WPS5971

Policy Research Working Paper 5971

A Tale of Two Species

Revisiting the Effect of Registration Reform on Informal Business Owners in Mexico

Miriam Bruhn

The World Bank
Development Research Group
Finance and Private Sector Development Team
February 2012

Abstract

Different views have been put forward to explain why most firms in developing countries operate informally. One view argues that informal-business owners are entrepreneurs who do not register their firm because the regulation process is too complex. Another argues that informal-business owners are people trying to make a living while searching for a wage job. This paper contributes to recent literature that argues that both factors are at work. The author uses discriminant analysis to separate informal business owners into two groups: those with personal characteristics similar to wage workers, and those with traits similar to formal-business owners. The paper then examines how the two groups were affected by a business registration reform in Mexico. Informal-business owners from the second group were more likely to register their business after the reform. By contrast, informal-business owners from the first group were less likely to register but more likely to become wage workers after the reform. This is consistent with the finding in Bruhn (2008 and 2011) that the reform led to job creation. It also explains why the earlier papers find that the reform didn't affect the number of new registrations by all informal business owners.

This paper is a product of the Finance and Private Sector Development Team, Development Research Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org.
The author may be contacted at mbruhn@worldbank.org.

A Tale of Two Species:

Revisiting the Effect of Registration Reform on Informal Business Owners in Mexico

Miriam Bruhn[1]

JEL codes: O12, O17, L26
Keywords: Informal sector, business registration reform, entrepreneurship
Sector Board: Financial Sector (FSE)

[1] Development Research Group, The World Bank. mbruhn@worldbank.org. I thank David McKenzie for valuable comments.

1. Introduction

Most firms in developing countries are informal, that is they operate without registering with the government (OECD, 2009, and data from IFC, 2010). This can pose disadvantages to firms since they may be subject to government penalties and they may not have access to low cost sources of financing, government contracts, and public contract enforcement (Jansson and Chalmers, 2001). It can also limit firms' market size since they cannot issue formal receipts to customers (McKenzie and Sakho, 2010). From the government's perspective, informality may result in lower tax collection, restricting the government's ability to finance public services (Levy, 2008).

Historically, different views have been put forward to explain why many firms operate informally. One view, associated with De Soto (1989), argues that informal business owners are viable entrepreneurs who are being held back from registering their firm due to complex regulation. This regulation includes the initial procedures for obtaining an operating license, as well as ongoing compliance costs for registered firms, such as taxes and labor contributions. Another view, expressed for example by Tokman (1992), sees informal business owners as individuals who are trying to make a living while they search for a wage job.

Several papers have developed theoretical models supporting either view[2]. Other papers examine empirically which view is correct, leading to different conclusions (Maloney, 1999 and 2004, and La Porta and Shleifer, 2008 and 2011). Recently, some have emphasized that informal firms are heterogeneous and that a mix of both views may be correct (OECD, 2009). Self-reported statistics support this mixed view. In World Bank Enterprise Survey data on informal firms in Madagascar, Côte d'Ivoire, and Mauritius, about 62 percent of business owners report that they started their firm to take advantage of a business opportunity, while the remainder says they were not able to find a satisfactory job elsewhere (Amin, 2009). Maloney (2004) also presents similar numbers for Brazil and Mexico.

De Mel, McKenzie, and Woodruff (2010) investigate heterogeneity in the informal sector in Sri Lanka through discriminant analysis, a tool used by biologists to separate animals or plants into species on the basis of easily measured characteristics. The authors classify a sample of self-

[2] See for example Bennett and Estrin (2009), Bennett (2010), and Straub (2005) for models supporting the De Soto view and Fields (1975) and Fields (2004) for models supporting the Tokman view.

employed microenterprise owners into those who have personal characteristics similar to wage workers and those who have characteristics similar to larger firm owners[3]. Their analysis shows that about 70 percent of microenterprise owners fall into the first category and 30 percent fall into the second category.

This paper uses the context of a reform in Mexico that simplified local business registration procedures to provide further evidence for the existence of two different species of informal business owners. The business registration reform was implemented in different municipalities at different times, providing an estimation strategy for identifying its effects on formal firm creation and employment. Bruhn (2008 and 2011) shows that the reform increased the number of registered business owners, and that it also created additional wage jobs in eligible sectors. However, the results indicate that the increase in registered business owners was due to former wage earners opening businesses. Former informal business owners were not more likely to register their business after the reform, on average.

In this paper, I follow the approach of De Mel, McKenzie, and Woodruff and use discriminant analysis based on personal characteristics of informal business owners to separate them according to their potential for becoming formal business owners. The discriminant analysis classifies half of the informal business owners in my sample as wage workers and the other half as formal business owners.

I then examine the impact of the business registration reform on these two separate groups and find that informal business owners from the formal business owner species are 14.3 percent more likely to register their business after the implementation of the reform. In contrast, informal business owners from the wage worker species are less likely to become formal business owners after the reform, but they are 20.4 percent more likely to become wage workers. This is consistent with the finding in Bruhn (2008 and 2011) that the reform led to job creation and it explains why the effect of reform is zero for the group of all informal business owners taken together.

[3] Employers and wage workers differ along many dimensions, including personal background characteristics, attitudes, and cognitive ability measures. Djankov et al (2005 and 2006) also find this to be the case in Brazil, China, and Russia.

Overall, these results support the argument that the informal sector consists of different types of business owners. Some operate informally due to stringent regulation and simplifying regulation can entice them to register their business. Others run informal businesses while they are looking for a job and they switch to being wage earners when more job opportunities arise. The evidence in this paper does not exclude the possibility that there could be more than two different species of informal business owners. For example, there may be a third group of individuals that does neither want to formalize nor become a wage earner. In my data, a large number of firms continue to operate informally even after the business registration reform. In fact, evidence from Bolivia and Indonesia suggests that not all informal firms benefit equally from registering and for some firms in Bolivia, formalization lowers profits (McKenzie and Sakho, 2010, and McCulloch, Schulze, and Voss, 2010, see also Perry et al, 2007).

This paper is also related to Hsieh and Klenow's (2009) argument that low aggregate productivity in developing countries is in part due to misallocation of resources across firms and that complex regulation is one factor than can contribute to this misallocation. The findings of this paper suggest that business registration reform allows individuals to better sort across occupations, thus promoting reallocation of resources and potentially raising productivity. More broadly, the results imply that studies of regulatory reforms may need to go beyond measuring average effects since reforms can have important effects on productivity through reallocation.

The remainder of this paper is structured as follows. Section 2 describes the data and the classification of informal business owners into wage worker and formal business owner species. Section 3 discusses the business registration reform and hypotheses for how this reform affects different species of informal business owners. Section 4 lays out the identification strategy and summarizes transitions into different occupations in the pre-reform period. Section 5 presents the impact estimates of the reform on firm formalization and transitions on wage work. Section 6 concludes.

2. Mexican Employment Survey Data and Species Classification

The main data source used in this paper is the Mexican National Employment Survey (ENE), the survey that the Mexican government relies on for calculating unemployment statistics and the size of the informal sector. The ENE was conducted quarterly starting in 2000-II and covers a

random sample of approximately 150,000 households. Each household remains in the survey for five consecutive quarters. I use data for 2000-II to 2004-IV (19 quarters in total)[4].

The ENE includes detailed information on each individual's employment status and occupation. In particular, the survey asks all currently employed individuals whether they work as wage workers or whether they are employers or self-employed in their main job. I group employers and the self-employed together and call them business owners. The survey then asks these business owners whether their business is formally registered with the authorities. Close to 50 percent of business owners report that their business is not registered with the authorities. I refer to these business owners as informal business owners[5]. Among working age (20 to 65) individuals in the ENE, 49.5 percent are wage workers, 8.6 percent are formal business owners and 8 percent are informal business owners. The remaining individuals are not employed (either unemployed or not in the labor force).

Personal background characteristics

Following De Mel, McKenzie, and Woodruff (2010), I classify the group of informal business owners into wage worker and formal business owner species using discriminant analysis. As described in De Mel, McKenzie and Woodruff, discriminant analysis is a tool used by biologists to separate animals or plants into species on the basis of easily measured characteristics. For the species classification, De Mel, McKenzie, and Woodruff rely on a large number of background, ability, and attitude measures, collected through their own survey. I have to work with a less rich set of personal characteristics since the ENE only includes basic background characteristics for each individual: age, gender, marital status, education, whether or not the individual is a head of household, and whether or not the individual is a migrant (defined as living in a state that is different from the state where the person was born). The reason for using ENE data in this paper is that it is high frequency data with broad geographic coverage that allows me to identify informal business owners and to track them over time. These features are essential for the impact analysis performed in later sections of this paper.

[4] After 2004-IV, the ENE was changed to a new survey, the ENOE, and some of the questions used to define the variables in this paper where modified, limiting comparability across the two surveys.
[5] Bruhn (2008) includes a detailed description of how I classified individuals into different occupation groups.

Table 1 displays averages and standard deviations for the personal background characteristics, by occupation group. The sample here includes individuals in their first quarter of observation in the ENE before the business registration reform was implemented in the municipality where the individual lives. The stars on the averages for formal business owners and wage workers denote the statistical significance level of the difference in averages compared to informal business owners.

The statistics in Table 1 show that informal business owners tend to be slightly younger than formal business owners, but they are 6.5 years older than wage workers, on average. A little over one-third of informal business owners are female, while only 27 percent of formal business owners are female, but 40 percent of wage workers are female. Informal business owners have lower levels of education than formal business owners and wage workers, with a much larger fraction having completed only primary school as opposed to higher education. Informal business owners are 6.8 percentage points less likely to be married than formal business owners, but ten percentage points more likely to be married than wage workers. Similarly, informal business owners are less (more) likely to be heads of household than formal business owners (wage workers). Finally, close to 23 percent of informal business owners and wage workers are migrants, but this number is higher among formal business owners (26 percent).

Logistic regressions

Table 2 displays the results from logistic regressions that examine more systematically the extent to which each personal characteristic is correlated with occupational choice, controlling for other characteristics. Column 1 reports marginal coefficients for the choice of being an informal vs. formal business owner. Age, being married, being a head of household and having higher levels of education are all negatively correlated with being an informal instead of a formal business owner[6]. Females, on the other hand, are more likely to be informal instead of formal business owners. Column 2 shows that many of these correlations are reversed for the choice of being an informal business owner vs. a wage worker. Older individuals, people who are married or a head of household are more likely to be informal business owners than wage workers. However, higher levels of education are associated with a lower probability of being an informal business

[6] The omitted education category in the regressions is less than primary education.

owner instead of a wage worker. The coefficients in Column 3 indicate that age, being married, being a head of household, and having higher levels of education are correlated with being a formal business owner vs. a wage worker. In contrast, females and migrants are less likely to be formal business owners instead of wage workers.

Overall, the results in Table 2 indicate that all of the characteristics included in the analysis statistically significantly contribute to predicting who in the sample is an informal business owner, a formal business owner, or a wage worker. One caveat though is that the combined predictive power of the variables in not high, as illustrated by the relatively low R-squared of the regressions. Unfortunately, the ENE does not include additional personal background characteristics that could improve the predictive power of the analysis. I therefore view the classification described in the following paragraph as a lower bound for how well informal business owners can be grouped into species.

Discriminant analysis

Table 3 reports the results of the logistic discriminant analysis used to classify informal business owners into wage worker and formal business owner species based on the personal characteristics listed in Table 1. This analysis first obtains the combination of personal characteristics that best separates wage workers from formal business owners. It then applies the fitted model to the group of informal business owners, predicting who belongs to the wage worker species and who belongs to the formal business owner species. Panel A of Table 3 displays as check of how successful the fitted model is at classifying individuals into species. When applying the fitted model to the groups of formal business owners and wage workers, it classifies close to 65 percent of each group correctly. For comparison, the richer set of personal background characteristics used in De Mel, McKenzie and Woodruff allows them to classify up to 79 percent of the species groups correctly. Panel B of Table 3 shows that when I apply the fitted model to the group of informal business owners, it classifies about half of them as wage workers and the other half as formal business owners.

3. Business Registration Reform and Hypotheses

In this section, I study the impact of a business registration reform in Mexico, the Rapid Business Opening System (SARE), on the occupational choices of informal business owners, keeping in mind their division into wage worker and formal business owner species. SARE simplified local business registration procedures, reducing the average the number of days, procedures, and office visits required to register a business, from 30.1 to 1.4, from 7.9 to 2.7, and from 4.2 to 1, respectively. The reform was organized by a federal agency, the Federal Commission for Improving Regulation (COFEMER), which had to coordinate with municipal governments since many business registration procedures are set locally in Mexico. As a result of this need for coordination, SARE was implemented in different municipalities at different times, starting in May 2002[7].

Bruhn (2008) shows that the implementation of SARE increased the number of formal business owners by 5 percent. It also increased wage employment by 2.2 percent. However, the results indicate that the increase in formal business owners was due to former wage earners opening businesses. Former informal business owners were not more likely to register their business after the reform. This conclusion is based on the average effect of the reform on all informal business owners in the sample. The paper also separates informal business owners by whether they have any employees or not or by whether they have fixed or mobile premises, but it does not find any effect on business registration for any of these sub-groups of informal business owners.

Bruhn (2008) relied on business characteristics to separate informal business owners into different groups, recognizing that the informal sector is heterogeneous and trying to isolate the informal business owners that would be most likely to register their business after a reform. However, De Mel, McKenzie, and Woodruff suggest that it may be more appropriate to use the personal characteristics of business owners to classify them according to their potential for becoming formal business owners. This paper thus revisits the earlier results from Bruhn (2008) and examines the impact of SARE separately for informal business owners that belong to the wage worker and formal business owner species, according to the discriminant analysis

[7] Bruhn (2008) includes a more detailed description of the reform.

performed in Section 2. I expect to find that only informal business owners from the formal business owner species are more likely to register their business after the implementation of SARE. In contrast, informal business owners from the wage worker species should be more likely to become wage workers after the reform since the reform also created more jobs.

Testing these hypotheses sheds light on the effect of SARE on firm formalization and transitioning to wage work for different types of informal business owners. At the same time, it provides a test of the classification of informal business owners into wage worker and formal business owner species. That is, if I find that informal business owners from the wage worker (formal business owner) species are more likely to become wage workers (formal business owners) when a reform makes it easier to do so, this confirms the validity of the species classification.

4. Identification Strategy and Transitions into Different Occupations

This paper follows the identification strategy in Bruhn (2008 and 2011) to measure the effects of SARE on business registration and transitions to wage employment of informal business owners. In particular, I exploit the fact that the reform was implemented in different municipalities at different points in time to estimate the following equation

$$y_{ict} = \alpha + \beta_c + \gamma_t + \delta SARE_{ct} + \varphi EC_{1999} * t + \varepsilon_{ict},$$

where the outcome variable y_{ict} is a dummy variable indicating the occupation (e.g. formal business owner, wage worker) of individual i living in municipality c in quarter t. The regression includes municipality fixed effects, β_c, and quarter fixed effects, γ_t. The variable $SARE_{ct}$ is the reform dummy and, for each municipality, it is equal to one for the quarter in which the reform was implemented and for all following quarters. The vector EC_{1999} consists of control variables from the 1999 Economic Census interacted with a linear time trend, t. These variables are log GDP per capita, log number of economic establishments per 1000 capita, log fixed assets per capita, and log investment per capita. The standard errors of the regressions are clustered at the municipality level.

The coefficient δ measures the unbiased impact of SARE on outcomes y_{ict} under the assumption that the time trends of y_{ict} would have been parallel across municipalities in the

absence of the reform. Bruhn (2008 and 2011) performs a number of checks suggesting that this assumption holds. Both the levels and the pre-reforms changes in outcomes variables do not display systematic statistical differences across municipalities in the sample. In line with Bruhn (2008 and 2011), the sample used in this paper here only includes the 34 municipalities that adopted SARE by December 2004[8]. Municipalities that adopted the reform later or that have not yet adopted tend to be less comparable to the ones that adopted the reform early.

In order to study the differential effect of SARE on informal business owners in the wage worker and formal business owner species, I make use of the panel structure of the ENE. For the analysis, I only keep the individuals who report being informal business owners when I first observe them in the pre-reform period. The species classification exercise in Section 2 assigns each of these individuals to a species based on the data from their first quarter of observation. I then drop the first quarter of observation for each person and use the remaining data in the regression outlined above, running separate regressions for the wage worker and formal business owner species[9]. The outcome variables (occupation dummies) in these regressions can be interpreted as occupational transition probabilities. That this, they represent the average fraction of informal business owners that is employed in each occupation during the following quarters[10].

Table 4 displays the probabilities of transitioning into different occupations in the pre-reform period, indicating a high degree of mobility in the informal sector[11]. Only 55 (44) percent of informal business owners in the formal business owner (wage worker) species remain informal business owners during the following quarters. About 12 percent of individuals in the formal business owner species switch to being formal business owners. This fraction is smaller

[8] According to COFEMER's website, by November 2011, 191 municipalities had adopted SARE (http://www.cofemer.gob.mx/contenido.aspx?contenido=122).

[9] Bruhn (2008 and 2010) also controls for personal background characteristics in the regressions. I do not include these variables here since they were already used to separate the sample into different species.

[10] Some industries were not eligible for SARE. In this paper, I only study the impact of SARE on informal business owners in eligible industries since individuals in non-eligible industries are not able to register their business through SARE. Informal business owners in eligible industries make up 96.5 percent of informal business owners in the ENE.

[11] High mobility across occupational sectors has also been observed in earlier work with the Mexican Labor Market Survey (Bosch and Maloney, 2006, and Woodruff, 2007). The labor market is similarly dynamic in Brazil (Bosch and Maloney, 2010).

in the wage worker species (7.3 percent)[12]. On the other hand, the wage worker species is more likely to transition into wage work during the following quarters, compared to the formal business owner species. A sizable fraction of each species also ends up not being employed at all during the following quarters. Overall, the transition patterns are consistent with the species classification. Compared to the wage worker species, individuals in the formal business owner species are more likely to remain informal business owners or become formal business owners, as opposed to becoming wage workers or not employed.

As mentioned above, Bruhn (2008 and 2011) performs various tests that suggest that the identification strategy used to measure the effects of SARE is valid. Table 5 contains additional tests for the sample of informal business owners. Columns 1 and 2 display the results from taking only pre-reform data and running a regression of each occupation dummy on a variable that indicates in which quarter the municipality implemented the reform. The coefficients show that pre-reform transition probabilities are, for the most part, not statistically significantly correlated with the quarter of implementation. The only exception here is that, in the pre-reform period, individuals in the formal business owner species were more likely to remain informal business owners during the following quarters in municipalities that implemented the reform later rather than earlier. This correlation is only statistically significant at the 10 percent level.

Columns 3 and 4 test the parallel trends identification assumption more directly. They show the coefficients from a regression of each occupation dummy variable in the pre-reform period on a time trend, the quarter of implementation variable, and the interaction of the two (scaled by 100). None of the coefficients on the interaction terms are statistically significant, indicating that transition probabilities in the pre-reform period did not display time trends that varied systematically with the quarter of reform implementation.

5. Results

Table 6 presents the estimated impacts of SARE on the occupational choices of informal business owners. Column 1 replicates the results from Bruhn (2008 and 2011), grouping all informal business owners together. The coefficients show no impact of SARE on the likelihood

[12] The data does not allow me to determine for certain whether an owner registers the same business that was previously informal or whether they close the informal business and open a new, formal business. However, I assume that they register the business that was previously informal.

of being a formal business owner or a wage earner for the group of all non-registered business owners. However, when I break up informal business owners into the two different species, more nuanced results emerge. As hypothesized, individuals from the formal business owner species are statistically significantly more likely to be formal business owners after the reform. The size of this effect is equal to an increase of 0.017 in the pre-reform transition probability of becoming a formal business owner listed in Table 4 (0.118). Thus, the reform caused 13.5 percent instead of 11.8 percent of informal business owners to become formal business owners over the following quarters. This effect is equivalent to a 14.3 percent increase in the transition probability (0.017/0.118).

Informal business owners from the wage worker species, on the other hand, are less likely to become formal business owners after the reform. This explains why the effect of SARE is zero for the group of all informal business owners taken together. One possible reason why individuals from the wage worker species are less likely to be formal business owners is that they face increased competition from the individuals in the formal business owner species who transitioned to being formal business owners due to SARE. These individuals are plausibly better at running a formal business and may drive out or prevent entry into the formal sector of informal business owners from the wage earner species.

Another possibility is that individuals from the wage earner species have a preference for working as wage earners rather than business owners. In fact, the results show that SARE led to an increase in the fraction of informal business owners from the wage earner species that transition to being wage earners. This is in line with my hypotheses and with the fact that SARE created more wage jobs in eligible sectors, as shown in Bruhn (2008 and 2011). Kaplan, Piedra and Seira (2007) also find that SARE increased the creation of formal jobs registered with the Mexican Social Security Institute (IMSS). Table 5 shows that the positive effect of SARE on transitions to wage work for individuals in the wage earner species is only statistically significant for wage jobs that provide a contract. The magnitude of this effect is equivalent to a 20.4 percent (0.010/0.049) increase in the fraction of individuals from the wage worker species that transfer to being wage workers during the following quarters. The finding that informal business owners transition to formal jobs, i.e. jobs that provide a contract, is consistent with anecdotal evidence

suggesting that a higher degree of income security is among the advantages that some informal business owners associate with wage jobs[13].

Finally, the results in Table 6 indicate that informal business owners from the formal business owner species are more likely to remain informal business owners and less likely to be not employed at all (unemployed or out of the labor force). This could be due to increased demand for the products and services that these businesses sell. Bruhn (2008 and 2011) shows that SARE led to more wage employment and higher incomes for individuals who were previously not employed, which may increase demand. It could also mean that some informal business owners are choosing not to close their business since they aim to register the business through SARE at a later date.

6. Conclusion

This paper uses discriminant analysis to separate informal business owners into a species that has characteristics similar to formal business owners and another species that has characteristics similar to wage workers. The analysis classifies about half of the sample into each group. I then examine the impact of a business registration reform in Mexico on these two species. The results show that informal business owners from the formal business owner species are 14.3 percent more likely to register their business after the implementation of the reform. In contrast, informal business owners from the wage worker species are less likely to become formal business owners after the reform, but they are 20.4 percent more likely to become wage workers. This is consistent with the finding in Bruhn (2008 and 2011) that the reform led to job creation and it explains why the effect of the reform is zero for the group of all informal business owners taken together.

The results in this paper support the argument that the informal sector consists of different types of business owners. Some operate informally due to stringent regulation and simplifying regulation can entice them to register their business. Others run informal businesses while they are looking for a job and they switch to being wage earners when more job opportunities arise. This heterogeneity among informal firms may be one reason why a randomized control trial from Peru that tries to encourage informal firm registration through

[13] Based on ten case studies of informal business owners conducted for the author in Puebla, Mexico, in 2009.

financial and technical assistance with the licensing process finds that only one out of four informal firms take up this incentive (Jaramillo, 2009). Some of the remaining informal business owners may prefer to become wage earners instead. Take-up rates of these types of program could potentially be improved by screening participating informal business owners first. As shown in this paper, even basic background characteristics can provide an insight into which informal business owners are more likely to formalize their business vs. become wage earners.

Overall, policy interventions that try to reduce the size of the informal sector may need to target both firm formalization and job creation. The business registration reform in Mexico did both since it also incentivized former wage earners to open new formal businesses, thus freeing up wage jobs and creating additional formal jobs (Bruhn 2008 and 2011, and Kaplan, Piedra and Seira, 2007). Although the reform in Mexico had positive effects, the fraction of informal business owners transitioning to being formal business owners (13.5 percent in the formal business owner species) or wage workers with a contract (5.9 percent in the wage worker species) after the reform is still relatively small. Entry regulation is only one barrier to formal firm creation. Bringing a larger fraction of informal firms into the formal sector and creating additional jobs most likely also requires other reforms, such as tax reform (see also Fajnzylber, Maloney, and Montes-Rojas, 2011).

References

Amin, Mohammad. 2010. "Labor Productivity in the Informal Sector: Necessity Vs. Opportunity Firms." The World Bank, mimeo.

Bennett, John and Saul Estrin. 2009. Entrepreneurial entry in developing economies. In R. Kanbur & J. Svejnar (Eds.), *Labour markets and economic development*. Abingdon, UK: Routledge.

Bennett, John. 2010. "Informal firms in developing countries: entrepreneurial stepping stone or consolation prize?" *Small Business Economics* 34(1): 53-63.

Bosch, Mariano and William F. Maloney. 2006. "Gross worker flows in the presence of informal labor markets: the Mexican experience 1987-2002" World Bank Policy Research Working Paper No. 3883.

Bosch, Mariano and William F. Maloney. 2010. "Comparative Analysis of Labor Market Dynamics using Markov Processes: An Application to Informality." *Labor Economics*, 17(4): 621-631.

Bruhn, Miriam. 2008. "License to Sell: The Effect of Business Registration Reform on Entrepreneurial Activity in Mexico." World Bank Policy Research Working Paper No. 4538.

Bruhn, Miriam. 2011. "License to Sell: The Effect of Business Registration Reform on Entrepreneurial Activity in Mexico." *Review of Economics and Statistics*, 93(1): 382–386.

De Mel, Suresh, David McKenzie, and Christopher Woodruff. 2010. "Who Are the Microenterprise Owners? Evidence from Sri Lanka on Tokman v. de Soto." in *International Differences in Entrepreneurship*, J. Lerner and A. Schoar (eds.), pp.63-87.

De Soto, Hernando. 1989. *The Other Path: The Invisible Revolution in the Third World*, New York, NY: Harper & Row.

Djankov Simeon, Edward Miguel, Yingyi Qian, Gerard Roland, and Ekaterina Zhuravskaya. 2005. "Who are Russia's Entrepreneurs?" *Journal of the European Economic Association*, Vol 3(2-3), pp. 1-11.

Djankov, Simeon, Yingyi Qian, Gerard Roland, and Ekaterina Zhuravskaya. 2006. "Entrepreneurship in Brazil, China, and Russia." CEFIR Working Paper No. w0066.

Fajnzylber, Pablo, William F. Maloney, and Gabriel V. Montes-Rojas. 2011. "Does formality improve micro-firm performance? Evidence from the Brazilian SIMPLES program." *Journal of Development Economics* 94 (2): 262-276.

Fields, Gary, 1975, "Rural-Urban Migration, Urban Unemployment and Underemployment, and Job Search Activities in LDC's." *Journal of Development Economics*, Vol. 2, pp. 165-88.

Fields, Gary, 2004, "A Guide to Multisector Labor Market Models," Working paper, Cornell University.

Hsieh, Chang-Tai and Peter J. Klenow. 2009. “Misallocation and Manufacturing TFP in China and India.” *The Quarterly Journal of Economics*, 124(4): 1403-48.

IFC (International Finance Corproation). 2010. MSME Country Indicators. http://www.ifc.org/ifcext/globalfm.nsf/Content/MSME-CountryIndicators

Jansson, Tor, and Geoffrey Chalmers. 2001. "The Case for Business Registration Reform in Latin America." IADB Sustainable Development Department Best Practices Series, MSM-110.

Jaramillo, Miguel. 2009. “Is there Demand for Formality among Informal Firms? Evidence from microfirms in downtown Lima.” Deutsches Institut für Entwicklungspolitik Discussion Paper 12/2009

La Porta, Rafael and Andrei Shleifer. 2008. “The Unofficial Economy and Economic Development.” NBER Working Paper No. 14520.

———. 2011. *The Unofficial Economy in Africa*. NBER Working Papers 16821, National Bureau of Economic Research, Inc.

Levy, Santiago. 2008. *Good Intentions, Bad Outcomes: Social Policy, Informality, and Economic Growth in Mexico*. Brookings Institution Press.

Kaplan David, Eduardo Piedra, and Enrique Seira. 2007. “Entry Regulation and Business Start-ups: Evidence from Mexico.” World Bank Policy Research Working Paper No. 4322.

Maloney, William. 1999. “Does informality Imply Segmentation in Urban Labor Markets? Evidence from Sectoral Transitions in Mexico.” *World Bank Economic Review*, 13 (2): 275-302.

Maloney, William. 2004. “Informality Revisited.” *World Development*, 32 (7): 1159-1178.

McKenzie, David, and Yaye Seynabou Sakho. 2010. “Does it pay firms to register for taxes? The impact of formality on firm profitability.” *Journal of Development Economics* 91 (1): 15-24.

McCulloch, Neil, Günther G Schulze, and Janina Voss. 2009. *What Determines Firms’ Decisions to Formalize? Empirical Evidence from Rural Indonesia*. Proceedings of the German Development Economics Conference, Frankfurt a.M. 2009. Verein für Socialpolitik, Research Committee Development Economics.

OECD (Organisation for Economic Co-operation and Development). 2009. “Is Informal Normal? Towards More and Better Jobs in Developing Countries,” Edited by Johannes P. Jütting and Juan R. de Laiglesia.

Perry, Guillermo, William Maloney, Omar Arias, Pablo Fajnzylber, Andrew Mason and Jaime Saavedra. 2007. *Informality: Exit and Exclusion*. World Bank Latin America and Caribbean Studies: World Bank, Washington D.C.

Straub, Stéphane. 2005. “Informal Sector: The Credit Market Channel.” *Journal of Development Economics* 78: 299-321.

Tokman, Victor. 1992. *Beyond Regulation: The Informal Sector in Latin America*. Bolder: Lynne Rienner Publishers.

Woodruff, Christopher, 2007, "Self Employment: Engine of Growth or Self-Help Safety Net?" in Paci and Serneels, Eds., *Employment and Shared Growth*. Washington, DC: The World Bank.

Table 1: Personal Background Characteristics

	Averages and standard deviations (in brackets)		
	Informal business owners	Formal business owners	Wage workers
Age	40.821	41.177***	34.271***
	(11.701)	(10.797)	(34.271)
Female	0.360	0.274***	0.400***
	(0.480)	(0.446)	(0.490)
Highest education level			
Primary	0.314	0.196***	0.195***
	(0.464)	(0.397)	(0.396)
Secondary	0.211	0.213	0.259***
	(0.408)	(0.410)	(0.438)
High school	0.133	0.209***	0.250***
	(0.340)	(0.406)	(0.433)
University	0.036	0.280***	0.190***
	(0.186)	(0.449)	(0.392)
Married	0.721	0.789***	0.620***
	(0.449)	(0.408)	(0.485)
Head of household	0.594	0.690***	0.465***
	(0.491)	(0.463)	(0.499)
Migrant	0.226	0.261***	0.229
	(0.418)	(0.439)	(0.420)
Observations	32,452	34,276	205,935

Notes: The sample includes individuals in their first quarter of observation in the Mexican Labor Market Survey (ENE) before the business registration reform was implemented in the municipality where the individual lives. The stars on the averages for formal business owners and wage workers denote the statistical significance level of the difference in averages compared to informal business owners. Significance levels: *10 percent, **5 percent, ***1 percent.

Table 2: Logistic Regressions

	Informal vs. formal business owners	Informal business owners vs. wage workers	Formal business owners vs. wage workers
	(1)	(2)	(3)
Age	-0.005***	0.003***	0.005***
	(0.000)	(0.000)	(0.000)
Female	0.026***	0.002	-0.027***
	0.006	0.002	0.002
Highest education level			
Primary	-0.179***	-0.032***	0.035***
	(0.006)	(0.001)	(0.003)
Secondary	-0.307***	-0.069***	0.045***
	(0.005)	(0.001)	(0.003)
High school	-0.385***	-0.095***	0.055***
	(0.005)	(0.001)	(0.003)
University	-0.553***	-0.136***	0.099***
	(0.003)	(0.001)	(0.003)
Married	-0.083***	0.016***	0.037***
	(0.005)	(0.001)	(0.002)
Head of household	-0.073***	0.010***	0.036***
	(0.006)	(0.002)	(0.002)
Migrant	0.001	-0.002	-0.005***
	(0.005)	(0.001)	(0.001)
Pseudo R2	0.150	0.111	0.079
Observations	66,728	238,387	240,211

Notes: The sample includes individuals in their first quarter of observation in the Mexican Labor Market Survey (ENE) before the business registration reform was implemented in the municipality where the individual lives. Coefficients are marginal effects from a logit regression. Robust standard errors in parentheses. The omitted education category is less than primary education. Significance levels: *10 percent, **5 percent, ***1 percent.

Table 3: Species Classification

Panel A: Formal business owner and wage worker samples	
% of formal business owners correctly classified	65.40
% of wage workers correctly classified	64.10
Panel B: Informal business owner sample	
% classified as formal business owner	49.38
% classified as wage worker	50.62

Table 4: Transition Probabilities in Pre-Reform Period

Average fraction of informal business owners that is employed in each occupation during the following quarters		
	Species:	
	Formal business owner	Wage worker
Informal business owner	0.551	0.441
Formal business owner	0.118	0.073
Wage worker	0.154	0.228
with contract	0.037	0.049
without contract	0.117	0.179
Not employed	0.137	0.225

Notes: This table only includes informal business owners in SARE eligible industries. About 4 percent of these individuals transition to occupations in non-eligible industries (mostly to being wage workers). These transition probabilities are not reported above, which is why the probabilities in the table do not add up to one.

Table 5: Are Pre-Reform Transition Probabilities Correlated with SARE Implementation Dates?

	Coefficient on quarter of implementation		Coefficient on quarter of implementation interacted with a time trend	
	Species:			
Dependent variables: Occupation dummy variables	Formal business owner	Wage worker	Formal business owner	Wage worker
	(1)	(2)	(3)	(4)
Informal business owner	0.007*	0.003	0.011	0.025
	(0.004)	(0.003)	(0.067)	(0.068)
Formal business owner	-0.004	-0.003	0.009	-0.006
	(0.003)	(0.002)	(0.044)	(0.026)
Wage worker	-0.002	0.000	-0.036	-0.010
	(0.002)	(0.002)	(0.032)	(0.043)
with contract	-0.002	-0.002	-0.031	-0.028
	(0.002)	(0.002)	(0.027)	(0.023)
without contract	-0.000	0.002	-0.005	0.019
	(0.002)	(0.002)	(0.024)	(0.039)
Not employed	0.001	0.000	0.026	0.000
	(0.002)	(0.002)	(0.031)	(0.043)

Notes: This table only includes informal business owners in SARE eligible industries and all occupation dummy variables refer to eligible industries only. All regressions use only pre-reform data. Columns 1 and 2 display the results from running a regression of each occupation dummy on a variable that indicates in which quarter the municipality implemented the reform. Columns 3 and 4 show the coefficients from a regression of each occupation dummy variable on a time trend, the quarter of implementation variable, and the interaction of the two (scaled by 100). Robust standard errors, clustered at the municipality level, in parentheses. Significance levels: *10 percent, **5 percent, ***1 percent.

Table 6: Reform Impact

	Coefficients on SARE dummy		
	Species:		
Dependent variables:	All	Formal business owner	Wage worker
Occupation dummy variables	(1)	(2)	(3)
Informal business owner	0.012	0.023**	0.006
	(0.012)	(0.011)	(0.019)
Formal business owner	0.001	0.017**	-0.013**
	(0.006)	(0.008)	(0.006)
Wage worker	-0.000	-0.014	0.011
	(0.009)	(0.009)	(0.013)
with contract	0.003	-0.004	0.010**
	(0.003)	(0.004)	(0.005)
without contract	-0.003	-0.009	0.001
	(0.007)	(0.007)	(0.011)
Not employed	-0.011*	-0.023***	-0.001
	(0.006)	(0.008)	(0.011)
Observations	81,995	42,139	39,856

Notes: This table only includes informal business owners in SARE eligible industries and all dependent variables refer to eligible industries only. Regressions include quarter and municipality fixed effects, as well as 1999 Economic Census variables at the municipality level interacted with a linear time trend. Robust standard errors, clustered at the municipality level, in parentheses. Significance levels: *10 percent, **5 percent, ***1 percent.