

Informality, firm performance and labor market outcomes: Evidence from Matched Employer-employee Data for Morocco¹

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Abstract

How do micro-firms relate to informality? Is informality systematically associated with firm performance? What does informal employment in micro-firms really mean? To answer these questions we use matched employer-employee data on firms with up to 5 workers and all their workers from the Moroccan Enterprise Survey of Micro-firms 2007. Our main findings are as follows. First, the strongest predictors of a firm lack of registration are the owner's level of education, having started the business following from a period of unemployment, absence of business with larger firms, and concerns about tax increase and labor law enforcement. Second, even among small and similar firms, those choosing to register have better performance, including higher labor productivity and likelihood of producing a level of income classified as satisfactory by the owner. Third, informal employment goes beyond informal firms: 55% of the workforce of registered firms is informal. It is mainly associated with labor market-unrelated workers' characteristics, such as household size and being a married woman. Similarly, worker gender is the sole systematic determinant of hours worked. Besides being systematically related to age and education, wages of informal workers rise with the number of children and household size, and tend to be higher for the head of the household, suggesting a higher bargaining power and that informality may be in itself a coping mechanism with vulnerability. Nonetheless, firms' characteristics play an important role in wage determination, particularly labor productivity and, to a smaller extent, size. Finally, while there is no significant wage (or hours worked) premium to formality, earnings of informal entrepreneurs tend to be significantly higher than those of informal salaried workers.

JEL Classification Codes: O17; J31; D21.

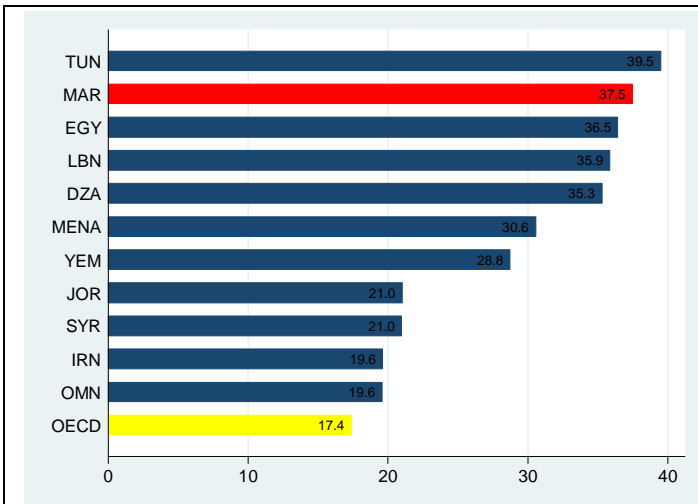
Keywords: Informality; Firm behavior, Labor Markets, Earnings.

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1. Introduction

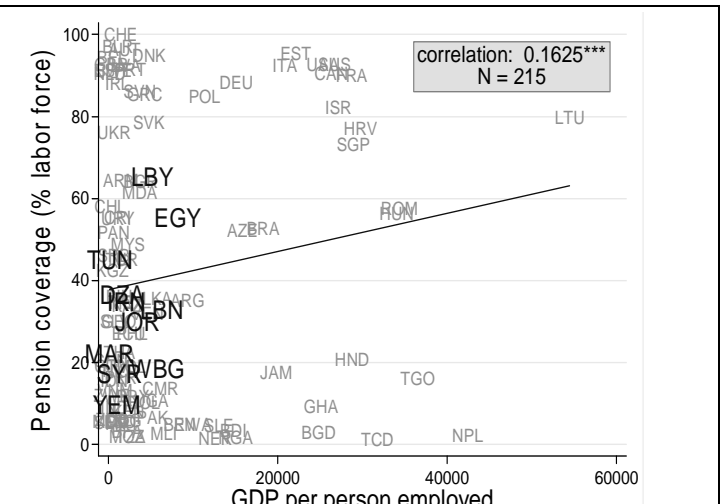
Morocco's total informal economy is estimated to account for almost 38% of GDP², a relatively high figure by regional standards (see figure 1). Correspondingly, pension coverage (and, with it, access to old age insurance, work injury and disability coverage where in place) ranges at around 25% of the labor force, substantially lower than the world average (43%) (see figure 2), and a considerable share of firms report informal practices as a major or very severe obstacle to the operations and growth of their establishment (34% according to the enterprise survey in Morocco).

Figure 1: Size of informal economy (% of GDP)



Source: Schneider, 2004.

Figure 2: Pension Coverage and GDP per person employed



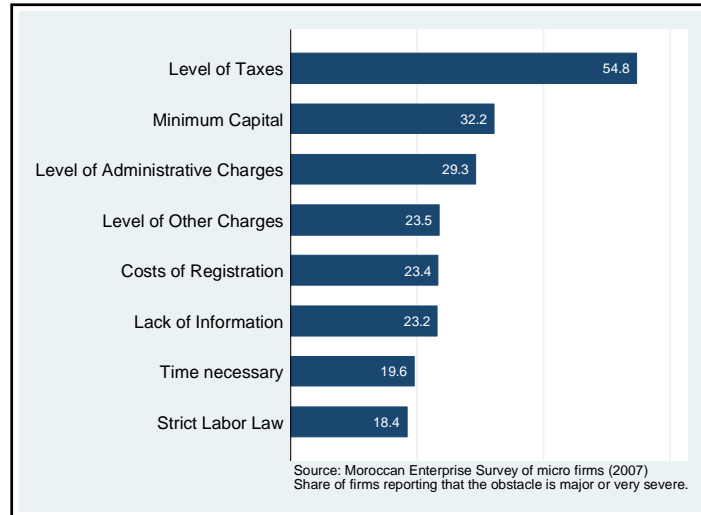
Source: World Development Indicators, 2008.

A number of barriers might preclude firms from formalization. According to the firms' report in the Moroccan Enterprise Survey of micro-firms (2007), the top constraint to their registration is the tax level, identified by nearly 55% of firms as a major or very severe obstacle towards registration. The share of firms feeling constrained by the minimum capital requirement and the level administrative charges is also high (around 30% in both cases), but significantly lower than that for tax level. The level of other charges, costs of registration, and lack of information are each reported by over 23% of the firms. Nearly 20% of firms bemoan the time necessary to register, while over 18%

² Estimates from the 2000 ENSINA (National survey of non-agricultural informal sector) in Morocco return a similar estimate: 39% (see Haut-Commissariat au Plan, 2000). Note that the survey defines an informal production unit as an organization which produces and/or sells goods or offers services without having a complete accounting system in place, which conforms to the accounting law from 1994.

feel constraint by labor regulations (see figure 3). Note that these constraints interact: for example, high contributions and strict legislation can incentivize informality.

Figure 3: Major obstacles to firms' registration in Morocco



Objective measures of tax rates for Morocco corroborate firms' perceptions. Figure 4 reports tax rates in a number of developing countries, showing that Morocco's rate, second to Pakistan, is among the highest. Evidence on tax rate *vis a vis* the development level of countries also indicates that profit taxes are relatively high in Morocco (see figure 5).

Figure 4: Tax rates in the developing world

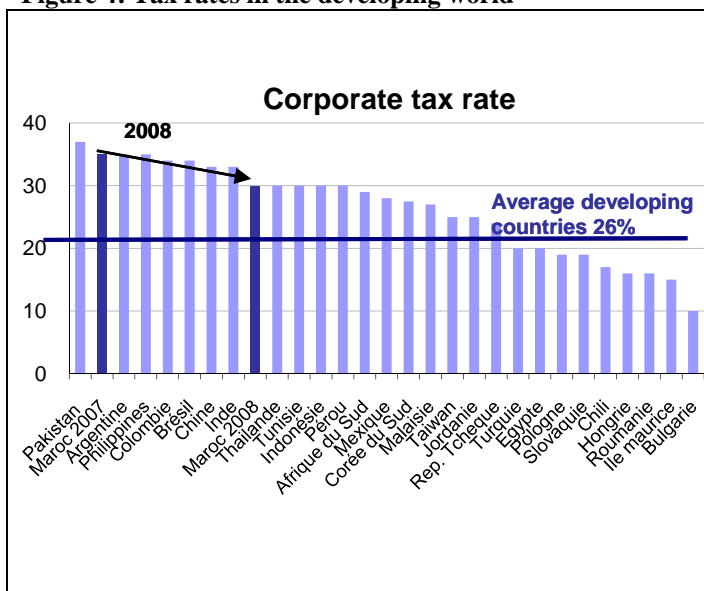
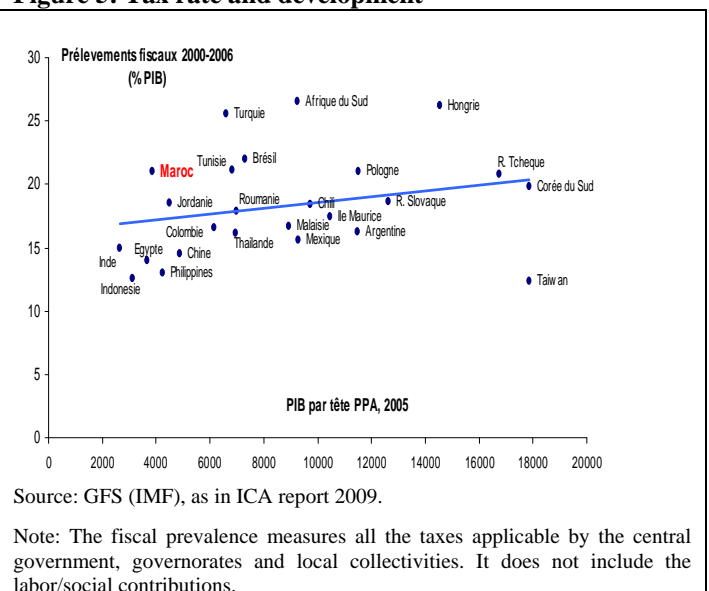


Figure 5: Tax rate and development



This paper aims at providing a better understanding of informal employment and informal firms' behavior, the determinants of workers' and firms' informality, and its consequence for firms' performance and employees working condition and labor market outcomes.

With this aim, we start by discussing the different margins of informality, considering the workers' and firms' perspective, and how informal firms operate. We proceed by examining the determinants of informality from the firms' perspective. Next we explore the relationship between informality of firms (lack of registration and/or tax number) and their performance. We turn then to informal employment (workers not enrolled in social security) and start by analyzing the determinants of informality from the workers' perspective, including firms' and works' characteristics and distinguishing between self-employed and salaried workers. We then investigate the consequences of being an informal worker for working conditions and labor market outcomes and whether these conditions are significantly different for different types of informal workers.

To analyze the relationship between (i) firms' informal status and their performance, and (ii) workers' informal status and the quality of employment, we start by using OLS. Following McKenzie and Sakho (2007) and Arias and Khamis (2008), and to account for possible endogeneity, the analysis is then complemented by applying the "propensity score matching" method and the two steps maximum likelihood approach. We control for a comprehensive set of owners and firms characteristics.

Our main findings are three fold. First, they indicate that the education level of the owner is the strongest predictor of informality, for instance one additional year of education (to the mean) is associated with a 3.6% to 7.6% increase in the likelihood of formalization. The previous employment status is also an important driver of informality, we find that there is a 23% decrease in the probability of becoming formal if the firm's owner was previously unemployed. Furthermore, while registration costs are a significant determinant of formality, delays and information costs do not appear to be significantly associated with firms' formality. Moreover, firms that perceive labor regulations as a major constraint to registration are less likely to be formal, firms in activities for which

there is enforcement are more likely to be formal, but the average level of enforcement at the sectoral level does not have a significant association with the probability of being formal. We also find that firms that do business with large firms are more likely to be formal. Furthermore, firms that report insufficient technical capacity as an important constraint for their operations are more likely to be informal. However, interestingly, the reported lack of access to financing does not have a significant impact on the likelihood of formality.

Second, we find a strong association between informality and firms' performance. Formal firms are 21% more productive than informal firms. Further, owners of registered firms are 20 percentage points more likely to report that they earn a decent income than their peers owning informal firms. The impact of formality on firms' profits is not statistically significant.

Third, many informal workers (defined as those not contributing to social security) are employed by formal firms: up to 55%. The characteristics that more strongly correlate with this type of employment are: household size, being a married woman, firm productivity and whether the firm is subject to labor inspections. In micro firms, there does not appear to exist a significant wage (or hours worked) premium for formality, but within informal workers, there is a wage premium associated with being the entrepreneur rather than a salaried worker. Among informal workers, age, education, the number of children, being the household head are systematically associated with higher earnings.

The paper is structured as follows. Section 2 presents the data. Section 3 describes how to measure informality in Morocco. Section 4 presents the descriptive statistics on informality in Morocco. Section 5 discusses firms' informality while section 6 discusses workers informality reporting the methodology and results of our analysis. Section 7 concludes.

2. Data

We use data from the Moroccan Enterprise Survey of micro-firms (2007) with up to 5 workers, collected by the World Bank, *Enterprise Surveys*, covering matched employer-

employee information for 219 firms, 264 salaried workers, 127 employers and 26 self-employed. All workers in each firm were interviewed in the context of this survey. Data cover the cities of Casablanca, Rabat, Salé, Témara, Fès in urban as well as rural areas. Four sectors were chosen for the survey: manufacturing, construction, trade, and services. It covers all the key sectors of informal employment identified by ENSINA: trade, services, construction, textile, clothes and shoes (see Haute-Commissariat, 2000, pp. 40-1). ENSINA indicates that these sectors employ 37%, 20%, 7%, and 50% of their workforce informally, respectively. It also indicates that entrepreneurship³ forms an important part of the national informal sector by representing 69% of the total informal employment. Our data consists of 219 firms and 417 individuals (264 salaried workers, 26 self-employed⁴ and 127 employers⁵).

Microfirms' operation: summary statistics

Summary statistics on firms in our sample are presented in Table 1. They indicate that the manufacturing, construction, trade, and service sector represents about 31%, 7%, 21%, and 41% of our sample, respectively. Most firms are in urban areas (66%). The median firm has been in business for 7 years and has 2 paid workers. Mean monthly profits are 1850 Moroccan Dirham (Dh) (\$US220) and productivity (value added per worker⁶) is 1320 Dh (\$US157). The median sales margin on products is around 15%. 50% of firms own their location, 43% rent their location and 7% have a mobile location. Financing for micro-firms appears to be mainly informal: as table 1 indicates, only 21% have a separate bank account for the business, less than 15% have ever demanded a bank credit, on average each firms mobilizes as few as 1.4% of their total resources from bank credit. In terms of infrastructure, evidence indicates that around 70% do not have a land line and 14% are not connected to the public grid. Regarding technology, the use of internet appears to be limited (to 21% of firms). A significant share of firms report to have innovated and improved the products' quality of products in the last 12 months: 30% and 19% of firms report to have introduce new products and production processes, and 40% to have done quality upgrading. Micro firms concentrate heavily on local markets. Over

³ Defined as the job status of either self-employed or employer.

⁴ Firm owners who do not employ other workers are defined self-employed.

⁵ Firm owners who employ other workers are defined employers.

⁶ Value added calculated as sales minus non-labor costs of inputs.

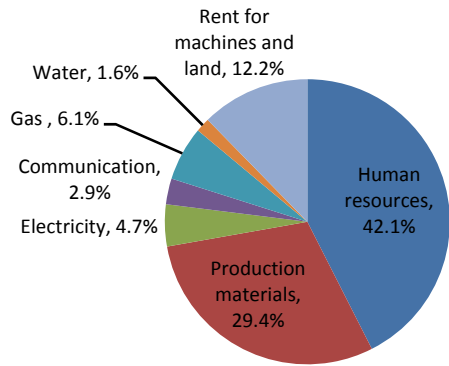
80% of their sales are devoted to local markets, and as few as 1% are shipped to foreign countries. Concerning their client base, over 87% of their customers are Moroccan consumers, 9% are other Moroccan micro firms and almost 2% are large Moroccan firms. Two thirds of firms report that they do not provide receipts to clients 25% and only 49% report to accept checks. 79% of owners do not have a personal bank account and 62% do not have separate household and firm expenses

Table 1: Summary Statistics Micro Firms

		Mean	Median			Mean	Median
General	Manufacturing	31%		Infrastructure & Innovation	Own computer	20%	
	Construction	7%			Owns telephone line	31%	
	Trade	21%			Connected to public electricity	86%	
	Services	41%			Uses internet	21%	
	Urban	66%			Improved quality within last year	40%	
	Sub-Urban	33%			Introduced a new product within last year	29%	
	Rural	2%			Introduced new materials within last year	16%	
Firm Characteristics	Age of firm (in years)	10.19	7	Market Orientation	Introduced new prod. method within last year	19%	
	Permanent workers	1.92	2		Location rented by firm	43%	
	Profit (in Dh)	5756	1850		Location owned by firm	50%	
	Productivity	5453	3625		Location is mobile	7%	
	Sales margin (in %)	17.77	15		Local market (% of sales)	81%	
	Invoice to clients	25%			Regional market (% of sales)	13%	
	Accept cheques	49%			National market (% of sales)	5%	
Finance	Has business bank account	21%		Government	Export market (% of sales)	1%	
	Demanded for bank credit in the past	13%			Maroccan consumers (% of client base)	87%	
	% of firm ressources from bank credit	136%			Maroccan Micro firms (% of client base)	9%	
Competition	Intense competition: informal producers	33%		Large Maroccan firms (% client base)	2%		
	Intense competition: small and medium prod.	36%		Quality problems with clients	7%		
	Intense competition: large producers	31%		Bribe as % of market to receive public market	32%	41%	
	Intense competition: imports	19%		Application of law is foreseeable & consistent	48%		
	Impact of competition: forced to reduce price	25%		Bribe often expected by inspectors	43%		
	Impact of competition: forced to reduce sales	18%		Firm knows level of bribe expected in advance	31%		
	Impact of competition: forced to reduce both	24%		% of sales devoted to bribes	11%	19%	
Impact of competition: none	33%		Firm subject to inspections	46%			

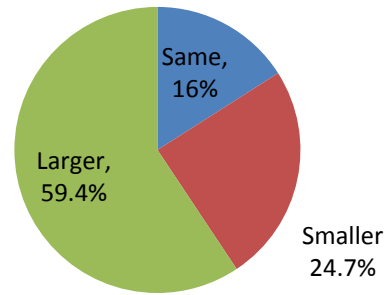
Figure 6 shows the average cost share in micro firms' expenditures. Human resources and production materials constitute the largest share with 42.1% and 29.4%, respectively. The expenditure share on the rent of machines is much smaller (12.2%), but distinctively bigger than the energy and communication expenditure shares. Figure 7, shows that more than half the firms optimistic about the future of their business. 59.4% believe that their sales are going to be larger in 2 years and as few as 24.7% believe they are going to be smaller.

Figure 6: Cost Categories



Source: Moroccan Enterprise Survey of micro firms (2007).
Note: Pie chart showing average cost shares of firms in data set.

Figure 7: Expectations Regarding the Evolution of Sales



Source: Moroccan Enterprise Survey of micro firms (2007).
Note: This graph depicts firms' response to the question: Do you expect your sales to be larger, smaller or the same in 2 year time?

Figure 8 shows the major constraints to business operations for firm owners. 45.8% of the micro firms said that financing constitutes a major or severe problem to their daily business operations. This is followed by unfair competition (41.3%) and the fiscal system (37.6%). Corruption and lack of qualified worker are identified by less than a third of the firms, but still rank among the top 5 constraints. Transport, rules for external trade and the legal system ranked lowest on the list of business obstacles for micro firms. It is interesting that over 41% of micro-firms mentioned unfair competition as major or very severe constraints. This tends to reinforce the notion that micro firms behavior with respect to informal practices tends to vary. At the same time this result illustrates the pervasive condition and vulnerabilities these firms and their workers may experience, as there may be very little recourse available in case of complaints and/or abuses by either government officials or stronger competitors. Alternative/informal mechanisms that provide arbitration in case of conflicts among informal firms to exit but these offer little protection against abuses from other entities other than firms.

Figure 8: Obstacles to Business Operations

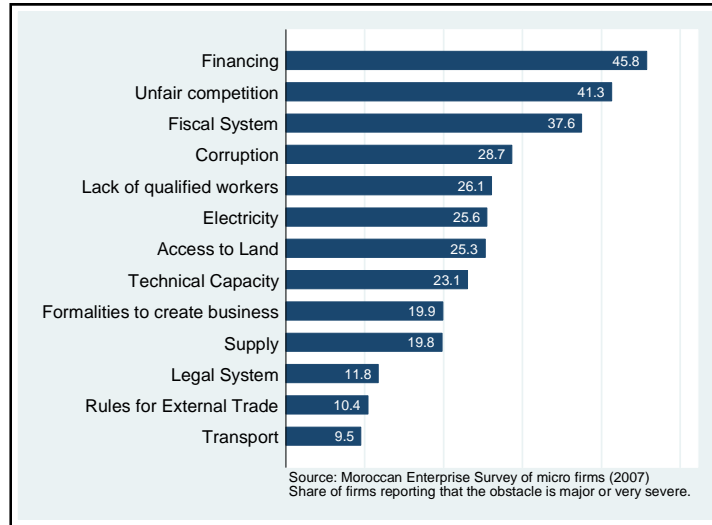


Figure 9: Sources of Financing: Working Capital

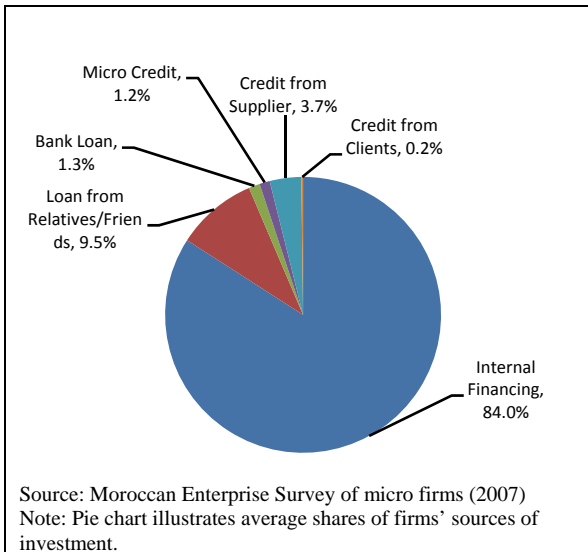
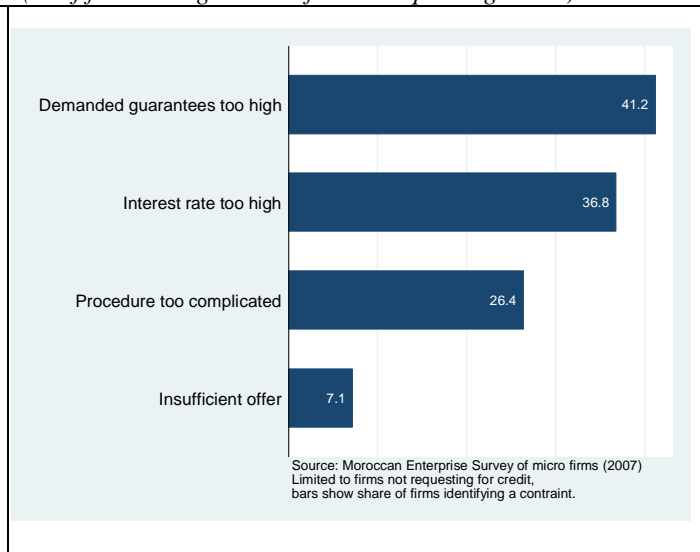


Figure 10: Obstacle to Credit Entry

(% of firms citing reasons for not requesting credit)

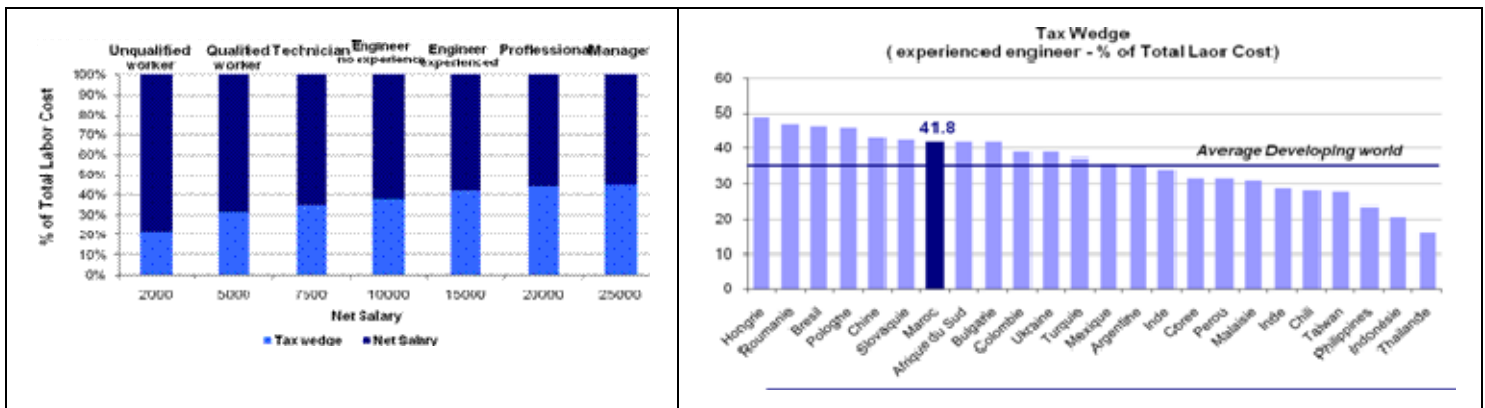


The sources of financing used to meet the working capital needs of micro-firms rely mainly on internal financing (84%) (see figure 9). Similarly we observe that external financing represents only 6.4%, with very little bank financing and micro credit used to meet investment requirement, accounting for 1.3% and 1.2%, respectively. In fact only 13% of micro-firms ask for bank or other formal sources of financing. Moreover when looking at the reasons mentioned by firms for not applying for a loan, insufficient collateral and perceived high interest rates are cited as the two main factors by 41% and 36% of micro-firms, respectively (see figure 10). These results point to a chronic inability and/or unwillingness to access formal credit which is mentioned as the main constrain to

micro firm operation and growth. In fact, the proof of registration is a minimum condition for many times even approaching Banks. Other conditions include the need of an existing bank account (which only 20% in our sample do) and to present paperwork which by default implies some degree of formality (including, tax id, formal address). In addition there are internal factors such as the firms' ability to prepare an effective business plan which takes time and resources that the firm may not have available. Even if the procedures mentioned above can be fulfilled, the amount and the nature of the collateral requirements may be prohibitive for micro firms. Most banks will require in excess of 150% of collateral as a percent of loan value (Morocco ICA 2008). In addition, most banks will require immoveable assets such as land and machinery as a form of guarantees. Micro-firms with low capital and human resources, little equipment and or formal land with which to constitute a form of guarantees may be particularly at risk of failing to fulfill some of these requirements. As a result they may be often unable/unwilling to go through the application process.

Firms also expressed concerns about fiscal system as important impediments to their operations. The level of taxes and/or the nature and fiscal structure of the system could be in the origin of these concerns. Figure 10 depicts the tax wedge of workers with different levels of skills in Morocco and compares Morocco's tax wage of a skilled worker with that of other countries. It indicates that tax wedge is high and penalizes heavily the progression towards more qualified workers, providing a disincentive to hire more and to also move up the skill ladder.

Figure 10: Tax wedge of a skilled worker as a percentage of total labor costs



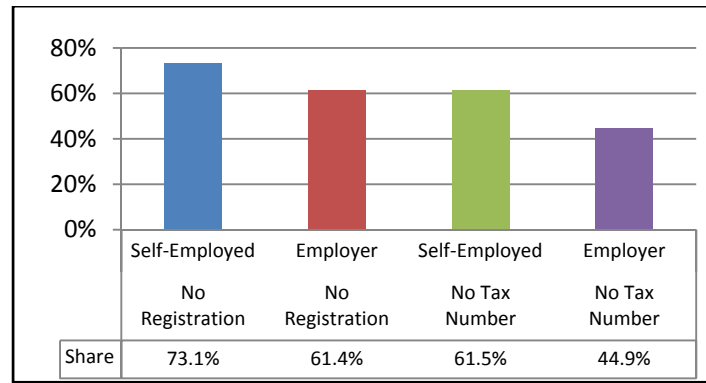
Firm owners' summary statistics

Table 2: Summary Statistic on Firm' Owners

	Mean	Median
Female owner	17%	
Education of owner (in years)	8.63	9
Age of owner	42.03	39
Owner is married	74%	
Number of children	2.45	2
Owner was unemployed before	26%	
Household income for owner	4109.62	3500

Table 2 illustrates the summary statistic for firm owners. 17% of them are female. The average education levels of the owners are low (8.6 years of schooling). The median owner has 9 years of education, is 39 years old, 74% are married and 26% were unemployed before starting this business.

Figure 11: Share of owners leading informal firms by job status and informality of firm



Self-employed are more likely to lead an informal firm than employers. This may reflect the fact that firms of employers (by our definition) are larger than those of self-employed and, therefore, risk to be detected more easily by government officials. Figure 11 shows the share of owners leading an informal firm by job status (self-employed or employer) and informality of establishment (no business or tax registration). 73.1% of all self-employed own a firm which is not registered compared to 61.4% of employers. The difference is even larger when we focus on tax registration as the criterion for formality: the share of self-employed owning an informal firm is 11.6 percentage points higher than for employers.

Employees' summary statistics

Table 3 provides summary statistics of the 264 salaried workers used in this paper. The median worker is 28 years old and has 7 years of schooling. Most get paid weekly (50%). 75% are male. The median hourly wage is 7Dh (\$US0.83) and the number of hours worked 54. 27% are married and have an average number of 0.64 children.

Table 3: Summary Statistic Workers

	Mean	Median
Age	30.17	28
Education (in years)	7.46	7
Paid daily	13%	
Paid weekly	50%	
Paid every two weeks	2%	
Paid every month	35%	
Male	75%	
Hourly Wage	8.71	7
Weekly hours of work	55.89	54
Married	27%	
Number of children	0.64	0
Employer himself	4%	
No relationship to employer	73%	
Married to employer	1%	
Child of employer	8%	
Sibling of employer	4%	
Parent of employer	2%	
Other blood relation to employer	8%	
Household income	3141.26	3000
Age of chef of household	48.89	48
Size of household	8.00	5

3. Measuring informality in Morocco

3.1. Definition of informality

Informal activities occur across a range of activities having to do with the interaction between firms and public agencies. An accepted definition (ILO, 1993) describes informality as an activity that is unregulated by the formal institutions that govern economic activities such as labor laws, registration, and taxation.⁷ It can be argued that this definition covers two main dimensions: (i) the firm's perspective which includes the legal existence of a firm and (ii) the workers' perspective, which focuses on employment characteristics such as contractual ties, social security and health insurance coverage. Typically, an enterprise is considered to operate informally if it fails any of the following requirements: to be registered, licensed or to have kept financial accounts. This usually

⁷ See also De Soto (1989).

includes small-scale production units with no legal separation from their owners, such as family-based businesses in which one or more family members participate, and micro-enterprises with at most five employees.⁸

The data used in this paper collects information on whether a firm is registered, has tax identifier and is affiliated with social security (CNSS⁹). These are based on the survey questions “*Does your business activity have a commercial registration number?*”, “*Does your business have a tax-number (“patente”)?*” and “*Is your enterprise affiliated with CNSS?*”, respectively. It also collects data from workers on whether they are enrolled in social security on the survey question “*Is there an indirect income which is directed towards CNSS or other social insurances?*”.

3.2. Formalization Process for firms¹⁰

There are four mandatory and sequential formalities that sole proprietorship firms should complete before starting up a business (described in annex table 2)¹¹. These steps can all be completed in one place: the corresponding regional office of CRIs (Centre Regional d’Investissement). The first one consists in obtaining a tax ID. This step is free and not very demanding with respect to the paperwork needed. The next step is to register the firm with the commercial court, with a total cost of \$31. The third step consists in registering with the social security office, which is free of charge. Finally, the firm has to proceed to the publication of its existence in the legal bulletin.

Firms in partnership have a higher number of formalities to fulfill in order to fully comply with the legislation. The most onerous of them is the minimum capital required to establish their status equal to 1.5% of the minimum capital of \$122. The level of taxation a firm is subject to also differs between sole-proprietorship firms and partnerships. In sole proprietorship there is no legal separation between the taxes the individual is paying on his/her income and the firm (i.e. the individual pay an income tax but no corporate tax).

⁸ See Oviedo (2008).

⁹ Caisse Nationale de Sécurité Sociale

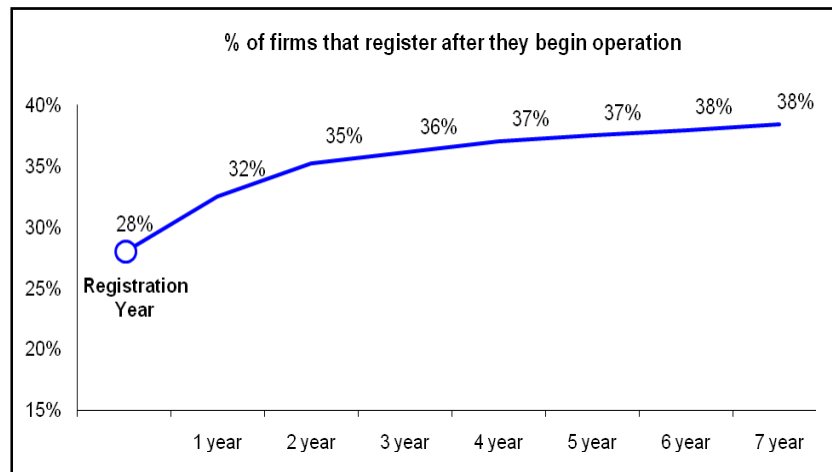
¹⁰ For further details on the formalization process in Morocco see Annex table 1.

¹¹ In addition, sole proprietorship if in retail trade has to obtain, as a first step, a certificate that no other firm carries the same name. Partnership firms have a more complicated formalization process that entails nine steps as described in annex table 1.

In this context it is not surprising that in our sample only 10% of firms have a juridical status of partnership¹².

Interestingly, we find that most firms will register at the time they begin operations – year or registration- , as time passes the probability of registering begins to fade this may be due to the fact as time passes the cost of formalization increases (e.g. fear of past due back taxes and legal sanction) while the perceived benefits decrease (see figure 12).

Figure 12: Share of firms registering by number of years of operation



4. Descriptive Statistics

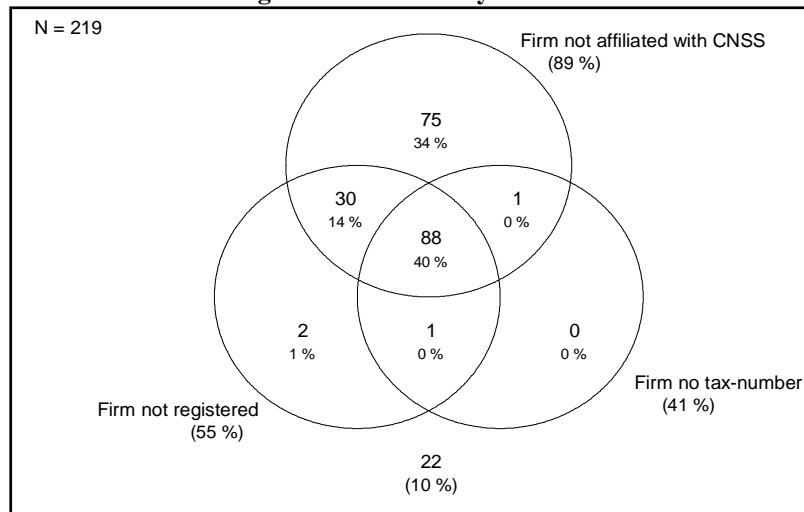
In Morocco, the lack of tax identifier, firm registration and affiliation with social security are not mutually exclusive. In our data only 40% of firms are informal by all 3 margins simultaneously (intersection of the three circles in figure 13), while 90% are informal in at least one of the margins¹³. The more frequent margin of informality is the lack of affiliation with social security (89%) followed by a lack of registration (55% of firms). As expected, obtaining a tax-number seems to be the minimum step towards formality. In our data, there is not one single firm which does not have tax-number but obeys the other two steps to become formal. It can be argued that this phenomenon arises because firms see the largest benefit in having a tax-number compared to the other requirements. The

¹² Partnership includes the following categories: "Cooperative, Société de personnes, SARL AU, SARL".

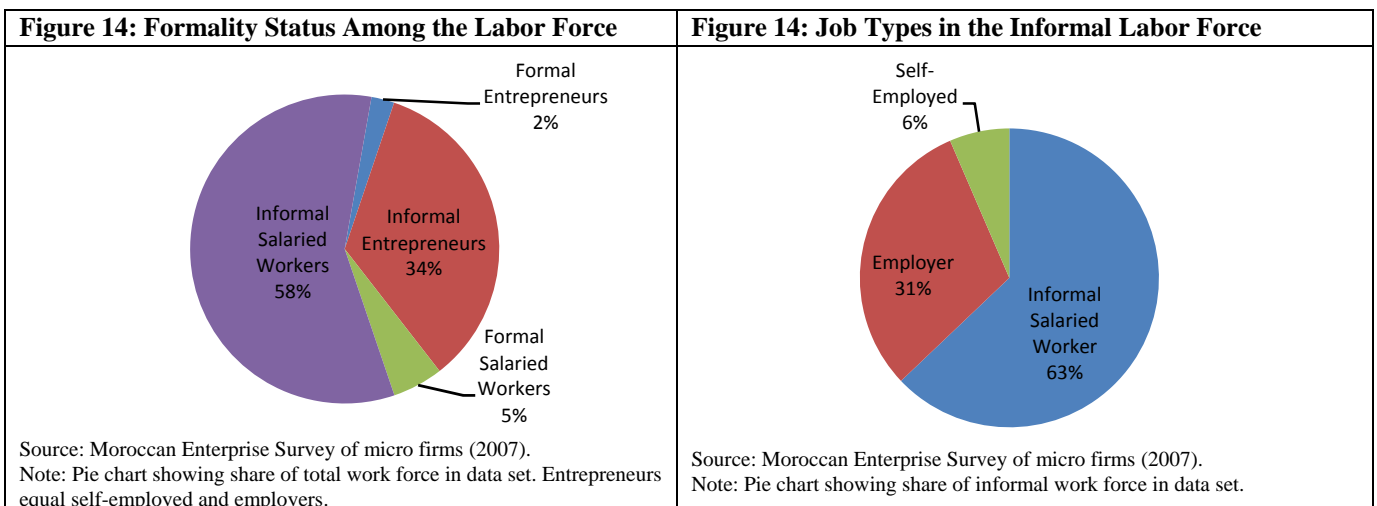
¹³ A firm which fulfills all three registration requirements may still to a certain extent be informal if it does not satisfy the law by its full degree. A firm may for example have a tax number and pay taxes but decide to pay only part of its burden. The different degrees of commitment are not considered in this study.

World Bank study on firms' informality in Bolivia (World Bank, 2007b) shows that the main benefit perceived by firms in having a tax-number is being in compliance with the law (47%) followed by increasing their client base (25%) by being able to provide clients with tax receipts. This is in line with the finding that employment taxation represents a significant share of costs, being perhaps the single most avoided obligation, and that registration despite no being a difficult or expensive process per se requires willingness to assemble a bureaucratic process that in many cases may not be present.

Figure 13: Informality of Firms

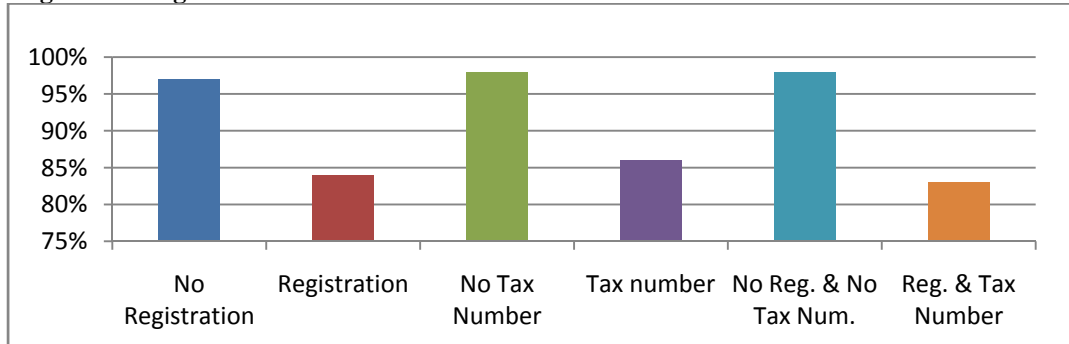


Informal make up to 93% of our sample: 34% entrepreneurs and 59% salaried workers (see Figure 14). The largest part of informal consists of salaried workers (62.9%), followed by employers (30.6%) and self-employed (6.5%) (see figure 15).



Many informal workers are employed by formal firms: up to 55%. This is not surprising considering that informal workers represent up to 84% of the labor force of firm which a business registration, and 68% of firms with tax registration. Interestingly, some formal workers are employed by informal firm, but are a minority (corresponding to 3% of the labor force in registered firms and 2% in firms with tax id) (see figure 16).

Figure 15: Avg. Share of Informal Salaried Workers in Formal and Informal Firms



Source: Moroccan Enterprise Survey of micro firms (2007)

Note: Shares of informal salaried workers in each firm's work force were calculated. Bars represent average of these shares over formality categories.

5. Firms' informality

5.1 The determinants of firm's informality

Profit-maximizing firms will decide to formalize if the expected present discounted value of the benefits from this decision net of costs (π_j^*) are positive. Since π_j^* is unobserved, it cannot be estimated directly. Therefore, we assume that π_j^* is a linear function of several observable firm, owner and industry characteristics.

In the literature¹⁴, the determinants of informality can be categorized in three main groups: formalization costs (monetary, time and information), nature and degree of enforcement of the regulatory framework (utility benefit to firm owners from obeying the law, restrictions imposed¹⁵, legal consequences of not registering e.g. impossibility of proving receipts to clients, and risk of being caught), and opportunity costs of operating

¹⁴ See e.g. Elbadawi and Loayza (2008), McKenzie and Sakho (2007) and World Bank (x).

¹⁵ Informality may be chosen to avoid burdensome government regulations such as hiring and firing costs, government standards for products and production processes and strict working hours and wages.

informally (e.g. limited access to markets, formal financing, courts or other forms of contract enforcement, government services and highly educated employers). The costs and benefits of formalization are also likely to depend on firm characteristics such as firm size (according to World Bank (2007a) small firms may face a lower risk of being caught by inspectors and may find it more difficult to amortize fixed costs of registration) and time in business (recently created firms may, for example, not know how profitable their business will be and want to wait to register until enough evidence that they will stay in business if monetary costs and red tape of registration high). As emphasized by World Bank (2007) and McKenzie and Sakho (2007), owner characteristics may also play a crucial role, in particular those correlated with the ability to understand the benefits of compliance with the law, to meet the costs of formalization (e.g. owner characteristics and family wealth may influence their ability to cover the minimum capital needed to register through credit see e.g. McKenzie and Sakho, 2007) and the size of gain in profits from becoming formal (see e.g. McKenzie and Sakho 2007).

Following the literature, we state the probability that a firm is formal as:

$$p_i = \alpha + X_i' \beta + Z_i' \theta + city_dummies + urban + sct_dummies + \mu_i \quad (1)$$

where p_i is the probability that firm i is formal), X_i is a vector of owner characteristics (including sex, age, marital status and education in years), Z_i is a vector of firm characteristics (age and size¹⁶ of firm), $city_dummies$ are city dummies (Salé, Rabat, Témara, Casablanca, and Fès¹⁷), $urban$ is a dummy indicating if firm i is situated in an urban area, $sct_dummies$ are sector dummies controlling for the four sectors (manufacturing, construction, trade and services¹⁸), and u_i is an unobserved error term. Since this probability (p_{ij}) is not directly observed, the propensity equation is revised as a probit model:

$$\Pr(p_i = 1) = \Phi(\alpha + X_i' \beta + Z_i' \theta + city_dummies + urban + sct_dummies) \quad (2)$$

¹⁶ Size measured as number of permanent workers.

¹⁷ Fès represents the base dummy and is left out of the regression.

¹⁸ Manufacturing represents the base dummy and is left out of the regression.

where $p_i = 1$ in the event that firm i is formal. Φ is the standard normal distribution function. We employ two separate definitions of formality: (i) a firm is registered as a business, (ii) firm has a tax number, and run a set of regressions using each of these definitions.

Table 4 below reports marginal effects¹⁹ in a series of two probit regressions, according to equation (2). Columns 1-3 presents results using registration as the criteria for firm formality while columns 4-6 presents results using having a tax identifier as the criteria for formality. Results in column 1 indicate that the education of the owner (in years) is the strongest predictor for registration; in fact one additional year of education (to the mean) is associated with a 4.6 percentage point increase in the likelihood of registration. Older firms are also more likely to be registered: a firm which is one year older than the average has a 0.6 percentage point higher probability of being registered. Firms operating in the construction sector are significantly less likely to be registered than firms operating in the manufacturing sector. Fès has a significantly lower rate of registration than Rabat. Results are robust and stable to considering alternative definitions of formality, except for firm age. As shown in column 4, owners who pursued one more year of education than the average owner, are 5.5 percentage points more likely to have a tax number. Owner's age is not significantly associated with the probability of being formal. These results are in contrast with World Bank, 2007b that finds that the age of the owner has significant and positive effects on the likelihood of having a tax number while it does not find significant effects of his/her educational attainment. Similarly to registration, we find that firms operating in the construction sector are significantly less likely to be registered than firms operating in the manufacturing sector. Fès has a significantly lower rate of registration than Rabat. Differently than for registration, however, the size of the firm has a significant positive association with having a tax number. The result that firm size is an important predictor of the likelihood of having a tax number was also found for Bolivia (see World Bank, 2007b).

¹⁹ Marginal effects are computed at the mean for continuous variables and as discrete changes in the probability for dummy variables.

Table 4: Determinants for Formality by Establishment - Baseline*Marginal results from Probit estimation*

Dependent variable:	Registration			Tax Number		
	(1)	(2)	(3)	(4)	(5)	(6)
Age of firm (in yrs.)	0.006*	0.005	0.003	0.007	0.005	0.007
	(0.004)	(0.004)	(0.006)	(0.005)	(0.004)	(0.012)
Number of permanent workers	0.035	0.035	0.03	0.080**	0.087**	0.133**
	(0.028)	(0.029)	(0.036)	(0.033)	(0.034)	(0.054)
Female owner (0/1)	0.058	0.072	-0.002	0.146	0.165	-0.097
	(0.106)	(0.106)	(0.171)	(0.121)	(0.123)	(0.260)
Owner is married(0/1)	-0.057	-0.061	0.012	-0.066	-0.063	-0.026
	(0.096)	(0.095)	(0.116)	(0.099)	(0.102)	(0.153)
Education of owner (in yrs.)	0.046***	0.049***	0.036***	0.055***	0.058***	0.076***
	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.015)
Age of owner	0.001	-0.001	0.004	0.005	0.002	0.007
	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)	(0.008)
Unemployed before start of business		-0.226**	-0.167		-0.319***	-0.359***
		(0.079)	(0.094)		(0.097)	(0.118)
Number of children of owner			-0.037			-0.015
			(0.042)			(0.056)
Female*Number of children			0.021			0.063
			(0.082)			(0.125)
Ln Household Income			-0.003			-0.125
			(0.063)			(0.103)
Regional Controls included?	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies included?	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.206	0.253	0.266	0.261	0.308	0.373
N	170	169	101	170	169	98

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Regional Controls are dummy for urban, Salé, Rabat, Témara, Casablanca and Fès. Industry dummies are manufacturing, construction, trade and services.

Columns 2-3 and 5-6 reports the point estimates under alternative sets of controls. Our main finding of a positive association between owner's education and formality is significant across all specifications and the magnitude of its coefficient is largely unaffected. We add four main sets of controls. First we include three additional measures of the owners' ability, background and motivation for entering business. We start by including a dummy variable indicating whether the owner was unemployed before starting off the business which may also be capturing the labor market conditions at his location²⁰. Next, we include the reported value of the average income of the owner's household to capture family wealth. This may be associated with the owner's ability to meet the costs of

²⁰ We also experimented with a variable measuring for the number of children the owner as a proxy of whether starting the business could be related with wanting more flexible working hours to devote to looking after the children or domestic tasks, but the coefficient despite being negative was not statistically significant. For brevity we do not report these results but they are available from the authors.

formality (including the minimum capital) and his access to financing. Finally, we add the number of children the firm owner has and its interaction with gender. Previous studies have shown that higher flexibility to care for family or carry out household tasks may be important reasons for entering entrepreneurship, and as McKensie and Sakho (2007, pp. 7) show “owners who entered self-employment for the chance of business growth may be more likely to become formal than those who entered self-employment in order to have flexibility to care for family and carry out household tasks”. This variable aims at investigating this hypothesis. As significantly fewer owners replied to the questions on children and income than on previous employment status, we present the results of a regression where this is the only variable added and another one with the full set of owners’ controls. We find that firms whose owners who were unemployed prior to starting the business are less likely to be formal (23 and 32 percentage points for registration and tax number, respectively). The variables on family background and motivation to start a business have the expected sign in the registration regressions but are not statistically significant.

Second, we add a set of controls for formalization costs, point estimates reported in columns 7 and 11 of table 5. To analyze the relationship between monetary costs of formalization and informality we have included two dummy variables equal to one if the firm reports that costs of registration and the minimum capital, respectively, are important obstacles to registration. Similarly, and for time and information costs, we use information on whether the firm perceives the time necessary to complete the registration procedures and the lack of information on these procedures, respectively, as important obstacles to registration. We find that registration costs are important determinants of the likelihood that a firm is formal while the association between formality and time and information costs is not statistically significant.

Third, we add a set of controls for the nature and enforcement of the labor law, point estimates reported in columns 8 and 12. On the nature and enforcement of the labor law we consider the following measures: a dummy variable equal to one if the firm indicates that having to obey to a strict labor law is an important obstacle to registration, a dummy

variable equal to one if the firm reports that, in the exercise of its activity, it is subject to control by officials and the mean number of inspections that a formal firm of the same sector and operating in the same city observer during the last 12 months²¹. According to expected, we find that firms that perceive the strict labor law as an important constrain to formality are less likely to be formal and firms in activities for which there is enforcement are more likely to be formal. The average number of inspections larger formal firms are subject to does not have a significant impact on the probability of being informal.

Fourth, we include a set of controls to illustrate the opportunity cost of being informal whose point estimates are reported in columns 9 and 13. In particular we include dummy variables indicating whether the firm makes business with large firms (that would be more likely to require receipts), whether it indicates lack of access to financing, lack of qualified workers, insufficient technical capacity and corruption as an important constraints to its activity. The latest is included following the theory of “dodging the grabbing hand” by Friedman et al. (2000)²² that postulates that firm owners which face a high risk of being extorted by corrupt officials may decide to operate informally to hide from the officials. We find that, as expected, firms that do business with large firms and report a lack of qualified workers are more likely to be formal and those that report insufficient technical capacity as an important constraint for their operations are more likely to be informal. However, the reported lack of access to financing does not have a significant impact on the likelihood of formality. Finally, firms that report corruption as an important obstacle to their activity are significantly more likely to be formal which suggests that there is no evidence that firms hide from corrupt officials due to extortion by government officials. It may reflect the fact that hiding is not possible and that bribing officials when as an informal firm is very costly. Hence, firm owner may decide to formalize to circumvent the need for bribing.

²¹ The micro-firms survey does not include self reported information on the number of visits by inspectors received by the firm. However, the enterprise survey of larger formal firms includes this information. Using data from this source we have computed the average number of visits by sector in each city and used this information here.

²² Friedman et al. (2000) employ ‘corruption indices’ at the global level or business manager opinions from the Global Competitiveness Survey to measure impact on countries country level activity.

Table 1: Determinants for Formality by Establishment

Marginal results from Probit estimation

Dependent variable:		Registration					Tax Number		
		(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Age of firm (in yrs.)		0.011** (0.006)	0.007 (0.005)	0.005 (0.005)	0.005 (0.005)	0.022** (0.009)	0.009 (0.006)	0.006 (0.005)	0.006 (0.005)
Number of permanent workers		0.047 (0.033)	0.043 (0.044)	-0.037 (0.047)	0.049 (0.079)	0.093** (0.041)	0.055 (0.046)	-0.002 (0.043)	0.112 (0.062)
Female owner (0/1)		0.096 (0.130)	-0.086 (0.161)	0.483*** (0.131)	0.261 (0.200)	0.108 (0.134)	0.032 (0.192)	0.282** (0.096)	-0.298 (0.281)
Owner is married(0/1)		-0.127 (0.120)	-0.248* (0.132)	-0.067 (0.130)	-0.166 (0.164)	-0.053 (0.129)	-0.181 (0.129)	-0.072 (0.095)	0.013 (0.126)
Education of owner (in yrs.)		0.039*** (0.012)	0.051*** (0.013)	0.036** (0.014)	0.038** (0.017)	0.059*** (0.012)	0.058*** (0.011)	0.048*** (0.011)	0.072*** (0.018)
Age of owner		0.002 (0.005)	0.006 (0.006)	-0.001 (0.005)	0.005 (0.008)	0.005 (0.005)	0.004 (0.006)	0.003 (0.005)	0 (0.005)
Unemployed before start of business					-0.461** (0.160)				-0.863*** (0.133)
Severe obstacle to registration	Lack of information (0/1)	-0.122 (0.151)				-0.176 (0.156)			
	Time necessary (0/1)	-0.039 (0.176)				-0.152 (0.192)			
	Costs of registration (0/1)	-0.240* (0.112)				-0.177 (0.132)			
	Minimum Capital (0/1)	-0.187 (0.123)				-0.279** (0.135)			
	Tax level (0/1)		-0.331*** (0.121)		-0.364** (0.155)		-0.116 (0.120)		-0.071 (0.138)
	Labor law (0/1)		-0.376*** (0.097)		-0.413** (0.159)		-0.469*** (0.112)		-0.590** (0.208)
	Firm subject to inspections (0/1)		0.351*** (0.111)		0.565*** (0.136)		0.266** (0.108)		0.336** (0.158)
	Avg. tax inspection rate		-0.096 (0.196)				-0.130 (0.186)		
	Makes business with large firms (0/1)			0.397** (0.147)	0.531*** (0.109)			0.17 (0.113)	-0.083 (0.238)
	Financing (0/1)			0.103 (0.119)				-0.015 (0.095)	
Severe obstacles to business operation	Lack of qualified workers (0/1)			0.258* (0.136)				0.123 (0.103)	
	Insufficient technical capacity (0/1)			-0.432*** (0.108)	-0.216 (0.163)			-0.206 (0.130)	0.1 (0.090)
	Corruption (0/1)			0.366** (0.149)	0.482** (0.174)			0.013 (0.127)	0.138 (0.166)
	Regional Controls included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Industry Dummies included?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.273	0.337	0.35	0.462	0.399	0.415	0.363	0.526	
N	121	105	112	78	121	105	112	68	

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Regional Controls are dummy for urban, Salé, Rabat, Témara, Casablanca and Fès. Industry dummies are manufacturing, construction, trade and services. Average tax inspection rate at city and industry level calculated from ICA 2007 firms for the same cities and industries as used here.

5.2. Performance of formal vs. informal firms

We now turn to the estimation of the relationship between of registering and having a tax number on the performance of firms. We use three different estimation techniques. First, and following World Bank, 2007b, we estimate an OLS model with robust standard errors. We complement this analysis by applying the “propensity score matching” method

whereby the non-linear estimation technique assumes that all selection occurs on observable²³ and by using the two steps estimation method that replaces the formality dummies by the respective deviances of the probit regression on formality determinant above.^{24 25}

Following McKenzie and Sakho (2007), the basic estimation equation of interest is, for firm i :

$$Performance_i = \alpha + \mathcal{G}' Formal_i + X_i' \beta + Z_i' \theta + city_dummies + urban + sct_dummies + \mu_i \quad (3)$$

where $Performance_i$ is the variable of interest measuring performance of the firm. We analyze log profits, log productivity (output per worker), and whether the activity provides descent income to the owner. X_i is a vector of owner characteristics (including sex, age, marital status and education in years), Z_i is a vector of firm characteristics (age and size²⁶ of firm), $city_dummies$ are location dummies including dummies for cities (Salé, Rabat, Témara, Casablanca, and Fès²⁷) and $urban$ a dummy indicating if firm i is situated in an urban area, $sct_dummies$ are sector dummies controlling for the four sectors (manufacturing, construction, trade and services²⁸), and u_i is an unobserved error term. Theoretically, the sign of the relationship between on informality and firms' performance may be either positive or negative. On the one hand, there are four main reasons why formalization may be associated with higher performance. First, it may allow for increasing the customer base, through the ability to issue receipts²⁹. This is for example, the main benefit reported by micro-firms of having a tax number in Bolivia (see

²³ In this case, firms are “matched” in terms of all common characteristics except one (being formal), and this allows to see what difference that one characteristic makes. Comparing the difference in the average performance between these two otherwise similar groups of firms provides a measure of the impact of formality.

²⁴ As pointed by the literature, the impact of productivity on performance is difficult to identify as lower performance firms may self-select into the informal sector (World Bank, 2007a, pp. 171-72), in which case lower performance of informal firms may just reflects less performing firms choosing to remain informal rather than lower performance being a consequence of informality.

²⁵ In applying this method we follow Elbadawi and Loayza (2008) The deviances are orthogonal to the independent variables and can be interpreted as the component of formality which is unexplained which is unexplained by owner and firm characteristics, location, and sector dummies.

²⁶ Size measured as number of permanent workers.

²⁷ Fès represents the base dummy and is left out of the regression.

²⁸ Manufacturing represents the base dummy and is left out of the regression.

²⁹ These can then be used by clients for claims or tax refunds.

McKenzie and Sakho, 2007). This effect however is likely to depend on other firm (e.g. size and sector) and owner characteristics (e.g. owners with high business skills and networks may find it easier to transform the possibility of accessing the new market into effective business). Second, it may also allow for increased access to finance (note that x% of firms in Morocco indicate the lack of access to financing as an important constraint to their operations). Third, it may avoid fines. Forth, restricted access to factors of production (to financing and labor) that may lead to operating in a non-efficient manner. On the other hand, formalization may also imply lower flexibility in each firm employment and production decisions, and therefore lower profits and productivity) as it will then be subject to labor regulation (see Almeida and Carneiro, 2005).

Table 6: Impact of Formality on Firms' Performance I

	Profits			Productivity			Owners' activity provides decent income		
	OLS	PSM	Two-Step	OLS	PSM	Two-Step	Probit	PSM	Two-Step
Registration									
Formal firm	0.451	1.140***	0.198	0.523***	0.667***	0.214***	0.199**	0.189**	0.083**
	(0.356)	(0.389)	(0.149)	(0.187)	(0.209)	(0.077)	(0.090)	(0.091)	(0.104)
Age of firm (in yrs.)	0.006		0.007	-0.003		-0.001	-0.002		-0.001
	(0.013)		(0.012)	(0.006)		(0.006)	(0.004)		(0.009)
Number of permanent workers	0.359***		0.369***	-0.052		-0.038	0.053*		0.058**
	(0.106)		(0.104)	(0.061)		(0.061)	(0.030)		(0.076)
Female owner (0/1)	-0.282		-0.268	-0.262		-0.245	-0.078		-0.071
	(0.430)		(0.430)	(0.224)		(0.224)	(0.116)		(0.294)
Owner is married(0/1)	0.064		0.048	0.146		0.129	0.096		0.089
	(0.373)		(0.376)	(0.192)		(0.192)	(0.095)		(0.243)
Education of owner (in yrs.)	0.077**		0.090***	0.042***		0.058***	0.014		0.021**
	(0.030)		(0.027)	(0.014)		(0.012)	(0.009)		(0.023)
Age of owner	0.012		0.012	0.004		0.004	0.000		0.000
	(0.019)		(0.019)	(0.008)		(0.008)	(0.004)		(0.011)
R-squared / Pseudo R-squared	0.267		0.268	0.241		0.240	0.141		0.140
N	131	131	131	134	134	134	169	169	169
Tax number									
Formal firm	0.549	0.920**	0.199	0.370*	0.385*	0.143*	0.055	0.000	0.020
	(0.340)	(0.366)	(0.143)	(0.260)	(0.201)	(0.085)	(0.095)	(0.094)	(0.101)
R-squared / Pseudo R-squared	0.272		0.268	0.211		0.208	0.122		0.122
N	131	131	131	134	134	134	169	169	169

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Regional and industry controls included but not shown. These are urban, Salé, Rabat, Témara, Casablanca, Fès, manufacturing, construction, trade and services. Profit and productivity in natural logarithm. Productivity is value added per worker. PSM is Propensity Score Matching. Tax Number regressions employ same independent variables as regressions above.

Columns 1 to 3 variable of table 6 provide the OLS, propensity score matching and 2 steps-method estimates, respectively, for the relationship between formality and log profits, columns 4 to 6 for log productivity, and 7 to 9 for whether owners' activity provides decent income. The estimates show that formality has a positive impact on

firms' performance with respect to productivity and providing a satisfactory income from the owners perspective. Its association with profits is weaker.

Registration has a strong and highly significant impact on productivity and whether the owner has a decent income. The OLS results show that on average registered firms are 52.3% more productivity than unregistered firms. OLS may drive the coefficient upwards due to correlation with the firms formality decision, correction for this we can see that the two-step-estimation is still highly significant on a statistical level and on an economic level (formal firms are 21.4% more productive). The propensity score matching results remain fairly close to OLS predictions. Further, owners of registered firms are 20 percentage points (OLS) more likely (on a 5% significance level) to report that they earn a descent income than their peers owning an informal firm. With the same statistical significance, the two-step estimation estimates an 8.3% increase in the likelihood to earn a descent income. The impact of registration on profits is also positive but is only significant in the propensity score matching estimation. The impact of having a tax number is also positive on all lines, but less strong and only significant in the productivity (with the exception of the PSM results on profits). We find that firms with a tax number have 38.5% (PSM) to 14.5% higher productivity than firms without a tax number.

Table 7: Impact of Formality on Firms' Performance II

	Profits			Productivity			Owners' activity provides decent income		
	OLS	PSM	Two-Step	OLS	PSM	Two-Step	Probit	PSM	Two-Step
Registration									
Formal firm	0.435 (0.351)	1.159*** (0.400)	0.190 (0.147)	0.500*** (0.185)	0.664*** (0.206)	0.206*** (0.076)	0.184* (0.091)	0.195 (0.089)	0.077* (0.105)
Makes business with large firms	1.103*** (0.373)			0.418** (0.203)		0.460** (0.203)	0.260** (0.103)		
R-squared / Pseudo R-squared	0.3		0.301	0.260		0.26	0.158		0.158
N	131	131	131	134	134	134	169	169	163
Tax number									
Formal firm	0.607* (0.337)	0.906** (0.366)	0.213 (0.140)	0.370* (0.206)	0.385** (0.192)	0.143* (0.082)	0.048 (0.094)	0.024 (0.090)	0.016 (0.101)
Makes business with large firms	1.165*** (0.389)		1.152*** (0.387)	-0.003 (0.006)		0.473** (0.207)	0.276** (0.099)		0.277** (0.395)
R-squared / Pseudo R-squared	0.309		0.304	0.211		0.232	0.142		0.142
N	131	131	131	134	134	134	169	169	169

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01

Age of firm, number of workers, female owner, married, education and age of owner are included but not shown. Regional Controls are dummy for urban, Salé, Rabat, Témara, Casablanca and Fès. Industry dummies are manufacturing, construction, trade and services. Profit and productivity in natural logarithm. Productivity is value added per worker. PSM is Propensity Score Matching. Tax Number regressions employ same independent variables as regressions above.

We also included a dummy to the existing set of variables indicating whether a micro firm makes business with larger firms in table 7, because there is a high correlation between strong performance and selling to larger firms. We want to measure the additional benefit of formality on firm performances given that it sells to larger firms. Again, formality has a positive impact on every category of firm performance. Similar to above, we see that registered firms are on average 50% (OLS) or 21% (Two-Step) more productive on a 1% significance level. Further owners' of registered firms are 18.4 to 7.7% more likely to think of their income as descent. The results on the impact of a tax number are weaker, but contrary to before we measure a significant, positive impact on profits. The impact on productivity is weaker but remains significant and the impact on descent income becomes insignificant.

5.3. Micro informal firms versus larger formal firms

We complement our analysis by appending to the Enterprise Survey of the micro-firms subsample analyzed in this study, data from firms covered by the Enterprise survey of formal larger firms. These data were collected in simultaneous to that of micro-firms. For comparability, we restrict the sample to firms with 20 or less workers. These data does not include information on owners' characteristics, except for gender. We run the determinants and performance regressions with the variables available in both surveys.

Table 8 presents the results on determinants of formality. The estimates show that among firm characteristics size is the most important determinate of formality: an additional worker to average of six workers increases the likelihood that the firm is formal by 6.6 (registration) and 4.4 (tax number) percentage points. Female owners are 10.4 percentage points more likely to lead a registered firm than their male counterparts. The effect is not significant on having a tax number.

Table 8: Determinants for Formality (micro vs. large formal firms)

Marginal results from Probit estimation

Dependent variable:	Registration	Tax Number
	(1)	(2)
Age of firm (in yrs.)	0.001 (0.002)	0.000 (0.001)
Number of permanent workers	0.066*** (0.007)	0.040*** (0.007)
Female owner (0/1)	0.104** (0.044)	0.042 (0.028)
Regional Controls included?	Yes	Yes
Industry Dummies included?	Yes	Yes
Pseudo R-squared	0.37	0.323
N	315	310

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
Regional Controls are dummies for Salé, Rabat, Témara, Casablanca, Fès, Berrechid, Had Soualem, Mohammedia, Settat, Tanger, and Tetouan.. Industry dummies are manufacturing, construction, trade and services.

Table 9 reports results on the performance indicators: log profits and log productivity³⁰. The estimates confirm that the positive impact of informality on firm performances. Two-step estimation shows 27.8 and 31.1% higher profits on average for formal firms with high statistical significance, respectively. Similarly, firm productivity is 23.5% higher for registered firms and 21.3% higher for firms with a tax number on average (on a 1% significance level).

Table 9: Impact of Formality on Firm Performance (micro vs. large formal firms)

	Profits			Productivity		
	OLS	PSM	Two-Step	OLS	PSM	Two-Step
	Registration					
Formal firm	0.682*** (0.258)	1.038*** (0.308)	0.278*** (0.104)	0.573*** (0.138)	0.657*** (0.156)	0.235*** (0.059)
Age of firm (in yrs.)	-0.001 (0.010)		0.000 (0.010)	-0.004 (0.005)		-0.003 (0.006)
Number of permanent workers	0.373*** (0.088)		0.410*** (0.086)	-0.037 (0.054)		-0.002 (0.054)
Female owner (0/1)	-0.373 (0.265)		-0.279 (0.261)	-0.238 (0.151)		-0.156 (0.149)
R-squared / Pseudo R-squared	0.207		0.205	0.138		0.133
N	169	169	169	168	168	168
	Tax number					
Formal firm	0.772*** (0.283)	1.017*** (0.318)	0.311*** (0.116)	0.519*** (0.157)	0.516*** (0.171)	0.213*** (0.066)
R-squared / Pseudo R-squared	0.213		0.21	0.113		0.11
N	167	167	167	166	166	166

Note: Robust standard errors in parentheses, * p<0.10, ** p<0.05, *** p<0.01
Regional and industry controls included but not shown. These are dummies for Salé, Rabat, Témara, Casablanca, Fès, Berrechid, Had Soualem, Mohammedia, Settat, Tanger, Tetouan, manufacturing, construction, trade and services. Profit and productivity in natural logarithm. Productivity is value added per worker. PSM is Propensity Score Matching. Tax Number regressions employ same independent variables as regressions above.

³⁰ Note that information on owners perceptions about his earnings was not collected for firms with more than 5 workers.

6. Informal Employment

As described in section xx informal workers in our sample are heterogeneous. They include salaried workers (242), self-employed (25) and employers of micro-firms (118). These three groups differ considerably (see table 10). The median informal salaried worker is 28 years old, male, has 7 years of schooling, is not married and has no kids, is paid weekly and receives 6.9Dh (0.83USD) per hour of work, works 54 hours and works in manufacturing. The median self-employed³¹³² is older (36 years old), male, has more schooling (8 years of schooling), is married, head of household and has one child, receives 7.9Dh (1USD) per hour, works 63 hours per week on average and works in the service sector. The median informal employer is 40 years old, male, has 9 years for schooling, is married with 2 children, receives 15.6Dh (1.9USD) per hour and works 57 hours a week.

Table 10: Summary Statistic Informal Employment

	Salaried Worker		Self-Employed		Employer	
	Mean	Median	Mean	Median	Mean	Median
Age	29.8	28	39.5	36	42.0	40
Female	23.9%		12.0%		16.9%	
Education (in years)	7.3	7	8.6	8	8.2	9
Married	26.3%		64.0%		76.9%	
Number of children	0.6	0	1.6	1	2.5	2
Head of household	34.5%		68.0%		72.9%	
Paid daily	13.5%		50.0%		61.5%	
Paid weekly	54.6%		5.0%		13.5%	
Paid every two weeks	1.7%		0.0%		0.0%	
Paid every month	30.1%		45.0%		25.0%	
Hourly wage	8.1	6.9	9.1	7.9	19.3	15.6
Weekly hours worked	55.5	54	62.1	63	57.4	57
Manufacturing	40.9%		16.0%		35.6%	
Construction	12.0%		4.0%		13.6%	
Trade	14.9%		32.0%		16.1%	
Services	32.2%		48.0%		34.7%	

The high dispersion of labor income also reflects the heterogeneity of the informal sector (see figures 16 and 17 below). Only 8% of all salaried workers are in the highest income quintile, while the rest is uniformly distributed among the other quintiles. Self-employed is likely to cover a diversity of people. Among them, most are in the two lowest or the two highest lowest quintile and as few as 10% are in the middle quintile. This may indicate that there is an even distribution of successful (higher earning) and less successful self-employed. Employers are highly concentrated among the higher earnings

³¹ All Self-employed in our data set are informal ie do not report contributions for social security.

³² Please note that self-employed are not covered by social security arrangements.

quintiles. More than 50% of all employers earn an hourly income in the top quintile of the hourly earnings distribution (see figure 16). The distribution of earnings of informal entrepreneurs (self-employed and employers) is more disperse and to the right than that of informal salaried workers (see figure 17).

Figure 16: Distribution of workers by hourly wage quintile

Figure 17: Distribution of hourly earnings for formal and informal salaried worker and informal entrepreneurs (self-employed and firm owners)

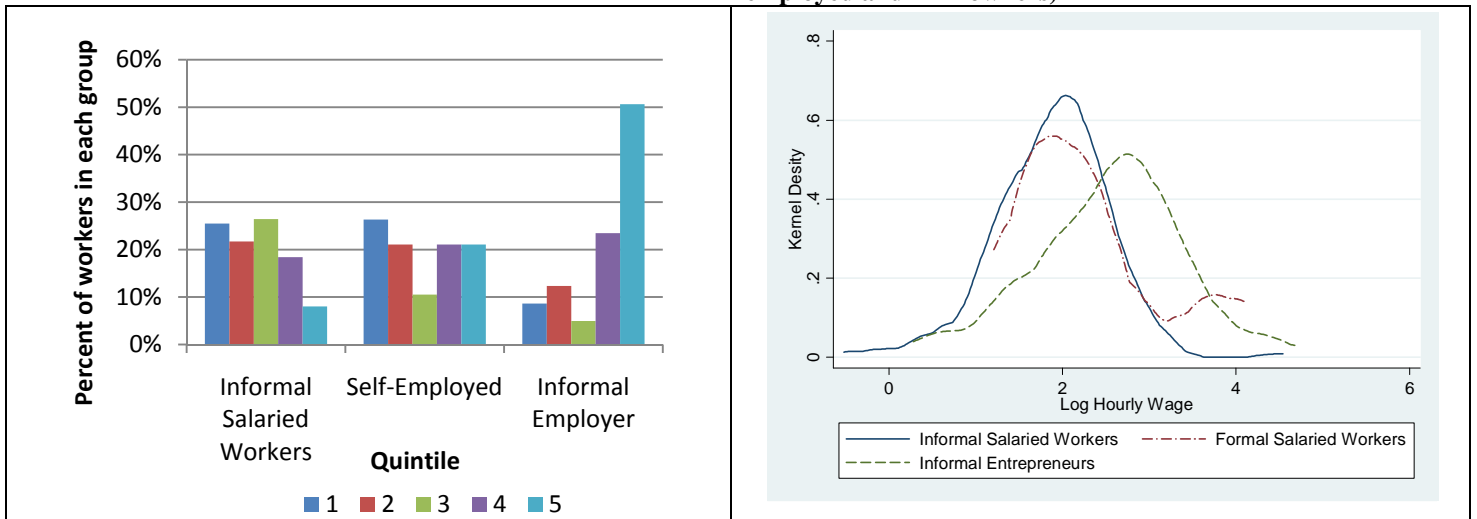
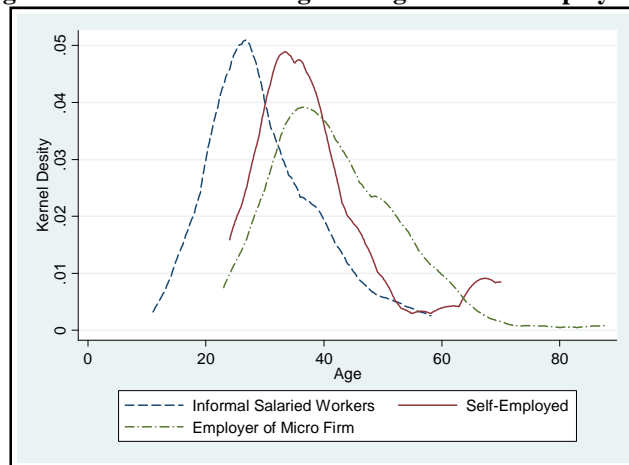


Figure 18 shows the distribution of age by job status among informal employment. Salaried workers are highly concentrated between the ages of 25 and 29 years old. While the distribution of employers is more dispersed than those of salaried workers, it can be seen they tend to be older (concentrated around the age of 40). Similarly the largest age group of self-employed is between 30 and 39. As the second peak in the self-employment density indicates, older workers (60+) seem to be attracted by self-employment.

Figure 18: Distribution of Age among Informal Employment



Informal salaried workers differ considerably from formal salaried workers: they are significantly younger, a significantly lower share has post-secondary education, have lower hourly wages and are significantly more likely to be paid weekly (see table 11). The distribution of earnings of formal salaried workers has two peaks and there is a small group of formal salaried workers earning high wages. Informal workers and formal workers seem to be more homogenous than entrepreneurs and self-employed (see figure 18 above).

Table 11: Differences between Informal and Formal Workers

	Salaried Worker	
	Informal	Formal
	Mean	Mean
Age	29.8***	34.5
Female	23.9%	31.8%
Married	26.3%	31.8%
Number of children	0.6	0.9
Head of household	34.5%	45.5%
Education (in years)	7.3	8.8
Primary Education or less	47.5%	36.4%
Secondary Education	39.3%	31.8%
Post-Secondary Education	13.2%**	31.8%
Hourly wage	8.1***	14.7
Weekly hours worked	55.5	60.0
Paid daily	13.5%	9.1%
Paid weekly	54.6%***	4.5%
Paid every two weeks	1.7%	0.0%
Paid every month	30.1%***	86.4%

Note: Stars indicate statistical significance of mean differences: * p<0.10, ** p<0.05, *** p<0.01.

6.1. Determinants informal employment

This section examines the main determinates of informal employment. Up to this end we focus on the choice between informal and formal salaried work. In the model specification we follow Arias and Khamis (2008) as include the following worker's characteristics: including gender, age, education, marital status, number of children, whether the individual is the head of the household, size of the household. Differently from these authors we have matched information on firm's characteristics that we include in our model. In particular, we use controls for firm size and productivity and for whether the firm is subject to labor inspections. In addition, we consider two other margins of informality: (1) Formal salaried worker versus informal entrepreneur and (2) Informal salaried worker versus informal entrepreneur.

The estimates of the three occupational choices are presented in table 12. Column one shows that the characteristics that are more strongly correlated with informal employment are household size, being a married woman, firm productivity and enforcement of labor law (measured by whether the firm is subject to labor inspections). Individuals in bigger households have a significantly higher likelihood of being informal salaried workers rather than formal salaried workers. Similarly, married women are more likely to be informal than single women. These results have also been found in Arias and Khamis (2008). On firms' characteristics, our results suggest that individuals in more productive firms, independently of their size, have a higher likelihood of being formal. Similarly, those in firms subject to enforcement of the labor law are less likely to be informal. Interestingly, when the comparison group of formal salaried workers is informal entrepreneurs (see columns 3 and 4) results are similar. The main difference is that in this case, not only productivity and enforcement, but also size is significantly correlated with informality. Columns 5-6 analyze correlates with between different alternative types of informal employment. Estimates indicate that age increases significantly the likelihood of conditional on being informal, being an entrepreneur rather than a salaried worker. Interestingly, while the number of years of schooling is not significantly correlated with the informality status of the worker, it is significantly correlated with the type of informal employment: more schooling increases the likelihood of being an informal entrepreneur rather than an informal salaried worker. As expected, enforcement is significantly correlated with the informal status of employment but not with the type of informality.

Table 12: Determinants of informal employment and the type of informal employment, regression results

Marginal results from Probit estimation

Dependent variable	Informal (=1) vs. Formal salaried Worker (=0)		Informal Entrepreneur (=1) vs. Formal Salaried Worker (=0)		Informal Entrepreneur (=1) vs. Informal Salaried Worker (=0)	
	(1)	(2)	(3)	(4)	(5)	(6)
Age of worker	-0.004 (0.007)	0.001 (0.004)	0.001 (0.005)	-0.001 (0.002)	0.032* (0.017)	0.035** (0.017)
Age^2	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00
Education (in years)	-0.002 (0.004)	-0.001 (0.002)	0.002 (0.003)	0.000 (0.001)	0.026*** (0.007)	0.026*** (0.007)
Female worker (0/1)	0.014 (0.037)	0.007 (0.020)	0.039 (0.025)	0.007 (0.010)	-0.176 (0.108)	-0.153 (0.118)
Married*Female worker	0.045 (0.024)	0.022* (0.017)	0.051** (0.034)	0.007 (0.014)	0.680** (0.180)	0.658** (0.188)
Married (0/1)	0.007 (0.033)	0.008 (0.014)	-0.027 (0.028)	0.006 (0.020)	0.027 (0.096)	0.006 (0.100)
Number of children	-0.013 (0.012)	-0.005 (0.006)	-0.019 (0.013)	-0.001 (0.002)	-0.007 (0.042)	0.001 (0.043)
Head of household (0/1)	0.098* (0.057)	0.042 (0.034)	0.764*** (0.217)	0.334** (0.387)	0.426*** (0.117)	0.426*** (0.118)
Log household size	0.088** (0.037)	0.042** (0.028)	0.135*** (0.060)	0.018** (0.029)	0.210** (0.104)	0.209** (0.104)
Log firm productivity	-0.029 (0.026)	-0.031** (0.019)	-0.013 (0.015)	-0.006* (0.009)	-0.119*** (0.041)	-0.128*** (0.042)
Number of workers in firm	-0.027* (0.022)	-0.009 (0.010)	-0.031** (0.016)	-0.005** (0.007)	-0.091*** (0.021)	-0.089*** (0.021)
Firm subject to inspections (0/1)		-0.087** (0.046)		-0.049** (0.034)		-0.013 (0.067)
Pseudo R-squared	0.201	0.293	0.592	0.649	0.44	0.44
N	179	174	102	100	251	246

Note: Standard errors clustered by firm in parentheses, * p<0.10, ** p<0.05, *** p<0.01

6.2. Informal employment, earnings and mean number of hours worked

In this section we investigate whether earnings and working hours of informal workers differ considerably from those of formal workers. Our model specification follows that of Pratap and Quintin (2006). We start by estimation earnings functions and hours worked by OLS. We complete our analysis by using propensity score matching technique and two-steps estimation. We consider both workers and firm characteristics.

Table 13 reports results on the association between of the informality status of the worker and his earnings. The estimates do not support the idea that there is a wage premium for being informal – formal appear to have higher earnings than informal but the difference is not statistically significant. Further, we find that among informal, entrepreneurs have significantly higher earnings than salaried workers (by more than 22%). Firm characteristics appear in our wage regressions as more significant determinants of wages

than worker characteristics; in particular, size and productivity are systematically associated with higher earnings. In contrast, among informal workers, workers characteristics such as age education and the number of children and being the household head, and firm characteristics such as size and productivity, are positively related with earnings.

Table 13: Earnings by informality status of workers and type of informal employment, regression results

	Log Hourly Wage								
	OLS	PSM	Two-Step	OLS	PSM	Two-Step	OLS	PSM	Two-Step
Formal (=1) vs. Informal Worker (=0)	0.170	0.325	0.055						
	(0.272)	(0.266)	(0.098)						
Informal Entrepreneur (=1) vs. Formal Salaried Worker (=0)				0.497	0.469	0.209*			
				(0.328)	(0.356)	(0.118)			
Informal Entrepreneur (=1) vs. Informal Salaried Worker (=0)							0.518***	0.508***	0.222***
							(0.110)	(0.152)	(0.046)
Age of worker	0.066		0.066	0.014		0.014	0.043		0.050*
	(0.043)		(0.043)	(0.047)		(0.046)	(0.029)		(0.029)
Age^2	-0.001		-0.001	0.000		0.000	0.000		0.000
	(0.001)		(0.001)	(0.001)		(0.001)	0.00		0.00
Education (in years)	0.024		0.024	0.028		0.032*	0.019*		0.028**
	(0.016)		(0.016)	(0.018)		(0.018)	(0.012)		(0.011)
Female worker (0/1)	0.013		0.008	0.703		0.74	0.057		0.014
	(0.116)		(0.115)	(0.470)		(0.490)	(0.139)		(0.139)
Married*Female worker	0.013		0.002	-0.417		-0.207	0.009		0.186
	(0.269)		(0.268)	(0.653)		(0.624)	(0.259)		(0.247)
Married (0/1)	-0.128		-0.132	-0.137		-0.124	-0.236*		-0.217
	(0.165)		(0.165)	(0.253)		(0.251)	(0.135)		(0.133)
Number of children	0.094*		0.096*	0.104		0.082	0.107**		0.110**
	(0.055)		(0.055)	(0.080)		(0.081)	(0.044)		(0.043)
Head of household (0/1)	-0.014		-0.037	0.274		0.51	0.222		0.368**
	(0.187)		(0.194)	(0.414)		(0.386)	(0.169)		(0.156)
Log household size	-0.018		-0.039	0.116		0.287	0.034		0.098
	(0.094)		(0.101)	(0.247)		(0.221)	(0.076)		(0.073)
Log firm productivity	0.343***		0.350***	0.377***		0.340**	0.260***		0.222***
	(0.068)		(0.076)	(0.122)		(0.129)	(0.056)		(0.057)
Number of workers in firm	0.082**		0.089**	0.139**		0.098	0.080**		0.050*
	(0.039)		(0.041)	(0.057)		(0.063)	(0.031)		(0.029)
R-squared	0.392		0.39	0.481		0.482	0.509		0.511
N	164	164	164	75	75	75	211	211	211

Note: Standard errors clustered by firm in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Lower includes same independent variables as above but additionally includes whether firms are subject to inspections.

Table 14 reports the results on the determinants of hours worked. Informality does not appear as a significant determinate of this aggregate, whose main correlates are gender (associated with significantly less hours worked) and, among informal workers only, being the household head.

Table 14: Hours worked by informality status of workers and type of informal employment, regression results

	Log Weekly Hours Worked								
	OLS	PSM	Two-Step	OLS	PSM	Two-Step	OLS	PSM	Two-Step
Formal (=1) vs. Informal Worker (=0)	-0.040	0.047	-0.01						
	(0.127)	(0.125)	(0.047)						
Informal Entrepreneur (=1) vs. Formal Salaried Worker (=0)				0.032	-0.068	0.018			
				(0.165)	(0.156)	(0.066)			
Informal Entrepreneur (=1) vs. Informal Salaried Worker (=0)							0.04	0.069	0.012
							(0.089)	(0.095)	(0.035)
Age of worker	0.008		0.008	0.008		0.008	-0.002		-0.002
	(0.017)		(0.017)	(0.033)		(0.033)	(0.019)		(0.018)
Age^2	0		0	0.000		0.000	0.000		0.000
	0.00		0.00	0.00		0.00	0.00		0.00
Education (in years)	0.008		0.008	-0.023		-0.023	-0.002		-0.001
	(0.009)		(0.009)	(0.014)		(0.015)	(0.009)		(0.010)
Female worker (0/1)	-0.234**		-0.233**	-0.438		-0.435	-0.247**		-0.251**
	(0.095)		(0.096)	(0.323)		(0.325)	(0.117)		(0.117)
Married*Female worker	0.106		0.109	0.203		0.216	0.049		0.064
	(0.172)		(0.170)	(0.376)		(0.361)	(0.166)		(0.164)
Married (0/1)	-0.003		-0.002	-0.078		-0.078	0.023		0.024
	(0.136)		(0.136)	(0.146)		(0.147)	(0.116)		(0.116)
Number of children	-0.078		-0.078	-0.022		-0.024	-0.052		-0.051
	(0.056)		(0.056)	(0.045)		(0.044)	(0.040)		(0.040)
Head of household (0/1)	-0.106		-0.101	-0.192		-0.177	-0.238*		-0.226*
	(0.107)		(0.109)	(0.147)		(0.147)	(0.122)		(0.124)
Log household size	-0.036		-0.032	-0.176		-0.165	-0.075		-0.069
	(0.064)		(0.064)	(0.119)		(0.119)	(0.072)		(0.073)
Log firm productivity	-0.006		-0.008	0.120*		0.118*	0.051		0.048
	(0.045)		(0.045)	(0.061)		(0.062)	(0.037)		(0.037)
Number of workers in firm	0.026		0.024	-0.041		-0.043	0.004		0.001
	(0.026)		(0.026)	(0.058)		(0.051)	(0.024)		(0.024)
R-squared	0.127		0.127	0.131		0.131	0.082		0.081
N	178	178	178	102	102	102	250	250	250

Note: Standard errors clustered by firm in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Lower includes same independent variables as above but additionally includes whether firms are subject to inspections.

7. Conclusion

In this paper we examine the relationship between firm informality and performance, and between worker informality and labor market outcomes. We use a unique matched employer-employee dataset with information on firms with up to 5 workers and all their employees from the Moroccan Enterprise Survey of Micro-firms 2007. This allows us to analyze not only firms' informality, which is particularly pervasive among micro-firms (see e.g. World Bank 2007a), but also employment informality. This type of employment goes beyond firms' informality: for example, in our data up to 55% of the labor force of registered firms' lacks social security registration, and imposes a difficult set of challenges for data collection. The linked nature of the data allows us to control for both

workers and firms characteristics in the analysis of the determinants of informal employment and its relationship with labor market outcomes.

We find a systematic association between firms' registration and factors that are internal and external to the firm. The results support the importance of the firm owner's level of education, being unemployed before starting the business and doing business with larger firms on the firms' formalization decision. In the domain of external factors, concerns about the level of taxation, restrictiveness of the labor code and corruption are systematically associated with informality. In contrast, there is no systematic association with formalization costs, despite having being reported as the main reason for lack of registration by more than 20% of firms. This is, however, in line with the recent reduction of this cost to values close to zero.

Even among micro-firms that potentially have less to win from formalization, as for example their gains from access to large scale clients may be limited, formality is associated with higher productivity and likelihood of producing decent income from the owner perspective. Hence, increasing the incentives for formalization of micro-firms can be potentially productivity enhancing.

Informal employment is mainly associated with personal attributes such as household size and being a married woman. Similarly, worker gender is the sole systematic determinant of hours worked by informal workers. Besides being systematically related to age and education, wages of informal workers rise with the number of children and household size, and tend to be higher for the head of the household. Nonetheless, firms' characteristics play an important role in wage determination, particularly labor productivity and, to a smaller extent, size. Finally, while there is no significant wage (or hours worked) premium to formality, earnings of informal entrepreneurs tend to be significantly higher than those of informal salaried workers.

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Annex table 1: Formalization Process in Morocco

Steps	Purpose	Legal obligation	Cost (\$US)	Agency	Firm status/ownership	
					Partnership or LLC	Sole proprietorship
1. Obtain a “Certificate Negatif”	Certifies that no other firms carries the same name	Mandatory	\$20.5 USD	CRI	✓	<i>expect for retail trade</i>
2. Establish Statutes	Draft by laws of the firms	Mandatory	\$2.5USD per sheet plus 1.5% of minimum capital of \$122USD	law firms/public notaries/audit bureau	✓	
3. Establish “Buletin de souscription”	Submit firm statutes to law firm for review		none	law firm/Public notary	✓	
4. Proof of capital requirement	Shows that the firm has set aside the minimum capital requirement bylaw in an bank account	Mandatory	none	Bank	✓	
5. Proof of capital requirement and souscription	Establishes legal proof of financial and legal existence	Mandatory	Lawyer/notary fees – <i>varies according to law firms</i>	law firms/public notaries/ Court	✓	
6. Obtain Tax ID Patente/IS / IGR/TVA	Establish firm existence with tax authorities	Mandatory	none	Tax administration/ CRI	✓	✓
7. Register firm		Mandatory	\$43 USD for company \$31 USD for individual	commercial court/CRI	✓	✓
8. Register with social security office	Establish existence with social security administration	Mandatory	None	Social Security Office/CRI	✓	✓
9. Legal publication of firm s existence in legal bulletin	Legal information to the legal and business community indicating that the firm officially exists	Mandatory	varies	Legal bulletin	✓	✓

Annex table 2. Summary statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Registration	219	0.45	0.5	0	1
Tax number	219	0.59	0.49	0	1
male	219	0.67	0.47	0	1
Owner age	219	41.86	11.1	22	75
Married owner	175	0.71	0.45	0	1
Owner education	171	8.95	5.29	0	24
firm age	218	10.19	11.68	0	81
ln(productivity)	183	8.82	1.02	6.21	12.5
size	219	1.92	1.38	0	4
unemployed before	218	0.22	0.42	0	1
#Children owner	174	2.12	2.38	0	18
Fixed Location	200	0.5	0.5	0	1
enforcement	216	0.8	0.6	0	2.71
corruption	197	0.43	0.5	0	1
Finacing obstacle	185	0.23	0.42	0	1
Lack of qualifird labor obstacle	184	0.23	0.42	0	1
Insuficient technical capacity obstacle	177	0.55	0.5	0	1
corruption	152	0.18	0.39	0	1