survey—covers formal firms and is available for 105 countries. The other two surveys—the Informal and Micro Surveys—contain information on both informal and formal firms in a few poor countries. The Informal Survey is available for 13 countries: Bangladesh, Brazil, Cambodia, Cape Verde, Guatemala, India, Indonesia, Kenya, Niger, Pakistan, Senegal, Tanzania, and Uganda.[30] With the exception of Brazil, all these countries were below the world median income per capita in 2003 (equal to $5,322), and 7 out of 13 were below the 25th percentile (equal to $1,682). The Micro Survey is available for 14 mostly African countries: Angola, Botswana, Burundi, Democratic Republic of the Congo, The Gambia, Guinea, Guinea-Bissau, India, Mauritania, Namibia, Rwanda, Swaziland, Tanzania, and Uganda. With the exception of Botswana, all were below the world median

30. The World Bank also carried out an Informal Survey of Cameroon in 2006. However, data on sales are missing from that survey.

income per capita in 2006 (equal to $6,224), and 9 out of 14 were below the 25th percentile (equal to $1,965). The concept of informality used in the Informal and Micro Surveys focuses on registration (as we discuss below, there are several possible kinds of registration). Although questions about tax avoidance are asked, they are indirect. As discussed in the preceding section, this definition has both advantages and conceptual limitations.

Before describing the data in detail, we need to preempt a possible misconception about the nature of the firms in our data. In the context of poor countries, the term "informal firm" evokes the image of street hawkers selling goods out of baskets, or of eateries in front of homes. In fact, such an image is a good description of how the very poor make a living.[31] However, the informal firms in our sample do not fit that image. For example, firms accounting for roughly 85 percent of the observations in the Informal and Micro Surveys have, in addition to the entrepreneur, two employees or more. The informal firms in our sample are likely to be substantially more productive than the own-account workers described by Abhijit Banerjee and Esther Duflo.

Data

All three World Bank surveys have a similar structure and differ mainly in the firms that they sample. It is easiest to start by describing the Enterprise Survey, the source for our control group of *registered* or formal firms. It covers mainly manufacturing and certain services firms with five or more employees in 105 countries. The earliest available data are from 2002 and the latest from 2007. The initial step in carrying out an Enterprise Survey involves contacting the government statistical office of the relevant country to request a list of registered establishments. In some instances the World Bank supplements the government's list with firms registered with the chamber of commerce of the relevant country or listed by Dun & Bradstreet or by similar private vendors of business directories. Thus, although firms in the Enterprise Survey may hide some of their output, the government typically knows of their existence. We refer to these firms as "registered" and define the term below. The next step involves contacting the firms that will be sampled. Enterprise Surveys use either simple random sampling or random stratified sampling. A local World Bank contractor telephones each firm to set up an interview with the person who most often deals with banks or government agencies. At that stage, firms with fewer than five employees are dropped from the sample, as are government-owned establishments,

31. Banerjee and Duflo (2007).

cooperatives, and community-owned establishments. Typical final sample sizes range between 250 and 1,500 businesses per country. As described on the Enterprise Surveys website, "The core questionnaire is organized in two parts. The first part seeks managers' opinions on the . . . business environment. The second part focuses on productivity measures and is often completed with the help of the chief accountant or human resource manager."

The World Bank has also conducted separate surveys of informal firms to complement the Enterprise Survey in countries with large informal economies. Initially, data on the unofficial sector were collected through the "Informal Sector" questionnaire. Starting in 2005, the World Bank switched to the "Micro Sector" questionnaire while phasing out the Informal Sector questionnaire. Institutional amnesia makes it hard to ascertain the precise methodology followed with the Informal Sector questionnaire. Nevertheless, the basic outlines of what was done are clear. World Bank contractors identified neighborhoods perceived to have a large number of informal firms. These neighborhoods were then divided into enumeration blocks, which were then surveyed on foot.[32]

A similar methodology was followed to implement the Micro Sector questionnaire. A local contractor selected districts and zones within each district where, based on national information sources, there was a high concentration of establishments with fewer than five employees ("micro" establishments). The contractor then created a comprehensive list of *all* establishments in these zones. Finally, the contractor selected randomly from that list and went door to door to set up interviews with the top managers of the selected establishments. Although the Micro Survey targets establishments with fewer than five employees, larger establishments are not dropped from the sample. In fact, establishments with fewer than five employees account for only 50 percent of the Micro Survey sample.

Participation in the surveys is voluntary, and respondents are not paid to participate.[33] Respondents are asked sequentially about the business environment, infrastructure, government relations, employment, financing, and firm productivity. There is some variation in the response rate across questions. To illustrate, out of 6,466 Informal and Micro firms surveyed, we have the age of 6,412 firms, the number of employees of 6,416 firms, the sales of 6,136 firms, the fraction of investment financed internally of 5,689 firms, assessments of the fraction of taxes typically evaded by firms

32. Jorge Rodriguez Meza, World Bank, personal correspondence with the authors, June 27, 2008.

33. We lack detailed data on nonparticipation rates. In Mali, the only country for which we have data on nonparticipation, the refusal rate is 9 percent.

in their industry of 4,670 firms, and capacity utilization of 3,083 firms. Since Informal and Micro firms typically do not keep detailed records of their operations, some respondents may simply not have the information being asked. Unfortunately, we have no way of quantifying the biases, if any, from missing data.

Critically, the Informal and Micro Surveys cover registered firms as well as firms that exist without the government's knowledge ("unregistered" firms). In the remainder of this paper, we focus on informality understood in terms of hidden firms rather than hidden output. To compare the performance of registered and unregistered firms, we need to define what it means to be registered. The questions regarding the legal status of the firm are worded differently in the Informal and the Micro questionnaires. In the Informal Survey we rely on the respondent's answer to whether firms are "registered with any agency of the central government." In practical terms, firms are registered with an agency of the central government if they have obtained a tax identification number. In the Micro Survey, we rely on the respondent's answer to whether firms have either "registered with the Office of the Registrar . . . or other government institutions responsible for commercial registration" or "obtained a tax identification number from the tax administration or other agency responsible for tax registration."[34] Both surveys also keep track of whether firms are registered with "any local government agency" or with any "industry board or agency." We focus on registration with the central government because this form of registration is more directly relevant to avoiding taxes, enforcing contracts, and raising finance. We will also present statistics on municipal and industry board registration. In sum, the Informal and Micro Surveys allow us to examine the productivity of (small) registered and unregistered firms, whereas the Enterprise Survey provides information on the productivity of registered firms that have at least five employees.

Descriptive Statistics

Tables 3 and 4 list the countries surveyed and present the number of observations and average sales for the Informal and Micro samples, respectively. Most of the surveys (19 out of a total of 27) were carried out in African countries, but 6 surveys were done in Asia and 2 in Latin America. India, Uganda, and Tanzania were surveyed with both the Informal and the Micro questionnaires. As indicated earlier, most countries covered by the

34. We obtain very similar results if the definition of "registered" firms in the Micro Survey includes only firms that have a tax identification number.

Informal and Micro Surveys are poor. The average income per capita in current purchasing power terms is roughly $2,400 and ranges from $281 in Congo to $12,744 in Botswana.

The Informal Survey covered 13 countries. The surveys were typically carried out in 2003 and, on average, have 223 firms with nonmissing sales in each country. The Micro Surveys were carried out in 14 countries in 2006 and, on average, have 214 firms with nonmissing sales per country. The World Bank also carried out Enterprise Surveys in parallel with the relevant Informal and Micro Surveys. We use firms from the Enterprise Survey as the control group. The average number of firms in the control group with available sales data is 474 for the Informal sample and 554 for the Micro sample and ranges from 53 in Niger (table 3) to 3,860 in India (table 4).

Throughout the paper we emphasize productivity differences between registered and unregistered firms and between small and big firms. Critically, whereas firms in the Informal Survey are typically unregistered, firms in the Micro Survey are typically registered. The average Informal Survey has 31 *registered* firms out of a total of 223 firms, whereas the average Micro Survey has 137 *registered* firms out of a total of 214 firms. To examine differences in size, we group Enterprise Survey firms into three categories according to the number of employees: fewer than 20 (“small”), between 20 and 99 (“medium”), and 100 or more (“big”). When assessing some of our results on productivity, it is worth keeping in mind that the distribution of firms across these three categories is fairly uneven. For example, there is 1 big firm with nonmissing sales data (out of 93) in the control group for firms in Cape Verde, but there are 337 (out of 640) in the control group for firms in Indonesia (table 3). Perhaps because of the small number of observations, there are few extreme outliers in the data; these most likely result from errors in currency units. To mitigate the role of outliers, we cap at the 95th percentile the value of sales, sales per employee, and value added per employee in each country and in each survey. Capping does not qualitatively change the results we present.

The most striking fact in tables 3 and 4 is that the average annual sales of firms in the Informal and Micro Surveys are tiny even in comparison with those of small firms in the Enterprise Survey. Specifically, average sales are $24,671 for Informal Survey firms but $948,805 for small firms in the Enterprise Survey control group for those countries. Similarly, average sales are $50,853 for Micro Survey firms but $354,318 for small firms in that control group. Unregistered firms are even smaller than the average firm in the Informal and Micro Surveys. For example, in the Informal Survey

Table 3. Sales of the Informal Survey Sample and Its Control Group

Dollars at purchasing power parity except where stated otherwise

		Informal Survey sample					
		Unregistered firms		*Registered firms*		*All firms*	
Country	*Year*	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*
Bangladesh	2003	19,794	195	48,856	2	20,089	197
Brazil	2003	32,528	218	51,227	126	39,377	344
Cambodia	2003	25,710	209	75,165	6	27,090	215
Cape Verde	2006	29,917	85	18,922	18	27,996	103
Guatemala	2003	16,339	183	23,604	10	16,716	193
India	2002	31,956	419	69,237	30	34,447	449
Indonesia	2003	29,237	276	. . .	. . .	29,237	276
Kenya	2003	20,297	149	30,712	36	22,323	185
Niger	2005	15,169	48	14,927	58	15,037	106
Pakistan	2003	15,435	210	7,805	3	15,327	213
Senegal	2004	24,944	153	29,827	41	25,976	194
Tanzania	2003	9,212	285	19,260	23	9,963	308
Uganda	2003	35,082	91	45,341	23	37,152	114
Average		23,509	194	36,240	31	24,671	223

	Enterprise Survey control group							
	Small firms (<20 employees)		*Medium-size firms (20–99 employees)*		*Big firms (>99 employees)*		*All firms*	
Country	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*
Bangladesh	321,193	64	2,360,761	259	8,367,846	642	6,221,918	965
Brazil	767,484	252	3,419,992	811	24,100,000	406	8,683,195	1,469
Cambodia	167,574	193	979,849	40	3,260,287	26	603,488	259
Cape Verde	374,308	69	1,738,857	23	4,149,963	1	752,375	93
Guatemala	460,772	163	1,782,770	131	9,557,032	83	2,922,765	377
India	459,165	749	2,804,990	485	17,200,000	230	3,871,384	1,464
Indonesia	34,244	2	4,608,116	301	41,500,000	337	24,000,000	640
Kenya	1,675,268	49	6,070,552	65	31,800,000	41	11,500,000	155
Niger	4,999,650	34	4,416,983	16	14,700,000	3	5,371,892	53
Pakistan	2,066,015	7	4,316,266	66	9,332,258	33	5,729,247	106
Senegal	433,291	86	4,542,087	90	18,400,000	35	5,169,733	211
Tanzania	278,088	77	3,754,425	62	15,700,000	38	4,796,542	177
Uganda	297,418	107	3,222,021	58	10,700,000	28	2,681,279	193
Average	948,805	142	3,385,975	185	16,059,030	146	6,331,063	474

Sources: World Bank Informal and Enterprise Surveys; authors' calculations.

Table 4. Sales of the Micro Survey Sample and Its Control Group

Dollars at purchasing power parity except where stated otherwise

		Micro Survey sample					
		Unregistered firms		*Registered firms*		*All firms*	
Country	*Year*	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*
Angola	2006	22,524	8	46,153	107	44,509	115
Botswana	2006	27,192	27	105,688	73	84,494	100
Burundi	2006	31,950	16	44,336	121	42,889	137
Congo, Dem. Rep.	2006	20,150	40	32,891	64	27,991	104
Gambia, The	2006	12,955	47	20,307	76	17,498	123
Guinea	2006	93,345	27	129,568	77	120,164	104
Guinea-Bissau	2006	22,532	29	48,451	108	42,965	137
India	2006	40,179	643	92,382	906	70,713	1,549
Mauritania	2006	56,070	69	38,977	53	48,644	122
Namibia	2006	5,392	49	31,419	47	18,134	96
Rwanda	2006	8,295	22	46,821	106	40,199	128
Swaziland	2006	5,658	34	52,230	83	38,696	117
Tanzania	2006	30,093	25	48,327	40	41,314	65
Uganda	2006	43,584	38	93,144	59	73,729	97
Average		29,994	77	59,335	137	50,853	214

	Enterprise Survey control group							
	Small firms (<20 employees)		*Medium-size firms (20–99 employees)*		*Big firms (>99 employees)*		*All firms*	
Country	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*	*Sales*	*No. of observations*
Angola	219,543	353	440,131	64	826,909	6	261,533	423
Botswana	1,054,364	212	4,027,974	86	9,497,498	39	2,790,306	337
Burundi	262,566	219	1,313,305	43	2,923,213	8	508,740	270
Congo, Dem. Rep.	156,191	258	779,580	71	1,675,336	11	335,518	340
Gambia, The	191,976	118	975,985	47	3,564,678	7	543,472	172
Guinea	180,759	194	979,018	19	2,246,573	7	315,430	220
Guinea-Bissau	155,735	97	441,720	16	. . .	. . .	196,228	113
India	391,872	2,839	2,121,049	714	8,301,780	307	1,340,829	3,860
Mauritania	258,159	181	2,287,588	44	8,216,648	5	819,408	230
Namibia	665,167	225	2,917,353	82	9,329,198	17	1,689,759	324
Rwanda	344,204	143	2,071,016	53	7,671,968	16	1,328,946	212
Swaziland	391,593	207	2,418,694	55	6,982,505	32	1,488,191	294
Tanzania	326,825	259	3,430,273	111	16,400,000	44	2,866,305	414
Uganda	361,505	367	1,609,611	149	5,885,212	36	1,058,645	552
Average	354,318	405	1,843,807	111	6,424,732	41	1,110,236	554

Sources: World Bank Micro and Enterprise Surveys; authors' calculations.

sample, average sales for unregistered Brazilian firms are $32,528, compared with $51,227 for registered firms. Looking across countries, unregistered firms in the Informal Survey sample have average sales of $23,509, compared with $36,240 for registered firms. Similarly, unregistered firms in the Micro Survey sample have average sales of $29,994, compared with $59,335 for registered firms. It is natural to worry that the reported sales of unregistered firms may be low because respondents lie about their output. We address this issue in the third section of the paper.

What do unregistered firms do? Tables 5 and 6 shed light on some of the basic characteristics of firms in the Informal and Micro Surveys, respectively. The two tables have a similar—but not identical—structure, since there are only small differences between the two questionnaires. For each variable we present the mean for each group (for example, unregistered, registered, small, medium, and big) as well as the differences between the means for selected groups of interest (for example, small versus unregistered) and their statistical significance. So that the results are not driven by the countries with the most observations, we first average all observations within a country and then compute means and *t* statistics across countries.

The first block of variables in table 5 shows some general characteristics of the firms. Unregistered firms, although younger (9.9 years on average) than the average firm in the control group (17.8 years), have been operating for quite a long time. By definition, unregistered firms are not registered with the central government. Yet 34 percent of them are registered with a local government agency, and 7.2 percent are registered with an industry board or agency.

The next four variables describe the assets owned by firms in the Informal Survey. Unregistered firms own, on average, 52.3 percent of the land and 45.1 percent of the buildings that they occupy. Registered firms have comparable figures (55.5 percent and 48.1 percent). In contrast, firms in the Enterprise Survey control group own a significantly larger fraction of the land and buildings that they occupy (on average, 67.4 percent and 71.2 percent, respectively). The ownership of electric generators—a key asset in poor countries—shows a similar pattern. Few firms, unregistered or registered, in the Informal Survey own a generator (5.5 percent and 5.1 percent, respectively). In contrast, 20.1 percent of small firms and 77.0 percent of big firms in the Enterprise Survey own a generator. Capacity utilization rates vary little between unregistered Informal Survey firms and Enterprise Survey firms (61.9 percent versus 68.2 percent, respectively). The evidence also suggests that unregistered and registered firms may not share the same clients. In the Informal Survey, only 1.2 percent of the

unregistered firms make the largest fraction of their sales to large firms. In contrast, large firms are the main client of 13.5 percent of registered firms—a percentage comparable to the average firm in the Enterprise Survey (15.1 percent).

The next block of variables describes the employees and their human capital in the Informal Survey. Unsurprisingly, unregistered firms have the smallest average number of employees (3.9). More interestingly, registered firms in the Informal Survey and small firms in the Enterprise Survey have very similar employment levels (9.8 and 10.3 employees, respectively). The key fact regarding informal firms is that—consistent with the dual view but not with the other two views—their top managers have low human capital. For example, the probability that the top manager of a firm has some college education is only 6.1 percent in the Informal Survey if the firm is unregistered, compared with 15.9 percent for registered firms in the same survey and 63.9 percent for all firms in the Enterprise Survey. To summarize the differences in human capital, we created an index ranging from 1 to 4 according to whether the top manager's highest level of education attended was primary school, secondary school, vocational school, or college. This index equals 1.6 for managers of unregistered firms and 3.3 for managers of Enterprise Survey firms. We constructed a similar index for the employees, with strikingly different results. Employees of Informal Survey firms have levels of education very similar to those of Enterprise Survey firms (indexes of 2.4 and 2.3, respectively).

Next, we turn to how firms are financed. All views of informality agree that greater access to finance is an important benefit of operating in the formal sector. In fact, roughly 75.1 percent of the unregistered Informal Survey firms have never even had a commercial loan. Instead, they finance 74.9 percent of investment with internal funds and 10.5 percent with help from the owner's family. The most striking fact about financing is that all small firms—not just unregistered ones—lack access to finance. In fact, small firms in the Enterprise Survey finance 67.8 percent of their investment with internal funds and 6.3 percent with family funds. Big firms in the Enterprise Survey have more access to external finance than small ones. For example, internal funds pay for 50.4 percent of the investment of big firms. Yet the fact that all small firms lack access to finance suggests that it may be misguided to put access to finance for unregistered firms at the center of the development agenda.

Finally, contrary to the romantic view, there is no evidence in the Informal Survey that unregistered firms are dynamic engines of employment creation. Two-year growth rates of employment are 5.2 percent for

Table 5. Attributes of Firms in the Informal Survey Sample

Percent except where stated otherwise

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[a]			
Attribute	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. informal*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
General characteristics											
Age of the firm (years)	9.9	11.6	9.9	14.4	18.8	22.6	17.8	7.9***	1.7	4.5***	8.1***
Share of firms registered with a central government agency	0.0	100.0	14.9	. . .	. . .	. . .	. . .	. . .	100.0	. . .	. . .
Share of firms registered with a local government agency	34.0	47.2	37.0	. . .	. . .	. . .	. . .	. . .	13.2	. . .	. . .
Share of firms registered with an industry board or agency	7.2	14.8	8.9	. . .	. . .	. . .	. . .	. . .	7.6	. . .	. . .
Share of occupied land owned by the firm	52.3	55.5	53.9	59.0	70.9	70.8	67.4	13.5	3.2	6.7	11.8
Share of occupied buildings owned by the firm	45.1	48.1	44.9	60.8	74.8	79.3	71.2	26.2**	3.0	15.7	18.4**
Share of firms that own a generator	5.5	5.1	5.6	20.1	53.9	77.0	45.9	40.3***	–0.4	14.6***	56.8***
Average capacity utilization	61.9	65.8	62.4	66.5	68.0	71.2	68.2	5.8	3.9	4.5	4.7
Share of firms for which main customers are large firms	1.2	13.5	1.6	9.2	17.8	16.1	15.1	13.5***	12.3	8.0***	6.9
Employment and human capital											
Average number of employees	3.9	9.8	4.1	10.3	43.1	487.8	151.0	146.9***	5.9	6.4***	477.5***
Median number of employees	3.8	4.6	4.1	10.2	42.9	426.7	100.6	96.5***	0.9	6.4***	416.5***
Index of education of top manager (4 = attended college)	1.6	2.0	1.6	2.8	3.3	3.8	3.3	1.7***	0.4**	1.2***	1.0***

Share of top managers with indicated highest educational attendance:											
Primary	64.8	47.8	64.2	13.0	7.0	2.1	8.9	−55.3***	−17.0*	−51.8***	−10.9***
Secondary	19.3	20.8	18.6	34.8	19.5	5.9	18.1	−0.5	1.4	15.4*	−28.9***
Vocational	9.8	15.6	10.4	10.9	8.2	4.6	9.1	−1.3	5.8	1.0	−6.3*
College	6.1	15.9	6.8	41.4	65.2	87.5	63.9	57.0***	9.8**	35.3***	46.1***
Index of education of average employee (4 = attended college)	2.4	2.5	2.4	2.3	2.3	2.4	2.3	−0.1	0.1	−0.1	0.2
Share of employees with indicated highest educational attendance:											
Primary	59.0	50.0	58.2	52.3	51.5	45.2	47.9	−10.3	−9.1	−6.8	−7.1
Secondary	34.3	40.2	34.9	24.4	27.7	33.5	32.5	−2.4	5.9	−9.9	9.0
College	6.7	9.8	6.9	21.8	18.3	17.7	17.4	10.5***	3.2	15.1**	−4.0
Finance											
Share of firms that have ever had a commercial loan	24.9	35.6	26.0	. . .	. . .	. . .	. . .	. . .	10.7	. . .	. . .
Share of financing from:											
Internal funds	74.9	71.0	75.7	67.8	56.3	50.4	58.2	−17.5***	−3.9	−7.2	−17.4**
Trade	4.6	6.2	4.7	4.9	6.2	7.2	5.9	1.2	1.7	0.4	2.2
Owner's family	10.5	9.1	9.5	6.3	6.3	3.7	6.6	−2.9	−1.4	−4.2	−2.6
Banks	3.0	4.0	3.0	9.6	16.0	20.9	15.0	12.0***	1.1	6.6**	11.4***
Duration of last loan (months)	14.6	13.3	14.1	29.0	32.7	35.1	32.2	18.1**	−1.2	14.5**	6.1
Growth											
Annual growth in employment over previous two years	5.2	7.1	5.4	8.1	11.1	11.6	10.0	4.6*	1.9	2.9	3.5

Sources: World Bank Informal and Enterprise Surveys; authors' calculations.

a. Asterisks indicate significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

Table 6. Attributes of Firms in the Micro Survey Sample

Percent except where stated otherwise

	Micro Survey sample			*Enterprise Survey control group*				*Difference*[a]			
Attribute	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. micro*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
General characteristics											
Age of the firm (years)	7.0	8.2	7.8	9.2	14.3	18.3	10.7	3.0***	1.2	2.2***	9.1***
Share of firms registered with a central government agency	0.0	100.0	68.4	. . .	. . .	. . .	. . .	. . .	100.0	. . .	. . .
Share of firms registered with a local government agency	39.4	81.1	68.7	. . .	. . .	. . .	. . .	. . .	41.7***	. . .	. . .
Share of firms registered with an industry board or agency	5.0	30.7	20.0	. . .	. . .	. . .	. . .	. . .	25.7	. . .	. . .
Share of firms located in the owner's home	17.2	13.4	13.8	. . .	. . .	. . .	. . .	. . .	–3.9	. . .	. . .
Share of firms located in a permanent structure	71.4	80.4	77.0	. . .	. . .	. . .	. . .	. . .	9.0	. . .	. . .
Share of occupied land owned by the firm	21.7	20.1	20.1	28.4	54.3	71.0	36.2	16.1***	–1.6	6.7	42.7***
Share of firms forced to move last year because of lack of secure title	11.3	8.8	9.8	. . .	. . .	. . .	. . .	. . .	–2.5	. . .	. . .
Share of firms that own a generator	12.7	23.6	20.2	32.5	52.1	75.8	43.0	22.8***	10.9*	19.8***	43.3***
Share of firms with an electrical connection	60.0	79.2	73.6	. . .	. . .	. . .	. . .	. . .	19.2*	. . .	. . .
Share of firms that use their own transportation equipment	6.6	22.9	18.2	. . .	. . .	. . .	. . .	. . .	16.3***	. . .	. . .

Hours per week that the firm operates	64.8	64.6	64.9	59.4	60.9	79.8	62.2	−2.7	−0.2	−5.4	20.4***
Share of firms for which main customers are large firms	0.4	2.6	1.8	21.1	36.1	44.7	29.0	27.2	2.2***	20.7	23.6
Exports as share of sales	0.1	0.7	0.5	0.9	4.4	19.9	2.8	2.3***	0.7***	0.8***	19.0***
Share of firms that use e-mail to connect with clients	3.2	9.1	7.1	29.5	57.8	78.7	39.0	31.9***	5.9***	26.3***	49.1***
Share of firms that use a webpage to connect with clients	0.9	2.8	2.2	8.9	22.2	42.2	14.1	11.8***	2.0**	8.0***	33.3***
Employment and human capital											
Average number of employees	2.9	4.5	3.9	8.7	38.7	290.4	32.7	28.8***	1.5**	5.8***	281.6***
Median number of employees	2.7	3.7	3.5	8.7	39.4	253.2	29.1	25.6***	1.0**	5.9***	244.5***
Index of education of top manager (4 = attended college)	1.8	2.3	2.1	2.7	3.2	3.8	2.8	0.7***	0.4***	0.8***	1.1***
Share of top managers with indicated highest educational attendance:											
Primary	49.8	35.9	40.2	22.1	0.1	2.2	19.6	−20.6***	−13.9*	−27.7***	−19.9***
Secondary	27.8	26.2	26.2	25.3	0.1	5.5	21.6	−4.6	−1.7	−2.6	−19.8***
Vocational	10.2	13.4	12.4	17.0	0.1	6.9	15.7	3.3	3.2	6.8**	−10.1***
College	12.2	24.6	21.2	35.7	0.6	85.3	43.1	21.9***	12.4***	23.5***	49.7***
Index of education of average employee (4 = attended college)	2.3	2.3	2.3	2.5	2.5	2.8	2.5	0.2	0.0	0.1	0.3**
Share of employees with indicated highest educational attendance:											
Primary	48.7	46.1	46.4	47.8	0.4	31.2	44.8	−1.6	−2.7	−0.9	−16.5**
Secondary	40.2	41.2	41.3	42.9	0.5	52.8	45.8	4.5	1.0	2.7	9.9
College	4.0	5.7	5.3	9.3	0.1	16.0	9.4	4.1	1.7	5.3	6.6

(*continued*)

Table 6. Attributes of Firms in the Micro Survey Sample (*Continued*)

Percent except where stated otherwise

	Micro Survey sample			*Enterprise Survey control group*				*Difference*[a]			
Attribute	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. micro*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Finance											
Share of firms that have ever had a commercial loan	7.3	12.5	10.9	. . .	. . .	. . .		. . .	5.1**	. . .	. . .
Share of financing from:											
Internal funds	81.9	76.9	78.9	75.5	64.4	59.1	72.4	–6.5*	–5.1	–6.4*	–16.4***
Trade	8.3	11.5	10.6	13.3	17.3	16.5	14.2	3.6	3.3	5.0*	3.2
Owner's family	6.6	6.7	6.2	4.6	3.1	0.9	4.1	–2.1	0.1	–2.0	–3.7***
Banks	0.4	2.0	1.5	4.1	11.3	18.5	6.4	4.9***	1.6***	3.7***	14.4
Duration of last loan (months)	13.2	29.9	26.8	30.5	39.3	55.5	37.6	10.8*	16.8**	17.4**	25.0**
Growth											
Annual growth in employment over previous two years	24.3	27.1	25.9	17.5	18.9	14.6	17.6	–8.3***	2.8	–6.8**	–2.9

Sources: World Bank Micro and Enterprise Surveys; authors' calculations.

a. Asterisks indicate significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

unregistered firms, 7.1 percent for registered firms, and 10.0 percent for all Enterprise Survey firms.

Firms in the Micro Survey sample show patterns very similar to those in the Informal Survey sample (table 6). We therefore discuss them only briefly, focusing on the questions that are available only on the Micro Survey questionnaire and on the few results that are different between the two questionnaires. The Micro questionnaire provides a bit more insight into the firms' assets. Only 17.2 percent of the unregistered firms and 13.4 percent of the registered ones are located in the owner's house. Most unregistered (71.4 percent) and registered (80.4 percent) firms occupy a permanent structure. However, there is evidence of hardship resulting from the lack of secure title:[35] 11.3 percent of unregistered firms and 8.8 percent of registered firms were forced to move in the previous year for this reason.

Much like their counterparts in the Informal Survey, unregistered firms in the Micro Survey sample are significantly less likely to own a generator than all other firms. This lack of generators is suggestive of insufficient capital, since unregistered firms are significantly less likely to have an electrical connection than registered ones (60 percent versus 79.2 percent). Furthermore, unregistered firms are much less likely to use their own transportation equipment than registered firms (6.6 percent versus 22.9 percent). Consistent with the view that unregistered firms and Enterprise Survey firms may serve different clients, big Enterprise Survey firms export 19.9 percent of their sales, whereas unregistered firms export only 0.1 percent of their sales. Finally, there is evidence that unregistered firms have less access to computers than do other firms. In particular, unregistered firms are less likely to use e-mail to communicate with their clients than either registered firms or Enterprise Survey firms (3.2, 9.1, and 39.0 percent, respectively). Similarly, unregistered firms are less likely to use a webpage to connect with clients than either registered firms or Enterprise Survey firms (0.9, 2.8, and 14.1 percent, respectively). Consistent with the dual view, unregistered firms tend to own low-quality assets.

Unregistered firms in the Micro sample—unlike their counterparts in the Informal sample—have a faster growth rate of employment than firms in the Enterprise Survey. Average annual employment growth among unregistered firms (24.3 percent), although not quite matching that of registered firms (27.1 percent), exceeds that of Enterprise Survey firms (17.6 percent). The fast employment growth rate of unregistered Micro Survey firms is consistent with the romantic view. However, this finding

35. De Soto (2000).

Table 7. Legal Status of Enterprise Survey Firms in Latin America

Country	*No. of observations*	*Percent of firms that registered upon formation*	*Percent not knowing when firm was registered*	*Firm age (years)*
Argentina	1,051	92.8	1.1	28.6
Bolivia	609	85.7	0.7	21.8
Chile	1,007	98.0	1.0	26.6
Colombia	995	89.0	0.5	17.0
Ecuador	652	91.6	0.9	21.3
El Salvador	683	77.7	1.4	21.4
Guatemala	511	90.4	2.1	20.9
Honduras	424	89.4	2.8	20.5
Mexico	1,439	94.9	2.8	18.5
Nicaragua	474	80.4	0.8	22.9
Panama	601	97.8	0.5	24.5
Paraguay	608	94.4	0.8	21.3
Peru	630	96.8	0.3	19.8
Uruguay	607	97.5	2.3	28.8
Average		91.2	1.3	22.4

Source: World Bank Enterprise Survey 2006.

needs to be interpreted cautiously, since these firms remain very small despite having been around for an average of 7 years.

To complement the evidence on growth rates, we examine, for a few countries, how often registered firms initially started operating as unregistered. The Enterprise Survey files for 14 Latin American countries include a question on whether firms were registered when they started operations and, if not, on whether they have since registered. As it turns out, all firms in this sample of 14 countries are registered. Table 7 shows the available data regarding the initial legal status of these firms. The fraction of firms that were registered from the outset ranges from 77.7 percent in El Salvador to 98 percent in Chile and averages 91.2 percent. Since 1.3 percent of the respondents did not answer the question, we estimate that only 7.5 percent of the firms registered after starting operations. Firms that start operations without being registered often register relatively quickly: 36.5 percent of the initially unregistered firms had registered by the end of the second year of operations (table 8). It is unclear whether those firms spent two years hiding from the government or, alternatively, started operations while their request for a permit was pending. Either way, firms rarely start as unregistered and later change their status. This is not the pattern that one would expect to see if the informal sector were a reservoir of entrepreneurial talent, as predicted by the romantic view. Nor is it the pattern that one would

Table 8. Delays in Registering by Enterprise Survey Firms in Latin America

Years[a]	*Frequency*	*Percent of total*	*Cumulative percent*
1	129	17.9	17.9
2	134	18.6	36.5
3	79	11.0	47.5
4	52	7.2	54.7
5	58	8.1	62.8
6	26	3.6	66.4
7	28	3.9	70.3
8	19	2.6	72.9
9	22	3.1	76.0
10	23	3.2	79.2

Source: World Bank Enterprise Survey 2006.
a. Year of operations in which the firm registered.

expect to see if entrepreneurs used entry into the informal sector as a way of acquiring information (for example, about demand for the firm's products) at a lower cost than entry into the formal sector.[36]

We conclude this section by presenting some data on the institutional environment in which firms operate. All views of informality agree on the basic trade-off faced by firms (the tax and regulatory burden versus access to public goods and finance). The previous literature has emphasized access to public goods as one of the main attractions of operating in the formal sector. Tables 9 and 10 present data on the institutional environment faced by firms in the Informal and the Micro Surveys, respectively, and how they operate in it.

Three facts stand out. First, consistent with all views of informality, unregistered firms enjoy tangible advantages. Managers of unregistered firms in the Informal sample estimate that a typical firm in their sector evades 74.8 percent of its tax liability. Tax evasion sharply decreases with firm size. For example, managers of small firms in the control group estimate that a typical firm in their sector evades 35.5 percent of its liability; tax evasion drops to 22.9 percent for big firms in the control group. Tax evasion by unregistered Micro Survey firms and by small firms in their control group follows a similar pattern (67.7 percent versus 44.4 percent, respectively).

Likewise, the regulatory burden increases rapidly with firm size. Whereas managers of unregistered firms in the Informal Survey sample report spending 5.6 percent of their time dealing with government regulations, that task requires 14.5 percent of the time of managers of big firms in the control group; the corresponding figures for the Micro Survey sample and

36. Bennett and Estrin (2007).

Table 9. Indicators of the Institutional Environment Facing Informal Survey Firms

Percent except where stated otherwise

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[a]			
Indicator	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. informal*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Compliance with government regulations											
Share of tax liability evaded by "typical" firm	74.8	53.5	72.2	35.5	28.6	22.9	30.3	–41.9***	–21.4*	–39.3***	–12.6
Share of management's time spent dealing with government regulations	5.6	6.8	5.3	9.8	15.4	14.5	12.9	7.6***	1.2	4.2*	4.7**
Share of sales a "typical" firm pays in informal gifts or payments to get things done	3.6	4.8	3.9	4.6	4.1	3.8	4.6	0.7	1.1	1.0	–0.8
Public goods											
Days last year with power outages	50.0	56.3	50.6	44.9	52.1	53.5	48.0	–2.6	6.3	–5.0	8.6

Days last year with water outages	33.6	31.3	34.3	22.5	24.4	24.2	23.5	−10.8	−2.4	−11.1	1.6
Days last year with telephone outages	4.1	19.3	14.2	13.1	10.6	11.8	11.7	−2.5	15.2	9.0	−1.3
Days last year with transportation outages	33.6	22.0	32.7	7.1	9.2	10.9	9.1	−23.6	−11.6	−26.5	3.8
Property rights											
Share of sales lost last year owing to theft	2.9	3.5	3.1	3.8	1.7	0.8	2.2	−0.9	0.6	0.9	−3.0
Share of sales spent on security expenses	1.8	1.2	1.6	2.2	2.3	2.5	2.3	0.6	−0.6	0.4	0.3
Share of sales spent on “protection payments”	1.0	0.5	1.0	0.5	0.8	0.7	0.7	−0.3	−0.5	−0.5	0.3
Share of incidents reported to police	14.1	26.2	19.1	36.0	38.0	54.0	42.6	23.5**	12.1	21.9**	18.1
Share of firms that had a payment dispute in last two years	21.5	0.0	21.3	. . .	. . .	. . .	. . .	. . .	−21.5	. . .	. . .
Days it took a typical court case to be resolved	60.9	90.3	66.2	67.9	56.1	68.3	61.9	−4.3	29.4	7.0	0.4

Sources: World Bank Informal and Enterprise Surveys; authors’ calculations.

a. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

Table 10. Indicators of the Institutional Environment Facing Micro Survey Firms

Percent except where stated otherwise

Indicator	*Micro Survey sample*			*Enterprise Survey control group*				*Difference*[a]			
	Unregistered	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. micro*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Compliance with government regulations											
Share of tax liability evaded by "typical" firm	67.7	54.2	58.3	44.4	33.7	32.5	41.6	−16.6**	−13.5	−23.3***	−11.9*
Share of management's time spent dealing with government regulations	1.5	4.2	3.5	8.2	9.3	10.5	8.5	5.0***	2.7***	6.6***	2.3*
Share of sales a "typical" firm pays in informal gifts or payments to get things done	4.0	3.5	3.3	6.6	7.1	5.6	6.6	3.2***	−0.5	2.6	−1.0
Public goods											
No. of power outages in last year	167.1	134.4	138.8	138.3	151.7	157.9	143.7	4.9	−32.7	−28.8	19.6
Days last year with water outages	. . .	. . .	. . .	57.9	56.4	51.8	51.9	. . .	. . .	. . .	−6.1
Days last year with telephone outages	. . .	. . .	. . .	3.7	4.8	3.5	4.0	. . .	. . .	. . .	−0.2

Property rights											
Share of sales lost last year owing to theft	0.5	0.5	0.5	2.6	1.8	1.6	2.4	1.8***	0.0	2.1***	−1.0
Share of sales spent on security expenses	3.4	2.8	2.9	2.3	2.1	1.2	2.1	−0.8*	−0.6	−1.1	−1.1***
Share of sales spent on "protection payments"	. . .	. . .	. . .	0.4	2.9	0.2	1.2	. . .	. . .	. . .	−0.1
Share of firms that had a payment dispute in last two years	6.0	8.4	7.5	9.5	16.6	19.4	11.4	4.0*	2.3	3.5	9.9***
Share of firms with payment dispute that used courts to resolve it	29.2	33.2	30.1	51.3	67.6	81.8	58.3	28.3***	4	22*	31.0***
Days it took a typical court case to be resolved	. . .	44.3	44.3	45.4	74.1	64.4	51.9	7.7	. . .	. . .	19.1

Sources: World Bank Micro and Enterprise Surveys; authors' calculations.

a. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

its control group are 1.5 and 10.5 percent, respectively. Finally, unregistered firms pay a smaller fraction of their sales in bribes than do firms in the control group. Managers of unregistered firms in the Informal Survey estimate that firms in their sectors pay 3.6 percent of their sales to "get things done." In contrast, managers of registered firms in the Informal Survey report that bribes equal 4.8 percent of sales, a percentage similar to that reported by firms in the control group (4.6 percent). Similarly, managers of unregistered firms in the Micro Survey estimate that firms in their sector pay 4.0 percent of their sales to "get things done"; the comparable figures are 3.5 percent for registered Micro Survey firms and 6.6 percent for firms in the control group. In sum, lower taxes and less regulation confer a clear cost advantage on unregistered firms.

Second, the quality of public goods in our sample is very low. In the Informal Survey, unregistered firms report that they experienced power outages on 50 days of the previous year. Firms in the Enterprise Survey fare only slightly better (48 days on average). On many days, firms experience multiple power outages. For this reason the number of power outages for the Micro Survey is dramatically higher than the number of days without power in the Informal Survey: unregistered firms in the Micro survey experienced 167.1 power outages in the previous year. Once again, Enterprise Survey firms do only marginally better (143.7 outages). In such an environment, only firms large enough to afford a generator can be productive. Outages of water, phones, and transportation are less frequent than power outages but nevertheless very common by the standards of developed countries. As a result, the performance of firms that are too small to provide substitutes for these public goods (their own transportation equipment, for example) may be severely impaired.

Third, outright theft is very prevalent in our sample, but small firms do not make much use of police or the courts. Theft affects all small firms, not just unregistered ones. Specifically, unregistered firms in the Informal Survey report that, in a typical year, losses from theft amount to 2.9 percent of annual sales. Registered firms in the same survey and small firms in the Enterprise Survey report even higher losses (3.5 percent and 3.8 percent, respectively). Somewhat surprisingly, losses as a result of theft appear to be lower for Micro Survey firms (0.5 percent) than for small firms in the control group (2.6 percent). To put these figures in context, note that Enterprise Survey respondents estimate losses as a result of theft equal to 0.54 percent of sales in Germany, 0.26 percent in Ireland, and 0.22 percent in Spain.

In response to theft, firms in our sample spend heavily on security and make "protection" payments to gangsters. For example, security and pro-

tection payments equal, respectively, 1.8 and 1.0 percent of the sales of unregistered firms in the Informal Survey sample. Firms in their control group spend a bit more on security and a bit less on protection, but their total expenditure is similar (3 percent). The police do not appear to play a central role in addressing theft. In fact, most theft is not even reported to the police. Only 14.1 percent of incidents suffered by unregistered firms in the Informal Survey were reported to the police. Registered firms in the same survey reported 26.2 percent of incidents—still a low figure. This pattern is consistent with the view that unregistered firms may have trouble protecting their property rights. Alternatively, the absolute value of the losses suffered by unregistered firms may be too low to justify filing a police complaint. Firm size does play a role in reporting theft to the police. However, even big firms in the control group for the Informal Survey sample report to the police only about half of theft incidents (54.0 percent).

Interestingly, small firms do not make much use of the courts to adjudicate disputes either. Only 29.2 percent of unregistered and 33.2 percent of registered firms in the Micro Survey sample used the courts to resolve commercial disputes during the previous year. In the control group, the use of the courts to solve commercial disputes rises quickly with firm size, from 51.3 percent for small firms to 81.8 percent for big firms. Surprisingly, the courts appear to work in a reasonably efficient manner. It takes roughly 62 days to resolve a commercial dispute in the Informal Survey countries and approximately 52 days in the Micro Survey countries. These figures are in line with the average length of court proceedings in Germany (35 days), Ireland (79 days), and Spain (91 days). The fact that unregistered firms and small firms in the control group behave similarly in solving commercial disputes suggests that inadequate access to courts is unlikely to explain differences in productivity between the two groups of firms. The same argument applies to lack of police protection.

The tentative picture that emerges from this section is inconsistent with the romantic view. Unregistered firms have been around for a long time (7 to 10 years on average), but their sales are still trivially small. Moreover, few registered firms started out unregistered. The small size of unregistered firms is symptomatic of uneducated management and low-quality assets. When public goods are unreliable, unregistered firms are too small to afford substitutes such as generators, computers, or transportation equipment. They do not have large firms as clients. They do not export. Despite de Soto's emphasis on access to credit as the key to igniting the growth of unregistered firms, lack of external finance appears to be an attribute of all small firms in poor countries, not just of unregistered

firms. In sum, the limitations of unregistered firms appear to be far more severe than acknowledged by proponents of the romantic view.

Productivity of Unregistered Firms

In this section we examine the productivity of unregistered firms and present the key findings of the paper. In measuring the productivity of these firms, we face severe data limitations. In particular, we lack information on how much capital these firms have. The Informal and Micro questionnaires do not collect such information, since unregistered entrepreneurs typically lack detailed records to estimate the value of their assets. We thus have to measure productivity without capital.

To this end we use two crude measures of productivity: sales per employee and (gross) value added per employee, the latter defined as sales net of expenditure on raw materials and energy.[37] Thus, we define value added per employee for firm i in industry s as

$$VA_{si} = \frac{P_{si}Y_{si} - P_m M_{si} - P_E E_{si}}{L_{si}},$$

where $P_{si}Y_{si}$ is the level of sales, $P_m M_{si}$ is expenditure on raw materials, $P_E E_{si}$ is expenditure on energy, and L_{si} is the number of employees (including both full- and part-time but not seasonal workers). To the extent that seasonal employment is more prevalent in unregistered firms than in the formal sector, we overstate the productivity of unregistered firms. We use expenditure on production inputs (such as energy) as a crude proxy for capital invested.

This approach to productivity measurement has recently received considerable criticism, since the sales measure obviously combines physical output and prices. But in a competitive equilibrium, prices may vary inversely with efficiency exactly to eliminate any variation in productivity as measured by sales (or value added) per employee. The recognition of this problem in the absence of firm-specific price indices is credited to Tor Jakob Klette and Zvi Griliches;[38] several more recent studies seek to address the problem.[39] We follow the approach of Chang-Tai Hsieh and

37. Data on wages are unavailable for most countries in the Informal sample. For this reason we are unable to remove labor costs from our measure of value added.

38. Klette and Griliches (1996).

39. These include Bernard and others (2003); Katayama, Lu, and Tybout (2006); Foster, Haltiwanger, and Syverson (2008); Hsieh and Klenow (2007).

Peter Klenow,[40] which assumes that all firms in an industry use the same Cobb-Douglas production technology and that industry output is a constant-elasticity-of-substitution (CES) aggregate of the outputs of all the firms. They then show that, in a competitive equilibrium, physical productivity A_{si} (or real output per employee) can be estimated from nominal sales using the following formula:

$$A_{si} = \kappa_s \frac{\left(P_{si} Y_{si}\right)^{\frac{\sigma}{\sigma-1}}}{L_{si}},$$

where κ_s is an unobserved constant and σ is the elasticity of substitution of output. Although we do not observe κ_s, relative productivities are unaffected by setting κ_s equal to 1 for each industry *s*. Intuitively, goods sold by very productive firms must command lower prices to induce buyers to demand the higher output. Raising sales to the power $\sigma/(\sigma - 1)$ yields Y_{si}, making it possible to infer real output from nominal revenue. Since registered firms tend to have higher sales, productivity differences between registered and unregistered firms are increasing in σ. Empirically, estimates of σ range from 3 to 10. We follow Hsieh and Klenow and conservatively set σ equal to 3.[41]

Before turning to the results, we note the empirical finding of Lucia Foster and coauthors that the correlation between the sales-based and the corrected measures of productivity is incredibly high, well over 0.9.[42] Thus, although the theoretical objection to the traditional measures is compelling, its empirical significance appears minor. Indeed, Foster and coauthors have data on both prices and sales. The correlation that they report between nominal and real output is based on actual data rather than on a model.

Measurement Error

Even aside from the theoretical concerns, we need to deal with the fact that our sales numbers come from unofficial firms, raising concerns about measurement error. There is good reason to worry that our productivity measures may be biased, since unregistered entrepreneurs may choose to hide output not only from the government but also from the World Bank contractors. For example, Suresh de Mel, David McKenzie, and Christopher Woodruff find that microenterprises underreport profits by 30 percent

40. Hsieh and Klenow (2007).
41. Hsieh and Klenow (2007).
42. Foster and others (2008).

to researchers, although they attribute this more to lack of recall than to intentional understatement.[43]

We offer two pieces of evidence that support the view that such biases are unlikely to drive our main results. First, table 11 shows the available information regarding expenditure on various production inputs (scaled by sales). If unregistered entrepreneurs lied *only* about sales, inputs as a fraction of sales would be higher for unregistered firms than for other firms. In fact, expenditure on raw materials by small firms in the control group is 12.7 percentage points higher than for unregistered firms in the Informal sample, and 2.7 percentage points higher than for unregistered firms in the Micro sample. Moreover, expenditure on energy by unregistered firms is comparable to that by firms in the control group. Other variables show a mixed pattern. In particular, expenditure on labor by small firms in the control group is 8.1 percentage points higher than that by unregistered firms in the Informal sample, but 1.7 percentage points lower than that by unregistered firms in the Micro sample. Similarly, expenditure on machines by small firms in the control group is 14.8 percentage points higher than that by unregistered firms in the Micro sample, but equal to that by unregistered firms in the Informal sample. Finally, there is weak evidence that unregistered firms in the Informal Survey spend more on rent than do small firms in the control group. In sum, there is no evidence that unregistered firms consistently spend a larger fraction of their sales on inputs than do small firms in the control group, as would be the case if unregistered entrepreneurs lied only about their sales.

Second, table 12 shows the available data on wages per employee. Under the dual hypothesis, unregistered firms should pay low wages.[44] These low wages may be consistent with some on-the-job home production by workers in unregistered firms. Alternatively, workers in these firms may be less skilled than those in registered firms. Either way, the dual view predicts that the measured output of unregistered firms should be low relative to that of workers in the control group. In contrast, wages in the formal and informal sectors should be comparable if observed differences in productivity are due only to measurement error. The top panel of table 12 shows wages per employee in Cape Verde, the only country in the Informal sample with wage data. The bottom panel shows wages per employee for the countries covered by the Micro sample. Wages in both panels are scaled by income per capita.

43. De Mel, McKenzie, and Woodruff (2007).
44. Harris and Todaro (1970).

Table 11. Expenditure on Production Inputs by Informal and Micro Survey Firms

Percent of sales

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[a]			
Indicator	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. informal*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Raw materials	30.5	35.2	31.0	43.2	47.2	41.3	46.4	15.4***	4.7	12.7**	−1.9
Energy	6.8	6.8	6.8	6.8	6.8	6.8	6.8	0.0	0.0	0.0	0.0
Labor	13.4	21.8	14.9	21.5	17.8	17.3	18.9	4.0	8.4	8.1	−4.2*
Machines	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Land	8.3	13.2	10.4	4.2	1.6	2.0	3.6	−6.8	4.9	−4.1	−2.2
Rent	7.5	9.7	7.9	3.9	2.2	1.3	2.8	−5.1***	2.3	−3.6**	−2.6**
Average difference								1.3	3.4	2.2	−1.8

	Micro Survey sample			*Enterprise Survey control group*				*Difference*			
Indicator	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. micro*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Raw materials	38.5	39.7	39.6	41.3	44.4	49.3	42.6	3.0	1.2	2.7	8.0
Energy	3.6	2.9	2.9	4.2	3.8	4.6	4.1	1.2*	−0.7	0.6	0.4
Labor	23.3	21.0	21.5	21.6	19.7	17.7	20.9	−0.5	−2.3	−1.7	−3.9*
Machines	2.9	3.3	3.1	17.8	44.1	32.9	18.6	15.5	0.4	14.8	15.1
Land	. . .	. . .	. . .	0.7	0.7	0.7	0.7	. . .	. . .	. . .	0.0
Rent	7.4	8.3	8.0	6.7	3.5	2.3	5.8	−2.2*	0.9	−0.6	−4.4***
Average difference								3.4	−0.1	3.2	2.5

Sources: World Bank Informal, Micro, and Enterprise Surveys; authors' calculations.

a. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

Table 12. Ratio of Wages per Employee to GDP per Capita in Informal and Micro Survey Firms[a]

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[b]			
Country	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. informal*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Cape Verde	0.90	1.25	0.96	2.92	4.03	2.62	3.19	2.23***	0.35	2.03***	–0.30
	Micro Survey sample			*Enterprise Survey control group*				*Difference*			
Country	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. micro*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Angola	1.35	2.23	2.17	3.26	3.02	1.51	3.20	1.03***	0.88*	1.91***	–1.74***
Botswana	0.35	0.58	0.52	0.89	1.05	1.03	0.95	0.43***	0.23***	0.54***	0.14
Burundi	1.76	3.13	2.97	5.84	7.29	4.82	6.04	3.07***	1.37*	4.08***	–1.02
Congo, Dem. Rep.	5.64	5.45	5.52	8.25	11.35	9.26	8.93	3.41***	–0.18	2.62***	1.01***
Gambia, The	0.54	1.04	0.85	1.52	2.41	1.92	1.78	0.94***	0.49***	0.98***	0.40
Guinea	0.83	1.23	1.13	1.30	1.13	0.91	1.27	0.15*	0.40**	0.47***	–0.39
Guinea-Bissau	6.11	7.21	6.97	9.64	6.92	. . .	9.25	2.29**	1.10	3.53*	. . .
India	1.31	1.43	1.39	1.54	1.82	1.62	1.64	0.25***	0.12***	0.22***	0.09
Mauritania	2.12	2.10	2.11	3.88	3.98	4.33	3.91	1.80***	–0.02	1.76***	0.44
Namibia	0.27	0.79	0.55	2.48	2.56	2.30	2.49	1.94***	0.51***	2.21***	–0.19
Rwanda	1.29	1.52	1.47	4.01	5.70	3.12	4.36	2.89***	0.23	2.72***	–0.89
Swaziland	0.50	1.20	1.05	1.92	2.21	1.88	1.97	0.92***	0.69***	1.42***	–0.04
Tanzania	1.44	1.59	1.53	3.59	5.07	5.72	4.21	2.68***	0.16	2.15***	2.13***
Uganda	3.08	3.93	3.60	4.32	4.90	3.91	4.45	0.85**	0.85	1.24**	–0.42
Average	1.90	2.39	2.27	3.75	4.24	3.26	3.89	1.62**	0.49	1.85**	–0.04

Source: World Bank Informal, Micro, and Enterprise Surveys; authors' calculations.

a. See tables 3 and 4 for the survey years for each country.

b. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

Three facts stand out. First, there is no clear correlation between firm size and wages within the control group. Big firms pay higher wages than do small firms in Congo and Tanzania. The reverse is true in Angola. On average, wages in big and small firms are essentially indistinguishable from each other. Second, unregistered firms consistently pay lower wages than do small firms in the control group. Cape Verde illustrates this point. Wages in unregistered firms there are 10 percent lower than income per capita. In contrast, wages in the control group of small firms are 2.92 times income per capita. On average, in the Micro sample, wages are 1.90 times income per capita in unregistered firms and 3.75 times income per capita in small firms in the control group. Third, although there is considerable heterogeneity across countries, the workers of unregistered firms are not the poorest among the poor. In India, for example, wages for the employees of unregistered firms exceed GDP per capita by 31 percent. Similarly, in the Micro sample, the average wage of unregistered workers is roughly twice GDP per capita. Taken at face value, the large wedge in wages between unregistered firms and the control group is strongly consistent with the dual view of unregistered firms. Of course, we cannot rule out the alternative interpretation that respondents shrewdly lie to the World Bank about sales, inputs, and wages. However, the findings on inputs and wages should allay some of the concerns regarding data quality.

As a final point, it seems to us that concerns about intentional understatement of revenues should not be exaggerated for our data. Firms participating in the surveys do so voluntarily. Virtually all of them answer questions about sales, even though they do not have to. They also give answers suggesting massive underpayment of taxes and bribe payments by "firms like theirs." This is not the behavior one would expect of those fearful that World Bank contractors will turn them in (or that the authorities would do anything about it if they did). Our view is that most informal firms operate in the open, that they have done so for years, that they pay the police and other authorities to leave them alone, and that fear of reprisals for truly reporting revenues to the World Bank is very far from most of their minds. This particular concern is a rich-country fear rather than a poor-country reality.

Productivity of Unregistered Firms

Tables 13 and 14 present the main findings of the paper. Table 13 shows estimates of log value added (top panel), log sales per employee (middle panel), and log real output per employee (bottom panel) for the Informal sample and its Enterprise Survey control group. Table 14 shows analogous data for the Micro sample. Three key facts stand out. First, registered

Table 13. Productivity of Firms in the Informal Sector Survey[a]

Log units

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[b]			
Country	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*	*Big v. unregistered*
						Log of value added per employee					
Bangladesh	7.09	7.92	7.10	7.96	8.53	8.69	8.61	0.83	0.87**	0.73	1.60***
Brazil	8.30	8.77	8.47	9.22	9.58	10.36	9.74	0.48***	0.92***	1.14***	2.06***
Cambodia	7.19	8.01	7.22	. . .	. . .	. . .	. . .	0.82	. . .	. . .	. . .
Cape Verde	8.12	7.85	8.07	8.47	9.21	9.78	8.78	–0.27	0.35	1.30	1.65
Guatemala	7.37	8.59	7.48	8.95	9.39	9.42	9.21	1.22	1.57***	0.48***	2.05***
India	7.64	8.29	7.69	9.16	9.43	9.90	9.36	0.64***	1.52***	0.74***	2.26***
Indonesia	7.73	. . .	7.73	8.53	8.39	9.16	8.80	. . .	0.80	0.64	1.44***
Kenya	7.76	8.04	7.83	9.58	9.99	10.30	9.94	0.28	1.82***	0.71***	2.54***
Niger	9.32	7.16	8.24	11.44	10.01	9.98	10.83	–2.16	2.12	–1.46	0.66
Pakistan	7.21	6.59	7.20	9.78	9.76	9.18	9.58	–0.62	2.58***	–0.60	1.98***
Senegal	7.19	7.22	7.20	9.09	9.81	9.96	9.54	0.03	1.90***	0.87***	2.77***
Tanzania	6.23	. . .	6.23	8.65	9.51	9.83	9.40	. . .	2.43***	1.18	3.61***
Uganda	7.15	7.92	7.30	8.71	9.33	10.02	9.09	0.76	1.56***	1.31***	2.87***
Average	7.56	7.85	7.52	9.13	9.41	9.72	9.41	0.18***	1.54***	0.59**	2.12***
						Log of sales per employee					
Bangladesh	7.82	8.82	7.83	9.39	10.00	9.61	9.70	1.00	1.57***	0.22*	1.79***
Brazil	8.63	9.18	8.83	9.84	10.23	11.02	10.38	0.55***	1.21***	1.18***	2.40***
Cambodia	7.77	9.10	7.80	8.84	8.95	8.61	8.84	1.33***	1.08***	–0.24	0.84***
Cape Verde	8.35	8.33	8.34	9.82	10.35	9.94	9.96	–0.02	1.48***	0.12	1.60
Guatemala	7.80	8.12	7.81	9.70	10.14	10.19	9.96	0.32	1.90***	0.49***	2.39***

India	8.20	8.83	8.25	10.09	10.32	10.77	10.27	0.63***	1.89***	0.67***	2.56***
Indonesia	8.38	. . .	8.38	7.66	9.07	10.04	9.58	. . .	−0.72	2.38**	1.66***
Kenya	8.11	8.34	8.15	10.76	11.07	10.98	10.95	0.24	2.65***	0.22	2.87***
Niger	7.80	7.45	7.61	11.40	10.76	10.95	11.18	−0.35*	3.60***	−0.45	3.15***
Pakistan	7.73	7.30	7.73	10.73	10.83	10.17	10.62	−0.44	2.99***	−0.56	2.43***
Senegal	7.81	7.95	7.84	10.16	10.77	11.34	10.61	0.14	2.35***	1.19***	3.53***
Tanzania	7.26	8.08	7.32	8.96	10.28	10.68	9.79	0.82***	1.70***	1.73***	3.42***
Uganda	7.73	8.12	7.81	9.42	10.02	10.69	9.79	0.38	1.69***	1.27***	2.96***
Average	7.95	8.30	7.98	9.75	10.21	10.38	10.12	0.38**	1.80***	0.63**	2.43***
					Log of real output per employee						
Bangladesh	12.49	14.79	12.51	15.35	16.90	17.29	17.05	2.30**	2.86***	1.94***	4.80***
Brazil	13.49	14.34	13.80	16.12	17.21	19.25	17.59	0.85***	2.63***	3.13***	5.76***
Cambodia	12.56	14.66	12.62	14.23	15.26	16.00	14.57	2.10***	1.67***	1.77***	3.44***
Cape Verde	13.02	13.09	13.03	15.87	17.28	17.66	16.24	0.06	2.84***	1.80	4.64
Guatemala	12.46	13.00	12.49	15.74	17.04	18.15	16.72	0.54	3.28***	2.40***	5.69***
India	13.14	14.18	13.21	16.29	17.24	18.98	17.02	1.04***	3.15***	2.69***	5.84***
Indonesia	13.32	. . .	13.32	12.69	15.42	18.25	16.90	. . .	−0.62	5.55***	4.93***
Kenya	12.82	13.29	12.91	17.36	18.51	19.31	18.36	0.47	4.54***	1.95***	6.49***
Niger	12.27	12.01	12.13	18.31	18.10	19.16	18.29	−0.26	6.03***	0.85	6.88***
Pakistan	12.38	11.63	12.37	17.26	18.08	18.08	18.03	−0.75	4.88***	0.82	5.70***
Senegal	12.51	12.69	12.55	16.35	17.99	19.71	17.61	0.18	3.84***	3.36***	7.20***
Tanzania	11.55	12.85	11.65	14.55	17.28	18.72	16.40	1.30***	2.99***	4.17***	7.17***
Uganda	12.39	13.08	12.53	15.05	16.66	18.59	16.05	0.69	2.66***	3.54***	6.20***
Average	12.65	13.30	12.70	15.78	17.15	18.40	16.99	0.71***	3.14***	2.61***	5.75***

Source: World Bank Informal and Enterprise Surveys; authors' calculations.

a. See tables 3 and 4 for the survey years for each country.

b. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

Table 14. Productivity of Firms in the Micro Sector Survey[a]

Log units

	Micro Survey sample			*Enterprise Survey control group*				*Difference*[b]			
Country	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*	*Big v. unregistered*
						Log of value added per employee					
Angola	7.48	8.35	8.30	8.97	8.86	9.34	8.97	0.87***	1.50***	0.36	1.86***
Botswana	9.00	8.85	8.88	9.49	10.02	9.52	9.66	–0.15	0.48	0.03	0.51
Burundi	8.52	7.81	7.91	8.19	9.23	9.11	8.47	–0.72	–0.33	0.92**	0.59
Congo, Dem. Rep.	6.91	7.65	7.38	8.25	8.89	8.53	8.47	0.74**	1.34***	0.28	1.62***
Gambia, The	6.86	7.39	7.24	8.23	8.76	9.35	8.44	0.52*	1.37***	1.12	2.49***
Guinea	8.01	8.65	8.49	8.34	8.67	9.60	8.41	0.64*	0.33	1.26***	1.59**
Guinea-Bissau	7.78	8.39	8.31	8.28	8.47	. . .	8.32	0.61	0.50	. . .	. . .
India	8.05	8.40	8.25	8.75	8.99	9.44	8.93	0.35***	0.70***	0.68***	1.39***
Mauritania	8.43	7.50	8.16	8.69	9.23	9.34	8.92	–0.93**	0.26	0.66**	0.91*
Namibia	6.76	7.82	7.51	9.81	10.21	10.44	10.04	1.06**	3.05***	0.63**	3.68***
Rwanda	7.51	8.38	8.32	9.15	9.36	9.10	9.21	0.86	1.64***	–0.05	1.59*
Swaziland	7.63	8.64	8.54	9.83	9.55	9.62	9.67	1.00**	2.20***	–0.21	1.99***
Tanzania	7.88	8.21	8.09	8.92	9.74	10.37	9.32	0.33	1.05***	1.44***	2.49***
Uganda	8.13	8.40	8.30	8.66	8.92	9.71	8.80	0.27	0.52***	1.05***	1.57***
Average	7.78	8.17	8.12	8.83	9.21	9.50	8.97	0.39**	1.04***	0.63***	1.71***
						Log of sales per employee					
Angola	8.16	8.90	8.85	9.58	9.50	9.92	9.58	0.74***	1.43***	0.34	1.77***
Botswana	8.53	9.49	9.23	10.33	10.78	10.62	10.48	0.95***	1.80***	0.28	2.08***
Burundi	9.09	8.69	8.73	9.25	9.86	10.15	9.37	–0.40	0.16	0.91**	1.06**
Congo, Dem. Rep.	7.91	8.38	8.20	8.91	9.52	9.57	9.06	0.48*	1.01***	0.66**	1.67***

Gambia, The	7.42	8.02	7.79	8.76	9.41	10.30	9.00	0.60***	1.34***	1.55***	2.88***
Guinea	8.88	9.53	9.36	8.92	9.18	9.90	8.98	0.66**	0.05	0.98**	1.03
Guinea-Bissau	8.49	9.05	8.93	9.27	9.35	. . .	9.28	0.57*	0.79***	. . .	. . .
India	8.66	9.12	8.93	9.79	9.93	10.14	9.85	0.46***	1.13***	0.35***	1.48***
Mauritania	9.14	8.79	8.99	9.98	10.24	11.14	10.05	–0.35**	0.84***	1.17***	2.00***
Namibia	7.17	8.21	7.68	10.34	10.65	10.96	10.45	1.04***	3.16***	0.63***	3.79***
Rwanda	7.39	8.62	8.41	9.26	9.96	10.01	9.49	1.23***	1.87***	0.74**	2.61***
Swaziland	7.62	8.94	8.55	9.87	10.25	10.06	9.96	1.32***	2.25***	0.19	2.44***
Tanzania	8.51	8.93	8.77	9.36	10.21	11.12	9.77	0.42	0.85***	1.76***	2.61***
Uganda	8.66	9.17	8.97	9.32	9.69	10.36	9.49	0.50***	0.66***	1.04***	1.70***
Average	8.26	8.85	8.67	9.50	9.89	10.33	9.63	0.59***	1.24***	0.81***	2.09***
					Log of real output per employee						
Angola	12.97	14.13	14.05	15.57	15.94	17.27	15.65	1.16***	2.60***	1.71***	4.30***
Botswana	13.38	14.89	14.49	16.63	18.01	18.54	17.20	1.52***	3.25***	1.92***	5.16***
Burundi	14.20	13.67	13.73	14.96	16.58	17.71	15.30	–0.53	0.75	2.76***	3.51**
Congo, Dem. Rep.	12.44	13.32	12.98	14.46	16.02	16.92	14.87	0.88**	2.02***	2.46***	4.48***
Gambia, The	11.77	12.72	12.35	14.22	15.94	18.11	14.85	0.95***	2.46***	3.89***	6.35***
Guinea	14.06	15.02	14.77	14.47	15.55	17.57	14.66	0.96**	0.42	3.10***	3.51***
Guinea-Bissau	13.23	14.01	13.84	15.01	15.78	. . .	15.12	0.78*	1.78***	. . .	. . .
India	13.76	14.68	14.30	15.33	16.71	18.04	15.80	0.92***	1.57***	2.71***	4.28***
Mauritania	14.42	13.92	14.20	16.07	17.15	19.31	16.35	–0.49**	1.65***	3.24***	4.89***
Namibia	11.17	12.92	12.02	16.64	17.72	19.15	17.04	1.75***	5.47***	2.52***	7.99***
Rwanda	11.62	13.44	13.13	15.00	16.75	17.89	15.65	1.82***	3.38***	2.89***	6.27***
Swaziland	11.71	14.03	13.35	15.91	17.17	17.85	16.36	2.31***	4.20***	1.94***	6.14***
Tanzania	13.33	14.13	13.82	15.17	17.16	19.36	16.15	0.80*	1.84***	4.19***	6.03***
Uganda	13.79	14.72	14.36	15.14	16.33	18.28	15.66	0.94***	1.35***	3.15***	4.50***
Average	12.99	13.97	13.67	15.33	16.63	18.16	15.76	0.98***	2.34***	2.80***	5.19***

Sources: World Bank Micro and Enterprise Surveys; authors' calculations.

a. See tables 3 and 4 for the survey years for each country.

b. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

firms in both the Informal and the Micro Surveys are more productive than unregistered ones in the same survey. Firms in India in the 2006 Micro Survey illustrate this pattern. Value added per employee for registered firms is 35 percent higher than for unregistered firms (8.40 versus 8.05), sales per employee are 46 percent higher (9.12 versus 8.66), and real output per employee is 92 percent higher (14.68 versus 13.76). Most countries exhibit a similar pattern, although Burundi, Mauritania, Niger, and Pakistan are exceptions. On average, value added per employee for registered firms in the Informal and Micro samples is, respectively, 18 percent and 39 percent higher than for their unregistered counterparts. Differences in sales per employee are even larger: 38 percent for the Informal sample and 59 percent for the Micro sample. Differences between unregistered and registered firms are most extreme for real output per employee: 71 percent in the Informal Survey sample and 98 percent in the Micro Survey sample.

Second, these differences become much more dramatic when we compare Informal or Micro Survey firms with the Enterprise Survey firms. The productivity gap between unregistered firms and even the small firms in the control groups is truly enormous. Take the case of India in 2006 again. Value added per employee for small Enterprise Survey firms is 70 percent higher than for unregistered Micro Survey firms, and sales and real output per employee for small firms are 113 percent and 157 percent higher, respectively, than for unregistered ones. The example of India is representative of the results for other countries, except that value added and real output per employee in Burundi and sales per employee in Indonesia do not conform to this pattern. Bearing in mind that the observations are unevenly distributed across size groups (only two small firms in Indonesia have nonmissing sales), the consistency of the results across countries is striking. On average, based on the Informal sample, the productivity of small firms in the Enterprise Survey is around 154, 180, or 314 percent higher than for unregistered firms depending on whether we look at value added, sales per employee, or real output per employee, respectively. Similarly, based on the Micro sample, the productivity wedge between small firms in the Enterprise Survey and unregistered firms is 104, 124, or 234 percent depending on whether we look at value added, sales per employee, or real output per employee, respectively.

Third, big firms are significantly more productive than small ones. Continuing with the example of India in 2006, the productivity wedge between big and small firms in the control group for the Micro sample is 68 percent for value added, 35 percent for sales per employee, and 271 percent for real output per employee. This large heterogeneity in firm productivity is

consistent with work by Hsieh and Klenow showing sizable gaps in the marginal products of labor and capital across plants within narrowly defined industries in China and India.[45] On average, depending on the measure and the sample, productivity of big firms is between 59 and 280 percent higher than that of small ones.

The cumulative effect of these productivity differences is large. Returning to the example of India in 2006, big firms are 139 to 428 percent more productive than unregistered firms. On average, the productivity wedge between big and unregistered firms in the Informal sample is 212 percent for value added, 243 percent for sales per employee, and 575 percent for real output per employee. The numbers for the Micro sample are of the same order of magnitude: 171 percent for value added, 209 percent for sales per employee, and 519 percent for real output per employee.

To illustrate what these differences in productivity mean in practice, consider the average unregistered Micro Survey firm in India. It has sales of $2,420 per employee and value added of $1,279 per employee. In contrast, an average small firm in the control group has sales of $12,285 per employee and value added of $4,335 per employee. If the unregistered firm could achieve the value added of a small Enterprise Survey firm simply by registering, would it choose to do that? By assumption, changing its legal status would generate $3,056 (= $4,335 − $1,279) in additional cash flow per employee. However, the firm would have to pay registration fees and taxes as well as comply with regulations. The registration fee—including the value of the entrepreneurs' time—would probably amount to roughly $400.[46] The firm would also need to pay labor taxes (17 percent of wages), corporate taxes (35 percent of profits), and value-added taxes (12.5 percent of profits).[47] Recall that our value-added estimates are based on expenditure on energy and materials and do not exclude labor costs. To keep things simple, assume that wages are 20 percent of sales ($2,457) and that there are no additional costs. Moreover, to bias the example against the firm choosing to register, assume that the firm would evade all taxes if unregistered but comply fully if registered. Under these assumptions, the firm would owe additional payments of $418 (= 0.17 × $2,457) in labor taxes, $657 in corporate taxes (= 0.35 × [$4,335 − $2,457]), and value-added tax of $235 (= 0.125 × [$4,335 − $2,457]), for a total of $1,710 per employee in taxes and fees. In this back-of-the-envelope calculation, the firm would pocket $1,346 (= $3,056 − $1,710) per employee by registering.

45. Hsieh and Klenow (2007).
46. Djankov and others (2002).
47. Djankov and others (2008b).

Of course, the gains would be even larger if the unregistered firm could, merely by registering, replicate the value added per employee of big firms in the control group. On average, such firms have value added per employee of $8,715 on sales per employee of $20,301. Calculations similar to the preceding ones suggest that the unregistered firm would gain $4,135 per employee if, simply by registering, it could replicate the value added per employee of big firms.

A similar set of calculations illustrates that unregistered entrepreneurs can simply not afford to pay taxes unless sales sharply increase from merely registering. Assuming wages equal 20 percent of sales ($484), the average unregistered firm has a pre-tax profit per employee of $795 (= $1,279 – $484) and owes taxes of $460 per employee.[48] Unless sales dramatically increased as a result of registering, the average unregistered firm would have considerable difficulty paying $400 to register.

In practice, these calculations mean that believers in the romantic view need to blame the precarious existence of unregistered firms on something beyond costly entry procedures and high tax rates. Given the very large difference in productivity between unregistered firms and the control group, the cost of complying with government regulations would have to be implausibly high to justify operating as an unregistered firm. A more realistic scenario is that—consistent with the dual view—unregistered firms would not be able to achieve the performance of small firms in the control group just by registering. Perhaps, for example, unregistered firms lack the human capital necessary to match the quality of the goods produced by formal firms. The image of unregistered firms that is consistent with their observed productivity is not that of predators but rather that of relics of the past.

What accounts for the large difference in productivity between unregistered firms and the control group? We begin by running simple ordinary least squares (OLS) regressions and discuss self-selection issues later. In principle, the productivity differences that we document in tables 13 and 14 could be driven by industry effects, by differences in inputs (including human capital), or by differences in size. The goal of these regressions is to examine whether unregistered firms remain unusually unproductive after we control for these factors. In simple terms, we interpret the estimated coefficient on the unregistered dummy as a measure of our ignorance regarding the production function of unregistered firms. Omitting the unregistered dummy would not mean that unregistered firms are as pro-

48. Such a firm would owe $82 in labor taxes (= 0.17 × $484), $278 in corporate taxes (= 0.35 × [$1,279 – $484]), and $99 in value-added taxes (= 0.125 × [$1,279 – $484]).

ductive as registered ones, but that differences in productivity are captured by differences in inputs, as in Rauch's selection story.[49]

All specifications include dummy variables equaling 1 under the following conditions: the firm is in the Informal Survey; the firm is registered and in the Informal Survey; the firm is in the Micro Survey; and the firm is registered and in the Micro Survey. Firms in the Enterprise Survey are the omitted category. We then add to the regression—one at a time—log income per capita, eight industry dummies, expenditure on raw materials, expenditure on energy, expenditure on machines, the index of manager education, and log sales.[50] All three expenditure variables are scaled by the number of employees.

Table 15 reports the results of OLS regressions in which log value added per employee is the dependent variable. Tables 16 and 17 show similar regressions for log sales and real output per employee, respectively. All three sets of results are qualitatively similar. We discuss the findings on value added in some detail and point out where the results for sales and real output per employee differ. The first regression reported in each table includes as independent variables only the dummies for whether the firm is in the Informal Survey sample or in the Micro Survey sample and the interactions between each of those two variables and whether the firm is registered.

The results confirm the findings in tables 13 and 14. The estimated coefficients in column 15-1 of table 15 are −1.78 for the Informal sample dummy and −1.29 for the Micro sample dummy. The coefficients for the interactions of the Informal and the Micro dummies with whether the firm is registered equal 0.81 and 0.35, respectively. All four dummies are highly statistically significant. Adding GDP per capita to the regression (column 15-2) does not change the basic pattern. Similarly, the estimated coefficients for the four dummies barely change as we add industry controls (column 15-3). The coefficients do change when we add expenditure on raw materials: the estimated coefficients for each of the four dummies are roughly cut in half (column 15-4). Adding expenditure on energy further lowers the estimated coefficients on the four dummies, but not significantly (column 15-5). The four coefficients barely change as we add expenditure on machinery (column 15-6). The coefficients for expenditure on raw materials, energy, and machines are not only statistically significant but also economically important. For example, increasing raw materials by

49. Rauch (1991).

50. Errors are clustered at the country level. We do not include country fixed effects since the frequency of unregistered firms in our sample may not reflect the incidence of unregistered firms in the population.

Table 15. Regressions Explaining Value Added per Employee[a]

	Regression							
Independent variable	*15-1*	*15-2*	*15-3*	*15-4*	*15-5*	*15-6*	*15-7*	*15-8*
Informal Survey dummy	−1.7788***	−1.7894***	−1.8135***	−0.8875***	−0.7075***	−0.6901***	−0.5574***	0.1247
	(0.1455)	(0.1265)	(0.1160)	(0.1788)	(0.1517)	(0.1543)	(0.1597)	(0.1225)
Informal Survey dummy	0.8077***	0.6241***	0.5906***	0.3032**	0.1612	0.1705	0.1281	0.2948***
× registered	(0.2476)	(0.1499)	(0.1204)	(0.1449)	(0.1223)	(0.1237)	(0.1226)	(0.0939)
Micro Survey dummy	−1.2910***	−1.2810***	−1.2488***	−0.7925***	−0.6626***	−0.5711***	−0.4746***	0.3720***
	(0.1464)	(0.0963)	(0.1035)	(0.1127)	(0.1256)	(0.1218)	(0.1133)	(0.0660)
Micro Survey dummy	0.3454***	0.3763***	0.3115***	0.1821***	0.1510***	0.1387***	0.0986**	−0.0728
× registered	(0.0368)	(0.0436)	(0.0330)	(0.0350)	(0.0467)	(0.0418)	(0.0398)	(0.0527)
Log of GDP per capita		0.3960***	0.4279***	0.3272**	0.2985**	0.2739**	0.2665**	0.0584
(at PPP)		(0.1164)	(0.1333)	(0.1184)	(0.1166)	(0.0983)	(0.0966)	(0.0760)
Log of expenditure on raw				0.2873***	0.2140***	0.2034***	0.1977***	0.0381
materials per employee				(0.0509)	(0.0491)	(0.0489)	(0.0483)	(0.0392)
Log of expenditure on					0.2059***	0.1909***	0.1834***	0.1093***
energy per employee					(0.0348)	(0.0317)	(0.0326)	(0.0303)
Log of expenditure on						0.0570***	0.0544***	0.0078
machines per employee						(0.0102)	(0.0100)	(0.0112)
Manager education							0.0986***	−0.0231
(4 = attended college)							(0.0292)	(0.0160)
Log of sales								0.4204***
								(0.0564)
Industry dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.2615***	6.1996***	5.7435***	4.0303***	3.6547***	3.7987***	3.6445***	1.9736***
	(0.1389)	(0.9186)	(1.0810)	(0.9428)	(0.9646)	(0.8459)	(0.8393)	(0.6059)
Adjusted R^2 (percent)	24.19	28.07	29.90	43.13	46.83	47.94	48.47	64.00

Source: Authors' regressions.

a. Results of ordinary least squares regressions on data from the 27 countries covered by the Informal and Micro Surveys. The dependent variable is the logarithm of value added per employee at purchasing power parity. The number of observations in all regressions is 8,478. Standard errors are clustered at the country level and reported in parentheses. Asterisks indicate statistical significance at the *10 percent, **5 percent, and ***1 percent level.

Table 16. Regressions Explaining Sales per Employee[a]

	Regression							
Independent variable	*16-1*	*16-2*	*16-3*	*16-4*	*16-5*	*16-6*	*16-7*	*16-8*
Informal Survey dummy	–1.9768***	–1.9861***	–1.9875***	–0.5355***	–0.3742**	–0.3625**	–0.2536	0.3420**
	(0.1395)	(0.1190)	(0.1173)	(0.1783)	(0.1468)	(0.1442)	(0.1548)	(0.1349)
Informal Survey dummy	0.7707***	0.6036***	0.5618***	0.1077	–0.0215	–0.0155	–0.0501	0.0916
× registered	(0.2493)	(0.1560)	(0.1211)	(0.1797)	(0.1615)	(0.1601)	(0.1620)	(0.1069)
Micro Survey dummy	–1.4258***	–1.4163***	–1.3843***	–0.6690***	–0.5474***	–0.4840***	–0.4048***	0.3288***
	(0.1389)	(0.1087)	(0.1151)	(0.1002)	(0.1126)	(0.1107)	(0.1018)	(0.0515)
Micro Survey dummy	0.4048***	0.4335***	0.3677***	0.1634***	0.1350***	0.1265***	0.0937***	–0.0554**
× registered	(0.0447)	(0.0423)	(0.0532)	(0.0292)	(0.0326)	(0.0328)	(0.0314)	(0.0217)
Log of GDP per capita		0.3685***	0.4094***	0.2533***	0.2271***	0.2101***	0.2040***	0.0233
(at PPP)		(0.0903)	(0.1081)	(0.0762)	(0.0736)	(0.0605)	(0.0590)	(0.0420)
Log of expenditure on raw				0.4536***	0.3835***	0.3759***	0.3713***	0.2300***
materials per employee				(0.0509)	(0.0479)	(0.0478)	(0.0475)	(0.0449)
Log of expenditure on					0.1934***	0.1829***	0.1768***	0.1126***
energy per employee					(0.0331)	(0.0313)	(0.0322)	(0.0273)
Log of expenditure on						0.0400***	0.0380***	–0.0031
machines per employee						(0.0088)	(0.0086)	(0.0096)
Manager education							0.0807***	–0.0256
(4 = attended college)							(0.0247)	(0.0155)
Log of sales								0.3675***
								(0.0485)
Industry dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.0297***	7.1802***	6.6180***	3.8967***	3.5466***	3.6473***	3.5206***	2.0659***
	(0.1430)	(0.7136)	(0.8958)	(0.6490)	(0.6878)	(0.6190)	(0.6062)	(0.3207)
Adjusted R^2 (percent)	28.95	32.20	34.72	68.86	70.06	70.60	70.94	82.59

Source: Authors' regressions.

a. Results of ordinary least squares regressions on data from the 27 countries covered by the Informal and Micro Surveys. The dependent variable is the logarithm of sales per employee at purchasing power parity. The number of observations in all regressions is 8,564. Standard errors are clustered at the country level and reported in parentheses. Asterisks indicate statistical significance at the *10 percent, **5 percent, and ***1 percent level.

Table 17. Regressions Explaining Real Output per Employee[a]

	Regression							
Independent variable	*17-1*	*17-2*	*17-3*	*17-4*	*17-5*	*17-6*	*17-7*	*17-8*
Informal Survey dummy	−3.9489***	−3.9681***	−3.9265***	−1.6477***	−1.3877***	−1.3577***	−1.0464***	0.3713**
	(0.2373)	(0.1678)	(0.1992)	(0.2838)	(0.2387)	(0.2307)	(0.2412)	(0.1343)
Informal Survey dummy × registered	1.1202***	0.7732***	0.7754***	0.0627	−0.1455	−0.1301	−0.2290	0.1083
	(0.3540)	(0.1764)	(0.1682)	(0.2821)	(0.2535)	(0.2387)	(0.2425)	(0.1122)
Micro Survey dummy	−3.1495***	−3.1298***	−3.1033***	−1.9807***	−1.7847***	−1.6211***	−1.3948***	0.3514***
	(0.2743)	(0.1637)	(0.1765)	(0.1908)	(0.2106)	(0.2069)	(0.1814)	(0.0486)
Micro Survey dummy × registered	0.7682***	0.8279***	0.7794***	0.4588***	0.4130***	0.3911***	0.2974***	−0.0575**
	(0.0945)	(0.0786)	(0.0972)	(0.0585)	(0.0580)	(0.0643)	(0.0663)	(0.0243)
Log of GDP per capita (at PPP)		0.7650***	0.7877***	0.5428***	0.5006***	0.4567***	0.4393***	0.0093
		(0.1502)	(0.1856)	(0.1343)	(0.1311)	(0.0987)	(0.0945)	(0.0399)
Log of expenditure on raw materials per employee				0.7118***	0.5989***	0.5794***	0.5662***	0.2297***
				(0.0820)	(0.0775)	(0.0769)	(0.0751)	(0.0459)
Log of expenditure on energy per employee					0.3117***	0.2848***	0.2671***	0.1144***
					(0.0538)	(0.0494)	(0.0515)	(0.0284)
Log of expenditure on machines per employee						0.1032***	0.0973***	−0.0005
						(0.0147)	(0.0151)	(0.0097)
Manager education (4 = attended college)							0.2307***	−0.0224
							(0.0595)	(0.0152)
Log of sales								0.8749***
								(0.0505)
Industry dummies	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Constant	16.7985***	10.8838***	10.4597***	6.1889***	5.6246***	5.8843***	5.5221***	2.0591***
	(0.2667)	(1.2225)	(1.5417)	(1.1699)	(1.2260)	(1.0445)	(1.0103)	(0.3085)
Adjusted R^2 (percent)	28.95	32.20	34.72	68.86	70.06	70.60	70.94	82.59

Source: Authors' regressions.

a. Results of ordinary least squares regressions on data from the 27 countries covered by the Informal and Micro Surveys. The dependent variable is the logarithm of real output per employee at purchasing power parity. The number of observations in all regressions is 8,564. Standard errors are clustered at the country level and reported in parentheses. Asterisks indicate statistical significance at the *10 percent, **5 percent, and ***1 percent level.

1 standard deviation is associated with a 43 percent increase in value added per employee.[51] Similar increases in expenditure on energy and machines have somewhat smaller effects (32 and 16 percent, respectively). Coefficients fall another notch when we add manager education to the regression (column 15-7). Interestingly, ignoring selection issues, the estimated coefficient on manager education suggests that a top manager with some college education increases value added per employee by 27 percent ($= 0.09 \times 3$) relative to a top manager with only some primary school education. Finally, there is no evidence that unregistered firms are unusually unproductive once we control for log sales: the estimated coefficients on both the Informal and the Micro dummies switch signs when we add log sales to the regression (column 15-8). In fact, the coefficient on the Micro dummy is not only positive but also significant. The interaction between the registration dummy and the Informal dummy is the only interaction term that remains statistically significant.

Again, the results on sales and real output per employee (tables 16 and 17, respectively) are very similar to those for value added. In the full specification, the estimated coefficients for both the Informal and the Micro dummies are positive and significant. The interaction between the registered and the Informal dummies is insignificant, whereas that between the registered and the Micro dummies takes a small—but statistically significant—negative value.

Selection

The OLS results in this section suggest that unregistered firms are not unusually unproductive once we take into account their expenditure on inputs, the human capital of their top managers, and their small size. Of course, these are all endogenous variables. In fact, a key distinguishing factor between the dual view and the other views of unregistered firms is the emphasis on the sorting process that matches able managers with good assets. High-quality managers are willing to pay taxes and bear the cost of government regulation in exchange for being able to advertise their products, raise outside capital, and access public goods. In contrast, low-quality managers avoid taxes and regulations, since the benefits of operating in the formal economy are less valuable for small firms.

Table 18 examines the sorting process. Specifically, we examine the relationship between the quality of the firm's assets and the human capital

51. The standard deviations for raw materials, energy, and machines are 2.11, 1.66, and 2.83, respectively.

Table 18. Probit and OLS Regressions Investigating Manager Ability and Self-Selection[a]

	Independent variables							
	Dummy for highest level of education attended by top manager							
Dependent variable	*Secondary*	*Vocational*	*College*	*Log of GDP per capita*	*Constant*	*No. of observations*	*Pseudo-*R^2 *or* R^2 *(percent)*	F-*test*[b]
				Probit regressions				
Firm is registered with central government	0.2064*** (0.0420)	0.2090*** (0.0452)	0.4096*** (0.0449)	–0.0029 (0.0555)	. . . . .	5,478	10.07	96.54***
Firm has ever had a commercial loan	–0.0250 (0.0254)	0.0115 (0.0369)	–0.0521 (0.0548)	0.0415 (0.0379)	. . . . .	3,763	2.75	2.81
Firm's main customers are large firms	0.0361*** (0.0060)	0.0349*** (0.0110)	0.0323** (0.0152)	0.0037 (0.0054)	. . . . .	2,869	9.14	78.08***
Firm occupies a permanent structure	0.0397 (0.0468)	0.0954** (0.0434)	0.0778 (0.0538)	–0.0762*** (0.0265)	. . . . .	1,429	4.22	4.64
Firm is located in owner's house	0.0561*** (0.0210)	0.0868** (0.0355)	0.0076 (0.0249)	–0.0258 (0.0253)	. . . . .	1,439	2.31	36.87***
Firm owns building it occupies	0.0847 (0.0527)	0.0863 (0.0691)	0.1118** (0.0542)	0.0167 (0.0466)	. . . . .	5,682	3.03	4.75
Firm owns land it occupies	0.0497 (0.0453)	0.0352 (0.0539)	0.0982** (0.0490)	0.0197 (0.0369)	. . . . .	11,760	5.82	6.11
Firm uses its own transportation equipment	0.0031 (0.0510)	0.1265** (0.0574)	0.1184*** (0.0284)	0.0097 (0.0216)	. . . . .	1,438	3.33	78.56***
Firm owns a generator	0.1280*** (0.0455)	0.1390** (0.0550)	0.3675*** (0.0454)	–0.1349*** (0.0464)	. . . . .	12,794	13.01	75.84***

Firm uses e-mail to communicate with clients	0.1662*** (0.0460)	0.2309*** (0.0453)	0.4799*** (0.0438)	0.1495** (0.0736)	. . . . .	11,081	21.62	158.61***
Firm uses website to communicate with clients	0.1159*** (0.0353)	0.1676*** (0.0361)	0.2574*** (0.0274)	0.1358** (0.0648)	. . . . .	11,044	16.91	61.46***
Firm has electrical connection	0.1837*** (0.0503)	0.1901*** (0.0579)	0.2833*** (0.0597)	−0.0200 (0.0517)	. . . . .	1,439	12.82	33.1***
			OLS regressions					
Percent of investment financed with internal funds	0.9852 (3.6083)	−2.9315 (1.9982)	−10.1707*** (2.1024)	−5.3383** (1.9468)	111.3720*** (14.7773)	13,006	5.10	35.06***
Expenditure on raw materials as percent of sales	0.0378*** (0.0130)	0.0338** (0.0147)	0.0874*** (0.0193)	−0.0080 (0.0154)	0.4461*** (0.1340)	11,966	3.83	11.32***
Expenditure on energy as percent of sales	−0.0015 (0.0039)	−0.0040 (0.0041)	−0.0077 (0.0047)	−0.0035 (0.0040)	0.0747** (0.0302)	12,546	1.72	1.78
Expenditure on machines as percent of sales	−0.0047 (0.0040)	0.0162*** (0.0052)	0.0019 (0.0041)	−0.0023 (0.0046)	0.0432 (0.0361)	12,577	3.26	7.91***
Capacity utilization (percent)	0.6230 (1.0430)	1.0456 (1.8476)	5.4810*** (1.3208)	1.5761 (1.1737)	57.7676*** (10.6062)	9,380	4.18	7.15***

Source: Authors' regressions.

a. Marginal effects of probit (top panel) or OLS (bottom panel) regressions on data from the 27 countries included in the Informal and Micro Surveys. All regressions include industry dummies. Robust standard errors are clustered at the country level and presented in parentheses. Asterisks indicate statistical significance at the *10 percent, **5 percent, and ***1 percent level.

b. Test of the null hypothesis that true coefficients on all three top-manager education dummies are zero.

of its top manager—our only proxy for managers' ability. The dependent variables fall into two categories: dummy variables (top panel, which reports probit regressions) and continuous variables (bottom panel, OLS regressions). The dummy variables include indicators for whether the firm is registered; the firm has ever had a loan; the firm's main customers are large firms; the firm occupies a permanent structure; the firm is located in the owner's house; the firm owns the building it occupies; the firm owns the land it occupies; the firm uses its own transportation equipment; the firm owns a generator; the firm uses e-mail to communicate with clients; the firm uses a website to communicate with clients; and the firm has an electrical connection. The five continuous variables are the percentage of investment that is financed internally; expenditure on raw materials as a fraction of sales; expenditure on energy as a fraction of sales; expenditure on machines as a fraction of sales; and capacity utilization. All regressions control for income per capita and include eight industry dummies.

Many—but not all—of the correlations in table 18 are consistent with sorting on managers' ability. Firms with more-educated managers are more likely to be registered, to sell mainly to large firms, to use their own transportation equipment, to own a generator, to communicate with clients through e-mail, to have a webpage, and to have an electrical connection. Along the same lines, managers who attended college are more likely to work for firms that own land and buildings. Firms with more-educated managers also use more raw materials and operate with higher capacity utilization. The economic significance of these coefficients is large. The probability of being registered increases by 41 percentage points if the top manager has some college education rather than only some primary school education. Having a top manager with some college education also has large effects on the probability of having a generator (+36.7 percentage points), the probability of using e-mail (+48.0 percentage points), the probability of having a webpage (+25.7 percentage points), and the probability of having an electrical connection (+28.3 percentage points). In contrast, the effect is moderate on the probability that the firm's main buyers are large firms (+3.2 percentage points), the probability of owning a building (+11.2 percentage points), the probability of owning land (+9.8 percentage points), and the probability of owning transportation equipment (+11.8 percentage points). Similarly, having a top manager with some college education increases expenditure on raw materials by a modest 8.7 percentage points (the standard deviation is 23.3 percent) and capacity utilization by 5.5 percentage points (the standard deviation is 21.4 percent).

The evidence on external finance is mixed. On the one hand, firms with more-educated managers rely more on external finance (bottom panel of table 18). On the other hand, the education of managers does not significantly affect the probability that the firm has ever had a loan (top panel). The evidence on investment in machines is also weak: in that regression the only significant coefficient is the one for vocational schooling. Nor is there evidence that expenditure on energy increases with managers' education. Only one regression has statistically significant coefficients with the "wrong" sign: the likelihood that the firm operates in the house of the owner is higher when managers have attended secondary or vocational school rather than primary school only.

These results suggest an explanation for the puzzlingly low productivity of unregistered firms. The productivity gap between registered firms and the control group disappears once we take into account crude proxies for physical and human capital and control for size. Of course, size is an endogenous variable. These results on manager selection are broadly consistent with the view that part of the reason that unregistered firms are small is that they are run by managers of low ability.[52] These managers do not find it worthwhile to pay the cost of running a formal firm. Unregistered firms are small because they are run by less able managers and, as such, face a high cost of capital, have few opportunities to advertise their products, and are of insufficient scale to own critical assets such as generators and computers.

Obstacles to Doing Business

As a final step, we present information on obstacles to doing business as reported by respondents in the Informal, Micro, and Enterprise Surveys. All obstacles are reported on a 0-to-4 scale for their perceived significance, with 0 representing "no obstacle," 1 "minor obstacle," 2 "moderate obstacle," 3 "major obstacle," and 4 "very severe obstacle." In table 19 we compare average responses about various obstacles for Informal Survey firms (top panel) and their Enterprise Survey counterparts, as well as for Micro Survey firms and their control group (bottom panel).

Starting with the Informal Survey, the most striking finding is the similarity in many responses between the registered Informal Survey firms and the Enterprise Survey firms. Both groups consider tax rates and tax administration their most significant problems. Registered Informal Survey firms,

52. Rauch (1991).

Table 19. Obstacles to Doing Business in the Informal and Micro Survey Samples

Index, 4 = very severe obstacle

	Informal Survey sample			*Enterprise Survey control group*				*Difference*[b]			
Obstacle[a]	*Unregistered*	*Registered*	*All*	*Small*	*Medium*	*Big*	*All*	*Enterprise v. informal*	*Registered v. unregistered*	*Small v. unregistered*	*Big v. small*
Access to or availability of markets	2.05	2.38	2.07	. . .	. . .	. . .	. . .	. . .	0.33	. . .	. . .
Tax rates	1.59	2.14	1.65	2.13	2.33	2.50	2.33	0.68**	0.55	0.54	0.37
Tax administration	1.40	2.05	1.46	1.79	2.14	2.37	2.05	0.59**	0.65*	0.39	0.58**
Cost of financing	2.19	2.37	2.25	1.99	2.25	2.30	2.20	–0.05	0.17	–0.20	0.31
Corruption	1.53	1.93	1.59	2.06	2.28	2.27	2.17	0.57**	0.40	0.53	0.21
Macroeconomic instability[c]	1.75	1.98	1.80	1.89	2.05	2.13	1.95	0.15	0.23	0.14	0.23
Electricity supply	1.74	1.70	1.74	1.85	1.94	2.12	1.92	0.18	–0.04	0.11	0.27
Anticompetitive or unfair practices by other businesses	1.74	2.16	1.78	1.74	1.98	2.11	1.94	0.16	0.42*	0.00	0.37
Economic policy uncertainty	1.72	1.96	1.75	2.08	2.20	2.10	2.07	0.33	0.24	0.36	0.02
Customs and trade regulations	1.00	1.51	1.06	1.24	1.61	2.09	1.53	0.46**	0.51	0.25	0.85***
Access to financing	2.29	2.46	2.32	1.95	1.92	1.83	1.83	–0.49**	0.17	–0.33	–0.12
Legal system, conflict resolution	1.04	1.33	1.07	1.10	1.47	1.78	1.24	0.17	0.29	0.06	0.67**
Labor regulations	0.84	1.20	0.91	0.99	1.27	1.75	1.17	0.26	0.36	0.15	0.76***
Crime, theft, and disorder	1.48	1.61	1.49	1.59	1.76	1.71	1.57	0.07	0.12	0.11	0.12
Skills and education of available workers	1.15	1.46	1.23	1.15	1.44	1.67	1.30	0.07	0.31	–0.01	0.52***
Transportation[d]	1.37	1.47	1.36	1.16	1.38	1.57	1.33	–0.04	0.11	–0.20	0.41**
Procedures to register firms, formalities, patents, etc.	1.26	1.64	1.49	1.20	1.21	1.42	1.12	–0.37	0.37	–0.06	0.23
Telephone, fax, e-mail	1.00	0.84	0.99	0.85	0.94	1.32	0.99	0.00	–0.16	–0.15	0.47**
Access to land	1.46	1.70	1.48	0.98	1.05	1.27	0.95	–0.53**	0.24	–0.47*	0.28
Postal services	0.07	0.00	0.06	. . .	. . .	. . .	. . .	. . .	–0.07	. . .	. . .

Obstacle[a]	Micro Survey sample			Enterprise Survey control group				Difference			
	Unregistered	Registered	All	Small	Medium	Big	All	Enterprise v. micro	Registered v. unregistered	Small v. unregistered	Big v. small
Electricity supply	1.96	1.99	1.98	2.24	2.43	2.69	2.30	0.32	0.03	0.27	0.45
Tax rates	1.35	1.69	1.59	1.75	1.90	1.84	1.78	0.19	0.34	0.40*	0.09
Access to financing	2.40	2.33	2.37	2.02	1.91	1.73	1.98	–0.39**	–0.06	–0.37	–0.29
Skills and education of available workers	0.51	0.63	0.60	0.92	1.17	1.64	1.02	0.41***	0.12	0.41***	0.72***
Macroeconomic instability[c]	1.38	1.67	1.63	1.47	1.51	1.53	1.50	–0.14	0.28	0.09	0.06
Tax administration	0.94	1.20	1.13	1.23	1.41	1.48	1.28	0.15	0.26	0.30*	0.25
Anticompetitive or unfair practices by other businesses	1.54	1.43	1.47	1.40	1.46	1.48	1.41	–0.06	–0.12	–0.14	0.08
Transportation[d]	1.34	1.30	1.31	1.23	1.25	1.40	1.25	–0.06	–0.04	–0.11	0.18
Corruption	1.09	1.06	1.07	1.20	1.46	1.37	1.27	0.20	–0.02	0.11	0.17
Crime, theft, and disorder	1.18	1.12	1.18	1.18	1.19	1.32	1.20	0.02	–0.06	0.01	0.14
Customs and trade regulations	0.55	0.82	0.76	0.79	1.20	1.22	0.91	0.15	0.27*	0.24*	0.43***
Cost of financing	. . .	. . .	. . .	0.99	1.02	1.12	1.01	. . .	. . .	. . .	0.14
Procedures to register firms, formalities, patents, etc.	1.22	1.11	1.10	1.00	1.08	1.00	1.01	–0.09	–0.12	–0.23	0.01
Labor regulations	0.34	0.33	0.34	0.49	0.74	0.99	0.57	0.24**	–0.01	0.15*	0.50***
Legal system, conflict resolution	0.38	0.44	0.43	0.55	0.68	0.98	0.60	0.17	0.07	0.17	0.43***
Economic policy uncertainty	0.88	0.92	0.96	1.02	1.11	0.96	1.05	0.08	0.04	0.14	–0.05
Access to land	1.44	1.14	1.22	1.06	0.90	0.89	1.02	–0.20*	–0.29	–0.38**	–0.17
Telephone, fax, e-mail	0.56	0.71	0.67	0.70	0.81	0.86	0.74	0.08	0.15	0.14	0.16

Sources: World Bank Informal, Micro, and Enterprise Surveys; authors' calculations.

a. All obstacles are reported on a 0-to-4 scale, with 0 indicating "no obstacle," 1 "minor obstacle," 2 "moderate obstacle," 3 "major obstacle," and 4 "very severe obstacle."

b. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

c. High inflation, exchange rate instability, etc.

d. Poor road quality, road blockages, difficulty finding ways to transport goods, etc.

like Enterprise Survey firms, regard the cost of financing and access to financing as major obstacles as well. Neither the Informal Survey firms nor the Enterprise Survey firms consider access to land, registration procedures, crime, low workforce skills, labor regulations (with the exception of big firms), or the legal system to be major obstacles to doing business (again with the exception of big firms).

There are some significant differences as well. Informal Survey firms consider access to or availability of markets to be a huge problem. The unregistered Informal Survey firms do not consider taxes or tax administration to be a huge problem, in obvious contrast to the registered firms. Corruption is a smaller problem for the unregistered firms than for the registered ones. Indeed, both tax administration and corruption are perceived as more serious obstacles by big firms than by small ones (but only differences in the perception of tax administration as an obstacle are statistically significant).

We can also use the information on obstacles to shed light on the parasite theory of the informal economy. Unfortunately, the question asked in the surveys is not ideal. Respondents assess on a 0-to-4 scale whether "anticompetitive and informal practices" are an obstacle to their business. Of course, anticompetitive practices can come not only from the informal firms, but also from formal firms with political or other connections. Nevertheless, several points emerge from these data. First, contrary to the parasite view, "anticompetitive and informal" practices are not among the key obstacles perceived by managers of firms in either the Informal Survey firms (the average score is 1.78) or their Enterprise Survey control group (1.94).[53] Second, the answer is only slightly higher for the Enterprise Survey firms than for the Informal Survey firms, which is not consistent with the view that the informal firms undercut the formal ones. Third, one might have guessed that it is the small registered firms in the Enterprise Survey that would be most severely affected by the informal firms. However, these firms perceive anticompetitive and informal practices to be a smaller problem, on average, than do the larger firms. None of this evidence is supportive of the parasite theory. The patterns in the Micro Survey are similar to those in the Informal Survey (except that some of the questions differ). Access to financing and electricity emerge as by far the greatest

53. Among big firms, concern over "anticompetitive or informal practices" ranks after concerns over tax rates, tax administration, cost of financing, corruption, macroeconomic instability, and electricity. On the other hand, it ranks ahead of, among other things, concerns over economic policy uncertainty, customs and trade regulations, access to financing, and crime, theft, and disorder.

obstacles to Micro Survey firms. These are also huge obstacles for their counterpart Enterprise Survey firms, along with tax rates. Finally, anti-competitive and informal practices are not among the top obstacles for firms in the Micro Survey.

A final piece of evidence comes from the Informal Survey, which only in Cape Verde asked respondents about the benefits of and obstacles to registering. The findings are summarized in table 20. The main benefits of registering are improved access to markets, to services, and to financing—findings broadly consistent with the previous findings about the obstacles to doing business faced by informal firms. Better property rights and lower need to pay bribes are not nearly as important. On the cost side, the main obstacles to registration are taxes and the cost of registering (along with

Table 20. Advantages and Obstacles to Registering in Cape Verde

Advantage or obstacle	*Percent of firms rating the advantage as very important or the obstacle as either major or extremely important*[a]
Advantages	
Better access to markets	44
Better access to services	39
Better access to financing	39
Better access to raw materials	34
Easier to bargain with formal enterprises	25
Easier to reduce theft by employees or others	23
Better access to government subsidies	20
More solid legal basis for property rights regarding real estate	20
Less turnover of employees or better product market competition	18
Less need to pay bribes	15
Obstacles	
Financial burden of taxes applicable to registered firms	43
Cost of registering	38
Difficulties in obtaining information about how to register	36
Minimum capital legally required to register	32
Administrative burden of complying with tax laws	32
Time necessary to register	19
Labor regulations applicable to registered firms	19
Other administrative burdens	18

Sources: World Bank Informal Survey for Cape Verde; authors' calculations.

a. Advantages are rated on a scale from 1 ("minor advantage") to 4 ("very important"). Obstacles are rated on a 0-to-4 scale, with 0 indicating "unimportant," 1 "minor obstacle," 2 "moderate obstacle," 3 "major obstacle," and 4 "extremely important."

the difficulty of obtaining information about how to register). Labor regulation and tax compliance are seen as much less important. Here as well, the picture that emerges is one in which the formal firms have better access to markets, services, and finance, and hence can be much more productive, but need to pay taxes. Presumably, for the Cape Verde firms in the Informal Survey, the tax price is too high to justify registration.

The evidence on obstacles further supports the dual theory and seems rather inconsistent with the parasite theory. Between their extreme inefficiency and their operation in very different markets, informal firms do not appear to pose much of a threat to formal firms, at least as perceived by the latter. Informal firms clearly recognize the many benefits of being official, including access to markets and to finance (although it is far from clear that they would gain the latter even if they registered). They do not seem to think that regulation and the cost of registration are the biggest obstacles to registration. On the other hand, they do see taxes as a huge problem. In this respect the results are consistent with the dual theory, as well as with the findings reported in the first section and by Djankov and coauthors.[54]

Conclusion

Our most basic finding is that high productivity comes from formal firms, and in particular from large formal firms. Productivity is much higher in small formal firms than in informal firms, and it rises rapidly with the size of formal firms. To the extent that productivity growth is central to economic development, the formation and growth of formal firms are necessary for economic growth.[55]

Formal firms appear to be very different animals from informal firms, and this fact accounts for their sharply superior productivity. Perhaps most important, they are run by much better educated managers. As a consequence, besides being larger, they tend to use more capital, have different customers, and market their products and use external finance to a greater extent than do informal firms. There is no evidence that informal firms tend to become formal as they grow. Rather, virtually none of the formal firms in our sample had ever been informal. Consistent with this result, Miriam Bruhn shows that business registration reform had a large effect on new registrations in Mexico, but that the new official entrants were former

54. Djankov and others (2008b).
55. See also Lewis (2004); Banerjee and Duflo (2005).

wage earners rather than informal entrepreneurs.[56] Similarly, Mondragón-Vélez and Peña-Parga find surprisingly little transition between self-employment and business ownership in Colombia.[57] It does not appear from the available evidence that informal firms would sharply increase their productivity if only they registered.

This interpretation raises the crucial question of what happens to informal firms as the economy develops. After all, the most basic fact about the informal economy is that its role diminishes sharply as incomes grow. How does this happen? Do informal firms register or do they die? We do not have a definitive answer to this question, but the evidence we have points in the direction of death rather than registration. It is still possible, of course, that a minority of informal firms, and especially the most productive ones, end up joining the formal economy, perhaps by supplying formal firms. But there is no evidence, at least in our data, that this is the typical story. The vast majority of informal firms appear to begin and end their lives as unproductive informal firms.

Informal firms nonetheless play a crucial role in developing economies, where they represent perhaps 30 to 40 percent of all economic activity and provide a livelihood to billions of poor people. Because these firms are so inefficient, taxing them or forcing them to comply with government regulations would likely put most of them out of business, with dire consequences for their employees and proprietors. If anything, strategies that keep these firms afloat and allow them to become more productive, such as microfinance, are probably desirable from the viewpoint of poverty alleviation. But these are not growth strategies: turning these unofficial firms into official ones is unlikely to generate substantial improvements in productivity.

Growth strategies, rather, need to focus on formal firms, especially the larger ones. Reducing the costs of formality, such as registration costs, is surely a good idea, but this is not the whole story. Likewise, some of the almost-standard proposals for development, such as improving land rights, the legal environment, and even the human capital of employees appear to address relatively minor factors, at least from the viewpoint of official entrepreneurs. The main obstacles to the operations of formal firms, according to our data, are three: taxation, uncertain supply of electricity, and lack of adequate access to finance.

To us, the most striking finding is the sharply higher education of managers of official than of unofficial firms, with no corresponding difference

56. Bruhn (2008).
57. Mondragón-Vélez and Peña-Parga (2008).

in the human capital of the employees. This suggests that educational policies, particularly those emphasizing secondary education, might be conducive to the formation of entrepreneurial talent that can run formal firms. We do not mean to suggest that formal education is either a necessary or a sufficient condition for entrepreneurial skills. But the data seem to indicate quite clearly that some aspects of management (for example, marketing and finance) require education. One can also think of other sources of human capital, such as immigration, as supplying the required entrepreneurial talent.

There is growing evidence that corporate income taxation deters investment and formal entrepreneurship. Using a new dataset of corporate income taxes in a large number of countries, Djankov and coauthors find strong evidence that these taxes reduce investment, foreign direct investment, and entrepreneurial activity.[58] Our evidence similarly shows that official firms perceive taxation as the top obstacle to doing business. To the extent that the formation and growth of official firms are the principal engines of development, this perception must be taken seriously. Needless to say, one needs to also think about alternative sources of public finance, as well as the size of government, in developing countries to determine whether corporate income tax cuts are warranted. But the evidence points to a potentially serious problem.

The evidence also suggests that official firms, just like unofficial ones, perceive lack of access to finance to be a serious obstacle to doing business. Recent research has pointed to a broad range of legal and regulatory reforms that can underpin the development of financial markets; in general these reforms seek to improve the legal rights of creditors and (in the case of very large firms) shareholders.[59] Unlike with tax cuts, there seem to be no compelling counterarguments to improving the laws and institutions that support financial markets.

Finally, the evidence indicates that problems with electricity supply, including disruptions, afflict unofficial as well as smaller official firms. This contrasts with an interesting lack of concern on the part of respondents with other limitations of infrastructure, such as transport, telephone, and mail. Most large firms have their own generators, whereas smaller official firms and unofficial firms do not and hence are more vulnerable.

The overall picture of economic development that emerges from this analysis is in many ways similar to the traditional pre-growth theory devel-

58. Djankov and others (2008b).

59. See La Porta, Lopez-de-Silanes, and Shleifer (2008) for a survey.

opment economics, although it is related to the modern reformulations of economic growth through the lens of development economics.[60] The recipe for productivity growth is the formation of official firms—the larger and the more productive, the better. Their formation must perhaps be promoted through tax, human capital, infrastructure, and capital markets policies, very much along the lines of traditional dual economy theories. From the perspective of economic growth, one should not expect much from the unofficial economy, with its millions of entrepreneurs, except to hope that it disappears over time. This "Wal-Mart" theory of economic development receives quite a bit of support from firm-level data.

ACKNOWLEDGMENTS We are grateful to Nicholas Coleman for excellent research assistance, to Jorge Rodriguez Mesa for help with the World Bank surveys, and to Charles Jones, Peter Klenow, James Rauch, Jeremy Stein, and William Nordhaus for helpful comments. This research was supported by the Kauffman Foundation.

60. Banerjee and Duflo (2005).

APPENDIX

Table A1. Correlations among the Main Variables[a]

Correlation coefficients

Variable	*Informal share of GDP from WEF survey*	*Tax evasion*[b]	*Self-employed as share of labor force*	*Informal share of GDP estimated from*		*Registered firms per 1,000 population*	*Procedures necessary to start a business*	*Taxes as percent of profits*	*Hours per year needed to comply with taxes*	*Management time dealing with regulations*
				Electricity consumption	*Multiple indicators*					
Tax evasion[b]	0.25**									
Self-employed as share of labor force	0.70***	0.25**								
Informal share of GDP, from electricity	0.61***	0.35**	0.61***							
Informal share of GDP, multiple indicators	0.70***	0.17	0.47***	0.71***						
Registered firms per 1,000 population	–0.43***	–0.16	–0.46***	–0.21	–0.38***					
Procedures necessary to start a business	0.48***	0.32***	0.37***	0.30**	0.37***	–0.50***				
Taxes as percent of profits	0.16*	0.17*	–0.04	–0.13	0.16*	–0.19*	0.15*			
Hours per year needed to comply with taxes	0.50***	–0.02	0.34***	0.42***	0.37***	–0.42***	0.38***	0.22***		
Management time dealing with regulations	0.43***	0.14	0.26**	0.24	0.20*	–0.06	0.15	0.00	0.20*	
Index of difficulty of hiring a new worker	0.32***	0.05	0.10	0.13	0.34***	–0.10	0.26***	0.11	0.26***	0.24**
Index of difficulty of firing a worker	0.23**	0.01	0.14	0.08	0.20**	–0.25**	0.27***	0.20**	0.32***	0.28***
Nonwage costs as percent of salary	–0.10	–0.16	–0.26***	–0.20	–0.08	0.05	–0.01	0.18**	0.27***	0.02
Steps required to collect on a bounced check	0.36***	0.09	0.25**	0.30**	0.39***	–0.18	0.45***	0.27***	0.36***	0.46***
Efficiency of bankruptcy procedure	–0.64***	–0.32**	–0.59***	–0.46***	–0.57***	0.35***	–0.54***	–0.15	–0.37***	–0.35***

Log of paved roads per km^2	–0.28***	–0.11	–0.24***	–0.22*	–0.20**	0.29***	–0.18**	–0.09	–0.33***	–0.03
Corruption index	–0.84***	–0.32***	–0.67***	–0.58***	–0.71***	0.48***	–0.57***	–0.23***	–0.43***	–0.26*
Rule of law index	–0.85***	–0.29***	–0.68***	–0.58***	–0.72***	0.49***	–0.59***	–0.26***	–0.44***	–0.29***
Private credit as percent of GDP	–0.67***	–0.28***	–0.49***	–0.38***	–0.60***	0.43***	–0.43***	–0.18*	–0.31***	–0.25*
Market capitalization as percent of GDP	–0.54***	–0.16	–0.39***	–0.37***	–0.51***	0.21*	–0.38***	–0.09	–0.36***	–0.19
Log of GDP per capita	–0.77***	–0.34***	–0.77***	–0.66***	–0.66***	0.52***	–0.45***	–0.27***	–0.30***	–0.13

Variable	*Index of difficulty of hiring a new worker*	*Index of difficulty of firing a worker*	*Nonwage costs as percent of salary*	*Steps required to collect on a bounced check*	*Efficiency of bankruptcy procedure*	*Log of paved roads per km^2*	*Corruption index*	*Rule of law index*	*Private credit as percent of GDP*	*Market capitalization as percent of GDP*
Index of difficulty of firing a worker	0.36***									
Nonwage costs as percent of salary	0.21***	0.22***								
Steps required to collect on a bounced check	0.47***	0.38***	0.21*							
Efficiency of bankruptcy procedure	–0.37***	–0.15	–0.10	–0.56***						
Log of paved roads per km^2	–0.12	–0.15*	–0.13	–0.26*	0.29***					
Corruption index	–0.23***	–0.21***	0.08	–0.37***	0.76***	0.29***				
Rule of law index	–0.25***	–0.25***	0.08	–0.39***	0.76***	0.31***	0.96***			
Private credit as percent of GDP	–0.26***	–0.21***	–0.03	–0.39***	0.61***	0.27***	0.74***	0.75***		
Market capitalization as percent of GDP	–0.24*	–0.17*	–0.08	–0.51***	0.52***	0.46***	0.62***	0.59***	0.71***	
Log of GDP per capita	–0.25***	–0.22***	0.21***	–0.22**	0.73***	0.27***	0.83***	0.84***	0.70***	0.52***

Source: Authors' calculations.

a. Asterisks indicate statistically significantly different from zero at the *10 percent, **5 percent, and ***1 percent level.

b. Calculated as 1 minus the share of sales reported for tax purposes.

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Comments and Discussion

COMMENT BY

CHARLES I. JONES This very nice paper is filled with interesting facts about firms in developing countries: about the size of the informal economy (around half that of the formal sector, on average); about the extent of theft among both small and large firms (less than 5 percent of sales); and about the number of days per year that firms face power outages (around 50, even for large firms). The tour through the extensive firm-level surveys across many countries is itself a valuable contribution. Indeed, but for the expert guidance provided by the authors, it would be easy to get lost along the way.

Rafael La Porta and Andrei Shleifer helpfully frame their discussion in terms of three "views" of the informal economy. The romantic view of Hernando de Soto and others suggests that the informal sector is an engine of growth just waiting to be released by giving informal firms property rights.[1] The parasitic view, associated with the McKinsey Global Institute,[2] sees the informal sector as a collection of firms that remain small (and unproductive) in order to avoid taxes and regulations, which allows them to inefficiently take away market share from more-productive formal firms. Finally, the dual economy view, associated with John Harris and Michael Todaro,[3] among others, suggests that informal firms are not so much a threat to formal firms as a social safety net that provides a livelihood for millions of very poor, uneducated people. In this view the informal economy is not so much a drag on development as it is a way station where people can

1. Hernando de Soto, *The Other Path: The Invisible Revolution in the Third World* (New York: Harper and Row, 1989).

2. For example, Martin Baily, Diana Farrell, and Jaana Remes, "Domestic Services: The Hidden Key to Growth" (Washington: McKinsey Global Institute, 2005).

3. John Harris and Michael Todaro, "Migration, Unemployment and Development: A Two-Sector Analysis," *American Economic Review* 60, no. 1 (1970): 126–42.

wait until development leads to the establishment of additional productive formal firms that can provide them with jobs.

After studying a wide range of correlations, facts, and survey responses in extensive firm-level surveys, La Porta and Shleifer conclude that the evidence is most consistent with the dual economy view. The main evidence against the romantic view is that informal firms look very different from formal ones—for example, the managers of informal firms are much less well educated—and the authors see very little evidence that growth occurs by informal firms eventually becoming large, productive formal establishments. The main evidence they offer against the parasitic view is that formal firms do not view competition from informal firms as a serious problem; they are much more concerned with access to markets, access to finance, and taxes.

A fact that emerges quite clearly from the data is that the informal sector is very large in the poorest economies and surely provides a kind of social safety net for many workers. By avoiding taxes and regulations, this sector can employ people who are not sufficiently productive to work in the formal sector. Given that this sector can encompass as much as half of the labor force, this is a substantial safety net. A question that naturally follows is whether or not this is the most effective way of providing it. What is the cost?

The firm-level surveys and a recent paper by Chang-Tai Hsieh and Peter Klenow suggest one way to make progress on this question.[4] Because this approach also provides some useful insights into the meaning of "value added per worker," I will outline a simple story along these lines in what follows.

WHAT DOES VALUE ADDED PER WORKER REALLY MEASURE? A recent and growing literature emphasizes the need for caution in interpreting measures of value added per worker, or "labor productivity." In particular, one seldom has access to firm-specific price deflators, so that measures of labor productivity actually measure *revenue per worker* rather than a real quantity—that is, they confound price and quantity.[5] La Porta and Shleifer recognize

4. Chang-Tai Hsieh and Peter Klenow, "Misallocation and Manufacturing TFP in China and India," Working Paper 13290 (Cambridge, Mass.: National Bureau of Economic Research, 2007).

5. Prominent examples from this literature include the following: Tor Jakob Klette and Zvi Griliches, "The Inconsistency of Common Scale Estimators When Output Prices Are Unobserved and Endogenous," *Journal of Applied Econometrics* 11, no. 4 (1996): 343–61; Andrew Bernard and others, "Plants and Productivity in International Trade," *American Economic Review* 93, no. 4 (2003): 1268–90; Hajime Katayama, Shihua Lu, and James Tybout, "Firm-Level Productivity Studies: Illusions and a Solution" (Penn State University, 2006); Lucia Foster, John Haltiwanger, and Chad Syverson, "Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability?" *American Economic Review* 98, no. 1 (2008): 394–425; and Hsieh and Klenow, "Misallocation and Manufacturing TFP in China and India."

this in the published version of their paper and do a good job of incorporating some of the implications. In particular, they employ an insight from Hsieh and Klenow that says that if one knows the shape of the demand curve, one can infer price and quantity from revenue.

It is possible, however, to go even further. In particular, although "revenue labor productivity" is not a quantity measure, it contains very useful information about the nature of the distortions that affect firms. One can use these revenue measures to back out those distortions and consider the hypothetical question of how much higher output would be in their absence. To see how this works, consider the following benchmark model, which is a simplified version of the framework in Hsieh and Klenow, augmented to include a Harris-Todaro dual economy element.

THE MODEL: WAL-MART VERSUS A TRINKET SHOP. Suppose there are two highly substitutable goods in the economy: the output of a very productive, Wal-Mart-like store, y, and the output of a small and less productive informal trinket shop, x. Each good is produced using only labor. The total quantity of labor, $\bar{L}$, is fixed and can be either used for production or left unemployed (u is the endogenous fraction unemployed).

This setup is summarized in the following equations:

Utility	$U(x,y) = \left(\alpha x^{\rho} + \beta y^{\rho}\right)^{1/\rho}$
Formal production	$y = A_y L_y$
Informal production	$x = A_x L_x$
Resource constraint	$L_x + L_y = (1-u)\bar{L}.$

Assume that resources are allocated according to perfect competition, subject to several distortions. First, each sector faces a firm-specific sales tax, at rates τ_x and τ_y, respectively. (One can think of the informal sector facing a tax rate of $\tau_x = 0$ as a special case.) Second, a combination of minimum wage laws and regulations leads to a wedge between the wage in the formal sector and that in the informal sector, such that the formal sector wage is $1 + \mu$ times the informal sector wage. This wage differential leads to queueing for the formal jobs, generating unemployment as in the Harris-Todaro model.

Profit maximization by the two kinds of firms ensures that labor is hired until the after-tax marginal revenue product of labor equals the wage:

$$p_y(1-\tau_y)A_y = w_y = w_x(1+\mu) \tag{1}$$

$$p_x(1-\tau_x)A_x = w_x. \tag{2}$$

On the household side, utility maximization delivers the following conditions for demand and the allocation of labor:

$$\frac{U_y}{U_x} = \frac{p_y}{p_x} \tag{3}$$

$$w_x = w_y(1-u) \Rightarrow u^* = \frac{\mu}{1+\mu}. \tag{4}$$

When these equations are combined, the allocation of labor to the formal and informal sectors satisfies

$$\frac{L_x^*}{L_y^*} = \left[\frac{\alpha}{\beta} \times \frac{1-\tau_x}{1-\tau_y} \times (1+\mu)\right]^{\frac{1}{1-\rho}} \left(\frac{A_x}{A_y}\right)^{\frac{\rho}{1-\rho}}. \tag{5}$$

According to equation 5, the informal sector is larger when

—the informal sector faces lower distortions or lower taxes (τ_x is smaller),

—the formal sector faces higher distortions or higher taxes (τ_y is larger),

—the wage premium μ in the formal sector is higher, or

—the informal sector is more productive relative to the formal sector (A_x / A_y is greater).

VALUE ADDED PER WORKER. Now suppose that Wal-Mart-specific and trinket store–specific price indexes are unavailable, and instead all firms' revenues are deflated by a common retail sector price deflator. What does a comparison of "value added per worker" reveal in this case? Recall the first-order conditions in equations 1 and 2, which can be rearranged to yield

$$\frac{p_y y}{L_y} = \frac{w_x(1+\mu)}{1-\tau_y} \tag{6}$$

and

$$\frac{p_x x}{L_x} = \frac{w_x}{1-\tau_x}. \tag{7}$$

Notice that differences in "revenue" labor productivity across firms reflect differences in the distortions (τ_y, τ_x, μ) and say nothing about differences in "true" productivity (A). Marginal revenue products are equated across firms, apart from any distortions that are present. At some level, everyone

knows this already: more-productive firms will charge lower prices, so sales revenue will not reveal which firm has higher productivity.

I have developed this point in the context of labor productivity. But exactly the same point applies to multifactor productivity measures.

Although this result is well known at some level, it is also ignored quite often in studies of firm-level productivity. One prominent example is the draft of the La Porta and Shleifer paper presented at the Brookings Panel conference, but these authors are certainly in extremely good company—nearly every study of firm-level productivity until recently likely suffers from the same criticism.

From this point there are two useful directions in which to proceed. First, one can seek better price deflators or other clever means to recover the true underlying productivities. Second, one can consider what is to be learned from revenue labor productivity itself. I will consider each of these in turn.

MEASURING TRUE PRODUCTIVITY. Recovering true productivity requires some measure of prices. In some (perhaps only a few) cases, such a price measure can be obtained directly.[6] Alternatively, one can use information about the demand elasticity to recover prices and quantities from firm revenue. For example, in the simple model here,

$$\frac{y}{x} = \text{constant} \times \left(\frac{p_y y}{p_x x} \right)^{\frac{1}{\rho}}. \tag{8}$$

Knowledge of the curvature parameter ρ (or of the elasticity of substitution) allows one to infer relative quantities. Hsieh and Klenow discuss this second approach in more detail, and this is the approach followed by La Porta and Shleifer, for example in the bottom panels of their tables 13 and 14.

An interesting and surprising finding that seems to be emerging from this literature—it is a feature in the La Porta and Shleifer paper as well as in others[7]—is that revenue labor productivity and "true" labor productivity are highly correlated. That is, even though there is no reason a priori to expect revenue labor productivity to provide any information about true labor productivity, the two seem to be closely related. One interpretation of this—explored in the next section—is that revenue labor productivity reveals something important about the pattern of distortions, namely, that more-productive firms face greater distortions. I have to confess to a

6. This is the approach taken in Foster, Haltiwanger, and Syverson, "Reallocation, Firm Turnover, and Efficiency."

7. Foster, Haltiwanger, and Syverson, "Reallocation, Firm Turnover, and Efficiency"; Hsieh and Klenow, "Misallocation and Manufacturing TFP in China and India."

nagging worry that it might reflect something else, but what exactly it is I am not sure.

STUDYING DISTORTIONS. As I noted above in discussing equations 6 and 7, even if revenue labor productivity says nothing about true productivity, it can still be quite informative about the distortions that affect the allocation of resources. Indeed, the results reported in tables 13 and 14 in this paper allow one to back out estimates of the distortions faced by firms. In particular, the ratio of firms' revenue labor productivities provides an estimate of $(1 + \mu)(1 - \tau_x) / (1 - \tau_y)$. This can be summarized in a measure of an "effective tax rate"—the tax rate that would apply if all of the distortions were embodied in τ_y itself. This effective tax rate is then equal to $1 - (1/RLP)$, where *RLP* denotes the ratio of revenue labor productivity across the two groups of firms. An example of results of this kind is summarized in table 1 below.

Apparently, big firms—which turn out to be the firms with the highest "true" productivity—have a marginal revenue product of labor that is 8.33 times that of unregistered firms. Part of this difference could come from big firms employing higher-quality labor; however, table 12 of the paper shows that big firms pay only somewhat higher wages than unregistered firms and actually pay lower wages than small firms. Instead, the interpretation suggested by the Hsieh-Klenow approach outlined here is that big firms face much larger distortions than unregistered firms.

The implication is that moving labor from the unregistered sector into big firms would have a large effect on total output. Hsieh and Klenow perform calculations along these lines (for China and India) to see by how much output could be raised if marginal revenue products were equated across firms.

A similar calculation could be done using the results in this paper, not across individual firms but across groups of firms: by how much would out-

Table 1. Effective Tax Rates Faced by Formal Firms

Comparison	*Log difference*[a]	*Factor [exp(logdiff)]*[b]	*Effective tax rate*[c]
Registered v. unregistered firms	0.18	1.20	0.17
Small v. unregistered firms	1.54	4.66	0.79
Big v. unregistered firms	2.12	8.33	0.88

Source: Author's calculations.

a. "Average" log difference for value added per employee, in log units, from La Porta and Shleifer, this volume, table 13.

b. Exponential of the difference in the first column.

c. Tax rate on formal firms that would apply if τ_x and μ were zero.

put be raised if labor were reallocated across unregistered, small, medium-size, and big firms so as to equate the marginal revenue products? I have done some simple calculations along these lines, and the results suggest that output could be increased by a factor of between 3.1 and 3.5 (of which a factor of 2 comes from the Harris-Todaro distortion associated with μ). A more careful calculation would be interesting and would help to shed some light on the important question of how costly it is to use the informal sector to provide social insurance. If those costs turn out to be high, it would suggest the need to think about more-efficient ways of providing that insurance.

COMMENT BY

WILLIAM D. NORDHAUS This paper by Rafael La Porta and Andrei Shleifer discusses the importance of the unofficial economy in economic development. They emphasize the different views of informal sector firms in development economics, but in parallel there has been a growing recognition of the innovational importance of small or nascent firms in developed countries. Work by Hernando de Soto and the awarding of the Nobel Peace prize to Muhammad Yunus, the founder of microfinance, are symptoms of the view that the smallest economic entities may be crucially important.

To begin, what does one mean by the "unofficial" (or "underground" or "informal") economy? I know of at least five possible definitions: unlawful economic activity, activity not reported on financial statements, activity not reported on tax statements, activity not measured in the national accounts, and activity by businesses not registered with government agencies. The paper discusses all of these, but I think the last one (or, more specifically, activity by businesses not registered with *central* government agencies) comes closest to describing the object of their analysis.

It is worth noting that even in the United States, where the data are good relative to those from developing countries, on which the paper must rely, most "businesses" are not registered in any meaningful sense. There were around 30 million tax returns of a business nature in 2005. Perhaps 6 million of these were from corporations, which would be registered. It is unclear how many of the other 24 million "businesses" are registered, although they do file tax returns. The government estimates that there are 20 million nonemployer firms. I would guess that the actual number of unregistered small businesses with receipts of more than $100 a year is as large as the number that file tax returns.

Which of the above five categories do these tens of millions of unofficial firms fall into? Most are unlikely to be engaged in unlawful activities, although the value of illegal drugs (circa $100 billion a year) is not far from the Internal Revenue Service's estimate of underreporting on tax returns (on the order of $130 billion). At the other extreme, most are unlikely to be required to register with governments. But they are likely to be included in the national accounts because of the multiple sourcing and imputations. It is not clear to me that the unofficial economies discussed in the paper are any larger in proportion to their national economies than the unofficial economy in the United States.

Let me turn to the question of the importance of the unofficial sector. The authors draw a rather extreme conclusion from their analysis: "From the perspective of economic growth, one should not expect much from the unofficial economy, with its millions of entrepreneurs, except to hope that it disappears over time." However, the paper does not discuss in any detail the characteristics of "unofficiality" that are critical to economic performance. Nonregistration per se is not obviously important. At the very least, it should be unlawful nonregistration. There is no way to know whether firms are not registered because they are small, or small because they are not registered.

As a rhetorical exercise, the paper is appealing. It distinguishes three views of the unofficial economy: the romantic view, the parasitic view, and the dual economy view. Aside from the names, however, which are probably self-explanatory, there is little to the paper's analysis of the different views. The first two are actually more similar to each other than to the third. The romantic view holds that bad laws, barriers to entry, and excessive regulation are holding back the vast pool of entrepreneurship among people in the informal sector. The parasitic view is in a sense the mirror image. It holds that implicit subsidies to unregistered small or microscopic enterprises give them advantages relative to the formal sector, and that this process undermines productivity and entrepreneurship in the formal sector. The dual view, in contrast, is that the informal sector is essentially another world—it goes about its business repairing shoes and the like but has little linkage with or, for good or bad, influence on the formal sector.

The paper provides some impressionistic evidence to back the authors' view. It discusses multiple indicators of informality, which turn out to be correlated with GDP per capita. However, the causal structure is so complex and the problems of measurement are so great that I take this just as an interesting correlation. Many of the variables tested, such as access to electric power and the number of employees in firms, are only tangentially

related to the informal economy. The most important missing variable is the industry in which a given firm operates. If the dual economy view is the correct one, there should be a big disconnect between the preferred industries of the two sets of firms, whereas under the other two views the firms should be in the same industries.

The paper uses three interesting datasets compiled by the World Bank to investigate the characteristics of informal firms. We learn a fair amount about these characteristics, but the paper provides no analytical structure, no central hypothesis, and little in the way of genuinely exogenous variables on which to base any analysis. One example of where the analysis is uninformative is in the productivity analysis. The authors do not measure productivity in the sense of real output per unit of real input—their "output" measures are nominal. If the small firms tend to have low-wage workers (as the authors indicate they do), then it would follow that value added per worker will be relatively low. The authors' defense of their use of nominal output would apply if those outputs referred to the same industries over time, or if they could control for industrial composition, but since the measures have only the crudest of industry controls, there is no convincing evidence that they measure real productivity growth accurately.

This point can be seen as follows. The budget identity for firms is $pQ \equiv wL/s$, where p is price, Q is quantity, w is the wage rate, L is labor inputs, and s is the share of compensation in the value of nominal output. I suppress any subscripts for time, country, industry, formality, and so forth for simplicity. Taking logarithms, $\ln(pQ) = \ln(L) + e$, where the residual e is equal to $\ln(w) - \ln(s)$. This is essentially the equation fitted by La Porta and Shleifer. Differences across firms reflect only differences in the share of compensation and in relative wages across firms. If the shares of compensation are equal, then the only difference is the relative wage rate. *The level of labor productivity or total factor productivity does not even enter the empirical estimate.*

One test that could be helpful would be to compare the incidence of self-employment in different sectors. For example, in the United States, ratios of self-employed to employed workers vary from (in rough figures) 100 percent in agriculture, through 24 percent in construction, to 2½ percent in manufacturing, to zero in utilities. It would be a demanding project, but I would think that looking at differential employment trends by industry would provide a better test than a selection of proxies and indicators such as the level of freedom.

Let me close with a comment on the romantic view of the informal sector. I am mindful of the observation, attributed to many, that "Anyone

under 30 who is not romantic has no heart, and anyone over 30 who is romantic has no head." With that in mind, what is the hard-headed romantic's take on all this? The role of small enterprises is, fundamentally, to provide radical new approaches to economic activity. The authors claim that virtually no informal firms make it into the formal sector. This is akin to saying that almost no storms become hurricanes and destroy major American cities. Out of the millions of small enterprises, it does not take more than a handful of tiny innovational hurricanes causing creative destruction to make a major contribution to economic growth.

GENERAL DISCUSSION Chang Hsieh interpreted the paper's evidence as clearly supporting the view of the informal sector as parasitic: the observed differences in output per worker indicate that the marginal product of labor is lower in the informal than in the formal sector. He wondered whether, in addition to the difference in the productivity of labor between the formal and informal sectors, one could also look at the productivity of capital in both sectors to determine the weighted average of the marginal products of capital and labor in the two sectors.

Paul Romer noted that the paper's conclusion seemed to imply that although the dual economic structure induces some distortions, it serves the goal of income redistribution and thus can be left alone. That idea seemed to him inefficient or even perverse. He suggested a model consisting of an informal sector in which output rises linearly with the labor input, and a formal sector with Cobb-Douglas output based on educated labor and unskilled labor, the latter of which can also be used in the informal sector. A tax on the formal sector ends up being a tax on human capital and thus serves to redistribute income. However, if foreign direct investment makes the supply of human capital elastic, such a tax could have large efficiency costs. The result could be that after-tax wages for less skilled workers are lower than if they were taxed directly. Romer remarked that the paper itself makes a similar statement, which is inconsistent with other comments in the paper. He also discussed the difference between catch-up growth and growth at the frontier: although start-up firms may be key to the development and dispersion of new technology in the United States, established firms like Nike might be better at raising wages quickly in developing countries like Vietnam, because of differences in industrial structures and dynamics between developing and developed countries.

Lawrence Summers proposed a distinction between two types of formal versus informal sector dualism, which he called right-wing and left-wing.

Under right-wing dualism, as exemplified by Charles Jones's comment on the paper, there are interferences in markets that restrict the size of the formal sector, making it the smaller of the two sectors and with higher measured productivity. Left-wing dualism, as articulated by the late W. Arthur Lewis and possibly Michael Todaro, posits a modern sector that has figured out how to be more productive. Workers in that sector share in the increased productivity, and therefore everyone would like to work in that sector. However, because the sector can expand only so fast, it may persistently remain too small, with high wages for the few workers it employs.

Martin Baily, drawing on his own investigations into the informal sector at the McKinsey Global Institute, offered several examples of interactions between the formal and informal sectors and particular industry concentrations in the informal sector. He cited Brazil's retail grocery sector as an example of the parasitic view (although he objected to the term): a large number of small, informal supermarkets compete directly with larger, formal supermarkets; the formal sector chains often acquire the informal stores as part of an expansion strategy. In Russia, in contrast, the informal sector deals in moonshine liquor and smuggled goods and thus competes with the formal sector little if at all. In many of these countries, large government bureaucracies essentially create the informal sector by necessitating very high taxes for their support. Tax and regulatory structures need to be reformed and downsized to bring them more in line with what the public wants, so that the formal sector can expand more easily.

Eduardo Engel added that the generous subsidies that some governments provide to the informal sector limit growth of the formal sector just as high taxes do. Examples are Mexico's social programs for day care, pensions, and health care, which are paid for by taxes on the formal sector. He cited a paper by Santiago Levy, a former Mexican cabinet member and currently the chief economist at the Inter-American Development Bank, which argues that these programs were a major source of Mexico's low productivity growth in the past few decades.