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The Divide between Subsistence and Transformational Entrepreneurship

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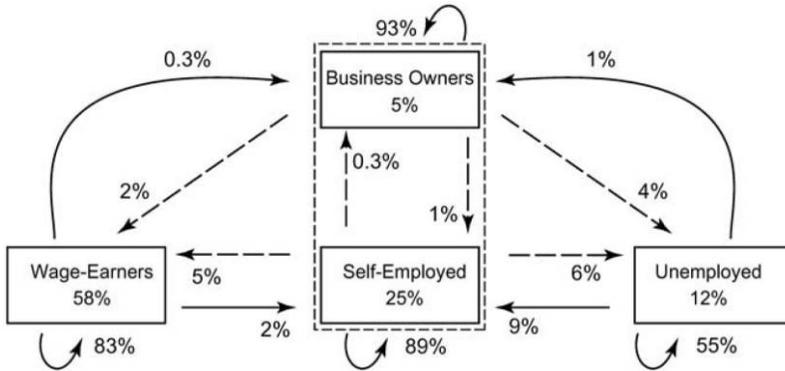
Executive Summary

This paper argues that it is crucially important to differentiate between two very distinct sets of entrepreneurs: subsistence and transformational entrepreneurs. Recent evidence suggests that people engaging in these two types of entrepreneurship are not only very distinct in nature but that only a negligible fraction of them transition from subsistence to transformational entrepreneurship. These individuals vary in their economic objectives, their skills, and their role in the economy. Most important, they seem to respond very differently to policy changes and economic cycles. Yet most development policies aimed at fostering entrepreneurship focus on subsistence entrepreneurship in the hope of creating transformational entrepreneurs. I argue that unless we understand the differences between those two types of entrepreneurs more clearly, many policy interventions may have unintended consequences and may even have an adverse impact on the economy.

I. Introduction

The rapid ascent of emerging markets like China and India has sparked a renewed interest in understanding the role entrepreneurs play in shaping the transformation of developing countries. Statistics show a dramatic increase in business activity and the number of entrepreneurial businesses started in developing countries over the last decade. At the same time, the market capitalization of multinational businesses that were started in emerging markets has grown from 5% to 25% as a fraction of the total market capitalization among the top 1,000 multinationals, as discussed in the special report on the rise of emerging market multinationals (Accenture 2008; see fig. 1). In fact, these trends have contributed to a growing popular perception that entrepreneurship is one of the main drivers of development that has transformed these economies.

Of course, the central role of entrepreneurship for economic growth and development has long been acknowledged in the economic literature.



Transition between occupations: 2001–2007

Fig. 1. Occupation groups within the labor force and transition flows into and out of self-employment and business ownership. Source: Reproduced from Mondragon-Velez and Pena-Parga (forthcoming).

A well-established research tradition focuses on the entrepreneur as the agent of innovation and restructuring in the economy. Knight (1921) and, most famously, Schumpeter (1942) described the transformative role that entrepreneurs play by increasing competition and helping shape markets. In more recent work, Acs and Audretsch (1988) and Kortum and Lerner (2000) show the importance of entrepreneurs in driving innovation and technological improvements in the economy.

However, despite this long-standing research interest, much less effort has been devoted to studying the actual entrepreneurs who are the agents of this change and the heterogeneity among these individuals. In fact, most policy makers as well as economic researchers treat entrepreneurs as a homogeneous group of actors that are uniformly affected by economic conditions or policy interventions. This view misses very fundamental differences among the types of entrepreneurs who are active in an economy. One can argue that there are at least two fundamentally different groups of entrepreneurs: First, there are those who become entrepreneurs as a means of providing subsistence income, which I will call the subsistence entrepreneurs. And second, there are those entrepreneurs who aim to create large, vibrant businesses that grow much beyond the scope of an individual's subsistence needs and provide jobs and income for others. I will call these transformational entrepreneurs.

Subsistence entrepreneurs make up the majority of the entrepreneurs in developing countries such as India or China, where we often find

millions of these subsistence businesses. They run tiny operations that do not grow into larger firms but merely provide an alternative employment opportunity to the entrepreneur and potentially their family members. However, these firms do not grow to be medium- or even large-sized businesses; nor do they create employment opportunities for other workers in the economy. In contrast, transformational entrepreneurs are much rarer in an economy and more difficult to identify for investors and policy makers. They build larger businesses that will achieve rapid growth if put in the right circumstances. Moreover, through their expansion process they will create jobs for others. As such they can be seen as the true engines of growth in an economy.

In this paper I argue that it is crucially important to differentiate between these two very distinct sets of actors: subsistence and transformational entrepreneurs. Recent evidence suggests that not only are the people engaging in these two types of entrepreneurship very distinct in nature but also that only a negligible fraction of the entrepreneurs transition from one type to the other. These individuals vary in their economic objectives, their skills, and their role in the economy. It also appears that they respond very differently to policy changes and economic cycles. Unless we more clearly understand the differences between these two types of entrepreneurs, many policy interventions may have unintended consequences or may even influence the economy in the opposite way from what they were intended to do. Most important, one needs to distinguish between them.

In contrast, instead of recognizing the existence of these very different types of entrepreneurs, many current approaches to development policy implicitly or even explicitly assume that subsistence entrepreneurship is the first step toward transformational entrepreneurship. Given the evidence presented in this paper, I believe that this line of argument is misguided, since it is not supported by the recent literature that aims to characterize the different types of entrepreneurs in emerging markets and how they respond to growth opportunities. It is quite surprising that many policy makers and international organizations seem to have adopted this view, since even in developed countries like the United States we do not find a seamless transition between subsistence and transformational entrepreneurs. Recent research by Gompers, Lerner, and Scharfstein (2005) suggests that the majority of venture capital-backed high-growth start-ups in the United States were started by founders who come from large and established technology firms or are repeat entrepreneurs who previously started high-growth firms. However, we do not see a meaningful fraction of these ventures evolve from subsistence entrepreneurship.

It will be crucially important to understand whether the lack of entrepreneurial dynamics in emerging markets can be explained by the economic policies in these countries. What are the bottlenecks that prevent transformational entrepreneurs from expanding their businesses? What motivates subsistence entrepreneurs to maintain their businesses? Economists have discussed two very different levers. On the one hand, capital constraints might explain the limited growth of both types of entrepreneurs: If most businesses must operate and invest out of personal savings, the speed of their growth will be naturally limited since the marginal utility of consumption of the owner is very high. This is especially true in countries where people live in extended families and more successful family members are expected to provide for the rest of their relatives. See, for example, King and Levine (1993) for a discussion of the growth implications of capital market access.

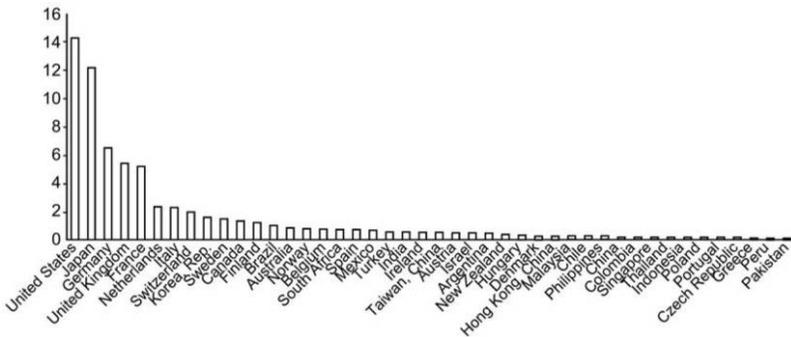
On the other hand, the more recent experience in many developing countries might suggest that the lack of entrepreneurial growth is related to labor market or even product market friction. Stringent regulations of market entry or labor laws that penalize large employers by dramatically increasing their cost of business can impede the growth of the most successful firms. As a result, an increase in subsistence entrepreneurship is often caused by growth constraints on the most successful entrepreneurs. Therefore, regulations and government interventions that positively affect subsistence entrepreneurs can often have the opposite effect on transformational entrepreneurs, and vice versa. Prominent examples in many developing countries are labor market regulations that prevent large firms, often measured by the number of employees, to enter certain sectors; for example, until very recently firms with more than 20 employees were barred from entering the retail sector in India. The rationale of this so called small-scale industry regulation was to protect subsistence entrepreneurs from competition by large firms. But it obviously also creates barriers to growth for the most successful firms and limits the potential for economies of scale and the creation of high-paying jobs. This argument is laid out comprehensively by Stiglitz and Hoff (2007), who show that friction in labor markets might make it optimal to engage in subsistence entrepreneurship when jobs are not accessible to this group of the population.

In the following, I will draw on a number of recent findings to document that there are important differences between transformational and subsistence entrepreneurs. I will argue that a better understanding of this differentiation between these two types of entrepreneurs can improve our ability to understand policy responses and to tailor regulation more.

II. Lack of Transition between Subsistence and Transformational Entrepreneurs

A striking fact that has recently been documented in a number of different countries underscores the importance of understanding the range of entrepreneurs in the economy; see, for example, Bartelsman, Haltiwanger, and Scarpetta (2004); Beck, Demirgüç-Kunt, and Vojislav Maksimovic (2004); Fogel, Morck, and Yeung (2008); and the World Bank’s *Doing Business* reports (various years). Beck et al. (2004) collected information on the size of the largest 100 firms across a large number of developed and developing countries as measured by annual sales in dollars. They then calculated the fraction of sales by the top 100 firms as a percentage of total GDP, as shown in figure 2. Economies such as the United States, Germany, and Japan are on the left side of the chart, which not only means that these countries have the largest firms but, even more important, that the top 100 firms in these countries earn a larger fraction of GDP. In contrast, the developing countries are all clustered to the far right of the chart, which suggests that the top 100 firms in these economies constitute only a small fraction of overall GDP.

In other words, markets in emerging economies are characterized by a large number of tiny firms and a few very large ones. In contrast, while developed economies like the United States have a lot of small businesses, a much larger fraction of business activity happens in the largest firms. In fact, country-level studies by Herrera and Lora (2005) suggest that if we compare the size distribution of firms in Latin American countries to European economies, we see a much more bimodal distribution with a large left mode. This suggests that there is a very large fraction of tiny firms in developing countries and some large firms, but



that in particular midsize firms are less prevalent in developing economies. In contrast, developed economies seem to have a much more continuous firm size distribution. Herrera and Lora (2005) suggest that the same patterns hold if we look at where jobs are created in developed versus developing economies.

These cross-section patterns could suggest that entrepreneurs in emerging markets are not able to increase the size of their businesses from small firms to larger and established companies. This would also mean that employment creation by entrepreneurial firms might be more limited in these markets, which ultimately restricts the ability of people in the economy to choose between employment and self-employment.

A number of recent papers provide more direct evidence of these transition patterns between different types of entrepreneurs and also between entrepreneurship and employment. For example, Mondragon-Velez and Pena-Parga (forthcoming) draw on a large-scale panel data set from the Colombia National Household Survey, which annually surveys wage earners, the self-employed, business owners, and the unemployed in Colombia. Business owners in the survey are characterized as those self-employed businesspeople who employ more than 10 workers. This household survey has been conducted over the last 20 years. Overall, the study shows that 25% of the respondents in the sample are self-employed, while only 5% are business owners. In the context of this paper, I want to think of the business owners as the transformational entrepreneurs, while self-employed are subsistence entrepreneurs. Indeed, the paper by Mondragon-Velez and Pena-Parga (forthcoming) shows that self-employed are mainly employed as domestic servants and other remedial occupations. In contrast, business owners are more likely to be in the manufacturing sector.

When looking at the transitions between the different occupations, the study shows that there are only a vanishingly small number of individuals who transition from subsistence to transformational entrepreneurs. The authors analyze the flow of individuals into and out of business ownership and self-employment over the entire period. Figure 2 provides a graphical representation of these flows. The majority of business owners, 93%, were previously business owners; 3% were previously employed in larger firms; 1% come from unemployment; and only 0.3% come from self-employment situations. In fact, subsistence entrepreneurs in Colombia are much more likely to transition into wage earning or even unemployment at a rate of 5% and 6% per year, respectively.

This means that the flow of unemployed to self-employed is eight times more than the flow of the unemployed to business owners, suggesting that

self-employment is a temporary transition for individuals that serves as an alternative to unemployment. Moreover, the authors show that entry into self-employment is characterized by low human capital and a strong motivation to support families, while entry into business ownership, or, in my language, transformational entrepreneurship, is characterized by higher human capital and higher willingness to take risks (i.e., it is less concerned with limiting downside risk and purely assuring the survival of the firm). Similarly, exit flows show that the self-employed are more likely to voluntarily exit to better jobs, while business owners are most likely to become unemployed. This suggests that exit results from business failure. The fact that little transition occurs between business owners and the self-employed, and that most of the transition into and out of the two occurs from the wage earners and the unemployed, provides strong evidence of the difference between subsistence and transformational entrepreneurs and argues against the traditional thinking that subsistence is a step toward transformational entrepreneurship.

A recent paper by Gompers et al. (2005) documents similar results for a developed economy like the United States. The study draws on detailed data about the demographic and employment backgrounds of the founders of venture-backed companies that were collected from Venture One and other sources. The authors found that the founders of venture-backed start-ups in the majority were previously employed at larger technology firms such as Microsoft, Intel, or similar firms. An alternative group of founders of transformational entrepreneurs were serial entrepreneurs who had previously started a high-growth firm. In contrast, almost none of them were running small subsistence businesses before they started a high-growth business. Interestingly, the study also found that these high-growth or transformational entrepreneurs are more likely to leave their existing employment in times of market expansion, or boom times. It underscores the idea that transformational entrepreneurs are driven by business opportunities. For additional analyses of the transition between self-employed and transformational entrepreneurs, and how the two groups respond to policy changes, see Nanda (2007) for the case of Denmark.

III. Argument for Discontinuity

The previous results document a strong discontinuity between subsistence and transformational entrepreneurship with only minimal transition between the two groups. I propose that this discontinuity can only be understood and addressed with policy solutions if we understand the

underlying differences between the two types of entrepreneurs. The two ends of the firm-size spectrum are not inhabited by a continuum of entrepreneurs, which means that we cannot easily scale up very small firms into large businesses. This means that not all start-ups have a chance to end up in the right tail of the size distribution. Instead, a number of recent studies suggest that there are different types of entrepreneurs who vary substantially along measures of ability, motivation, and personal characteristics. I will discuss some of the results that confirm this distinction.

In a very interesting experiment conducted in Sri Lanka, de Mel, McKenzie, and Woodruff (forthcoming) surveyed over 1,500 self-employed, wage workers, and business owners. The distinction between self-employed and transitional employees (business owners) is that the latter work for firms that employ more than five people. de Mel et al.'s paper uses data from a series of surveys carried out in Sri Lanka between 2005 and 2007. The first survey is a survey of 618 self-employed business owners, selected from three districts in south and southwestern Sri Lanka. These self-employed business owners were surveyed quarterly between April 2005 and April 2007 and then again in October 2007. Each survey included questions on the operating performance of the firms during the month preceding the survey and questions on additional topics such as a lottery game from which the authors can measure attitudes toward risk, data on the labor history of respondents, and a number of non-verbal tests of reasoning and IQ.

In July 2007, de Mel et al. also carried out two additional surveys in the same geographic area of Sri Lanka. Sampling at the household level using the same National Household data from which the subsistence businesses were selected, the study identified 456 wage workers who worked at least 30 hours per week. The second survey in July 2007 targeted 424 owners of enterprises hiring between five and 50 employees. Some of these were identified through the household screen used in the wage survey. The surveys of larger firm owners and wage earners were identical to the survey of the self-employed, with one exception. The business owners were asked a few questions about operating data on their enterprises in order to effectively separate self-employed from business owners. The project also included random grants of roughly \$100 or \$200, which were provided to 60% of the self-employed in the sample in either May 2005 or November 2005. These grants were intended to generate exogenous shocks to capital stock to measure returns to capital. de Mel et al. (forthcoming) explain these grants in more detail. Receiving a grant does not appear to have any effect on the responses to the survey.

The authors find significant differences in the ability and, in particular, in the attitudes of these three groups. In a baseline survey, the transformational entrepreneurs scored much higher on different measures of IQ, willingness to take risk, motivation, and the level of managerial and financial literacy. The results are replicated in table 1. Subsistence entrepreneurs, in contrast, differ from transformational entrepreneurs mostly along dimensions of ability and attitudes, but less on family background. In fact, almost three-quarters of the self-employed have characteristics that align exactly with those of wage workers instead of those of transformational entrepreneurs. Only one-quarter of self-employed look similar to transformational entrepreneurs in their background characteristics. The study also finds that transformational entrepreneurs are more motivated and more willing to put themselves in unfamiliar situations than

Table 1
Differences in Ability Measures

	SME Owners	Significance SME	Own Account	Significance Wage Workers	Wage Workers
Measures of ability:					
Years of schooling	11.5	***	9.3	***	10.4
Score on digitspan recall test	7.2	***	5.9	***	6.5
Score on Raven test	3.1	***	2.7		2.8
CRT	.39	***	.21		.25
First PC of Raven test, digitspan test, CRT	.49	***	-.36	***	-.04
Financial literacy (3 questions)	1.40	**	1.26		1.23
Attitudes toward risk:					
CRRA from lottery	.47	***	.16		.10
Overall life risk	6.87	***	6.47	**	6.18
Financial risk	5.6		5.64	**	5.28

Source: From de Mel, McKenzie, and Woodruff (forthcoming).

Note: SME = small and medium enterprises; CRT = cognitive reflection test; PC = principal component; CRRA = constant related risk aversion. Table shows differences in ability across SME owners (transformational entrepreneurs), self-employed (subsistent entrepreneurs), and wage workers. The measures of ability are as follows: (1) years of schooling; (2) forward digitspan recall test, where participants are asked to remember as many digits as possible; (3) Raven progressive reasoning test, where respondents are asked to recognize matching patterns; and (4) cognitive reflection test (based on Frederick [2005]).

**Significant at the .05 level.

***Significant at the .01 level.

self-employed or wage workers. The self-employed are less organized and more impulsive than business owners and wage workers. On the outcome dimension, the paper also finds that transformational entrepreneurs are more likely to add paid employees and to expand their business. In contrast, the self-employed often report that they have no intention of growing their business and are content with the (small) size of the business they manage, since it provides them with a management task that is comfortable for them and allows them the flexibility to tend to household chores at the same time as the business.

In a companion paper, de Mel, McKenzie, and Woodruff (2005) show the results from a randomized intervention with the same population of 405 self-employed businesses in Sri Lanka (with a maximum invested capital of \$1,000, excluding investments in land and building) who were given capital of either \$100 or \$200 or assets in kind. The paper finds an average return to capital of 5.7% per month. But, interestingly, even in this sample of self-employed, the heterogeneity between people of different ability swamps the average effect. The authors show that the treatment had a much larger effect for those self-employed whose characteristics are more similar to transformational entrepreneurs based on their IQ test and index of broad entrepreneurial ability. In contrast, when looking at the self-employed who have fewer years of schooling and who scored at the bottom of the ability distribution, the effect of receiving the capital grant is zero. Taken together, these results suggest a stark difference in the underlying characteristics of transformation and subsistence entrepreneurs.

Ardagna and Lusardi (forthcoming) confirm these findings in a very different setting using data from the Global Entrepreneurship Monitor (GEM), which collects cross-national harmonized data on entrepreneurship in 37 countries. GEM data are based on a survey conducted with a minimum of 2,000 individuals in each country. The questionnaire is unique in the sense that it contains information on the “intent” of the business owners by explicitly asking whether they chose to become an entrepreneur to pursue a business opportunity compared to those who enter it because there is no alternative to subsistence entrepreneurs. The authors find that, on average, “opportunity entrepreneurs” (or, in my language, transformational entrepreneurs) are more likely to have a college degree, have less fear of failure, and have more confidence in their set of skills. Subsistence entrepreneurs, in contrast, have much lower educational outcomes and are more likely to have been unemployed before starting their business. The authors also show that the different types of entrepreneurs respond very differently to regulatory changes. We will come back to this discussion at the end of the paper. But these findings again confirm

that there is a systematic difference between transformational and subsistence entrepreneurs. Interestingly, this study suggests that there is a difference in ambitions and expectations for the business from the inception.

Finally, there is some emerging evidence to suggest significant differences across ethnic communities in how entrepreneurs approach their business and how they think about expansion strategies. In a recent paper, Iyer and Schoar (forthcoming) explore the role of entrepreneurial culture by looking at differences in negotiation strategies across ethnic communities in India. The study is based on a field experiment in the wholesale market for pens and stationary goods in the South Indian city of Chennai. Entrepreneurs were selected from three different communities: Andhraites, Marwaris, and Tamilians. Tamilians are the predominant ethnic group in the city. They are usually considered hardworking, conservative in their cultural practices, and honest. The second group is made up of people from Andhra Pradesh, which is a neighboring state to Tamil Nadu. While they are ethnically similar to Tamilians, there is some tension between these groups that goes back to Indian independence. And finally, there are Marwaris, who are considered the trader and entrepreneurial community of India and originate from the state of Rajasthan in the north of India. They are usually seen as very shrewd and calculating people who know how to run a business. However, part of their stereotype is also that they are good to do business with, since they take business transactions very seriously and are not driven by emotional considerations.

To test whether entrepreneurs from different communities vary in their approach to business and in their negotiation outcomes, shoppers from different ethnic groups were randomly assigned to visit wholesalers and negotiate a bulk order for pens. First, there are large differences in how entrepreneurs from different communities conduct business. In negotiations between shoppers and wholesalers, Marwari wholesalers offer significantly lower prices than TAMILIAN or Andhra wholesalers. Not only is the final price per pen lower, but the starting offer of the negotiation is lower in Marwari establishments as well, so the observed lower prices for Marwari wholesalers are not an outcome of poor bargaining on the part of the wholesaler but instead seem part of a deliberate strategy. In contrast, wholesalers from Andhra Pradesh offer significantly higher prices at the start of the negotiation and also as a final outcome. Offering a higher price up front increases short-term profits but can jeopardize the long-term business interest if the wholesaler gets a reputation for high prices. Therefore, offering a lower price can be interpreted as forgoing current profits in order to build a business relationship (or reputation

with the client) for the future. When asked why they adopt a different strategy from the rest of the businesses, Marwaris consistently answer that they want to build a long-term business, and they are willing to give up short-term profits in order to build a reputation for being a fair business and thus they attract the best and the largest clients. These results provide further support to the idea that entrepreneurs differ in their goals and ambitions, which could be transmitted through ethnic or cultural networks or upbringing.

IV. What Are the Bottlenecks for Entrepreneurship?

A. Are Transformational Entrepreneurs Missing in Developing Economies?

If indeed transformational entrepreneurs are central to firm growth as I have argued above, we can ask whether the low numbers of start-ups that transition to medium-size or even large firms in emerging markets are due to lack of talented entrepreneurs in these countries. It is hard to believe that some countries systematically lack an “entrepreneurial gene” altogether. But it is entirely possible that in some countries incentives or social status are set in such a way that the smartest people do not go into entrepreneurship but rather enter government jobs or professions such as doctors or lawyers. If entrepreneurship is not valued highly in a society, then endogenously the supply of talented people into entrepreneurship might be limited. Social scientists from anthropologists to economists have invoked the lack of a so-called entrepreneurial culture to explain the differences in the levels of entrepreneurship across countries. However, this type of explanation is scientifically not very satisfying, since rather than explaining a phenomenon it assigns a name, “entrepreneurial culture,” to an unexplained residual, which is in fact quite large. But, even more important, the hypothesis does not seem to be borne out in the data.

In order to test this hypothesis, I use information from a recent survey I conducted in collaboration with the World Bank to study the attitudes of top managers of the largest 100 firms in each of 20 emerging market countries. The survey was implemented through telephone interviews with these executives and achieved a response rate slightly above 40%. For a more detailed description of how the survey was conducted, see Lerner and Schoar (forthcoming). The top executives were asked detailed questions about their firms, their management practices, as well their attitudes toward different aspects of business and management.

In particular, the survey also asked chief executive officers (CEOs) to rank the social prestige of different professions within their country, such as entrepreneurs, managers, medical doctors, politicians, and lawyers. The question was carefully worded to clarify that entrepreneurship here means starting a high-growth business and not subsistence self-employment.

The findings suggest that top managers in emerging markets have high appreciation for entrepreneurship. Figure 3 shows that the majority of CEOs across all countries ranked entrepreneurship at the top of the social prestige scale by a very wide margin. When breaking the results down by region, we see that at the lower end are the African countries, where only 50% of CEOs ranked entrepreneurship as the most prestigious profession. And at the high end are the Americas (excluding the United States), with 75% of the CEOs ranking entrepreneurship at the top of the list of professions with social status. In contrast, politicians are consistently seen as having the lowest social prestige across all countries: the fraction of times they are ranked at the top ranges only from 8% to 20%.

I then analyze how individual CEO characteristics are related to their attitude toward entrepreneurship. Table 2 shows the results from a simple

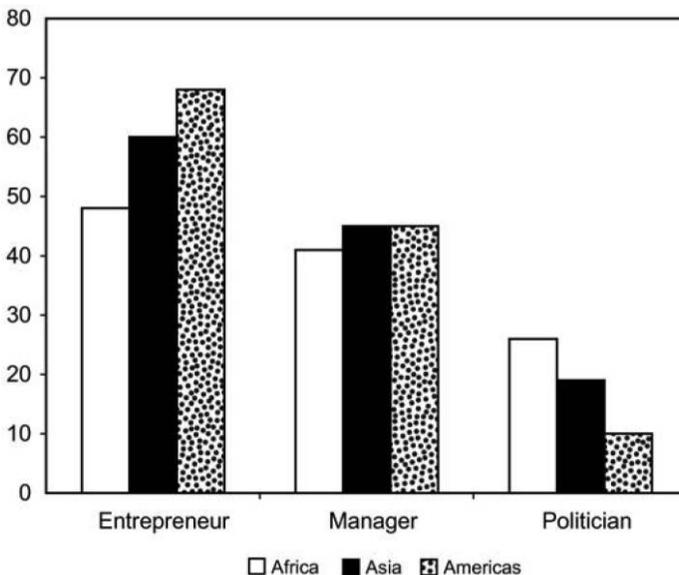


Fig. 3. CEOs' attitudes toward different occupations. Results from a survey of the largest 100 firms in 20 emerging market countries conducted in collaboration with the World Bank. CEOs were asked to rank the social prestige of different professions, such as entrepreneurs, managers, and politicians. The figure shows the percentage of managers in each region that ranked a specific profession at the top. Source: Based on data from Schoar (2009).

Table 2
Ranking of Entrepreneurship

Variable	Entrepreneurship			
	1	2	3	4
log GDP	.0386** (.0163)	.0383** (.0164)	.0421*** (.0162)	.110*** (.0214)
log age		-6.658* (3.583)	-8.888** (3.520)	-7.562** (3.758)
Founder			.207*** (.0435)	
Business regulation				-.129*** (.0262)
Constant	.332*** (.125)	50.79* (27.14)	67.62** (26.66)	57.44** (28.46)
Observations	839	832	832	787
R-squared	.007	.010	.029	.039

Source: Based on data from Schoar 2009.

Note: Linear regression of a dummy if a CEO ranked entrepreneurship at the top of the social status scale on a control for country GDP, and CEO characteristics such as age, whether the CEO is the founder of the firm, and log of sales. Business regulation is a dummy if the country scores high on regulation based on the Doing Business Index.

*Significant at the .10 level.

**Significant at the .05 level.

***Significant at the .01 level.

linear regression of a dummy for whether entrepreneurship was ranked at the top of the social status scale on CEO characteristics such as age, whether the CEO is the founder of the firm, and a control for the size of the firm, measured as the log of sales. First, we see a strong generational trend: across all emerging market countries, younger CEOs are much more likely to rank entrepreneurship at the top of the social prestige scale, while older CEOs rank entrepreneurship consistently lower in the hierarchy of occupations. Column 1 of table 2 shows that richer countries as measured by the log of GDP per capita rank entrepreneurship more positively. In column 2 we then add the log of age (measured as of 2008) to the regression. The coefficient is negative and significant, which confirms the idea that younger CEOs value entrepreneurship more highly. One very noticeable exception are CEOs who are the founders of their own companies. Not surprisingly, in column 3 we see that CEOs who themselves founded the company rank entrepreneurship consistently at the top. In contrast, CEOs who run large conglomerate firms are less likely to show a strong appreciation for entrepreneurship.

Finally, we look at country-level effects: from column 1 we had observed that CEOs in the richer among the developing countries more

consistently place entrepreneurship at the top of the social prestige hierarchy and vice versa for the poorer countries. In addition, the regression in column 3 shows that there is a strong positive correlation between the level of business regulation in the country and the appreciation for entrepreneurship. In countries where business activities are more restricted, which often are also the poorer countries, entrepreneurship is not ranked as highly. Of course it is not possible to give a causal interpretation to this last result: a country might be poorer because of a lack of appreciation for entrepreneurship or vice versa: in poor countries there are fewer successful entrepreneurs and thus they do not feature too strongly in the public perception of prestige.

When I repeat these regressions for the ranking of politicians in table 3, all the results reverse and are again strongly significant. This is not mechanically true, since our survey subjects were able to choose from a large number of occupations. I find that in particular politicians have high social status mainly in countries that are poorer and have more restrictive business regulation. These results could speak to the fact that in these countries either there are fewer successful entrepreneurs as role models in the society, or they are the result of the rent distribution in society. If politicians in countries that are more regulated can capture a higher

Table 3
Ranking of Politicians

Variable	Government			
	1	2	3	4
log GDP	-.0614*** (.0151)	-.0667*** (.0150)	-.0659*** (.0151)	-.0839*** (.0176)
log age		7.052*** (2.543)	6.596** (2.568)	7.296*** (2.726)
Founder			.0424 (.0419)	
Business regulation				.0308* (.0175)
Constant	.603*** (.118)	-52.79*** (19.27)	-49.35** (19.45)	-54.59*** (20.65)
Observations	839	832	832	787
R-squared	.035	.047	.048	.052

Source: Based on data from Schoar 2009.

Note: Linear regression of a dummy if a CEO ranked government jobs and politicians at the top of the social status scale on a control for country GDP, and CEO characteristics such as age, whether the CEO is the founder of the firm, and the log of sales. Business regulation is a dummy if the country scores high on regulation based on the Doing Business Index.

**Significant at the .05 level.

***Significant at the .01 level.

fraction of the GDP, this could explain the difference in trend. But, most important, the results underscore that businesspeople in developing countries have a high appreciation for transformational entrepreneurship. This is good news for policy makers, who can be assured that the desire and belief in entrepreneurship is strong in developing countries.

B. What Are the Relevant Bottlenecks?

However, this leaves us with the fundamental question: What are the constraints for transformational entrepreneurship in developing countries? I will argue that the two policy dimensions that are of particular importance for transformational entrepreneurs are (1) the regulation of labor and product markets, which in many countries do not give new entrants a level playing field, and (2) access to capital.

Regulation. The before-mentioned study by Ardagna and Lusardi (forthcoming) shows that regulation of business entry and labor markets plays a crucial role in the decision to start a business that is disproportionate for transformational entrepreneurs. As described earlier, this paper is based on microdata of different types of entrepreneurs from a large-scale cross-country survey (GEM). The authors show that the more regulated the business environment, the less personal skills matter for the selection into entrepreneurship. Specifically, regulation reduces the effects of social networks and business skills and strengthens risk aversion. Tighter labor market regulations increase the importance of social networks and risk attitudes and also play a larger role in affecting the decision to start a business. All of these results are particularly stronger for transformational entrepreneurs. The findings suggest that the regulatory environment affects the ability of people with entrepreneurial skills to express their talents. The importance of social networks when there is no flexibility in re-allocating capital across firms can lead to nepotism and an allocation of capital to people with lower ability for the task. For example, business owners might select to have their children start a new firm even if they are not the most talented entrepreneurs, just because it is easier to enforce the investment with them rather than with an outsider. Desai, Gompers, and Lerner (2005) find similar results for the sample of European countries. Political, legal, and regulatory variables greatly influence entrepreneurial activity. The authors also show that capital constraints induced by institutional factors have an impact on the entry of firms and the ability of firms to grow.

A related paper by Klapper et al. (forthcoming) corroborates the idea that for the business environment in particular, factors such as the ease

of starting a business and political corruption are important in explaining firm growth and success of entrepreneurial firms. The paper uses a very different sampling approach by collecting a novel data set of company incorporations from national business registers across more than 70 countries. The authors approached the official registrars with the help of the World Bank and collected annual information on the number of new business registrations and delisting by country. Most important, we see that administrative barriers to starting a business, as well as the cost of registering a business, are significantly and negatively correlated with business density and the entry rate. These results confirm the earlier studies that show an association of the regulatory and legal environment on firm entry, for example, Botero et al. (2004) or the World Bank *Doing Business* reports (various years).

Finally, we can also draw on a few microlevel studies that pursue related questions to understand the microdynamics of business formalization. One example is the recent paper by Mullainathan and Schnabl (forthcoming) on Lima, Peru. The authors investigated a business licensing reform that simplified and removed many of the licensing procedures for small businesses in the main municipality of Lima. The idea was to show how regulatory steps, such as changes in the time and cost that it takes to register a business, can affect the small business owners' choice of entering the formal sector. The reform significantly reduced the median licensing time from 40 to 15 days and lowered the average licensing cost by 42%. As a result, the number of newly licensed firms increased fourfold in the year after the reform. Out of these newly registered firms, three-quarters were operating informally prior to the reform, while one-quarter were new start-ups. Thus, initially the largest impact of the reforms is encouraging existing businesses to change their registration status, but it also encourages a significant increase in business starts in the municipality. Interviews with participating businesses also showed that the foremost motivation for obtaining a license after the reforms is to avoid having to pay fines and bribes.

These results highlight the microchannels by which regulations affect entrepreneurs and their planning horizon, including regulatory risks. We see the important influence of regulatory changes on the incentives and ability of local bureaucrats to engage in rent extraction. The suggestion is that simplifying government regulation, in this case registration procedures, reduces the opportunities of bureaucrats and government officials to engage in rent extraction and thus reduces the barriers to entry. It also affects the ease with which businesses can expect to grow since they do not face the uncertainties of changing extortion requirements

when the firm becomes more successful. This “regulatory tax” might be particularly distortive for transformational entrepreneurs if officials are more likely to increase their demands on the successful firms while smaller, less profitable firms are able to stay below the radar. This asymmetry could explain why greater regulation has a particularly negative effect on the transformational entrepreneurs but not on the subsistence entrepreneurs.

Access to capital. A number of studies suggest that there are extreme capital constraints for start-up firms in emerging markets. While it is often difficult to measure the extent of the capital constraints or even the cost of capital for a firm, Udry and Anagol (2006) use an innovative approach to estimate the real return to capital in Ghana’s informal sector in order to assess whether small businesses experience capital constraints. They derive estimates of the return to capital from the return differential for capital-intensive industries and those that do not require capital. The analysis is based on a focused household survey in Ghana, where farm households were asked about their income, savings, investment, and the farming technologies they use. In particular, the authors compare the return to capital in farming for new technologies versus well-established technologies. Farmers that use a new technology or cash crop cultivation have annual returns ranging from 205% to 350% compared to only 30%–50% in well-established food crop cultivation. The assumption is that this extremely large return differential can only be sustained in the market since some households are unable to switch to the more lucrative cash crop cultivation because of inherent capital constraints.

However, one could be concerned that the switch from traditional crops to cash crops might not only be hampered by access to capital but might also require inputs such as human capital or a greater risk tolerance if these crops have longer horizons or more volatility. In order to address these limitations, the paper also uses a second approach by looking at the difference in the rent versus buy price of durable goods of varying durability. The estimated lower bound for the opportunity cost of capital is about 60%. These estimates imply very dramatic effects of capital constraints.

Finally, a number of recent papers have looked at shocks to the supply of credit for small businesses and their implication for growth. The idea is that if firms are already at their optimal capital structure and funding level, supply shocks that relax credit constraint should have only minimal impact. But if firms are severely constrained, we should see a large impact on firm growth. See Banerjee and Duflo (2008); Bertrand, Thesmar, and Schoar (2005); and Cole (forthcoming) for a similar quasi-experimental analysis of lending constraints. For example, Banerjee and Duflo (2008)

study whether firms are credit constrained by looking at a shock to the supply of credit to small businesses in India. The study looks at the relaxation of credit constraints when priority sector lending expanded in 1998 to include larger firms. Becoming eligible for priority sector lending gives access to credit to firms that previously could not get financing from the formal banking sector. The eligibility expanded from firms with a maximum of Rs 6.5 million in investments to firms with up to Rs 30 million in investments. For those firms that were now eligible, an increase of Rs 1,000 in lending resulted in a 2.7% increase in profit. The authors calculate that this is a gap of at least 70% between the marginal product of capital and the market interest rate, which suggests that firms were highly credit constrained prior to the reform.

The paper by Bertrand et al. (2005) suggests that a change in the lending practices of banks not only can have an effect on the alleviation of credit constraints but can even have a multiplier effect through its impact on exit, entry, and overall industry structures throughout the economy. The authors focus on the deregulation of the French banking industry in 1985 that eliminated government interference in lending decisions, allowed French banks to compete more freely against each other, and sharply reduced government subsidies for bank loans. The paper compares bank-dependent industries to those that do not access bank loans pre- and postderegulation. The identification assumption is that firms in industries that heavily rely on bank debt should be more affected by the deregulation than industries that do not need to borrow from banks. Postderegulation, lending decisions became more closely tied to firm performance. Poor performing firms experience a steeper increase in the cost of capital after the reforms than good firms. Low-quality firms that suffer negative shocks are more likely to restructure, for example, to reduce wages and cut costs.

Most important on the product market side, the authors find that asset reallocation becomes much quicker, mostly through an increase in both entry and exit rates. These results support a view that banking sector distortions can create artificial barriers to entry in the bank-dependent industries. New potential entrants may be discouraged by the easy access to cheap credit for incumbent firms. In fact, the paper shows that industry concentration decreases countrywide after the deregulation. And as a result, better performing firms control higher market shares after the reforms. Overall, these results on industry structure support the Schumpeterian idea of creative destruction. It suggests that efficient financial markets play a central role in improving market dynamics, facilitating creative destruction, and leveling the playing field for entrepreneurial firms.

C. A Concrete Policy Example

We can now look at microfinance as a prime example that highlights the need to understand the differences between the transformational and subsistence entrepreneurs in order to design policy responses to foster entrepreneurial dynamics and growth in an economy. The misconception that entrepreneurship scales seamlessly from the tiny subsistence sector to the transformational entrepreneurs has led to a widespread misinterpretation of the microfinance revolution.

Over the last 2 decades the number and proliferation of microfinance organizations has grown dramatically across the world and has reached millions of poor borrowers in developing countries. The widely expressed rationale for microfinance is that financing tiny subsistence businesses will lead to firm growth and ultimately to job creation and economic development. Those who borrow from microfinance institutions (MFI), the majority of whom are women, take small loans of usually less than \$200 as part of joint liability groups where they are mutually responsible for each other's loans.

This form of financing has proven to be very effective in giving poor borrowers access to more formal means of financing. The pooling of borrowers into a joint liability group, and the accompanying mutual guarantee scheme, has allowed lenders to mitigate their default risk and reduce transaction costs relative to individual loan disbursements. Surely, access to MFI loans has tremendous benefit for the poor as a means of smoothing income shocks or even allowing them to start subsistence activities, like buying livestock. However, it has not led to an entrepreneurship revolution in these countries. Only a negligible fraction of microfinance borrowers develop into transformational entrepreneurs or even have the desire to grow their businesses beyond the subsistence level. This might not be too surprising, since one would have to assume massive economies of scale and scope in order to believe that firms that start with a capital base of \$200 and no discernible technological advantage could grow into a medium-size or even large firm in a reasonable time frame.

The mismatch comes from the fact that many donor organizations specifically invest in microfinance with an explicit intention of fostering the growth of transformational businesses and contributing to job creation. Policies often focus on ways to subsidize other business services for the self-employed in order to help them grow their business into a transformational firm. However, these policies in most cases prove to be ineffective or not even adopted by the target population. But it should

not be a surprise to anyone who understands the distinct differences between subsistence entrepreneurs and transformational entrepreneurs.

This argument is supported by a number of recent studies on microfinance investments. For example, a careful study by Banerjee et al. (2009) conducted a randomized experiment to analyze the impact of microcredit. Working with a local MFI in India that is expanding its network of branches, the authors randomly assigned 52 out of 104 slums in the city of Hyderabad to new branches, while the other half of the slums are not served by the MFI. In the baseline survey done with existing borrowers, the paper found that only 31% of the households owned a business. These businesses were very small: 20% had no assets, only 10% had employees, and the average profits were \$340 per month. When analyzing the impact of microcredit, the study finds that of those people who took a loan, 30% used the loan to start a new business, 22% used it to buy stock for their existing business, and the remaining 48% used it to pay off existing debt, buy household durables, and to smooth household consumption. While microcredit had a significant impact on the profit of existing business owners in treatment versus control, it did not have a significant impact on the income, business inputs, or number of employees. This suggests that even for the microbusinesses among the MFI clients (which is a small minority of these borrowers), the improved access to credit seems to have reduced their borrowing costs and thus the profits. But it did not lead to explosive growth of their businesses; in fact, it hardly led to any firm or employment growth at all.

V. Conclusion

Ultimately this debate takes us back to the fundamental question that has puzzled economists for more than a century. Robert E. Lucas (1990) famously phrased it as “Why Doesn’t Capital Flow from Rich to Poor Countries?” The most common answer economists will offer to this puzzle is that either financial market imperfections or regulations impede the flow of capital into emerging markets, and this forces many businesses and entrepreneurs to get stuck in the informal sector. However, the evidence brought together in this paper suggests that capital constraints or market regulations per se are only half of the story. Indeed, inefficient capital markets and regulatory imperfections affect transformational entrepreneurs most severely and thus will have the most severe impact on growth in developing economies.

First, a large part of the financial infrastructure that has been built to reach the poor in developing countries is based on the microfinance revolution,

which at its heart provides consumption loans to the very poor. MFIs have found a way to rapidly expand and effectively manage the operational challenges that come with such a retail-intensive approach. As I mentioned above, these are very important tools that help the poor manage negative income shocks and smooth consumption. The arguments in this paper are not meant in any way to understate the importance of this form of financial access. However, the individual MFI clients do not show explosive growth from one loan to the other as discussed above. Therefore, to increase the base of capital that MFIs deploy in a country, they have to proportionally increase the number of clients in their network. This logic suggests and is corroborated by balance sheet data from MFIs that show that even very big MFIs still have a large fraction of variable costs. This means that they cannot benefit from economies of scale in putting capital to work due to the limited growth potential of their clients. Moreover, the cost of capital for MFIs is very high since they cannot rely on deposits or other, cheaper forms of funding. As a result, MFIs are able to support subsistence entrepreneurs but are not well equipped to serve the transformational entrepreneurs.

To achieve a more effective flow of capital to transformational entrepreneurs in developing countries, these countries will need to rely on channels and organizations that effectively foster the selection and financing of these entrepreneurs. At the top end of the market we have seen an enormous increase of venture capital and private equity in rapidly emerging markets such as Brazil, China, and India. Not only is there an increased flow of risk capital from Western, especially U.S., venture capitalists. But there is also an emerging domestic class of venture investors who are supporting the top end of the entrepreneurial firms in these countries. These investors are supporting an emerging class of transformational entrepreneurs who build rapidly growing companies with global ambitions. We have seen in developed economies like the United States that these investors crucially rely on a liquid exit market through initial public offerings or acquisitions often by public firms. Therefore, improvements in the liquidity of public markets can also contribute to a more vibrant market for investments in transformational entrepreneurs.

However, private equity only constitutes a very small fraction of start-up investment in developing countries. The majority of the funding for small and midsize companies is provided through banks. Therefore, an improvement in the lending technologies of these banks can have a large positive impact on access to credit for this segment. In fact, over the last decade we have seen many financial innovations, especially in retail banking, spreading to developing countries, such as credit cards, consumer credit, or structured finance products that allow banks to improve their

risk-sharing models when lending to riskier borrowers. These types of financial innovations have helped to facilitate the access to finance for transformational entrepreneurs since these types of businesses usually need larger amounts of capital. But in many emerging markets banks are often still constrained in their ability to lend to high-growth businesses due to either regulations or a lack of a financial and technology infrastructure. Banking regulations in many countries direct credit to established and often well-connected businesses, which in turn creates barriers to entry for new and potentially more efficient firms. At the same time, many developing countries do not have the financial infrastructure that facilitates lending to small and medium enterprises (SMEs), such as the ability to pledge and seize collateral, a functioning credit bureau, and so on.

This leads to a second important policy dimension in which transformational and subsistence entrepreneurs are asymmetrically affected. As many of the research studies discussed here have shown, entry regulations and labor market constraints adversely affect the growth of transformational entrepreneurs. Many of these regulations are initially intended to protect small businesses and help them maintain their position relative to the largest firms in the economy. But over time these regulations often prevent effective competition by new entrants and curtail the growth of the firms that have the most potential in the economy. The recent trends in many of the so-called BRIC countries—Brazil, Russia, India, and China—provide suggestive evidence that the deregulation of product and labor markets can lead to a significant increase in transformational entrepreneurship. However, we are still very far from knowing what are the most effective policy levers to stimulate transformational entrepreneurship and creative destruction à la Schumpeter. Therefore, a lot more work and research is needed to advance our understanding on that matter.

Endnote

This paper draws in large part from some of the insights that were informed by a related NBER volume on the topic of “international differences in entrepreneurship,” which I have been coediting together with Josh Lerner over the past 2 years. I would like to thank Josh Lerner and Scott Stern, the editors of this volume, for their guidance and very valuable suggestions on the current paper.

References

- Accenture. 2008. “The Rise of the Emerging-Market Multinational: Special Report on Globalization.” *The Economist*, September.
- Acs, Z. J., and D. B. Audretsch. 1988. “Innovation in Large and Small Firms: An Empirical Analysis.” *American Economic Review* 78, no. 4:678–90.

- Ardagna, Silvia, and Annamaria Lusardi. Forthcoming. "Explaining International Differences in Entrepreneurship: The Role of Individual Characteristics and Regulatory Constraints." In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- Banerjee, Abhijit, and Esther Duflo. 2008. "Do Firms Want to Borrow More? Testing Credit Constraints Using a Directed Lending Program." Working Paper no. 02–25, Department of Economics, Massachusetts Institute of Technology.
- Banerjee, Abhijit, Esther Duflo, Rachel Glennerster, and Cynthia Kinnan. 2009. "The Miracle of Microfinance? Evidence from a Randomized Evaluation." Working paper, Massachusetts Institute of Technology.
- Bartelsman, E., J. Haltiwanger, and S. Scarpetta. 2004. "Microeconomic Evidence of Creative Destruction in Industrial and Developing Countries." Policy Research Working Paper Series, no. 3464, World Bank, Washington, DC.
- Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2004. "Financial and Legal Institutions and Firm Size." Policy Research Working Paper Series, no. 2997, World Bank, Washington, DC.
- Bertrand, Marianne, David Thesmar, and Antoinette Schoar. 2007. "Banking Deregulation and Industry Structure: Evidence from the 1985 French Banking Act." *Journal of Finance* 62, no. 2:597–628.
- Botero, J., S. Djankov, R. La Porta, F. Lopez-De-Silanes, and A. Shleifer. 2004. "The Regulation of Labor." *Quarterly Journal of Economics* 119:1339–82.
- Cole, Shawn. Forthcoming. "Financial Development, Bank Ownership, and Growth; or, Does Quantity Imply Quality?" *Review of Economics and Statistics*.
- de Mel, Suresh, David McKenzie, and Christopher Woodruff. 2005. "Returns to Capital in Microenterprises: Evidence from a Field Experiment." *Quarterly Journal of Economics* 123, no. 4:1329–72.
- . Forthcoming. "Who Are the Microenterprise Owners? Evidence from Sri Lanka on Tokman v. de Soto." In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- Desai, Mihir, Paul Gompers, and Josh Lerner. 2005. "Institutions, Capital Constraints and Entrepreneurial Dynamics: Evidence from Europe." Working Paper no. 10165, NBER, Cambridge, MA.
- Fogel, K., R. Morck, and B. Yeung. 2008. "Big Business Stability and Social Welfare." In *Financial Sector Development in the Pacific Rim*, ed. Takatoshi Ito and Andrew Rose. East Asia Seminar on Economics, vol. 18. Cambridge, MA: NBER Books.
- Frederick, S. 2005. "Cognitive Reflection and Decision Making." *Journal of Economic Perspectives* 19, no. 4:24–42.
- Gompers, Paul A., Josh Lerner, and David S. Scharfstein. 2005. "Entrepreneurial Spawning: Public Corporations and the Formation of New Ventures, 1986–1999." *Journal of Finance* 60, no. 2: 577–614.
- Herrera, Ana Maria, and Eduardo Lora. 2005. "Why So Small? Explaining the Size of Firms in Latin America." Unpublished working paper.
- Iyer, Rajkamal, and Antoinette Schoar. Forthcoming. "Are There Cultural Determinants of Entrepreneurship?" In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- King, Robert G., and Ross Levine. 1993. "Finance and Growth: Schumpeter Might Be Right." *Quarterly Journal of Economics* 108, no. 3:717–37.
- Klapper, Leora, Raphael Amit, and Mauro F. Guillén. Forthcoming. "Entrepreneurship and Firm Formation across Countries." In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- Knight, F. 1921. *Risk, Uncertainty, and Profit*. Boston: Houghton Mifflin.

- Kortum, S., and J. Lerner. 2000. "Assessing the Impact of Venture Capital on Innovation." *Rand Journal of Economics* 31:674–92.
- Lerner, Josh, and Antoinette Schoar, eds. Forthcoming. *International Differences in Entrepreneurship*. Chicago: University of Chicago Press (for NBER).
- Lucas, Robert. 1990. "Why Doesn't Capital Flow from Rich to Poor Countries?" *American Economic Review* 80:92–96.
- Mondragon-Velez, Camilo, and Ximena Pena-Parga. Forthcoming. "Business Ownership and Self-Employment in Developing Economies: The Colombian Case." In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- Mullainathan, Sendhil, and Philipp Schnabl. Forthcoming. "Does Less Market Entry Regulation Generate More Entrepreneurs? Evidence from a Regulatory Reform in Peru." In *International Differences in Entrepreneurship*, ed. Josh Lerner and Antoinette Schoar. Chicago: University of Chicago Press (for NBER).
- Nanda, Ramana. 2007. "Entrepreneurship and the Discipline of External Finance." Working paper, Harvard Business School.
- Schumpeter, J. A. 1942. *Capitalism, Socialism, and Democracy*. New York: Harper, 1942.
- Stiglitz, Joseph, and Karla Hoff. 2007. "Theory of Imperfect Competition in Rural Credit Markets." Working Paper no. 49, Institute for Policy Reform, Northwestern University, October.
- Udry, Christopher, and Santosh Anagol. 2006. "The Return to Capital in Ghana." Working Paper no. 932, Economic Growth Center, Yale University.