Wealth, Credit Constraints and Small Firms’ Investment: Evidence from Brazil

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Abstract
We explore the effect of wealth on occupational choice to find out whether small firms in Brazil face credit constraint and how occupational choice relates to investments. Using an instrumental variable approach, we find evidence that occupational choice is, in fact, constrained by wealth and this constraint is related to investment decisions. Our main results show that the probability of investment increases by 0.45 when the individual is an employer, controlling by entrepreneur’s characteristics and sector, suggesting that the constraints at the credit market may affect investment decisions of small firms in Brazil. The effect of being an employer on credit access is about 0.320, which supports the idea that employers have more access to credit than the self-employed.

Keywords: Wealth, occupational choice, credit constraints, investment, instrumental variable
JEL Codes: C5, D2, D3

1 Introduction
What differentiates the self-employed from employers? What guides individuals’ occupational choice to become an employer or to be self-employed? Ability or financial access? Do the self-employed face larger credit constraints?

Buera (2009) points to a large literature that tries to identify the relation between financial frictions and entry to entrepreneurship (Evans & Leighton, 1989; Evans & Jovanovic, 1989; Holtz-Eakin, Joulfaian, & Rosen, 1994; Quadrini, 1999; Gentry & Hubbard, 2004; Hurst. & Lusardi, 2004, Paulson & Townsend, 2004, 2010). A common thread running through these studies is the positive relationship between wealth and entrepreneurship.

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In this context, Buera (2009) shows that agents of a given ability choose to become entrepreneurs if they are wealthy enough to run their businesses at a profitable scale. Alternatively, agents of a given wealth choose to become entrepreneurs if their ability is high enough. According to his theory, ability and resources or initial wealth determine the occupational decision. Most empirical papers deal with the endogenous determination of wealth to correctly identify the causal relation between wealth and occupational choice. In general, individuals with less entrepreneurial ability tend to save less and have low probability of starting a business. Therefore, it is not easy to distinguish between the effects of ability and of the credit constraint on the entrepreneurial decision.

In this paper, we investigate whether small firms in Brazil face credit constraints, and how limited credit is related to their investment decisions. Unlike most previous researchers, the main focus of the present paper is the occupational choice between being self-employed and becoming an employer with at most 5 employees and its relationship with investment decision. We focus exclusively on individuals with some entrepreneurial ability. We investigate how an initial level of wealth is related to the decision to become an employer due to the higher fixed costs of starting a firm. Our assumption is that the primary difference between the self-employed and employers is the scale of their business, access to credit, and capacity of investment, and not entrepreneurial ability, since both groups started a business.

Both kinds of entrepreneurs can be characterized as low-income individuals in Brazil. Another important feature of most small businesses in Brazil is their low productivity and profits. Many researchers argue that this characteristic of small firms in Brazil is a consequence of a restricted credit market (C. C. d. X. Pinto, 2003; Assunção & Alves, 2007; A. d. R. Pinto, Chein, & Pinto, 2013). Bourguignon and Ferreira (2000) argue that the imperfections in the credit market do not allow small firms to start projects that require a large amount of initial capital and have higher returns. Consequently, these small firms cannot invest in more profitable projects. This mechanism explains why small entrepreneurs in Brazil face low incomes. Other authors show that these small firms do not have collateral, the usual guarantee required the banks to lend money. As a consequence, a great part of their credit comes from informal sources, such as relatives, friends, and others. Therefore, these entrepreneurs have limited credit. Neri and Giovanni (2003) show that only 7% of the 50,000 firms investigated by Pesquisa Informal Urbana – ECINF (Survey of the Informal Urban Economy) in 1997 had obtained credit from the formal sector.
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Understanding the relationship between credit constraints and investment is very important, given that these constraints are a barrier to investment in physical and human capital, and can be related to the low income of the self-employed and small employers in Brazil. As argued by Hurst and Lusardi (2004), if credit is limited and initial capital requirement is large, low-wealth households will not be able to invest in new projects or even start a new business.

We find reliable evidence that constraints in the credit market of small firms in Brazil exist, and that these constraints have a negative impact on investment decisions. The remainder of this paper is organized as follows. Section 2 discusses methodological aspects such as theoretical foundations and empirical strategy. The descriptive analysis of the database are presented in section 3. Section 4 brings the estimates and discussion. Section 5 concludes.

2 Methodology

We work with a model that relates wealth with occupational choice, following Evans and Jovanovic (1989). There are only two occupational choices: self-employed or small employer (with at most five employees). If there are credit constraints, a positive relationship between household wealth and the probability of becoming an employer should exist. If there are no credit constraints, the decisions to be self-employed or a small employer is based on cost-benefit analysis. In this model, the credit market is a set of formal and informal practices that provide capital for certain investment projects. Put it in another way, if financial constraints are not important, the potential entrepreneurs would make the decision to start a business taking into account only the expected profitability and their own wealth would no be relevant in the decision to become an employer (Paulson & Townsend, 2010).

It also important to clarify that, in our context, following Rissman (2003), self-employment is an alternative to unemployment, therefore being a self-employed is a poor condition than become a small employer.

In formal terms, each individual can be represented by a vector \((\theta, a)\), where \(\theta\) represents the characteristics of the firm and \(a\), its initial wealth. The occupational choice, \(e\), is a binary variable that equals 1 if the individual decides to be an employer, or 0 if he decides to be self-employed. The cost associated with each occupational choice is represented by \(C(e, \theta)\), with \(C(1, \theta) > C(0, \theta)\) and \(C_\theta > 0\). The profit associated with each occupational choice is \(L(e, \theta)\), and \(L(1, \theta) > L(0, \theta)\).
If there is no credit market, individual $i$ needs to use his initial income to start his new business. If there is a credit market, but individual faces credit constraints due to asymmetric information, the amount of capital that he can borrow to start a new business is an increasing and continuous function of his wealth, $M(a)$.

Ultimately, Individual $(\theta, a)$ will choose to become an employer if $C(1, \theta) \leq M(a)$. Define $a^*$ as the level of income that satisfies the inequality, $C(1, \theta) = M(a^*)$. If there are credit constraints, only individuals with initial wealth above $a^*$ will become an employer. Since $M_a(a) > 0$, if there is credit constraint, individuals with initial wealth below $a^*$ face limited credit and decide to become self-employed, and individuals with initial wealth above $a^*$ are not constrained, and become employers.

In this model, wealth is a determinant of occupational choice. If we could compare the investment decision of individuals with wealth just above the threshold, $a^*$, with the investment decision of individuals with wealth just below the threshold we will see the effect of credit constraints on investment. Unfortunately, we do not observe $a^*$, and we need to adopt an empirical strategy in which initial wealth (and not the discontinuity at $a^*$) is used as an instrument for occupational choice.

Our empirical strategy is based on a two-step estimator. In the first step, we use initial wealth as an instrument for occupational choice, and in the second step, we use the residuals of the first step as a control variable in the regression that relates the outcome with occupational choice. Let $E_i$ denote the occupational choice of individual $i$, with $E_i = 1$ if individual $i$ is a employer, and 0 if individual $i$ is self-employed. The probability of becoming an employer is increasing on initial household wealth, since individuals need a higher level of initial capital to become employers than to be self-employed, and the amount they can borrow in the credit market is an increasing function of initial wealth. We estimate the following system of equations:

$$E_i = \beta_0 + \beta_1 X_i + \tau W_i + \varepsilon_i,$$  

$$Y_i = \gamma_0 + \gamma_1 X_i + \theta E_i + \varpi_i,$$  

where $E_i$ is a dummy variable that equals 1 if individual $i$ is an employer; $X_i$ is a vector of individual characteristics (sex, age, race, sector of business activity);

\footnote{Jaffe and Russell (1976), Stiglitz and Weiss (1981), and Bell (1988) associate the imperfections in the credit market with asymmetric information.}
$W_i$ is the measure of initial wealth; and $Y_i$ is the outcome of interest (credit or investment). Since the decision of being an employer is endogenous, the idiosyncratic errors $(\varepsilon_i, \omega_i)$ are correlated. So, we estimate the system of equation using a two-stage least squares. In the first equation, we estimate equation (1), in the second stage, we estimate equation (2) using the residuals of the first stage ($\hat{\varepsilon}_i$) as an explanatory variable. In this two-step instrumental variable estimator, we use wealth as an instrumental variable for occupational choice. The main identification assumption is that wealth is completely exogenous, and that it is related to investment or credit only through the decision to become an employer. Since these assumptions are very strong, we do not interpret $\theta$ as a causal effect of occupational choice on investment or credit, but as an indirect test of how credit constraints can be related to investment, due to how limited credit affects the occupational choice. If there exist credit constraints, we expect the estimate of $\tau$ to be positive and significant, since by assumption in our theoretical model, a small employer has a higher level of initial wealth and faces fewer credit constraints (i.e. has access to more credit). In addition, if these constraints are related to investment decisions through occupational choice, we expect a positive correlation between occupational choice and investment in the second stage, i.e. we expect $\theta$ to be positive and significant.

3 Data Description

We use a household survey, called Economia Informal Urbana – ECINF (Survey of the Urban Informal Economy). ECINF collects information about the informal employment sector in Brazil. Informal sector is defined as urban household of the self-employed and employers with at most 5 employees. This survey was conducted by Instituto Brasileiro de Geografia e Estatística – IBGE (The Brazilian Institute of Geography and Statistics) in 1997 and 2003. In this article, we use data from ECINF 2003. Unfortunately, there is no more recent database of this type in Brazil.

ECINF consists of a sample in which households are stratified by income and sector of activity. This survey collects information about 48,800 informal economic units in all urban areas of Brazil. One interesting aspect of ECINF is that it includes not only information about small businesses, such as amount of sales and credit obtained, but also about the owners of these businesses, such as other sources of income, gender, age, education, and other socioeconomic variables. Table 1 presents summary statistics of the sample. This table shows that only 87% of individuals are self-employed, and among these individuals, only
Table 1. Descriptive Statistics.

| Variable                                           | Obs   | Weight       | Mean  | Std. Dev. | Min | Max |
|----------------------------------------------------|-------|--------------|-------|-----------|-----|-----|
| Employer                                          | 48,809| 10,525,954   | 0.1273| 0.3333    | 0   | 1   |
| Credit access                                      | 48,786| 10,521,074   | 0.0624| 0.2420    | 0   | 1   |
| Investment                                         | 48,781| 10,515,008   | 0.1595| 0.3662    | 0   | 1   |
| Wealth (continuous variable from 0 to 1)           | 45,599| 9,723,693    | 0.0048| 0.0156    | 0   | 1   |
| Sex (male=0, female =1)                            | 48,807| 10,525,820   | 0.3333| 0.4714    | 0   | 1   |
| Age (years)                                        | 48,809| 10,525,954   | 41.8731| 12.6310  | 10  | 98  |
| White                                              | 48,790| 10,518,264   | 0.5293| 0.4991    | 0   | 1   |
| Experience as an owner (in years)                  | 48,757| 10,511,970   | 9.3089| 9.3559    | 0   | 74  |
| Sectors                                            |       |              |       |           |     |     |
| Recreational activities, cultural and sports       | 48,418| 10,438,133   | 0.0178| 0.1324    | 0   | 1   |
| Extractive industries                              | 48,418| 10,438,133   | 0.0035| 0.0589    | 0   | 1   |
| Processing industries                              | 48,418| 10,438,133   | 0.1548| 0.3618    | 0   | 1   |
| Building                                           | 48,418| 10,438,133   | 0.1736| 0.3788    | 0   | 1   |
| Trade, repair of motor vehicles, personal and domestic objects | 48,418| 10,438,133   | 0.3358| 0.4723    | 0   | 1   |
| Accomodation and food                              | 48,418| 10,438,133   | 0.0698| 0.2549    | 0   | 1   |
| Transport, storage and communication               | 48,418| 10,438,133   | 0.0802| 0.2716    | 0   | 1   |
| Financial intermediation                           | 48,418| 10,438,133   | 0.0034| 0.0581    | 0   | 1   |
| Real estate activities, rentals and business services | 48,418| 10,438,133   | 0.0656| 0.2476    | 0   | 1   |
| Education                                          | 48,418| 10,438,133   | 0.0150| 0.1215    | 0   | 1   |
| Health and social care                             | 48,418| 10,438,133   | 0.0187| 0.1355    | 0   | 1   |
| Other collective, personal and social service      | 48,418| 10,438,133   | 0.0007| 0.0258    | 0   | 1   |
| Personal services                                  | 48,418| 10,438,133   | 0.0600| 0.2376    | 0   | 1   |

Source: Authors’ elaboration based on ECINF, 2003.
6% have had access to credit in the previous 12 months. Among all self-employed individuals, 15% invested in physical or human capital. Of those surveyed, 50% of them are white, and the average age is 42 years old. The small business had been in market about 9 years on average. In addition, 33% of the small businesses are in the trade sector, 17% are in the building sector, and 15% are in processing industries.

Table 2 shows the source of capital used to start the business. This table shows that 32% of business owners needed no capital to start their business, and 36% used their household wealth.

Table 2. Source of the Capital used to Start the Business.

| Source of Capital                          | Freq.  | Percent | Cum.  |
|-------------------------------------------|--------|---------|-------|
| Compensation received                     | 4,021.23 | 8.25    | 8.25  |
| Bequest                                   | 841.080003 | 1.73    | 9.98  |
| Savings or sale of goods or property       | 3,241.56 | 6.65    | 16.63 |
| Other own resources                        | 17,734.75 | 36.4    | 53.03 |
| Friends and relatives loan                 | 3,723.46 | 7.64    | 60.67 |
| Bank loan                                  | 860.918999 | 1.77    | 62.44 |
| Other enterprises and people               | 729.623506 | 1.5     | 63.94 |
| Partner had the capital                    | 529.881669 | 1.09    | 65.03 |
| Did not need any capital                   | 15,432.90 | 31.67   | 96.7  |
| Other                                      | 1,607.59  | 3.3     | 100   |
| Total                                      | 48,723   | 100     |       |

Source: Authors’ elaboration based on ECINF, 2003.

Figure 1 shows that most small firms used their profits to buy the basic inputs of production.

Unfortunately, ECINF do not provide us with direct information about the actual initial wealth. The proxy for initial wealth variable that we use is a index composed of three variables, total value of initial equipment and infrastructure, whether or not the household owns the facility where the business is located, and whether or not the household receives rent. This index is constructed using principal component analysis. We normalize this variable so that it ranges from 0 to 1. Figure 2 shows the kernel density estimation of this normalized variable. About 85% of individuals have wealth below 0.01, and 11% have wealth of zero. The average wealth is 0.33. This graph shows that the small entrepreneurs in Brazil have a low level of wealth. In addition, this graph shows

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2 In Appendix A we show the results of the principal component analysis used to construct the wealth index.
Figure 1. Distribution of Investments.

Source: Authors’ elaboration based on ECINF, 2003.

Figure 2. Distribution of Wealth.

Source: Authors’ elaboration based on ECINF, 2003.
that the employers have higher wealth than the self-employed, along the whole
distribution.

Table 3 shows that both investment and credit increase with wealth level. This table shows a noticeable jump in the probability of obtaining credit, and the probability of investing, between the 6\textsuperscript{th} to the 7\textsuperscript{th} decile of the wealth index. In addition, Table 3 shows that the probability of being an employer increases with the wealth index. The relationship between occupational choice and wealth is not linear, with a jump in the probability of being an employer also occurring between the 6\textsuperscript{th} to the 7\textsuperscript{th} decile of wealth.

Table 3. Occupational choice, investment and credit access per quantiles of wealth.

| Wealth Deciles | Wealth | Employer | Investment | Credit | Wealth Deciles |
|----------------|--------|----------|------------|--------|----------------|
| 1              | 0.000000 | 0.013    | 0.091      | 0.009  | 0.000000       |
| 2              | 0.000035 | 0.014    | 0.136      | 0.019  | 0.000055       |
| 3              | 0.000109 | 0.019    | 0.137      | 0.021  | 0.000166       |
| 4              | 0.000241 | 0.034    | 0.126      | 0.039  | 0.000350       |
| 5              | 0.000469 | 0.066    | 0.146      | 0.048  | 0.000627       |
| 6              | 0.000921 | 0.116    | 0.160      | 0.079  | 0.001288       |
| 7              | 0.002022 | 0.238    | 0.195      | 0.111  | 0.003050       |
| 8              | 0.005924 | 0.321    | 0.198      | 0.111  | 0.009049       |
| 9              | 0.009587 | 0.112    | 0.199      | 0.062  | 0.010788       |
| 10             | 0.029141 | 0.416    | 0.272      | 0.167  |                |

Source: Authors’ elaboration based on ECINF, 2003.

Table 4 compares the observable characteristics of employers and the self-employed. This table shows that they are very similar in terms of age, sex, race and experience as an owner, but they differ with respect to credit access and investment. In addition, we see evidence that employers invest in higher-return projects than the self-employed, generating a higher revenue.

Since there is evidence of a nonlinear relationship between wealth and occupational choice, in the first stage we estimate a linear model that relates wealth to occupational choice, and also a model that includes wealth squared as an explanatory variable, following some previous literature, e.g., Paulson and Townsend (2004) and Hurst and Lusardi (2004).

4 Results

In this section, we use the two-step estimator proposed section 2 to show whether or not there are credit constraints for the self-employed, and how these credit
Table 4. Comparative Analysis – Self-employed and Employer.

| Variable                        | Self-employed |          |          | Employer  |          |          | Observations |
|---------------------------------|---------------|----------|----------|-----------|----------|----------|--------------|
|                                 | Mean          | Standard Error |          | Mean      | Standard Error |          |              |
| Credit Access                   | 0.051***      | (0.002)   |          | 0.140***  | (0.008)   |          | 48,790       |
| Sex \(\text{man}=1; \text{female}=0\) | 0.656***     | (0.004)   |          | 0.743***  | (0.010)   |          | 48,813       |
| White                           | 0.514***      | (0.005)   |          | 0.634***  | (0.010)   |          | 48,813       |
| Age (years)                     | 41.855        | (0.121)   |          | 41.995    | (0.254)   |          | 48,813       |
| Experience as an owner          | 9.221***      | (0.088)   |          | 9.910***  | (0.198)   |          | 48,761       |
| Income (in minimum wage)        | 2.591***      | (0.068)   |          | 6.900***  | (0.181)   |          | 48,459       |
| Expenses (in minimum wage)      | 3.051***      | (0.109)   |          | 19.965*** | (0.769)   |          | 45,603       |
| Revenue (in minimum wage)       | 4.915***      | (0.093)   |          | 28.259*** | (0.942)   |          | 48,054       |
| Wealth                          | 0.004***      | (0.000)   |          | 0.013***  | (0.001)   |          | 45,603       |
| Number of employees             | 1.115***      | (0.003)   |          | 3.067***  | (0.028)   |          | 48,813       |
| Investment                      | 0.136***      | (0.003)   |          | 0.318***  | (0.010)   |          | 48,785       |

*Source: Authors’ elaboration based on ECINF, 2003.

*significant at 10%; **significant at 5%; ***significant at 1%.
constraints are related to investment. As our empirical strategy, we use wealth as an instrument for occupational choice. In the first stage, we estimate a regression that relates a dummy variable that equals one if the individual is an employer, or 0 if he/she is self-employed with wealth and wealth squared. Table 5 shows the results of the first step. We estimate two different models. Column (1) of Table 5 presents the results using only wealth as instrument, and column (2) presents occupational choice with wealth and wealth squared. The probability of being an employer increases with the level of wealth, and this relationship is not linear. For higher levels of wealth, the probability of becoming an employer decreases with the level of wealth. We do not have evidence of weak instruments, and the F-statistic for the second model is about 33. The positive and significant association between initial wealth and occupational choice provides indirect evidence that small firms in Brazil face constraints in the credit market.

Table 6 reports the second stage of our two-step instrumental variable estimator using wealth as an instrumental variable for occupational choice. Columns (1) and (2) show a positive correlation between occupational choice and investments. We find evidences that the probability of investment increases by 0.45 when the individual is an employer, controlling by entrepreneur’s characteristics and sector. This evidence suggests that the constraints at the credit market may affect investment decisions of small firms in Brazil. Columns (3) and (4) of Table 6 show the correlation between access to credit and being an employer. The effect of being an employer on credit access is about 0.320, which supports the idea that employers have more access to credit than the self-employed. As we emphasize in the methodology section, we cannot interpret these effects as causal effects, since our identification assumptions are too strong and our instrument (wealth) is probably not completely exogenous. However, we can interpret the results in Table 6 as evidence that credit constraints are probably associated with the decision to become an employer, and is indirectly related to investment decisions.

5 Conclusion

In this paper we explore the effect of wealth on occupational choice in order to investigate if small firms in Brazil face credit constraints. Moreover, in the presence of credit constraints, we investigate these constraints affect investments. Based on a theoretical model that associates initial wealth with occupational choice, we build an empirical strategy to test if small firms in Brazil are affected by credit constraints and how it is related to their investment. In the empirical
Table 5. First-Stage Estimation.

| Variables                                              | (1)             | (2)             |
|--------------------------------------------------------|-----------------|-----------------|
| Wealth                                                 | 3.981***        | 7.186***        |
|                                                        | (0.482)         | (0.700)         |
| Squared wealth                                         | -10.40***       |                 |
|                                                        | (1.931)         |                 |
| Woman                                                  | -0.0656***      | -0.0613***      |
|                                                        | (0.00674)       | (0.00666)       |
| Age (in years)                                         | -0.000906***    | -0.000986***    |
|                                                        | (0.000241)      | (0.000238)      |
| White                                                  | 0.0733***       | 0.0679**        |
|                                                        | (0.0273)        | (0.0265)        |
| Black                                                   | 0.0162          | 0.0170          |
|                                                        | (0.00674)       | (0.00666)       |
| Yellow                                                 | 0.139***        | 0.126***        |
|                                                        | (0.0482)        | (0.0476)        |
| Brown                                                   | 0.0377          | 0.0370          |
|                                                        | (0.0271)        | (0.0264)        |
| Recreational activities, cultural and sports           | 0.115***        | 0.116***        |
|                                                        | (0.0260)        | (0.0204)        |
| Extractive industries                                  | 0.172           | 0.173*          |
|                                                        | (0.105)         | (0.0971)        |
| Processing industries                                  | 0.144***        | 0.142***        |
|                                                        | (0.0111)        | (0.0107)        |
| Building                                               | 0.103***        | 0.114***        |
|                                                        | (0.0109)        | (0.0107)        |
| Trade, repair of motor vehicles, personal and domestic objects | 0.144***     | 0.138***        |
|                                                        | (0.00958)       | (0.00912)       |
| Accomodation and food                                  | 0.167***        | 0.161***        |
|                                                        | (0.0135)        | (0.0132)        |
| Transport, storage and communication                   | 0.0573***       | 0.0616***       |
|                                                        | (0.0105)        | (0.0103)        |
| Financial Intermediation                               | 0.111***        | 0.108***        |
|                                                        | (0.0381)        | (0.0396)        |
| Real estate activities, rentals and business services  | 0.148***        | 0.146***        |
|                                                        | (0.0142)        | (0.0141)        |
| Education                                              | 0.168***        | 0.168***        |
|                                                        | (0.0223)        | (0.0219)        |
| Health and social care                                 | 0.393***        | 0.393***        |
|                                                        | (0.0275)        | (0.0274)        |
| Other collective, personal and social service          | 0.0213          | 0.0261          |
|                                                        | (0.0378)        | (0.0389)        |
| Personal services                                      | 0.0963***       | 0.0957***       |
|                                                        | (0.0116)        | (0.0113)        |
| Experience as an owner (in years)                      | 0.000635*       | 0.000480        |
|                                                        | (0.000340)      | (0.000341)      |
| Constant                                               | -0.0200         | -0.0253         |
|                                                        | (0.0297)        | (0.0289)        |
| Observations                                           | 45,188          | 45,188          |
| \(^2\)                                                 | 0.067           | 0.085           |

Source: Authors’ elaboration based on ECINF, 2003.

Notes: Robust Standard errors in parentheses.

*significant at 10%; **significant at 5%; ***significant at 1%.
Table 6. Second-Stage Estimation.

| Variables | Investment                  | Credit                  |
|-----------|----------------------------|-------------------------|
|           | (1)                        | (2)                     | (3)                     | (4)                     |
| Employer  | 0.440***                   | 0.454***                | 0.320***                | 0.319***                |
|           | (0.0478)                   | (0.0434)                | (0.0488)                | (0.0415)                |
| Woman     | 0.000274                   | 0.00130                 | 0.0229***               | 0.0229***               |
|           | (0.00780)                  | (0.00769)               | (0.00624)               | (0.00596)               |
| Age (years) | -0.00182***               | -0.00181***             | 2.87e-05                | 2.81e-05                |
|           | (0.00273)                  | (0.00273)               | (0.000201)              | (0.000200)              |
| White     | 0.0788***                  | 0.0776***               | -0.00211                | -0.00205                |
|           | (0.0226)                   | (0.0225)                | (0.0210)                | (0.0208)                |
| Black     | 0.0791***                  | 0.0789***               | -0.00102                | -0.00101                |
|           | (0.0251)                   | (0.0251)                | (0.0215)                | (0.0214)                |
| Yellow    | 0.0504                     | 0.0482                  | -0.0279                 | -0.0278                 |
|           | (0.0396)                   | (0.0395)                | (0.0311)                | (0.0308)                |
| Brown     | 0.0888***                  | 0.0882***               | 0.00625                 | 0.00628                 |
|           | (0.0223)                   | (0.0222)                | (0.0207)                | (0.0207)                |
| Recreational activities, cultural and sports | 0.120**                  | 0.118**                 | -0.0249                 | -0.0248                 |
|           | (0.0503)                   | (0.0502)                | (0.0326)                | (0.0325)                |
| Extractive industries | -0.0111                  | -0.0136                 | -0.0950**               | -0.0948**               |
|           | (0.0927)                   | (0.0934)                | (0.0480)                | (0.0477)                |
| Processing industries | -0.00556                  | -0.00765                | -0.0410                 | -0.0409                 |
|           | (0.0441)                   | (0.0440)                | (0.0304)                | (0.0302)                |
| Building  | 0.0256                     | 0.0243                  | -0.0571*                | -0.0570*                |
|           | (0.0440)                   | (0.0439)                | (0.0298)                | (0.0297)                |
| Trade, repair of motor vehicles, personal and domestic objects | -0.0342                  | -0.0364                 | -0.00483                | -0.00472                |
|           | (0.0437)                   | (0.0435)                | (0.0304)                | (0.0301)                |
| Accommodation and food | 0.00193                   | -0.000556               | -0.0236                 | -0.0234                 |
|           | (0.0451)                   | (0.0449)                | (0.0315)                | (0.0312)                |
| Transport, storage and communication | 0.0146                   | 0.0139                  | 0.0332                  | 0.0332                  |
|           | (0.0442)                   | (0.0441)                | (0.0307)                | (0.0307)                |
| Financial intermediation | -0.0125                  | -0.0142                 | -0.0617*                | -0.0616*                |
|           | (0.0543)                   | (0.0541)                | (0.0330)                | (0.0329)                |
| Real estate activities, rentals and business services | 0.0537                   | 0.0515                  | -0.0223                 | -0.0222                 |
|           | (0.0453)                   | (0.0451)                | (0.0314)                | (0.0311)                |
| Education | 0.00743                    | 0.00501                 | -0.0275                 | -0.0274                 |
|           | (0.0506)                   | (0.0504)                | (0.0349)                | (0.0346)                |
| Health and social care | -0.0499                  | -0.0556                 | -0.0848**               | -0.0845**               |
|           | (0.0517)                   | (0.0510)                | (0.0390)                | (0.0376)                |
| Other collective, personal and social service | 0.272                    | 0.272                   | -0.0496                 | -0.0496                 |
|           | (0.172)                    | (0.172)                 | (0.0315)                | (0.0315)                |
| Personal services | 0.151***                  | 0.150***                | -0.0335                 | -0.0334                 |
|           | (0.0460)                   | (0.0459)                | (0.0307)                | (0.0306)                |
| Experience as an owner (in years) | -0.00123***               | -0.00124***             | -0.000262               | -0.000262               |
|           | (0.000381)                 | (0.000382)              | (0.000270)              | (0.000268)              |
| Constant  | 0.104**                    | 0.104**                 | 0.0375                  | 0.0375                  |
|           | (0.0490)                   | (0.0490)                | (0.0364)                | (0.0364)                |
| Observations | 45,188                    | 45,188                  | 45,188                  | 45,188                  |

Source: Authors’ elaboration based on ECINF, 2003.

Notes: Robust Standard errors in parentheses.

*significant at 10%; **significant at 5%; ***significant at 1%.
strategy, we use wealth as an instrument for occupational choice, and estimate the relationship between occupational choice and investment. We find evidence that small firms in Brazil face credit constraints, and this is related to investment decisions.

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### Appendix A

**Table A-1.** Principal Components Analysis – Wealth Variable.

| Component | Eigenvalue | Difference | Proportion | Cumulative |
|-----------|------------|------------|------------|------------|
| Comp1     | 1.03462    | 0.0236772  | 0.3449     | 0.3449     |
| Comp2     | 1.01094    | 0.0565064  | 0.3370     | 0.6819     |
| Comp3     | 0.954437   | -          | 0.3181     | 1          |

**Principal Components Eigenvectors**

| Variable          | Comp1 | Comp2 | Comp3 | Unexplained |
|-------------------|-------|-------|-------|-------------|
| Value of Equipments and Machines | 0.6390 | -0.4764 | 0.6039 | 0           |
| Renting           | 0.7405 | 0.1682 | -0.6507 | 0           |
| Place             | 0.2084 | 0.8630 | 0.4603 | 0           |

*Source: Authors’ elaboration based on ECINF, 2003.*