1 Credit Restrictions and Occupational Choice: The Impact of Payroll Lending

Abstract

In 2003, the Brazilian Congress passed a law regulating payroll lending that had a large impact on consumer lending (Coelho et al. [2011]). In this article, we present evidence that payroll lending had a small but non-negligible impact on occupational choice. In particular, we find that payroll lending is positively associated with more entrepreneurial-like occupations. The effect is stronger for individuals in age ranges that are unlikely to contain retirees in families with retirees or pensioners, suggesting that intra-family transfer mechanisms are operative. The results are robust to changes in functional form, wealth and entrepreneurial indicators.

1.1.Introduction

In recent years, a large body of literature has established a causal link between financial development and economic performance at the macro level (King and Levine [1993], Levine and Zervos [1998], Levine, Loayza and Beck [2000]). Much less empirical literature is available on the mechanisms through which financial development would affect economic performance.

Theoretically, poorly performing financial intermediation may lead to inefficiencies in the allocation of factors of production. Credit rationing, the intensity of which depends on the efficacy of intermediation, prevents individuals with high entrepreneurial skills from opening or expanding their businesses. Banerjee & Neumann [1993, 1994] proposed formal theoretical mechanisms through which credit rationing affects occupational choice, causes inefficiencies and leads to poverty traps.

In this context, this chapter contributes to the literature on credit rationing and occupational choice by evaluating the impact of the introduction of large-scale payroll lending in Brazil. A payroll loan is a personal loan that is repaid through direct deductions from the borrower's payroll check. Previously restricted to public servants, payroll deduction was extended to private sector employers and pensioners by the Brazilian Congress in December 2003. Basically, the law turned future income into solid collateral for a large group of wage and pension earners.[1] Coelho et al. [2011] showed that the 2003 law had a powerful impact on credit supply, increasing the origination of and reducing interest rates on personal lending.

With the mechanism already documented, this chapter assesses the impact of payroll lending on a final outcome variable: occupational choice. Using household survey data, we find that payroll lending increased the probability of an individual choosing more entrepreneurial-like occupations. The effect is stronger for 1) poorer individuals, which is compatible with cash-flow to investment sensitivity theories (Fazzari et al. [1988]); 2) individuals in households that do not own real estate property, suggesting that future income is a substitute for real estate as collateral; 3) working-age individuals in households with more pension income, i.e., intra-household bargaining is operative.

The results in this chapter are interesting for a variety of reasons. First, we document a potential microeconomic mechanism through which financial development improves economic performance. Second, our results are informative regarding the economic value of collateral. Coelho et al. (2011) document the value of payroll lending in terms of improved industry performance; we go a step further and study whether improved industry performance has an impact on non-financial variables, in our case occupational choice. Third, the evaluation of the payroll lending policy is interesting per se because it is a simple intervention and easily implementable.

Additionally, our results are interesting in light of the recent financial crisis. Technological improvements in finance caused a substantial increase in financial intermediation. One fair question is whether finance can over-extend. In the US, anecdotal evidence suggests that this is the case. Payroll lending

[1] Judicial insecurity, present early on, was resolved as of December 2004 by the STJ, the second highest court in the country (see Costa and Mello [2005]).

represents an improved technology to anticipate future income. How are the proceeds used? Are they being consumed or invested? When markets are complete, these questions are irrelevant. When governments cannot commit to a refusal to bail out lenders and borrowers, overextension is a possibility, and the use of the proceeds has welfare implications.

This chapter has eight sections including this introduction. Section 2 contains a short literature review. In section 3, we present a simple model of occupational choice to illustrate how credit rationing interferes with occupational choice; the model also provides information on how payroll lending mitigates credit rationing. Section 4 describes the payroll lending law. Section 5 describes the data. Section 6 outlines the empirical strategy used to uncover the casual impact of payroll lending on occupational choice. Section 7 presents the results. Section 8 concludes.

1.2. Literature Review

In a world with complete credit markets and without transaction costs, the decision to invest in a project should be determined by its expected return and the interest rate, adjusted by the undiversifiable risk it entails. If, for example, an entrepreneur does not have enough capital to undertake a project, she would always be able borrow the money or sell shares in the project to minimize the risk she is willing to accept, as long as the return is higher than the interest rate. Moreover, in this world, resources would be used efficiently: money would be invested in those projects that yield the highest expected returns, regardless of the identity of the entrepreneur.

Failure to meet these criteria implies a misallocation of resources. First, high-return projects of individuals who are credit constrained will not be undertaken. Moreover, individuals that do not face this problem may undertake less profitable projects if the interest rate is lower than otherwise. The misallocation of resources is a significant problem in developing countries, explaining a large fraction of the TFP gap with developed countries (see, for example, Hsieh and Klenow (2009) on China and India)

One could consider a well-functioning credit market to have two characteristics. First, in a well-functioning market, the difference between the interest rate charged to borrowers and that charged to lenders should not be large. Second, anyone should be able to borrow (lend) any amount she wants at this rate. One implication of the latter characteristic is that the interest rate should not depend on wealth or whether she is well-connected but only on the return on the investment. Although this situation is not possible in the real world, the literature on development has recognized that credit-market failures are especially important in developing countries.

Interest rates in developing countries have been estimated to be 50%, 80% or even higher in many cases with small default rates (see Banerjee and Duflo, 2005 and Banerjee, 2004). Dasgupta (1989) reports the results of various case studies in India and finds that borrowing rates for a year or less vary from 48% to 79%, while the maximum rate for lenders is 12%. This result is even more surprising if we consider that default cost explains only 4% of total interest costs. Moreover, many studies observe a large degree of variation in borrowing rates. Moreover, Dasgupta's reports for rural areas find that individuals with Rs. 100,000 or more in assets pay low rates (approximately 33%), while those with less assets pay 104%.

In a case study on Kenya and Zimbabwe, Fafchamps (2000) finds that the dominant trading group paid half the rate of blacks (the authors attribute this difference to network effects). Ghate (1992) reports results from a case study on Thailand. Interest rates were 2 to 3% in the Central Plain but 5 to 7% in the north and northeast (ver bien). Furthermore, case studies consistently find low levels of default (see Benerjee, 2001; Dasgupta, 1989; and Banerjee 2002).

Ultimately, the cost of obtaining a loan in developing countries can vary greatly according to the wealth or connections of the client, and this variation cannot be explained by differences in risk (Banerjee and Duflo, 2010; Banerjee, 2001). The explanation commonly found in the literature is associated with the cost of solving information and commitment problems. First, wealthier clients might have better collateral or more to lose if they decide to default on the loan, making them more attractive for banks or private lenders. Second, if a client has enough liquidity to invest in a higher share of a project, she will have incentives not only to repay the loan but also to apply the enough effort to ensure the

project's success. Finally, enforcing contracts can be very difficult in developing countries, where institutions may not function properly. In this context, lenders might be obligated to spend resources on monitoring borrowers to ensure that they will repay the loan. Therefore, if wealthier borrowers present fewer information asymmetries or have more incentives to repay the loan if the project succeeds, they will face lower interest rates. The same argument can be used for well-connected individuals.

We should also expect that if credit markets, and especially insurance markets, worked well, families would not bear avoidable risks. In other words, by constraining families' credit access, market imperfections impede poor families from smoothing their incomes over time. Many studies have tested this hypothesis by analyzing the relationship between household income and consumption. The main conclusion from insurance market research is that, although this relationship exists, its importance is highly dependent on the case study under analysis (see Banerjee, 2004). A possible explanation is informational asymmetries, but this aspect alone does not suffice in many cases, where shocks that affect income are observable. As in the credit case, a more credible explanation is limited commitment: if institutions do not function well and default costs are small enough, individuals will always have incentives to default when the payment is due.

There is a large body of literature that studies the theoretical connections between credit market imperfections, inequality and development[2]. Banerjee and Newman (1993) present an overlapping generations model in which individuals maximize income, which is then used for consumption and a bequest to the next generation. In their model, there are three alternative occupational choices: being self-employed, been an entrepreneur or working for one. Due to imperfect contract enforcement, credit rationing can lead to an equilibrium where poor agents choose to work for wealthier entrepreneurs, whose work is to monitor them. A similar model is that proposed by Ghatak and Jiang (2001) and finds similar conclusions: the initial distribution of wealth determines the steady state

[2] Matsuyama (2007) presents a series of models to examine the aggregate implications of credit market imperfections. In this paper, we will concentrate on a particular family of models similar to that presented in section 5.1.

equilibrium. In most cases, the greater the initial fraction of poor individuals in the economy, the lower the average income (and total production) in the economy.

Banerjee and Duflo (2010) use a simple model to illustrate how the fixed costs of ensuring loan repayment in the presence of moral hazard leads to credit rationing. Being wealthier has various implications. First, it lowers interest rate and increases the maximum amount of capital an individual can borrow, as he or she is able to post more collateral. Second, increasing wealth changes the interest rate and the maximum loan amount that an individual can borrow, and these effects reinforce each other. As the interest rate falls, it is easier to repay the loan, and thus, the maximum loan amount rises. Furthermore, if the loan is larger, the lender's fixed cost is smaller in relative terms; thus the interest rate she will charge will be lower.

Buera et al. (2011) develop a model with infinitely lived individuals and two sectors, small-scale services and large-scale manufacturing. In each period, individuals choose whether to work for a wage or to operate a business in one of the sectors based on their comparative advantages as entrepreneurs and their access to capital. Financial frictions impede the proper allocation of resources and entrepreneurial talent across production units, lowering total factor productivity and output per worker. Moreover, after calibrating the model, their quantitative analyses suggest that financial frictions account for a large proportion of differences across countries. The main channel is that the higher fixed costs faced by large firms make them more vulnerable to financial frictions. As a consequence, economies with poor institutions will end up with smaller, less productive firms.

Finally, Madeira et al. (2010) is closely related to our work. They also study the impact of payroll lending on inequality but use a different identification strategy based on annual household surveys from 2003 and 2008.

1.3. The Payroll Lending Law[3]

Payroll lending has existed in Brazil since the passage of Law 8,112, which was enacted in December 1990 to regulate the provision of such loans to public-sector retirees and public servants. Private-sector retirees and employees were not covered by the law. Brazil experienced a sustained period of financial turmoil due to high inflation until 1994. Subsequently, the country's banking system faced distress due to stabilization of the inflation rate, which was in turn followed by tight credit conditions in international markets in the late 1990s due to the Asian and Russian crises and turmoil due to the perspective of the left taking office in the beginning of the 2000s. Ten years of turmoil prevented the expansion of credit markets in general and payroll lending in particular. Furthermore, only state-owned banks were authorized to underwrite payroll loans to public servants.

In September 2003, the executive branch sent Congress new legislation on payroll loans (Medida Provisória 130) that subsequently became law (Law 10,820, December 2003).[4] The new law regulated the use of payroll loans, or salary consignation (called "consigned credit"), for private-sector employees and private-sector social security beneficiaries of the Instituto Nacional do Seguro Social (INSS), the federally run institution that administers the pay-as-you-go pension system.

A borrower's income constrains the size of payroll loans. Monthly deductions cannot be larger than 30% of the disposable wage or benefit, and loans must have a fixed payment during the amortization period. Severance earnings can be used for the amortization of the remainder of the debt. Employers have several obligations with respect to the amounts of the loans and the information that is passed on to financial institutions and employees. For active private-sector employees, trade unions must act as an intermediary. Unions normally suggest a lender, but the employee is free to choose any financial institution.

[3] This section draws heavily from Coelho et al. (2011).

[4] A Medida Provisória (provisional measure) is a presidential decree, with the status of ordinary law, that takes effect immediately but is then subject to congressional approval or amendment. Congressional deliberation of provisional measures takes priority over the consideration of other legislation. If Congress does not decide within the legally appointed time frame, the president can reissue the measure.

In practice, private-sector retirees are the most important pool of borrowers. The reason for this is simple: the INSS is a pay-as-you-go system backed by the National Treasury. The only risk incurred by lenders, in addition to sovereign risk, is the death of the beneficiary, which is largely diversifiable. In fact, payroll lending has achieved delinquency rates lower than other types of collateralized debt, such as housing and automobile loans (see Coelho et al. [2011]). Coelho, De Mello and Funchal [2011] find a large causal impact of the law on personal lending, the spread and increasing quantities.

Financial institutions have to be chartered by the INSS beneficiaries to underwrite payroll loans to INSS retirees. The first agreement between INSS and a financial institution was made in April 2004, when *Caixa Econômica Federal* (a bank owned by Brazilian federal government and with the characteristics of a savings and loan institution) branches became chartered. In September 2004, *Banco de Minas Gerais* signed the agreement, as the first private bank to be chartered. *Banco do Brasil,* the largest government-owned bank, became chartered in May 2005, and *Banco Itaú*, the largest private bank, only signed its agreement in December 2006. Despite that the decision to become chartered is clearly endogenous, we can treat it as being exogenous at the city level, as the branches are typically already established in a city and the impact of an isolated city on the decision to charter is of marginal importance. From these characteristics, we will show that the chartering process can be explored to establish a valid instrument for the levels of payroll lending per capita.

1.4. The Model

Consider an economy of successive generations of agents who live for two periods. There is one consumption good. Families are indexed by the subscript i. At time t, an individual is born in each family with bequest a_{it} and has to make an occupational choice and credit decisions. At the beginning of period t+1, she will receive a second bequest and income according to her occupation and skill, generating income y_{it} that is divided between consumption c_{it}, and a bequest to the next generation, b_{it}. We assume that individuals differ in their inherited wealth and their skills as an entrepreneur, q_{it}, which is drawn from a distribution f(q)

with support in $(\underline{q}; \overline{q})$. As in Gathak and Jiang (2002), agents have Cobb-Douglas utility functions[5]: $U(c_{it}, b_{it}) = c_{it}^{1-s} b_{it}^{s}$, where $s \in (0,1)$ and the budget constraint is $y_{it} \geq c_{it} + b_{it}$, which means that individuals will choose $b_{it} = s.y_{it}$ and $c_{it} = (1-s)y_{it}$. For simplicity, we will assume that the bequest, b_{it}, is divided in two parts that are given to the next generation in periods t and t+1. Therefore, $a_{it+1} = (b_{it})/2$.

Individuals have one unit of labor that can be invested in one of two production technologies. The first requires the whole unit of labor and produces w units of the consumption good. Individuals that choose this option will be called workers. The second option is to become an entrepreneur, which requires one unit of labor and an investment of I units of the consumption good to produce q.

Finally, there is an external credit market where agents can lend and borrow at an interest rate r.[6] Workers will deposit their wealth in the first period of their lives, and in return, they will obtain $r.a_{it}$ in period t+1. Conversely, entrepreneurs will invest their wealth in their project and borrow the remainder, repaying $r(I - a_{it})$ in the next period. However, this market is subject to limited liability. Here, we take an approach similar to that adopted by Matsuyama (2007) or Buera et al. (2011), where "no more than a fraction λ of the project revenue can be pledged to the lenders for the repayment". Therefore, for a bank to be willing to give a loan to individual i, the following incentive compatibility constraint must be satisfied:

(ICC) $$\lambda\, q_{it} \geq r.(I - a_{it})$$

$$a_{it} \geq I - \frac{\lambda}{r}.q_{it}$$

Figure 1 shows the ICC: for an individual to be able to borrow and became an entrepreneur, she has to have a large enough endowment or entrepreneurship skills that are sufficiently high. Note that some wealthy individuals with bad ideas will engage in such projects, while others with better ideas but who are poor will be workers.

[5] Here, we suppose that agents derive utility from the bequest itself, not from next generation's consumption or utility. This is a common assumption in the literature that simplifies the algebra.

[6] We can think of an international bank as an example. For the purposes of this work, we will take the interest rate as exogenous, although we will return to this topic later.

Assumption 1: Being an entrepreneur provides a higher expected return than working for a salary:

$$\underline{q} - rI \geq w$$

Assumption 1 is made to eliminate bankruptcy issues and simplify the algebra, stating that agents will always want to engage in an entrepreneurial project, and the only reason not to do so is because of credit rationing problems.

In summary, if individual i is a worker, in the next period, she will receive income $y_{it}^{W} = w + r.a_{it} + a_{it}$, while if an individual is an entrepreneur, she will have $y_{it}^{E} = q - r.(I - a_{it}) + a_{it}$. By Assumption 1, $y_{it}^{W} < y_{it}^{E}$ for all i and t.

Therefore, family wealth will observe the following dynamic rule:

$$a_{i,t+1} = \frac{b_{it-1}}{2} = \frac{s}{2}.y_{it} = \begin{cases} \frac{s}{2}\left(w + (1+r)a_{i,t}\right) & \text{if ICC is not satisfied} \\ \frac{s}{2}\left(q_{it} - rI + (1+r)a_{i,t}\right) & \text{if ICC is satisfied} \end{cases}$$

By replacing q_{it} with q^{*}, we have the following stationary equilibriums for the families of workers and entrepreneurs:

(SE) $$a^{W} = \frac{sw}{2-s(1+r)} \quad \text{and} \quad a^{E} = \frac{s(q-rI)}{2-s(1+r)}$$

As we can see in Figure 2, if λ is small enough, some individuals will be stuck in credit traps, with low wealth and working for subsistence.

Now suppose the government passes a law that permits the bequest of the second period to act as a collateral. In this case, the limited liability problem will be alleviated, and the new ICC will be as follows:

(ICC2) $$\lambda\, q_{it} + a_{it} \geq r.(I - a_{it})$$

$$a_{it} \geq \frac{rI - \lambda\,.\,q_{it}}{1+r}$$

From Figure 3, we can identify three areas. First, individuals in A were entrepreneurs both before and after the new law. Second, individuals in area C are always workers. Finally, individuals in Area B were formerly workers, and now, because the credit restriction weakens, they will be able to borrow from the bank and become entrepreneurs.

Now, suppose the economy is in the stationary state. Given the distribution of skills among the population, we can calculate the proportion of individuals that will be able to escape the credit trap:

Before the law: $$P\left(\lambda\, q_{it} > r(I - a^{W})\right) = 1 - F\left[\frac{r}{\lambda}(I - a^{W})\right]$$

After the law: $P(\lambda\, q_{it} > r(I - a^W) - a_{it}) = 1 - F\left[\frac{r}{\lambda}(I - a^W) - a_{it}/\lambda\right]$

Thus, the implementation of the law reduces individual credit constraints, meaning that for each entrepreneurship skill level, the individual will need to have lower wealth to be eligible for a loan.

Finally, there are other effects of the law that we did not consider in this model. First, higher demand for loans due to an increase in credibility will probably raise the interest rate. Second, consider a case in which assumption 1 is not true. This will imply that for each interest rate, there will be a minimum entrepreneurship skill $\tilde{q}(r)$ such that projects that have lower returns than $\tilde{q}(r)$ will not be profitable. Thus, the implementation of the law will raise this cutoff through the interest rate. Therefore, by relaxing credit constraints, the economy moves to a new equilibrium where resources are allocated more efficiently to projects that have higher returns.

Figure 1

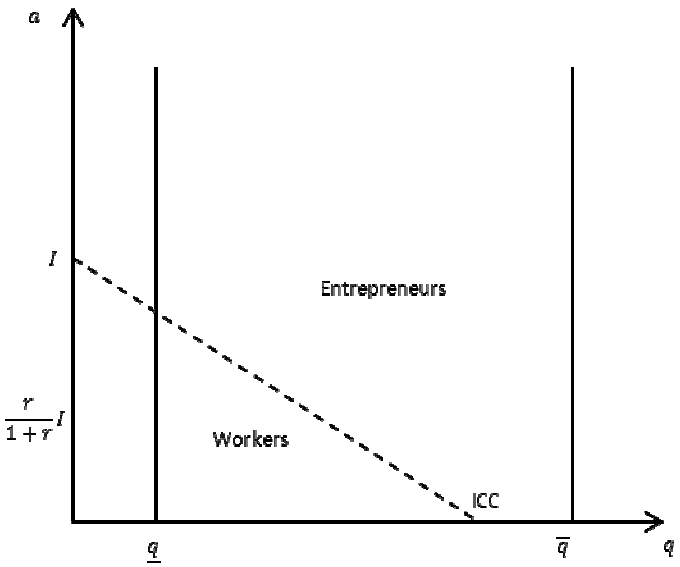


Figure 2

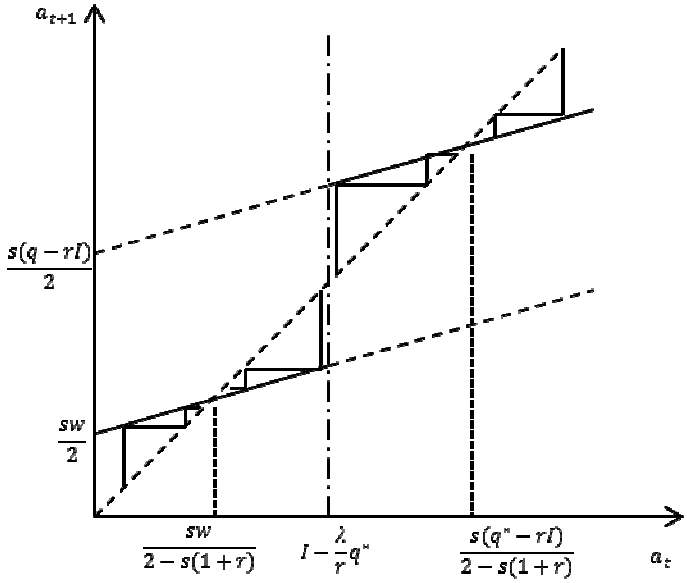
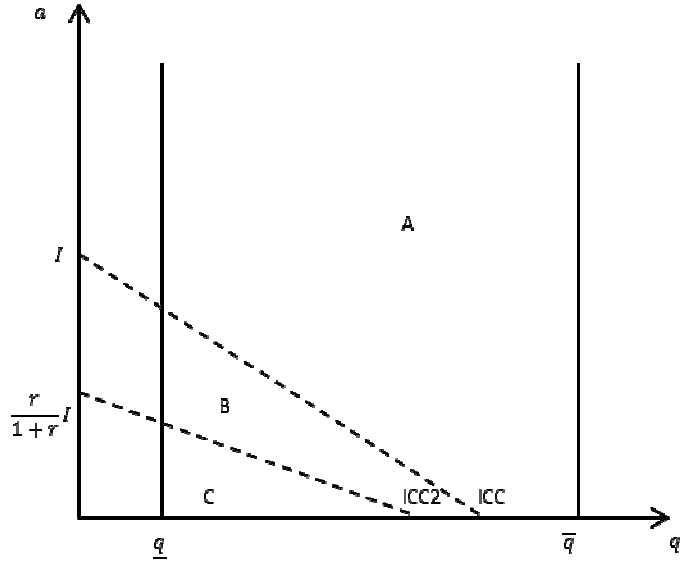


Figure 3



1.5. Data

We constructed a dataset by merging data from several sources. Occupational choice and other demographics are from the annual household survey, the *Pesquisa Nacional por Amostra de Domicílios* (PNAD) conducted by *Instituto Brasileiro de Geografia e Estatística* (IBGE). The database is divided into two files. One contains all of the data collected at the household level, and has information about household size, ownership, rent payments (if not owned by its inhabitants) and electric devices, among other information. The other has information on each individual in the household older than 10 years of age and contains variables, such as age, income, earnings from social security, years of study, occupation in the last week and occupational choice. Our data are from 2003 through 2008.

We use a dummy variable for being an employer (i.e., occupational choice) as a proxy for entrepreneurship. The employer dummy is the main dependable variable in our regressions. For robustness, we also look at self-employment, which some scholars do not consider entrepreneurship but a fragile occupation related to subsistence (Banerjee & Neumann [1993], King and Levine [1993]). In small villages in rural India, self-employment is in fact mainly associated with subsistence. In our sample, self-employment is often associated with professions, such as plumbers, carpenters, etc.

Table 1 displays income percentiles for employers, the self-employed and employed individuals. The self-employed have slightly lower incomes than the employed, and employers have larger incomes than both.

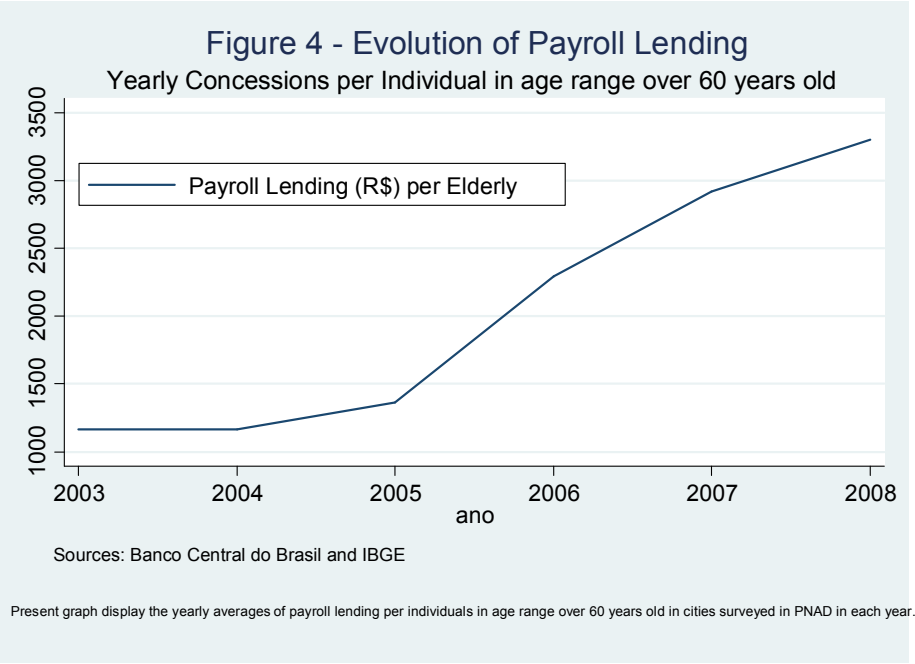
Table 1 - Individual Income Percentiles for Each Occupational Choice

Percentile	Employer	Self-Employed	Employed
25%	800	200	400
50%	1500	400	600
75%	3000	800	1000
95%	8000	2000	2680
Number of Observations	31,354	155,968	200,956

IBGE and DATASUS (a dataset from the Ministry of Health) provides us with demographic information at the city level, such as GDP and population.

From the Brazilian Central Bank, we use SCR (*Central de Risco*), a unique database with loan-level information from all loans over R$5,000.00

(approximately US$ 2,700). The SCR has rich supply side data but practically no demand information, with the important exception of the age of the borrower. Thus, we are unable to match PNAD and SCR data, and we collapsed the total payroll lending underwritten per year at the city level. Because INSS beneficiaries are the main borrowers, we focus on total payroll lending per person over 60 years of age. Figure 4 shows the time-series trend of the mean payroll lending from 2003 through 2008.[7] This figure indicates that the chartering process that began in 2004 preceded a large increase in this type of lending; the amount in 2008 is nearly three times larger than in 2003.



Finally, we merge all of the data above with *Estban* (also from the Brazilian Central Bank), a dataset containing annual information on the amount of credit transactions (in Reais) and the total demand deposits at the city level.

Table 2 displays some descriptive statistics, using observations for ages ranging from 20 to 49 years. The increase in payroll lending was accompanied by an increase in the amount of credit transactions. We observe an increasing trend in the proportion of employers (except for the year 2007) and a reduction in the proportion of self-employed individuals (both age and years of study increase over time).

[7] We take the mean over cities, weighting cities by the number of PNAD observations drawn from the city.

Table 2 - Descriptive Statistics

Panel A: Weighted by Observation Relevance

Year	2003	2004	2005	2006	2007	2008
Employer	0.03619	0.03561	0.03674	0.03825	0.03200	0.03702
	(0.20643)	(0.18532)	(0.18813)	(0.19181)	(0.17600)	(0.19027)
Employer or Self_Employed	0.2064	0.2021	0.2016	0.1985	0.1906	0.1886
	(0.4047)	(0.4016)	(0.4012)	(0.3989)	(0.3928)	(0.3912)
Years of Study	8.5094	8.6160	8.7407	8.9509	9.1040	9.3659
	(4.4228)	(4.4144)	(4.4041)	(4.3687)	(4.3718)	(4.3826)
Age	36.23	36.25	36.21	36.22	36.28	36.30
	(7.125)	(7.14)	(7.18)	(7.17)	(7.19)	(7.22)
Credit Operations per Capita	3328.3	3591.0	3973.69	4707.66	6208.65	6438.12
	(6279.4)	(7852.3)	(9512.23)	(11138.9)	(14572.0)	(19470.19)
Payroll per Capita	88.70	79.1	95.18	158.47	239.99	270.72
	(74.04)	(70.51)	(80.48)	(134.22)	(190.07)	(214.76)
Payroll per Old	1071.3	980.15	1175.48	1952.09	2537.58	2832.21
	(1068.8)	(1108.01)	(1266.49)	(2115.27)	(2358.74)	(2682.53)
Income	1370.07	1457.72	1592.63	1777.74	1888.22	2099.11
	(1954.6)	(2194.32)	(2331.99)	(2654.47)	(2631.6)	(2874.95)
Observations	111343	117220	120170	121984	119835	108345

Sources: Instituto Nacional de Geografia e Estatística and Banco Central do Brasil
This panel displays descriptive ststistics for each year of observation. All statistics are weighted by observation relevance, as suggested by IBGE

Panel B: Non-Weighted

	(1)			(2)	(3)	(4)
Dependent Variable	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Employer	0.03465	0.03525	0.03577	0.03657	0.03103	0.03670
	(0.18289)	(0.18439)	(0.1857)	(0.1877)	(0.1734)	(0.1880)
Employer or Self_Employed	0.2068	0.2035	0.2016	0.1997	0.1920	0.1908
	(0.4050)	(0.4026)	(0.4012)	(0.3997)	(0.3939)	(0.3930)
Years of Study	8.5287	8.6516	8.7752	8.9690	9.1127	9.3951
	(4.4188)	(4.4079)	(4.3886)	(4.3509)	(4.3609)	(4.3648)
Age	36.11	36.14	36.11	36.12	36.18	36.22
	(7.108)	(7.13)	(7.16)	(7.15)	(7.20)	(7.21)
Credit Operations per Capita	2767.9	2973.5	3260.3	3884.0	4949.8	6747.5
	(4997.05)	(6119.8)	(7288.3)	(8550.05)	(11133.47)	(15089.95)
Payroll per Capita	90.58	88.97	104.23	174.98	261.35	300.37
	(78.17)	(86.44)	(97.94)	(164.75)	(223.58)	(251.24)
Payroll per Old	1182.8	1192.7	1392.5	2348.27	2977.14	3366.84
	(1266.8)	(1493.04)	(1708.96)	(2907.49)	(3093.82)	(3440.52)
Income	1328.63	1434.60	1560.31	1726.89	1849.8	2076.6
	(1937.3)	(2222.74)	(2361.88)	(2566.62)	(2658.6)	(2914.4)
Observations	111343	117220	120170	121984	119835	108345

Sources: Instituto Nacional de Geografia e Estatística and Banco Central do Brasil
This panel displays descriptive ststistics for each year of observation.

1.6. Empirical Strategy

The main outcome variable is the occupational choice of individuals aged 25 to 50 years. Entrepreneurship should be a relevant phenomenon in this age bracket compared with the older age bracket that comprises retirees. If payroll lending alleviates credit restrictions, we expect that individuals in cities with more payroll lending should be less restricted, i.e., we expect that the availability of payroll lending will increase the probability of becoming an entrepreneur, which is measured by being an employer or employer/self-employed. We estimate the following linear probability model:

$$emp_{ijt} = \beta_1 . payroll_{jt} + \zeta_j + \theta_t + \gamma . \text{Controls}_{jit} + \varepsilon_{ijt} \quad (6.1)$$

where emp_{ijt} is an entrepreneur indicator for individual *i* in the city *j* at year *t*, and $payroll_{jt}$ is a payroll lending variable. For robustness, we use both payroll per capita and payroll per individual over 60 years of age (henceforth, payroll per old) as explanatory variables. The primary variable of interest is β_1. The parameters ζ_j and θ_t are two complete sets of city and time dummies. Controls_{ijt} include total bank credit assets per capita with respect to city, gender, age, income, wealth and education levels.

The primary means of identifying variation is controlled, within city variation in payroll lending. Potential identification issues may arise because we only observe equilibrium outcomes, not supply of or demand for credit, which may cause omitted variable and reverse causality problems. Our hypothesis is a credit supply effect: payroll lending shifts credit supply outward, relaxing borrowers' credit constraints and allowing individuals to opt for entrepreneurship. However, it may be that economic activity drives credit demand and increases entrepreneurship. In addition, entrepreneurship itself may drive demand for credit. In both cases, we would find a positive relationship between payroll lending and entrepreneurship, but a causal interpretation would not be warranted.

Casual interpretation requires that we somehow control for demand shocks or study heterogeneous effects that are mainly supply driven. First, we include

regressors that, albeit imperfectly, control for credit demand, such as income and wealth. More importantly, we include, in addition to payroll lending, the total amount lent per capita at the city level. If demand is driving our results, one would find a strong impact of total lending on entrepreneurship and little effect of payroll lending. Finally, we explore the heterogeneity of the impact of payroll lending according to income, wealth and property ownership. If payroll lending is alleviating credit constraints (a supply mechanism), we should expect the availability of payroll lending to reduce income-to-occupational choice sensitivity. Evaluating the impact of payroll lending using the heterogeneity of cash-to-income sensitivity is in the same spirit as gauging how financially constrained a firm is using investment to cash-in-hand sensitivity, a typical strategy in corporate finance. We expect a positive β_2 and a negative β_3 in the following regression:

$$emp_{ijt} = \beta_1 . payroll_{jt} + \beta_2 . inc_{ijt} + \beta_3 . payroll_{jt} * inc_{ijt} + \zeta_j + \theta_t + \gamma . X_{ijt} + \varepsilon_{ijt} \quad (6.2)$$

where inc_{ijt} is family income and X_{ijt} is a vector of controls. We also interact payroll lending with home ownership, which measures both wealth and the presence of an alternative form of collateral.

Another source of heterogeneity in the impact of payroll lending is mechanical. The major source of collateralizable future income is pension benefits. Thus, we expect that individuals in households that have more pension benefits should have occupational choice decisions that are more sensitive to increases in payroll lending, after controlling for total income, we expect a positive β_5 in the following regression:

$$e_{ijt} = \beta_1 . payroll_{jt} + \beta_2 . inc_{ijt} + \beta_3 . payroll_{jt} * inc_{ijt} + \beta_4 . ps_{ijt} + \beta_5 . payroll_{jt} * ps_{ijt} + \zeta_j + \theta_t + \gamma . X_{ijt} + \varepsilon_{ijt} \quad (6.3)$$

where ps_{ijt} is the total household retirement benefits.

Finally, we use a particular feature of the process of payroll lending chartering to explore a source of variation that is arguably exogenous. Banks must

be chartered by the INSS to be able to underwrite payroll loans. The charter is national, and the process was staggered over time. The ability to underwrite depends on the banks' distribution network because, at least partially, origination is performed through the brick and mortar branch network. Because banks differ in the geographical distributions of their branch networks, the staggered nature of INSS chartering provides exogenous variation in a bank's ability to originate payroll loans in different cities.

The IV strategy is implemented as follows. We use the city-level volume of demand deposits per capita for banks chartered with INSS as an instrument. The second and first stages are as follows:

$$emp_{ijt} = \beta_1 . payroll_{jt} + \zeta_j + \theta_t + \gamma . \text{controls} + \varepsilon_{jt} \quad \text{(Second-Stage)}$$

$$payroll_{jt} = \alpha_1 . chartered\_deposits_{jt} + \phi_j + \rho_t + \omega . \text{controls} + \mu_{jt}$$

(First Stage)

where emp_{ijt} is the entrepreneurship indicator for an individual *i* in city *j* at year *t*. $chartered\_deposits_{jt}$ is the demand deposits at chartered institutions per capita in city *j* at year *t*.

We also perform some robustness checks on the choice of functional form. We use a linear probability model, which the has advantage of a direct interpretation of city and time dummies as fixed effects. One disadvantage is that some predictions may fall outside the interval [0,1]. For this reason, we also employ probit models on equations (6.1) through (6.3).

1.7. Results

1.7.1. Effect of Payroll Lending on Occupational Choice

Table 3 displays the estimated coefficients from model (6.1). Throughout the tables, Panel A displays results using payroll per old as the main regressor, and Panel B presents payroll per capita as the main regressor. In Panel A, we find that payroll lending availability increases the odds of being an employer compared with being self-employed and an employee (column (1)). In column (2), the dependent variable bundles employers and the self-employed. The impact of payroll lending is stronger, but precision is lower. In columns (3) and (4), we compare employers with the self-employed and employers with employees. Again, payroll lending increases the odds of entrepreneurship. When payroll lending per capita is used (instead of payroll per old) the pattern is similar, except that all estimates of the impact of payroll lending are now significant at the 10% level (Panel B). The coefficients associated with the other variables all have the expected signs: males are more likely to be entrepreneurs, and the probability of entrepreneurship increases with age and years of study.

In practice, a one standard deviation increase in the availability of payroll lending is associated with an increase of roughly 4.5% in the probability of being an employer (significant at the 5% level) and 1.6% (while statistically not significant) of being either an employer or self-employed. When using payroll per capita, the respective impacts are 3.0% and 1.6% (both significant at the 10% level).

Table 3 - Occupational Choice as a Function of Payroll Lending

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0365***	-0.155***	-0.0494***	-0.0704***
	(0.000941)	(0.00449)	(0.00139)	(0.00234)
Years of Study	0.00513***	0.000771*	0.00563***	0.0256***
	(0.000160)	(0.000434)	(0.000190)	(0.000480)
Age	0.00184***	0.00617***	0.00245***	0.00319***
	(6.57e-05)	(0.000139)	(8.38e-05)	(0.000175)
Credit Operations per Capita	8.67e-08	2.58e-07*	9.86e-08	4.66e-07
	(5.81e-08)	(1.40e-07)	(6.79e-08)	(2.87e-07)
Payroll per Old	6.04e-07**	1.22e-06	7.02e-07**	3.11e-06**
	(2.77e-07)	(8.61e-07)	(3.18e-07)	(1.46e-06)
Constant	-0.0560***	0.0552***	-0.0666***	-0.140***
	(0.00323)	(0.00746)	(0.00393)	(0.00920)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll	0.001579	0.003189	0.001835	0.008129
Observations	720,323	720,323	601,173	144,597
R-squared	0.033	0.064	0.042	0.119

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0365***	-0.155***	-0.0494***	-0.0704***
	(0.000941)	(0.00449)	(0.00139)	(0.00235)
Years of Study	0.00513***	0.000772*	0.00563***	0.0256***
	(0.000160)	(0.000434)	(0.000190)	(0.000480)
Age	0.00184***	0.00617***	0.00245***	0.00319***
	(6.57e-05)	(0.000139)	(8.37e-05)	(0.000175)
Credit Operations per Capita	8.37e-08	2.41e-07	9.51e-08	4.48e-07
	(5.89e-08)	(1.49e-07)	(6.94e-08)	(2.80e-07)
Payroll per Capita	5.81e-06*	1.77e-05*	6.93e-06*	2.91e-05*
	(3.25e-06)	(9.54e-06)	(3.82e-06)	(1.57e-05)
Constant	-0.0559***	0.0550***	-0.0665***	-0.139***
	(0.00322)	(0.00745)	(0.00392)	(0.00927)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll	0.001070	0.003258	0.001276	0.005357
Observations	720,323	720,323	601,173	144,597
R-squared	0.033	0.064	0.042	0.119

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 4 displays the estimates for the parameters in model (6.2). All estimated coefficients on payroll lending are positive and statistically significant. The coefficients associated with the interaction terms are all negative and statistically significant. Thus, the sensitivity of occupational choice to income

changes with the availability of payroll lending, In practice, the ratio of the effects of a one standard deviation change in the level of payroll at the 75th income percentile to that at the 25th income percentile are approximately 43% to 65%, depending on the specification. This result is compatible with the hypothesis of payroll lending being used to alleviate credit restrictions, and it is difficult to explain this result with credit demand stories.

Table 4 - Occupational Choice as a Function of Payroll Lending and Income

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0338***	-0.152***	-0.0458***	-0.0684***
	(0.000929)	(0.00447)	(0.00134)	(0.00247)
Years of Study	0.00190***	-0.00269***	0.00186***	0.0177***
	(0.000135)	(0.000330)	(0.000162)	(0.000596)
Age	0.00124***	0.00550***	0.00171***	0.00214***
	(5.59e-05)	(0.000118)	(7.15e-05)	(0.000176)
Income	1.76e-05***	1.97e-05***	2.05e-05***	3.05e-05***
	(1.04e-06)	(9.89e-07)	(1.18e-06)	(2.72e-06)
Credit Operations per Capita	6.90e-08	2.44e-07*	8.01e-08	4.31e-07
	(5.72e-08)	(1.36e-07)	(6.52e-08)	(2.71e-07)
Payroll per Old	3.24e-06***	5.09e-06***	4.03e-06***	4.84e-06**
	(4.22e-07)	(9.23e-07)	(4.72e-07)	(2.12e-06)
Payroll per Old * Income	-1.10e-09***	-1.48e-09***	-1.32e-09***	-1.14e-09**
	(2.07e-10)	(2.48e-10)	(2.40e-10)	(4.63e-10)
Constant	-0.0337***	0.0777***	-0.0395***	-0.0855***
	(0.00265)	(0.00573)	(0.00328)	(0.00898)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll on 25th Percentile of Income	0.00689	0,01113	0.00862	0.01092
Effect of 1 sd change of Payroll on 50th Percentile of Income	0.00561	0.00942	0.00710	0,00961
Effect of 1 sd change of Payroll on 75th Percentile of Income	0.00322	0.00621	0.00423	0.00713
Observations	701,299	701,299	585,678	140,004
R-squared	0.066	0.072	0.080	0.168

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0337***	-0.152***	-0.0457***	-0.0684***
	(0.000935)	(0.00447)	(0.00135)	(0.00247)
Years of Study	0.00186***	-0.00272***	0.00182***	0.0176***
	(0.000142)	(0.000333)	(0.000170)	(0.000624)
Age	0.00123***	0.00549***	0.00170***	0.00213***
	(5.79e-05)	(0.000120)	(7.39e-05)	(0.000180)
Income	1.87e-05***	2.05e-05***	2.17e-05***	3.23e-05***
	(1.00e-06)	(9.08e-07)	(1.15e-06)	(2.97e-06)
Credit Operations per Capita	8.18e-08*	2.37e-07*	9.20e-08	4.86e-07*
	(4.93e-08)	(1.37e-07)	(5.64e-08)	(2.77e-07)
Payroll per Capita	4.67e-05***	7.10e-05***	5.69e-05***	6.73e-05**
	(5.91e-06)	(1.22e-05)	(6.43e-06)	(2.66e-05)
Payroll per Capita * Income	-1.70e-08***	-2.00e-08***	-2.00e-08***	-2.10e-08***
	(2.51e-09)	(1.98e-09)	(2.74e-09)	(6.85e-09)
Constant	-0.0347***	0.0767***	-0.0406***	-0.0873***
	(0.00251)	(0.00572)	(0.00311)	(0.00852)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll on 25th Percentile of Income	0.00709	0.01109	0.00853	0.01033
Effect of 1 sd change of Payroll on 50th Percentile of Income	0.00570	0.00945	0.00689	0.00861
Effect of 1 sd change of Payroll on 75th Percentile of Income	0.00307	0.00636	0.00380	0.00536
Observations	701,299	701,299	585,678	140,004
R-squared	0.066	0.072	0.080	0.168

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 5 displays the estimates for the parameters in specification (6.3). Again, the estimated coefficients on payroll lending are positive, and the interactions with household income are negative. The estimated coefficients for the interaction between payroll lending and pension benefits are positive and significant in all specifications. Their magnitudes are larger than those of the

interaction between payroll lending and income. An increase in payroll lending reduces the sensitivity of occupational choice to income. However, payroll lending has a stronger impact on occupational choice in households with more pension income (which is the main income category used as collateral in payroll lending). This is further evidence that the relationship between payroll lending and entrepreneurship is in fact driven by the supply of credit and is thus causal.

Table 5 - Occupational Choice as a Function of Payroll Lending, Income and Pension Benefits

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0340***	-0.153***	-0.0465***	-0.0666***
	(0.000940)	(0.00447)	(0.00136)	(0.00248)
Years of Study	0.00197***	-0.00274***	0.00192***	0.0180***
	(0.000146)	(0.000349)	(0.000178)	(0.000602)
Age	0.00128***	0.00552***	0.00177***	0.00211***
	(5.86e-05)	(0.000126)	(7.55e-05)	(0.000179)
Income	1.94e-05***	2.21e-05***	2.27e-05***	3.19e-05***
	(1.17e-06)	(1.14e-06)	(1.36e-06)	(2.93e-06)
Pension	-2.52e-05***	-4.26e-05***	-3.02e-05***	-4.60e-05***
	(1.36e-06)	(2.60e-06)	(1.67e-06)	(4.57e-06)
Credit Operations per Capita	5.99e-08	2.29e-07	7.27e-08	3.98e-07
	(6.19e-08)	(1.50e-07)	(7.13e-08)	(2.85e-07)
Payroll per Old	3.04e-06***	4.50e-06***	3.80e-06***	4.44e-06**
	(4.13e-07)	(9.52e-07)	(4.63e-07)	(1.98e-06)
Payroll per Old * Income	-1.16e-09***	-1.62e-09***	-1.42e-09***	-1.13e-09**
	(2.22e-10)	(2.68e-10)	(2.60e-10)	(4.81e-10)
Payroll per Old * Pension	1.50e-09***	3.06e-09***	1.89e-09***	2.22e-09**
	(2.95e-10)	(5.99e-10)	(3.57e-10)	(9.11e-10)
Constant	-0.0338***	0.0846***	-0.0396***	-0.0839***
	(0.00271)	(0.00599)	(0.00338)	(0.00905)
Observations	679,665	679,665	565,484	138,468
R-squared	0.070	0.075	0.086	0.171

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0340***	-0.153***	-0.0465***	-0.0666***
	(0.000946)	(0.00448)	(0.00137)	(0.00248)
Years of Study	0.00194***	-0.00276***	0.00189***	0.0180***
	(0.000154)	(0.000352)	(0.000187)	(0.000629)
Age	0.00127***	0.00552***	0.00176***	0.00210***
	(6.03e-05)	(0.000127)	(7.76e-05)	(0.000183)
Income	2.05e-05***	2.30e-05***	2.39e-05***	3.37e-05***
	(1.17e-06)	(1.10e-06)	(1.36e-06)	(3.22e-06)
Pension	-2.68e-05***	-4.61e-05***	-3.20e-05***	-4.79e-05***
	(1.34e-06)	(2.44e-06)	(1.61e-06)	(4.89e-06)
Credit Operations per Capita	7.54e-08	2.29e-07	8.84e-08	4.53e-07
	(5.23e-08)	(1.47e-07)	(6.01e-08)	(2.89e-07)
Payroll per Capita	4.24e-05***	5.97e-05***	5.17e-05***	5.80e-05**
	(5.79e-06)	(1.31e-05)	(6.48e-06)	(2.51e-05)
Payroll per Capita * Income	-1.79e-08***	-2.19e-08***	-2.14e-08***	-2.06e-08***
	(2.72e-09)	(2.35e-09)	(3.00e-09)	(6.98e-09)
Payroll per Capita * Pension	2.36e-08***	4.80e-08***	2.92e-08***	3.32e-08***
	(3.53e-09)	(6.95e-09)	(4.14e-09)	(9.88e-09)
Constant	-0.0347***	0.0839***	-0.0406***	-0.0853***
	(0.00258)	(0.00601)	(0.00322)	(0.00862)
Observations	679,665	679,665	565,484	138,468
R-squared	0.071	0.075	0.086	0.172

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

1.7.2. – Robustness: functional form

Tables 6 through 8 report marginal effects based on probit estimates of models (6.1) through (6.3). The results are similar to those in tables 3 through 5.

Table 6 - Occupational Choice as a Function of Payroll Lending

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0305***	-0.155***	-0.0419***	-0.0650***
	(0.000572)	(0.00372)	(0.000850)	(0.00237)
Years of Study	0.00399***	0.00104**	0.00439***	0.0247***
	(6.29e-05)	(0.000437)	(8.70e-05)	(0.000323)
Age	0.00133***	0.00621***	0.00177***	0.00291***
	(2.87e-05)	(0.000152)	(3.44e-05)	(0.000175)
Credit Operations per Capita	6.25e-08*	2.65e-07*	7.38e-08*	3.34e-07*
	(3.40e-08)	(1.56e-07)	(4.22e-08)	(2.00e-07)
Payroll per Old	4.68e-07**	1.14e-06	5.45e-07**	2.43e-06*
	(2.12e-07)	(9.30e-07)	(2.45e-07)	(1.44e-06)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll	0.001197	0.002916	0.001394	0.006216
Observations	718,681	720,323	599,985	144,143
Pseudo R-squared	0.105	0.0641	0.117	0.131

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0305***	-0.155***	-0.0419***	-0.0650***
	(0.000572)	(0.00372)	(0.000850)	(0.00237)
Years of Study	0.00399***	0.00104**	0.00439***	0.0247***
	(6.29e-05)	(0.000436)	(8.70e-05)	(0.000323)
Age	0.00133***	0.00621***	0.00177***	0.00291***
	(2.87e-05)	(0.000152)	(3.44e-05)	(0.000175)
Credit Operations per Capita	6.06e-08*	2.51e-07	7.15e-08*	3.25e-07*
	(3.47e-08)	(1.65e-07)	(4.34e-08)	(1.96e-07)
Payroll per Capita	4.31e-06*	1.60e-05	5.07e-06*	2.05e-05
	(2.53e-06)	(9.86e-06)	(2.96e-06)	(1.57e-05)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll	0.000784	0.002919	0.000922	0.003717
Observations	718,681	720,323	599,985	144,143
Pseudo R-squared	0.105	0.0641	0.117	0.131

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 7 - Occupational Choice as a Function of Payroll Lending and Income

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0287***	-0.152***	-0.0392***	-0.0663***
	(0.000455)	(0.00366)	(0.000640)	(0.00243)
Years of Study	0.00238***	-0.00236***	0.00240***	0.0173***
	(8.27e-05)	(0.000325)	(9.92e-05)	(0.000350)
Age	0.00104***	0.00559***	0.00137***	0.00197***
	(3.15e-05)	(0.000129)	(3.81e-05)	(0.000159)
Income	6.49e-08**	2.51e-07	7.60e-08**	3.52e-07*
	(2.92e-08)	(1.54e-07)	(3.42e-08)	(1.98e-07)
Credit Operations per Capita	4.89e-06***	1.78e-05***	6.14e-06***	2.53e-05***
	(2.42e-07)	(8.95e-07)	(2.72e-07)	(1.65e-06)
Payroll per Old	1.44e-06***	4.72e-06***	1.85e-06***	5.22e-06**
	(2.77e-07)	(9.31e-07)	(3.04e-07)	(2.19e-06)
Payroll per Old * Income	-2.83e-10***	-1.36e-09***	-3.73e-10***	-1.07e-09***
	(6.32e-11)	(2.72e-10)	(7.78e-11)	(3.80e-10)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll on 25th Percentile of Income	0.00332	0.01033	0.00425	0.01198
Effect of 1 sd change of Payroll on 50th Percentile of Income	0.00300	0.00877	0.00383	0.01075
Effect of 1 sd change of Payroll on 75th Percentile of Income	0.00238	0.00581	0.00301	0.00843
Observations	699,570	701,299	584,418	139,535
R-squared	0.146	0.0726	0.162	0.173

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0287***	-0.152***	-0.0392***	-0.0663***
	(0.000459)	(0.00367)	(0.000651)	(0.00244)
Years of Study	0.00236***	-0.00239***	0.00237***	0.0172***
	(8.50e-05)	(0.000326)	(0.000101)	(0.000357)
Age	0.00104***	0.00558***	0.00137***	0.00194***
	(3.23e-05)	(0.000130)	(3.88e-05)	(0.000162)
Income	6.94e-08***	2.45e-07	8.05e-08***	4.06e-07**
	(2.57e-08)	(1.54e-07)	(2.98e-08)	(2.03e-07)
Credit Operations per Capita	5.16e-06***	1.84e-05***	6.45e-06***	2.77e-05***
	(2.51e-07)	(7.65e-07)	(2.67e-07)	(1.69e-06)
Payroll per Capita	1.95e-05***	6.49e-05***	2.48e-05***	8.24e-05***
	(3.39e-06)	(1.16e-05)	(3.66e-06)	(2.49e-05)
Payroll per Capita * Income	-4.28e-09***	-1.78e-08***	-5.49e-09***	-2.16e-08***
	(6.86e-10)	(1.82e-09)	(7.42e-10)	(4.64e-09)
Constant	-0.0347***	0.0767***	-0.0406***	-0.0873***
	(0.00251)	(0.00572)	(0.00311)	(0.00852)
Variable Mean	0.03498	0.1991	0.04185	0.17568
	(0.18372)	(0.3993)	(0.2002)	(0.38053)
Effect of 1 sd change of Payroll on 25th Percentile of Income	0.00315	0.01018	0.00401	0.01302
Effect of 1 sd change of Payroll on 50th Percentile of Income	0.00281	0.00872	0.00356	0.01125
Effect of 1 sd change of Payroll on 75th Percentile of Income	0.00214	0.00597	0.00271	0.00792
Observations	699,570	701,299	584,418	139,535
R-squared	0.146	0.0726	0.163	0.175

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 8 - Occupational Choice as a Function of Payroll Lending, Income and Pension Benefits

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0289***	-0.153***	-0.0396***	-0.0652***
	(0.000463)	(0.00368)	(0.000651)	(0.00246)
Years of Study	0.00245***	-0.00245***	0.00244***	0.0175***
	(9.08e-05)	(0.000339)	(0.000111)	(0.000360)
Age	0.00104***	0.00559***	0.00138***	0.00188***
	(3.41e-05)	(0.000138)	(4.18e-05)	(0.000162)
Income	6.23e-08*	2.33e-07	7.46e-08**	3.21e-07
	(3.21e-08)	(1.67e-07)	(3.80e-08)	(2.10e-07)
Pension	5.38e-06***	2.01e-05***	6.83e-06***	2.72e-05***
	(2.78e-07)	(9.93e-07)	(3.18e-07)	(1.78e-06)
Credit Operations per Capita	-8.82e-06***	-4.14e-05***	-1.12e-05***	-3.77e-05***
	(6.34e-07)	(2.67e-06)	(7.78e-07)	(3.11e-06)
Payroll per Old	1.36e-06***	4.14e-06***	1.75e-06***	4.91e-06**
	(2.71e-07)	(9.62e-07)	(2.97e-07)	(2.19e-06)
Payroll per Old * Income	-2.98e-10***	-1.48e-09***	-4.01e-10***	-1.06e-09**
	(6.77e-11)	(2.87e-10)	(8.29e-11)	(4.38e-10)
Payroll per Old * Pension	5.10e-10***	2.88e-09***	6.90e-10***	1.73e-09**
	(1.35e-10)	(6.61e-10)	(1.67e-10)	(8.39e-10)
Observations	680,723	682,362	566,652	138,390
R-squared	0.149	0.0741	0.166	0.177

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0288***	-0.153***	-0.0396***	-0.0651***
	(0.000469)	(0.00369)	(0.000662)	(0.00246)
Years of Study	0.00242***	-0.00248***	0.00242***	0.0174***
	(8.84e-05)	(0.000340)	(0.000108)	(0.000368)
Age	0.00104***	0.00558***	0.00138***	0.00186***
	(3.44e-05)	(0.000138)	(4.23e-05)	(0.000165)
Income	5.67e-06***	2.08e-05***	7.17e-06***	2.97e-05***
	(2.58e-07)	(8.89e-07)	(3.09e-07)	(1.84e-06)
Pension	-9.47e-06***	-4.51e-05***	-1.21e-05***	-4.10e-05***
	(6.62e-07)	(2.56e-06)	(8.19e-07)	(3.28e-06)
Credit Operations per Capita	6.80e-08**	2.34e-07	8.07e-08**	3.76e-07*
	(2.78e-08)	(1.63e-07)	(3.24e-08)	(2.14e-07)
Payroll per Capita	1.79e-05***	5.42e-05***	2.28e-05***	7.72e-05***
	(3.30e-06)	(1.25e-05)	(3.77e-06)	(2.41e-05)
Payroll per Capita * Income	-4.55e-09***	-1.95e-08***	-5.92e-09***	-2.23e-08***
	(7.12e-10)	(2.09e-09)	(8.18e-10)	(4.98e-09)
Payroll per Capita * Pension	8.30e-09***	4.62e-08***	1.10e-08***	3.31e-08***
	(1.60e-09)	(7.37e-09)	(1.96e-09)	(8.55e-09)
Observations	680,723	682,362	566,652	138,390
R-squared	0.150	0.0741	0.167	0.178

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

1.7.3. – Robustness analysis: wealth

Tables 4 and 7 show that payroll lending increases the odds of being an entrepreneur, and occupational choice is less sensitive to income when payroll lending is available. Instead of income, we now interact payroll lending with home ownership, both as a measure of household wealth and an indicator of

another source of collateral. Table 9 reports estimates when income is replaced with a dummy for home ownership. We also include interactions with both income and the home ownership dummy. Table 10 shows the results. In general, the results in Table 9 show that the effects of payroll lending on entrepreneurship are stronger when individuals do not own the homes they live in. When we use both indicators together, entrepreneurship is more sensitive to changes in the level of payroll lending to individuals in families with lower incomes and without home ownership.

Table 9 - Occupational Choice as a Function of Payroll Lending and Home Ownership

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0366***	-0.155***	-0.0495***	-0.0704***
	(0.000944)	(0.00451)	(0.00140)	(0.00235)
Years of Study	0.00509***	0.000669	0.00558***	0.0256***
	(0.000159)	(0.000430)	(0.000189)	(0.000476)
Age	0.00180***	0.00605***	0.00240***	0.00306***
	(6.51e-05)	(0.000140)	(8.27e-05)	(0.000174)
Credit Operations per Capita	8.41e-08	2.47e-07*	9.49e-08	4.57e-07
	(5.94e-08)	(1.45e-07)	(7.01e-08)	(2.89e-07)
Ownership	0.00616***	0.0234***	0.00819***	0.0188***
	(0.000986)	(0.00281)	(0.00124)	(0.00361)
Payroll per Old	8.41e-07***	3.59e-06***	1.13e-06***	2.35e-06
	(2.85e-07)	(8.11e-07)	(3.36e-07)	(1.60e-06)
Payroll per Old * Ownership	-3.45e-07*	-3.45e-06***	-6.21e-07**	9.97e-07
	(1.94e-07)	(8.57e-07)	(2.41e-07)	(8.84e-07)
Constant	-0.0589***	0.0432***	-0.0704***	-0.149***
	(0.00325)	(0.00724)	(0.00394)	(0.00950)
Observations	720,323	720,323	601,173	144,597
R-squared	0.033	0.064	0.042	0.119

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0366***	-0.155***	-0.0495***	-0.0704***
	(0.000944)	(0.00451)	(0.00140)	(0.00235)
Years of Study	0.00509***	0.000670	0.00558***	0.0256***
	(0.000159)	(0.000430)	(0.000189)	(0.000476)
Age	0.00180***	0.00605***	0.00240***	0.00306***
	(6.51e-05)	(0.000140)	(8.27e-05)	(0.000174)
Credit Operations per Capita	8.12e-08	2.31e-07	9.15e-08	4.41e-07
	(6.03e-08)	(1.54e-07)	(7.16e-08)	(2.82e-07)
Ownership	0.00607***	0.0248***	0.00822***	0.0179***
	(0.00102)	(0.00264)	(0.00127)	(0.00390)
Payroll per Capita	8.16e-06**	5.09e-05***	1.20e-05***	1.62e-05
	(3.59e-06)	(1.02e-05)	(4.28e-06)	(1.86e-05)
Payroll per Capita * Ownership	-3.34e-06	-4.75e-05***	-7.18e-06**	1.73e-05
	(2.97e-06)	(8.86e-06)	(3.58e-06)	(1.26e-05)
Constant	-0.0587***	0.0420***	-0.0702***	-0.147***
	(0.00322)	(0.00738)	(0.00390)	(0.00959)
Observations	720,323	720,323	601,173	144,597
R-squared	0.033	0.064	0.042	0.119

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 10 - Occupational Choice as a Function of Payroll Lending, Income and Home Ownership

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0338***	-0.152***	-0.0458***	-0.0684***
	(0.000931)	(0.00448)	(0.00134)	(0.00247)
Years of Study	0.00190***	-0.00274***	0.00185***	0.0177***
	(0.000134)	(0.000327)	(0.000161)	(0.000593)
Age	0.00124***	0.00542***	0.00170***	0.00207***
	(5.68e-05)	(0.000121)	(7.21e-05)	(0.000177)
Income	1.76e-05***	1.95e-05***	2.05e-05***	3.04e-05***
	(1.03e-06)	(9.70e-07)	(1.18e-06)	(2.71e-06)
Credit Operations per Capita	6.81e-08	2.35e-07*	7.86e-08	4.25e-07
	(5.76e-08)	(1.40e-07)	(6.59e-08)	(2.71e-07)
Ownership	0.00166*	0.0182***	0.00275**	0.0102***
	(0.000955)	(0.00290)	(0.00121)	(0.00337)
Payroll per Old	3.47e-06***	7.09e-06***	4.40e-06***	4.84e-06**
	(4.33e-07)	(9.33e-07)	(5.06e-07)	(2.29e-06)
Payroll per Old * Ownership	-3.51e-07*	-3.10e-06***	-5.72e-07**	-3.82e-08
	(1.91e-07)	(8.35e-07)	(2.36e-07)	(8.81e-07)
Payroll per Old * Income	-1.09e-09***	-1.44e-09***	-1.31e-09***	-1.14e-09**
	(2.07e-10)	(2.41e-10)	(2.39e-10)	(4.60e-10)
Constant	-0.0346***	0.0682***	-0.0410***	-0.0908***
	(0.00275)	(0.00565)	(0.00341)	(0.00916)
Observations	701,299	701,299	585,678	140,004
R-squared	0.066	0.073	0.080	0.168

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0337***	-0.152***	-0.0457***	-0.0683***
	(0.000937)	(0.00449)	(0.00135)	(0.00247)
Years of Study	0.00186***	-0.00277***	0.00182***	0.0176***
	(0.000142)	(0.000330)	(0.000169)	(0.000621)
Age	0.00123***	0.00541***	0.00169***	0.00206***
	(5.86e-05)	(0.000122)	(7.44e-05)	(0.000181)
Income	1.87e-05***	2.03e-05***	2.17e-05***	3.23e-05***
	(1.00e-06)	(8.94e-07)	(1.15e-06)	(2.97e-06)
Credit Operations per Capita	8.10e-08	2.27e-07	9.07e-08	4.81e-07*
	(4.95e-08)	(1.41e-07)	(5.70e-08)	(2.77e-07)
Ownership	0.00160	0.0195***	0.00282**	0.00968***
	(0.000989)	(0.00277)	(0.00124)	(0.00364)
Payroll per Capita	4.94e-05***	9.98e-05***	6.17e-05***	6.52e-05**
	(5.83e-06)	(1.20e-05)	(6.61e-06)	(2.78e-05)
Payroll per Capita * Ownership	-4.03e-06	-4.37e-05***	-7.40e-06**	2.71e-06
	(2.97e-06)	(9.27e-06)	(3.54e-06)	(1.22e-05)
Payroll per Capita * Income	-1.69e-08***	-1.95e-08***	-1.99e-08***	-2.10e-08***
	(2.52e-09)	(1.95e-09)	(2.74e-09)	(6.83e-09)
Constant	-0.0356***	0.0662***	-0.0421***	-0.0922***
	(0.00261)	(0.00574)	(0.00324)	(0.00878)
Observations	701,299	701,299	585,678	140,004
R-squared	0.066	0.073	0.080	0.168

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

1.7.4. - Robustness analysis: pension indicator

We estimate other specifications to verify the robustness of pension indicators: we use the amount of pension benefits of individuals older than 60 (table 11). The results in table 11 are similar to those in Table 5.

Table 11 - Occupational Choice as a Function of Payroll Lending, Income and Pension Benefits for Elderly

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0347***	-0.154***	-0.0471***	-0.0687***
	(0.000952)	(0.00450)	(0.00137)	(0.00247)
Years of Study	0.00195***	-0.00277***	0.00191***	0.0180***
	(0.000142)	(0.000344)	(0.000173)	(0.000606)
Age	0.00125***	0.00548***	0.00173***	0.00207***
	(5.76e-05)	(0.000123)	(7.39e-05)	(0.000178)
Income	1.85e-05***	2.04e-05***	2.15e-05***	3.13e-05***
	(1.10e-06)	(1.03e-06)	(1.27e-06)	(2.83e-06)
Pension	-2.36e-05***	-3.50e-05***	-2.78e-05***	-4.90e-05***
	(1.46e-06)	(2.54e-06)	(1.74e-06)	(5.13e-06)
Credit Operations per Capita	6.29e-08	2.35e-07	7.35e-08	4.17e-07
	(6.02e-08)	(1.46e-07)	(6.91e-08)	(2.77e-07)
Payroll per Old	3.20e-06***	4.72e-06***	3.98e-06***	4.77e-06**
	(4.12e-07)	(9.62e-07)	(4.61e-07)	(2.03e-06)
Payroll per Old * Income	-1.13e-09***	-1.51e-09***	-1.37e-09***	-1.14e-09**
	(2.09e-10)	(2.44e-10)	(2.43e-10)	(4.74e-10)
Payroll per Old * Pension	1.44e-09***	2.48e-09***	1.77e-09***	2.31e-09**
	(2.67e-10)	(4.97e-10)	(3.23e-10)	(9.87e-10)
Constant	-0.0334***	0.0850***	-0.0391***	-0.0829***
	(0.00266)	(0.00595)	(0.00331)	(0.00901)
Observations	682,362	682,362	567,826	138,855
R-squared	0.068	0.073	0.082	0.170

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies. We study occupational choice for age range from 20 to 49 years old as function of household income and total amount of pension benefits from individuals older than 60 years in the household.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0346***	-0.154***	-0.0470***	-0.0687***
	(0.000956)	(0.00450)	(0.00138)	(0.00247)
Years of Study	0.00192***	-0.00279***	0.00187***	0.0179***
	(0.000150)	(0.000347)	(0.000181)	(0.000634)
Age	0.00124***	0.00547***	0.00172***	0.00206***
	(5.95e-05)	(0.000125)	(7.63e-05)	(0.000182)
Income	1.96e-05***	2.12e-05***	2.27e-05***	3.31e-05***
	(1.08e-06)	(9.77e-07)	(1.25e-06)	(3.10e-06)
Pension	-2.51e-05***	-3.82e-05***	-2.95e-05***	-5.12e-05***
	(1.51e-06)	(2.64e-06)	(1.79e-06)	(5.78e-06)
Credit Operations per Capita	7.65e-08	2.30e-07	8.68e-08	4.68e-07*
	(5.15e-08)	(1.46e-07)	(5.92e-08)	(2.80e-07)
Payroll per Capita	4.53e-05***	6.44e-05***	5.52e-05***	6.45e-05**
	(5.87e-06)	(1.29e-05)	(6.52e-06)	(2.57e-05)
Payroll per Capita * Income	-1.74e-08***	-2.03e-08***	-2.05e-08***	-2.08e-08***
	(2.56e-09)	(2.06e-09)	(2.80e-09)	(6.90e-09)
Payroll per Capita * Pension	2.26e-08***	3.98e-08***	2.75e-08***	3.53e-08***
	(3.40e-09)	(6.44e-09)	(3.98e-09)	(1.24e-08)
Constant	-0.0343***	0.0842***	-0.0402***	-0.0845***
	(0.00254)	(0.00597)	(0.00316)	(0.00859)
Observations	682,362	682,362	567,826	138,855
R-squared	0.068	0.073	0.083	0.170

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies. We study occupational choice for age range from 20 to 49 years old as function of household income and total amount of pension benefits from individuals older than 60 years in the household.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

We replace income and pension with their per capita values at the family level. We do so by dividing the total amounts by the number of individuals in each family. Table 12 presents the results for specifications that are similar to equation (6.2), while Table 13 presents the results for regressions that are similar to equation (6.3). The results are very similar to those of Tables 4 and 5.

Table 12 - Occupational Choice as a Function of Payroll Lending and Income per Capita (at the level of Family)

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0341***	-0.153***	-0.0465***	-0.0666***
	(0.000923)	(0.00444)	(0.00132)	(0.00246)
Years of Study	0.00236***	-0.00253***	0.00227***	0.0196***
	(0.000185)	(0.000388)	(0.000192)	(0.000847)
Age	0.00141***	0.00563***	0.00190***	0.00255***
	(6.31e-05)	(0.000128)	(7.70e-05)	(0.000189)
Income per Capita	4.43e-05***	5.05e-05***	5.36e-05***	6.91e-05***
	(4.14e-06)	(3.82e-06)	(4.82e-06)	(1.05e-05)
Credit Operations per Capita	7.48e-08	2.47e-07*	8.88e-08	4.47e-07
	(5.45e-08)	(1.39e-07)	(6.38e-08)	(2.74e-07)
Payroll per Old	2.75e-06***	4.23e-06***	3.59e-06***	4.85e-06**
	(4.33e-07)	(9.65e-07)	(4.92e-07)	(1.89e-06)
Payroll per Old * Income per Capita	-2.80e-09***	-3.79e-09***	-3.56e-09***	-3.03e-09**
	(5.90e-10)	(6.90e-10)	(7.24e-10)	(1.28e-09)
Constant	-0.0376***	0.0815***	-0.0436***	-0.102***
	(0.00284)	(0.00613)	(0.00336)	(0.0101)
Observations	682,362	682,362	567,826	138,855
R-squared	0.058	0.071	0.073	0.152

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

Income per Capita is the family income divided by its number of individuals. Other variables per capita are on city level.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0340***	-0.153***	-0.0464***	-0.0665***
	(0.000929)	(0.00444)	(0.00133)	(0.00246)
Years of Study	0.00231***	-0.00256***	0.00222***	0.0195***
	(0.000195)	(0.000394)	(0.000207)	(0.000864)
Age	0.00140***	0.00562***	0.00189***	0.00255***
	(6.56e-05)	(0.000131)	(8.03e-05)	(0.000190)
Income per Capita	4.78e-05***	5.35e-05***	5.77e-05***	7.26e-05***
	(4.37e-06)	(3.92e-06)	(5.09e-06)	(1.10e-05)
Credit Operations per Capita	8.68e-08*	2.42e-07*	1.01e-07*	4.83e-07*
	(4.78e-08)	(1.39e-07)	(5.55e-08)	(2.84e-07)
Payroll per Capita	4.23e-05***	6.42e-05***	5.40e-05***	5.90e-05***
	(6.47e-06)	(1.17e-05)	(7.28e-06)	(2.21e-05)
Payroll per Capita * Income per Capita	-4.56e-08***	-5.49e-08***	-5.66e-08***	-4.98e-08***
	(8.21e-09)	(7.15e-09)	(9.67e-09)	(1.57e-08)
Constant	-0.0387***	0.0801***	-0.0449***	-0.103***
	(0.00276)	(0.00608)	(0.00327)	(0.00986)
Observations	682,362	682,362	567,826	138,855
R-squared	0.059	0.071	0.073	0.152

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

Income per Capita is the family income divided by its number of individuals. Other variables per capita are on city level.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Table 13 - Occupational Choice as a Function of Payroll Lending, Income and Pension Benefits per Capita

Panel A: Payroll per old as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0340***	-0.153***	-0.0465***	-0.0666***
	(0.000940)	(0.00447)	(0.00136)	(0.00248)
Years of Study	0.00197***	-0.00274***	0.00192***	0.0180***
	(0.000146)	(0.000349)	(0.000178)	(0.000602)
Age	0.00128***	0.00552***	0.00177***	0.00211***
	(5.86e-05)	(0.000126)	(7.55e-05)	(0.000179)
Income per Capita	1.94e-05***	2.21e-05***	2.27e-05***	3.19e-05***
	(1.17e-06)	(1.14e-06)	(1.36e-06)	(2.93e-06)
Pension per Capita	-2.52e-05***	-4.26e-05***	-3.02e-05***	-4.60e-05***
	(1.36e-06)	(2.60e-06)	(1.67e-06)	(4.57e-06)
Credit Operations per Capita	5.99e-08	2.29e-07	7.27e-08	3.98e-07
	(6.19e-08)	(1.50e-07)	(7.13e-08)	(2.85e-07)
Payroll per Old	3.04e-06***	4.50e-06***	3.80e-06***	4.44e-06**
	(4.13e-07)	(9.52e-07)	(4.63e-07)	(1.98e-06)
Payroll per Old * Income per Capita	-1.16e-09***	-1.62e-09***	-1.42e-09***	-1.13e-09**
	(2.22e-10)	(2.68e-10)	(2.60e-10)	(4.81e-10)
Payroll per Old * Pension per Capita	1.50e-09***	3.06e-09***	1.89e-09***	2.22e-09**
	(2.95e-10)	(5.99e-10)	(3.57e-10)	(9.11e-10)
Constant	-0.0338***	0.0846***	-0.0396***	-0.0839***
	(0.00271)	(0.00599)	(0.00338)	(0.00905)
Observations	679,665	679,665	565,484	138,468
R-squared	0.070	0.075	0.086	0.171

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies. Income per Capita is the family income divided by the number of members of the family. Pension per Capita is calculated by the same procedure. All other variales per capita are on city level.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Payroll per capita as explanatory variable

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Female	-0.0340***	-0.153***	-0.0465***	-0.0666***
	(0.000946)	(0.00448)	(0.00137)	(0.00248)
Years of Study	0.00194***	-0.00276***	0.00189***	0.0180***
	(0.000154)	(0.000352)	(0.000187)	(0.000629)
Age	0.00127***	0.00552***	0.00176***	0.00210***
	(6.03e-05)	(0.000127)	(7.76e-05)	(0.000183)
Income per Capita	2.05e-05***	2.30e-05***	2.39e-05***	3.37e-05***
	(1.17e-06)	(1.10e-06)	(1.36e-06)	(3.22e-06)
Pension per Capita	-2.68e-05***	-4.61e-05***	-3.20e-05***	-4.79e-05***
	(1.34e-06)	(2.44e-06)	(1.61e-06)	(4.89e-06)
Credit Operations per Capita	7.54e-08	2.29e-07	8.84e-08	4.53e-07
	(5.23e-08)	(1.47e-07)	(6.01e-08)	(2.89e-07)
Payroll per Capita	4.24e-05***	5.97e-05***	5.17e-05***	5.80e-05**
	(5.79e-06)	(1.31e-05)	(6.48e-06)	(2.51e-05)
Payroll per Capita * Income per Capita	-1.79e-08***	-2.19e-08***	-2.14e-08***	-2.06e-08***
	(2.72e-09)	(2.35e-09)	(3.00e-09)	(6.98e-09)
Payroll per Capita * Pension per Capita	2.36e-08***	4.80e-08***	2.92e-08***	3.32e-08***
	(3.53e-09)	(6.95e-09)	(4.14e-09)	(9.88e-09)
Constant	-0.0347***	0.0839***	-0.0406***	-0.0853***
	(0.00258)	(0.00601)	(0.00322)	(0.00862)
Observations	679,665	679,665	565,484	138,468
R-squared	0.071	0.075	0.086	0.172

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies. Income per Capita is the family income divided by the number of members of the family. Pension per Capita is calculated by the same procedure. All other variales per capita are on city level.

In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

1.7.5. – IV Results

The results presented in previous subsections provide evidence that the availability of payroll lending is associated with increased entrepreneurship. In addition, occupational choice becomes less sensitive to income when payroll lending is available. These results are compatible with payroll lending alleviating

credit restrictions. We now turn our attention to the variation in payroll lending that is explained by the staggered nature of the chartering process.

The chartering process is staggered is because the agreements between banks and INSS were made nationwide. When a bank signs the agreement, all branches are allowed to make payroll loans. Despite being clearly endogenous at the national level, the agreements can be observed as an exogenous treatment at the city level. When a bank signs an agreement with INSS, we expect that, all other things equal, the bank will prefer to make loans in cities where its presence is stronger. To verify its claim, we created a variable that captures the presence of chartered banks. This variable is calculated using equation 7.1.

$$it_i = \sum_{j=1}^{N} DDpercap_{ij}.prop\_chart_j$$

(7.1)

where DDpercap is the volume of demand deposits at bank *j* in city *i* in 2003, and prop_chart is the proportion of the time elapsed between 2004 and 2008 when bank j was chartered with INSS. Our variable is larger in cities with more time deposits in 2003 and in those where most banks were chartered earlier.

Table 14 presents the results of a simple OLS model for intent to treat as a function of city characteristics in 2003. We display the results for both specifications with the volume of demand deposits per capita in 2003 as a control (column 1) and without this variable (column 2). The results show that, as expected, intent to treat is strongly related to the total amount of demand deposits. Moreover, the magnitudes of the coefficients for the other variables decrease sharply in the specification in column 1, indicating that a great part of the relationship between the independent variables and the outcome are due to their relationships with the size of banking markets at the city level. The coefficients for the proportion of elderly individuals and population are negative and significant for the specification in column 1, while the proportion of state-owned banks is only marginally significant. Neither GDP per capita in 2003 nor its growth between 2002 and 2003 has a significant coefficient in this regression, providing evidence that intent to treat is not related to the economy's size or growth at city level.

Table 14 - Intent to Treat as a Function of City Characteristics

	(1)	(2)
Dependent Variable	**Intention to Treat**	
Demand Deposits Per Capita	0.581***	
	(0.0108)	
Proportion of Elderly	-116,273**	882,475***
	(53,764)	(264,074)
ΔGDP per Capita (2000-2003)	-1.418	0.226
	(1.002)	(6.590)
Proportion of State-Owned Banks	6,046*	-121,297***
	(3,603)	(17,405)
Population	-0.0114***	0.0853***
	(0.00237)	(0.0137)
GDP per Capita	0.142	2.814
	(0.171)	(2.124)
Constant	16,753***	124,655***
	(4,851)	(30,660)
Observations	816	816
R-squared	0.986	0.489

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

Standard Errors in parentheses are robust for heteroscedasticity. Period of Analysis is 2003, except for ΔGDP per Capita, that computes the variation between 2000 and 2003. All specifications contain state dummies. Intention to treat is defined by, in each city, the sum of products between demand deposits per capita in each bank in 2003 branch and the proportion of time elapsed between 2003 and 2008 that the bank was chartered with INSS.

Table 15 presents the results for equation (6.5), where the dependent variable is the amount of payroll per capita. Panel A displays the results for OLS equations in 2003 (columns 1-2), 2006 (columns 3-4) and 2008 (columns 5-6), while panel B displays the results for a specification for the whole sample using year dummies. The coefficients in Panel A are positive for intent to treat in all specifications and significant in the even columns (those without demand deposits per capita in 2003 as a control). The coefficients for time deposits per capita in 2003 are non-significant. When they are present in the regression (odd columns), the coefficients for intent to treat are also not significant. The reductions in statistical significance (compared with the specifications in even columns), however, are caused mainly by an increase in standard errors (roughly 5 times greater) rather than a decrease in the coefficient's magnitude. The results show that the magnitudes of the coefficients for intent to treat increases over time, despite already having been positive in 2003, when no banks were chartered with INSS, and all payroll loans were made to public servants. The results in Panel B reinforce the relationship between intent to treat and payroll lending per capita, now robust to the introduction of per capita demand deposits in 2003.

Table 15 - Payroll per Capita as a Function of Intention to Treat and City Characteristics

Panel A: OLS in Specific Years

Year	2003		2006		2008	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	**Payroll per Capita**					
Intent to Treat	7.54e-05	9.11e-05***	0.000162	0.000193***	0.000197	0.000336***
	(9.98e-05)	(1.72e-05)	(0.000132)	(2.55e-05)	(0.000279)	(6.13e-05)
Demand Deposits per Capita (2003)	9.36e-06		1.97e-05		8.60e-05	
	(6.07e-05)		(8.06e-05)		(0.000171)	
Proportion of Elderly	352.4***	354.5***	52.51	59.88	129.5	161.0
	(77.12)	(75.94)	(94.05)	(92.96)	(170.7)	(172.3)
Proportion of State-Owned Banks	-27.81***	-27.94***	-56.60***	-57.29***	-121.8***	-124.1***
	(7.305)	(7.156)	(8.956)	(8.235)	(17.88)	(16.93)
Population	2.54e-06	2.76e-06	1.04e-05	1.09e-05*	1.56e-05	1.78e-05
	(3.73e-06)	(3.34e-06)	(6.64e-06)	(6.44e-06)	(1.66e-05)	(1.63e-05)
GDP per Capita	-4.84e-05	-4.57e-05	8.83e-05	9.85e-05	1.77e-06	2.03e-05
	(6.97e-05)	(7.30e-05)	(0.000110)	(0.000118)	(0.000125)	(0.000127)
Constant	27.28***	27.07***	92.51***	92.12***	169.3***	167.0***
	(6.621)	(6.726)	(9.224)	(9.457)	(19.82)	(20.47)
Observations	1,000	1,000	986	986	726	726
R-squared	0.447	0.447	0.577	0.577	0.529	0.529

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

Standard Errors in parentheses are robust for heteroscedasticity. All variables relates to the period of analysis, except Intention to Treat and Demand Deposits per Capita, that relates to the year of 2003. Intention to treat is defined by, in each city, the sum of products between demand deposits per capita in each bank in 2003 branch and the proportion of time elapsed between 2003 and 2008 that the bank was chartered with INSS.

Panel B: Analysis with Time Dummies

	(1)	(2)
Dependent Variable	**Payroll per Capita**	
Intent to Treat	0.000222***	0.000166***
	(6.25e-05)	(1.30e-05)
Demand Deposits per Capita	-3.40e-05	
	(3.79e-05)	
Proportion of Elderly	237.3***	225.7***
	(50.16)	(49.47)
Proportion of State-Owned Banks	-60.90***	-59.94***
	(4.542)	(4.337)
Population	1.22e-05***	1.14e-05***
	(3.15e-06)	(3.05e-06)
GDP per Capita	0.000121*	0.000107
	(6.51e-05)	(6.57e-05)
Constant	34.08***	34.82***
	(5.200)	(5.236)
Observations	5,445	5,445
R-squared	0.539	0.539

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

Standard Errors in parentheses are robust for heteroscedasticity. All variables relates to the year of observation, except Intent to Treat and Demand Deposits per Capita, that relates to the year of 2003. Intention to treat is defined by, in each city, the sum of products between demand deposits per capita in each bank in 2003 branch and the proportion of time elapsed between 2003 and 2008 that the bank was chartered with INSS.

Results from Tables 14 and 15 show that intent to treat is not related to the cities' economic size, while it is related to the levels of payroll lending, indicating that payroll lending is not solely caused by credit demand. Based on these results, our next step is to undertake an IV approach, using the amount of demand

deposits in chartered institutions per capita in each year in each city as an instrument. Table 16 displays the results, where panel A shows the first-stage, and panel B shows the second-stage. The results in Panel A of Table 16 show that chartered deposits per capita are positively related to the levels of payroll lending. Panel B displays the results for the second stage. The coefficients for payroll lending in the second stage are positive and are of greater magnitude than those displayed in Table 3. The standard errors are also higher, as expected, indicating some loss in the source of variability. The combined effect is that these coefficients from specifications using the employer indicator as the dependent variable are no longer statistically relevant. The effect of payroll lending on the occupational choice of being either an employer or self-employed is statistically significant in this model.

Table 16 - 2SLS Regressions for Occupational Choice as a Function of Payroll Lending

Panel A: First Stage

	(1)	(2)	(3)	(4)
Dependent Variable		**Payroll per Old**		
Age	0.111	0.111	0.166	-0.0552
	(0.0988)	(0.0988)	(0.108)	(0.224)
Time Deposits per Capita	-0.138***	-0.138***	-0.143***	-0.105***
	(0.00117)	(0.00117)	(0.00128)	(0.00258)
Female	0.889	0.889	1.880	-0.330
	(1.441)	(1.441)	(1.596)	(3.428)
Years of Study	-0.309*	-0.309*	-0.243	-0.313
	(0.178)	(0.178)	(0.193)	(0.408)
Chartered Time Deposits per Capita	0.151***	0.151***	0.154***	0.130***
	(0.000942)	(0.000942)	(0.00103)	(0.00209)
Constant	2,452	2,452	1,527***	1,836***
	(438,273)	(438,273)	(36.58)	(12.99)
Observations	720,323	720,323	601,173	144,597
R-squared	0.897	0.897	0.899	0.892

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

Panel B: Second Stage

	(1)	(2)	(3)	(4)
Dependent Variable	**Employer**	**Employer or self employed**	**Employer**	**Employer**
Payroll per Old	1.39e-06	6.34e-06**	1.11e-06	3.42e-06
	(1.53e-06)	(3.01e-06)	(1.36e-06)	(6.73e-06)
Age	0.00184***	0.00617***	0.00245***	0.00319***
	(3.34e-05)	(6.79e-05)	(4.00e-05)	(0.000150)
Time Deposits per Capita	-3.21e-08	-9.49e-08	5.66e-09	4.75e-07
	(1.75e-07)	(3.46e-07)	(1.70e-07)	(7.83e-07)
Female	-0.0365***	-0.155***	-0.0494***	-0.0704***
	(0.000502)	(0.00102)	(0.000620)	(0.00231)
Years of Study	0.00513***	0.000774***	0.00563***	0.0256***
	(6.39e-05)	(0.000122)	(7.35e-05)	(0.000283)
Constant	-0.333	1.134	-0.0780	-0.155
	(0.484)	(0.955)	(29.86)	(0.197)
Observations	720,323	720,323	601,173	144,597
R-squared	0.033	0.064	0.042	0.119

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.
In model (1) the dependent variable is an indicator of being an employer. In model (2), an indicator of being either employer or self-employed. In model (3) we use the indicator of being an employer, excluding self-employed from the sample. In model (4), we used the indicator of being an employer in a sample with only employers and self-employed

1.7.6. – Robustness on Outcome

We now repeat the estimation of equations (6.1) to (6.3) using a different approach for the entrepreneurship indicator. Instead of using the individual occupational choice, our indicator is whether there is an entrepreneur in the household. Table 17 presents the results, using as the dependent variable having an employer on the family (odd columns) or having an individual who is either an employer or self-employed in the family (even columns). The purpose of these specifications is to capture that payroll lending can be used for entrepreneurial activity by one member of the family, while others may be employees in the

family business. The results in Table 17 display similar patterns to those from previous specifications. The amount of payroll lending in the city has a greater effect on entrepreneurial activities in families with smaller incomes and more pension benefits.

Table 17 - Occupational Choice as a Function of Payroll Lending, Income and Pension Benefits

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	**Employer in the Family**	**Employer or self employed in the Family**	**Employer in the Family**	**Employer or self employed in the Family**	**Employer in the Family**	**Employer or self employed in the Family**
Female	-0.00860***	-0.0274***	-0.00407***	-0.0229***	-0.00314***	-0.0216***
	(0.000446)	(0.00118)	(0.000429)	(0.00115)	(0.000428)	(0.00114)
Years of Study	0.00905***	0.00170***	0.00308***	-0.00429***	0.00318***	-0.00416***
	(0.000251)	(0.000628)	(0.000237)	(0.000536)	(0.000244)	(0.000545)
Age	0.00184***	0.00465***	0.000778***	0.00358***	0.000764***	0.00356***
	(8.96e-05)	(0.000163)	(7.18e-05)	(0.000139)	(7.64e-05)	(0.000144)
Income			3.32e-05***	3.42e-05***	3.54e-05***	3.73e-05***
			(1.94e-06)	(1.76e-06)	(2.11e-06)	(1.92e-06)
Pension					-3.29e-05***	-4.43e-05***
					(1.76e-06)	(2.56e-06)
Credit Operations per Capita	2.60e-07***	3.25e-07*	2.03e-07*	2.75e-07	1.88e-07	2.57e-07
	(8.99e-08)	(1.74e-07)	(1.14e-07)	(2.08e-07)	(1.18e-07)	(2.13e-07)
Payroll per Old	6.16e-07	2.68e-06*	5.69e-06***	9.06e-06***	5.23e-06***	8.45e-06***
	(5.06e-07)	(1.44e-06)	(7.35e-07)	(1.51e-06)	(7.14e-07)	(1.51e-06)
Payroll per Old * Income			-2.05e-09***	-2.47e-09***	-2.13e-09***	-2.64e-09***
			(3.83e-10)	(4.53e-10)	(3.90e-10)	(4.57e-10)
Payroll per Old * Pension					1.97e-09***	3.13e-09***
					(3.13e-10)	(4.47e-10)
Observations	701,189	701,189	701,189	701,189	701,189	701,189
R-squared	0.038	0.040	0.101	0.057	0.106	0.060

*** = significant at the 1% level, ** = significant at the 5%, * = significant at the 10%.

This panel displays marginal effects on the mean for probit models with occupation indicator as outcome. In all specifications, observations are weighted according to relevance. Standard Errors in parentheses are clustered at the city level. Period of Analysis is 2003 through 2008, unless otherwise noted. All specifications contain a full set of period (year) and city dummies.

1.8.. Concluding Remarks

As shown in Coelho, De Mello & Funchal [2011], The change in payroll lending regulations had a substantial impact on personal lending, increasing the volume of personal lending and lowering interest rates.

Our results provide evidence that part of this credit is being used to alleviate credit restrictions on opening small businesses. It is important to document this channel because payroll lending is a measure that circumvents the relatively limited credit protections in Brazil and can be adopted by other countries with similar conditions. That this credit can be used to promote entrepreneurship, and not only consumption, is an indicator that the financial deepening promoted by measures of this type can help to increase economic growth and social development.

The results also shed some light on the possibility of intra-family lending, where members of a family use their resources to finance the investments of other family members. These results may be very useful for public policy makers interested in increasing their populations' access to credit.

We found evidence that pensioners and retirees have been a source of financial resources for investment since the beginning of chartering process. Verifying whether they gained bargaining power within the family from these measures would be a good topic for future research.