

Azzoni, Carlos Roberto; Kalatzis, Aquiles

Conference Paper

Regional Differences in the Determinants of Investment Decisions of Private Firms in Brazil

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Azzoni, Carlos Roberto; Kalatzis, Aquiles (2006) : Regional Differences in the Determinants of Investment Decisions of Private Firms in Brazil, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/118234>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Regional differences in the determinants of investment decisions of private firms in Brazil*

Carlos R. Azzoni¹, Aquiles E. G. Kalatzis²
University of São Paulo, Brazil

Abstract

This study takes on an important part of regional growth, that is, the investment decisions of private firms. The question asked is: do corporations decide on investments in the same way in different parts of the territory? The paper analyses investments of 373 large Brazilian firms in the period 1996-2004. The role of sales, cash-flow, external financing, and working capital is investigated through regression analysis, following the literature on firm investment decisions. Regional dummies used to capture differences in the role of those determinants indicate that there are significant differences across regions. This is important information for regional development policy, for different mechanisms should be used in different regions in order to foster private investments.

1. Introduction

In a perfect neoclassical world, factors would move to equalize returns, and therefore there would be no reason for regional income inequality. Observed differences would reflect variations in cost of living levels and migration costs. However, empirical studies have presented results that contradict that expected result. In the Brazilian case, for example, Azzoni and Servo (2002) and Menezes and Azzoni (2006) indicate that, even after controlling for demographic factors, education, job characteristics and cost of living levels, the income difference between the poorest and the richest metropolitan region is over 30%, well above what would be expected as migration costs. This residual income difference can be attributable to different factors. Azzoni et al. (2000), Gallup, Gaviria and Lora (2003) and Escobal and Torero (2005) stress the role of geography in

* The authors acknowledge support from CNPq – Brazilian Research Council (Bolsa Produtividade), Fipe – Fundação Instituto de Pesquisas Econômicas and the departments of Economics and of Production Engineering of USP. Fipecafi – Fundação Instituto de Pesquisas Contábeis, Atuariais e Financeiras kindly provided the database on balance statements of firms used in the study.

¹ Professor of Economics, University of São Paulo, Brazil

² Assistant Professor of Production Engineering, University of São Paulo, Brazil, São Carlos Campus.

affecting development (physical - productivity of land, health conditions, frequency and intensity of natural disasters, and human – settlement patterns, migration). Silveira-Neto and Azzoni (2005) concentrate on the sectoral composition of production in different regions and its effect on convergence. Other possible explanations are the different design, composition and operation of institutions, culture, social capital, etc.

Within the realm of corporate finance, Colombo (2001) point out the limits to achieving of an optimal capital structure for Hungarian firms due to the remaining distortions of the planned system. Shen and Wang (2005) stress the fact that, contrary to the situation in the US, subsidiaries in Taiwan are allowed to buy stocks of the parent company, which brings consequences for the investment decisions of firms. Russo and Rossi (2001) indicate that small and medium Italian firms located within the Marshallian industrial districts have better access to external financing than similar firms in other contexts. This paper analyzes the investment decision-making process of private firms belonging to different parts of the territory as a possible source of regional inequality. Since a large part of total investment is performed by private companies, especially in LDCs, where government capacity to invest is usually limited, it is important to investigate whether or not there are differences in the factors affecting investment decisions. This is important information for regional policy, for if firms in different parts of the country rely on different factors, a national long term credit policy could not lead to optimal results. To the best of our knowledge, this aspect has not been analyzed in the literature.

The paper is organized in five sections, including this introduction. Section 2 considers the factors traditionally considered in the investment decision literature and argues in favor of a possible regional differentiation. Section 3 presents the data base and some descriptive statistics. Section 4 presents the model and its results. Finally, Section 5 concludes the study.

2. Factors behind investment decisions of firms

Although the analysis of investment decisions has been dealt with in the literature for long time, the subject received renewed interest with the work by Fazzari, Hubbard

and Petersen (1988). Investment decisions are complex and not as frequent as other firm decisions, precluding the formation of rules-of-thumb. The literature stresses the role of information asymmetry in the credit market (Stiglitz and Weiss, 1981), for lending institutions have difficulties in differentiating among borrowers. Firm managers have more information on their business than bank officials, a factor that could lead to an under evaluation of the firm value, and hence on access to external capital. In this case, using internal sources of funds or debentures, commercial papers, etc. is a safer bet³. The preference for internal funds would also depend on the tax regime and on transaction costs. The use of external funds depend, of course, on relative costs (the tax rate is an important issue here), but it also is expected to increase efficiency in managing funds. On the other hand, it increases the cost of bankruptcy. Other sources of conflict between stockholders, managers, and the lenders of capital, also influence the cost of debt.

In order to test for those alternative explanations, different studies have introduced liquidity variables, recognizing the role of internal funds as determinant of investment. The representative firm typical of the theoretical model was abandoned, and micro data was used to take into account firm heterogeneity⁴. In general, investment is regressed on cash-flow, indebtedness, profitability, and specific variables pertaining to different situations. The role of different factors is analyzed from the empirical results. Typically, a standard model would have the following format

$$\left(\frac{I}{K}\right)_{jt} = \alpha + \beta_1 \left(\frac{I}{K}\right)_{jt-1} + \beta_2 \left(\frac{I}{K}\right)_{jt-1}^2 + \beta_3 \left(\frac{CF}{K}\right)_{jt-1} + \beta_4 \left(\frac{S}{K}\right)_{jt-1} + \beta_5 \left(\frac{D}{K}\right)_{jt-1} + \varepsilon_{jt} \quad (1)$$

The left-hand side variable is the investment rate in year t , for firm j ($t = 1, \dots, T$ and $j = 1, \dots, N$); I is investment, and K is capital stock (fixed assets). On the right-hand side all the possible factors influencing the investment rate are expressed. CF_{jt} is cash flow; S_{jt} is sales; D_{jt} is corporate debt, and ε_{jt} is the error term. All variables are expressed as ratios to capital stock.

³ According to Meyers (1984), “If external finance is required, firms issue the safest security first. That is, they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort” (page 9).

⁴ See Kaplan and Zingales (2000) and Kalatzis, Azzoni and Aschcar (2006a and 2006b) for a discussion.

The choice of variables follows the extensive literature on investment decisions. These studies assume the existence of a well-known investment function, in which the heterogeneity of firms may be considered by including a specific effect for each firm, as well as a time effect. Cash flow reflects the influence of possible liquidity restrictions, although it can also represent a potential for future profitability. Corporate debt is introduced to take into account the tax benefits of debt, as well as the notion that higher leverage may increase firm's value⁵. The use of lagged values seeks to consider the dynamic aspect of investment, as well as to avoid autocorrelation. The quadratic variable was introduced due to indications of non-linear behavior of residuals, as well as because it could reflect a quadratic form of cost adjustment. Sales bring in the role of the expected rate of change in the level of sales or production.

In this paper we investigate whether or not the importance of these factors is the same for firms of different regions in Brazil. If we take the profit-maximizing representative firm, there is no reason why investment factors varied across regions. One possible situation occurs when firms are not the same in different locations. In that case, differences would be due to firm heterogeneity (ownership, sector, size, etc.). Chen (2006) concludes that family involvement in the management is an important factor to determine the firm's choice of ownership regime. For firms selling only to the regional market, demand is different in distinct locations, as it is the industrial organization within which the firm operates. It is thus expected that firms within the same sector, with similar size and capital structure might rely on different factors, as compared with similar firms in a different competition environment. Almazan and Molina (2005) find that firms within more concentrated sectors exhibit greater intra-industry dispersion of leverage ratios. They find that dispersion is associated with use of incentive compensation, number of insiders in the boards, age, and capital expenditures in relation to assets. Mackay and Phillips (2005) conclude that financial structure depends on a firm's position within its industry, and that financial leverage is higher and less dispersed in concentrated industries.

⁵ Some authors have maintained that the degree of leverage is positively correlated with improvements in operating efficiency.

If the surrounding institutional environment is different across regions, it would be expected that factors could have different importance. In this later case, even branches belonging to the same corporations could behave differently in distinct locations. Agarwal and Mohtadi (2004) analyze the financing choice of firms in developing countries, and conclude that equity market development favors firm's equity financing over debt financing, while banking sector development favors debt financing over equity financing. The rules of the game might affect external capital cost, access to venture capital, stock market, availability of long term loans, etc. It can also change collateral requirements, tax treatment, etc. These points are investigated by Russo and Rossi (2001) in the Italian case, Shen and Wang (2005), in relation to American branches operating in Taiwan, and Colombo (2001), dealing with Hungarian firms, still under the influence of remaining planned economy rules.

Finally, differences can be due to non-observable factors, such as culture, tradition, limitation of entrepreneurial skills, etc. Bitzenis (2004) indicates that geographical distance from advanced Western countries is an important barrier to foreign investment in Bulgaria, although factors related to delays in institutional reforms are also important. However, controlling for all other factors, the conclusion is that historical links do not affect a company's decision to invest in another country. Trevino and Mixon (2004) argue, from a study of FDI in nine Latin American countries, that managers seek the minimal institutional distance between the home and the host country environments. Carr (2005) compares strategic decision styles of German, Japanese and Anglo-Saxon firms, and concludes that, even under globalization, Japanese firms generally, and German family firms in particular, exhibit deep-rooted differences from the Anglo-Saxon model, although evidence suggests convergence of the later. Harrison, Love and McMillan (2004) examine the role of foreign firms in crowding-out local firms out of the capital market in a group of countries, and find that FDI is associated with a reduction in financing constraints and with lower sensitivity of investment to cash flow for firms without foreign assets and for domestically owned enterprises. Interestingly for the point raised in this paper, they find that these effects are stronger for low-income than for high-income regions.

Although the influence of such factors is almost impossible to quantify, one has to recognize that they might influence the way firms make investment decisions in different places. In this paper we try to disentangle part of this compound set of factors, highlighting the factors traditionally associated to investment decisions.

3. The database

We analyze a sample of 373 of the 500 larger firms in Brazil, the equivalent to the Fortune 500 to the Brazilian context⁶. We have eliminated all firms in the public utility sectors, as well as the ones belonging to public administrations (federal, state or local). We deal with balance statements of these companies, covering the period 1996-2004. Considering that we have 373 firms, making investment decisions over 9 years, we have 3,357 investment decisions to work with.

Table 1 presents general information on the companies. Of the 373 firms, 77% are in manufacturing and 23% in tertiary activities. In terms of the distribution across the five macro regions in Brazil, there is an approximate replication of the regional shares in GDP, with 60% coming from the richest Southeast region and 26% from the second richest South region. The poor Northeast region shows only 7%, the remaining 7% coming from the fast-growing resource-oriented regions of Center-West (agriculture, livestock) and North (mining, timber). Besides the resource-oriented activities, the North region hosts a tax-free import zone, with firms in electronics and motorcycles. It is clear from the table that the 7 firms in this region present higher investment rates and lower ratios of sales to capital stock, considering the high aggregate value of the products they sale. They also exhibit the lowest levels of indebtedness and profitability. Firms in the Southeast have the highest debt/capital stock ratio. It is clear that firms in the richer part of the country (Southeast and South) present higher levels of working capital. Finally, firms in the South are the ones with the highest ratio of debt/stockholder's equity.

⁶ Published by the business magazine *Exame - Maiores e Melhores*, and organized by Fipecafi – Fundação Instituto de Pesquisas Contábeis, Atuariais e Financeiras, Department of Accounting, University of São Paulo (<http://www.fipecafi.com.br/exame/indica.asp>). The authors thank Fipecafi for allowing the use of the micro data.

Table 1- Characteristics of Firms by Macro Regions – Average Values

Variables	All Firms	Regional Distribution				
		CO	N	NE	S	SE
Investment/Capital Stock	.440	.460	.517	.360	.409	.459
Cash Flow/ Capital Stock	.548	.808	.178	.370	.487	.588
Sales/Capital Stock	8.04	6.51	12.616	3.81	8.614	8.258
Debt/Capital Stock	1.037	.830	.895	.746	.775	1.204
Change in Sales/Capital Stock	.325	.312	.269	.351	.307	.333
Debt/Total Equity	.185	.176	.105	.189	.176	.192
Net Income/Capital Stock	.371	.631	.049	.241	.333	.393
Net Income/ Stockholders' Equity	-.129	.162	.055	-.428	-.411	.0010
Working Capital/Capital Stock	1.264	1.81	.816	.678	1.264	1.306
Debt/Stockholders' Equity	1.319	.358	.300	.943	2.879	.786
Number of Firms	373	16	7	26	98	226

4. Models and results

We use the balance statement data from the 373 firms to estimate the following models:

$$\left(\frac{I}{K}\right)_{jt} = \alpha + \beta_1 \left(\frac{I}{K}\right)_{jt-1} + \beta_2 \left(\frac{I}{K}\right)_{jt-1}^2 + \beta_3 \left(\frac{FC}{K}\right)_{jt-1} + \beta_4 \left(\frac{V}{K}\right)_j + \beta_5 \left(\frac{FIN}{K}\right)_{jt-1} + \varepsilon_{jt} \quad (1)$$

$$\left(\frac{I}{K}\right)_{jt} = \alpha + \beta_1 \left(\frac{I}{K}\right)_{jt-1} + \beta_2 \left(\frac{I}{K}\right)_{jt-1}^2 + \beta_3 \left(\frac{FC}{K}\right)_{jt-1} + \beta_4 \left(\frac{V}{K}\right)_j + \beta_5 \left(\frac{FIN}{K}\right)_{jt-1} + \beta_6 \left(\frac{K}{V}\right)_j + \beta_7 \left(\frac{\Delta V}{V_R}\right)_j + \varepsilon_{jt} \quad (2)$$

$$\begin{aligned} \left(\frac{I}{K}\right)_{jt} = & \alpha + \beta_1 \left(\frac{I}{K}\right)_{jt-1} + \beta_2 \left(\frac{I}{K}\right)_{jt-1}^2 + \beta_3 \left(\frac{FC}{K}\right)_{jt-1} + \beta_4 \left(\frac{V}{K}\right)_j + \beta_5 \left(\frac{FIN}{K}\right)_{jt-1} + \beta_6 \left(\frac{K}{V}\right)_j + \beta_7 \left(\frac{\Delta V}{V_R}\right)_j \\ & + \beta_8 \left(\frac{FC}{K}\right)_{jt-1} * \delta 1 + \beta_9 \left(\frac{V}{K}\right)_{jt-1} * \delta 1 + \beta_{10} \left(\frac{FIN}{K}\right)_{jt-1} * \delta 1 + \beta_{11} \left(\frac{FC}{K}\right)_{jt-1} * \delta 2 + \beta_{12} \left(\frac{V}{K}\right)_{jt-1} * \delta 2 \\ & + \beta_{13} \left(\frac{FIN}{K}\right)_{jt-1} * \delta 2 + \beta_{14} \left(\frac{FC}{K}\right)_{jt-1} * \delta 3 + \beta_{15} \left(\frac{V}{K}\right)_{jt-1} * \delta 3 + \beta_{16} \left(\frac{FIN}{K}\right)_{jt-1} * \delta 3 + \varepsilon_{jt} \end{aligned} \quad (3)$$

where,

I_{kjt} is the firm's investment, defined as $K_t - K_{t-1}$; t is the year, ranging from 1 to T ; j stands for firm, ranging from 1 to N ; K_{jt} is the capital stock (fixed assets); FC_{jt} is cash flow; $\frac{\Delta V}{V_R}$ are the sales variation; V_{jt} are the company's sales; V_R are the sales of the firm in relation to the region; FIN_{jt} is the indebtedness of the company and ε_{jt} is the error term; $\delta 1$, $\delta 2$, $\delta 3$ are the three regional dummies, which interact with cash-flos, sales, and indebtedness.

The explanatory variables are typical of the literature on investment decisions, as explained in Section 2. Sales and Profitability are contemporaneous to investment, to capture the internal generation as a source of funds for investment. Cash-flow and Indebtedness are lagged one year, meaning that the investment decisions in year t is influenced by cash-flow generation in the previous year and on the degree of indebtedness the firm had at the beginning of the period. Time dummies are included to capture changes in economic conditions of different years. As for the regional aspects, we introduce a variable that relates the performance of the firm in relation to the regional economy it is located. We take the growth of sales of each firm and divide by the growth of sales for all firms in the same region. The idea is that investment decisions could depend on the regional environment the firms operates, in the sense that a booming region could present a positive influence on the investment decisions of all firms in the

same neighborhood, regardless of sectors. Given that the investment decision is taken under uncertainty, a bandwagon effect is to be expected, in a sort of demonstration effect. To the best of our knowledge, this variable is totally absent in other studies on investment decisions.

In order to check whether or not the factors behind investment decisions present different importance across regions, we introduce interaction dummies (slope dummies) between the three investment decision variables (sales, cash flow and indebtedness) and three macro regions in the country. If these dummies turn out significant, it means that the respective variable presents different coefficients across regions, that is, its influence differs depending on the region the firm is located. Given the small number of firms in regions North, Center-West and Northeast, we have considered these three regions as one, representing the poorer part of the country. Therefore, we deal with three regions: poor (49 firms), South (98 firms) and Southeast (226 firms). The poor region is taken as a reference for the definition of the dummies, meaning that the coefficients of the other regions interaction dummies will be defined in relation to that region. We estimate the model for all firms together and individually for commerce and service firms and manufacturing firms.

Panel data models with fixed or random effects have been used to estimate parameters when a non-observed variable, α_i , was added to a model to consider the effects of variables that are specific to each firm and constant over time. The firm-specific effect can absorb the peculiar behavior, such as management capacity. The time component, ω_t , aims to incorporate the effect of all of the observed and non-observed variables that do not vary between firms, but that vary between years.

The choice between fixed or random effect models is not an easy one. While the model with a stochastic component allows for inferences regarding the population as a whole, in the fixed effect model the inference is restricted to the companies in the sample. When a random effects model is used, it is assumed that the firm-specific effect and the regressors are non-correlated. Despite the interest in drawing inferences for the entire population, for which the random effect model is more appropriate, the fixed effect estimator may be preferred. If there is correlation between the firm-specific effect and the explanatory variables, the estimation by random effects will lead to inconsistent

estimators, even if $N \rightarrow \infty$. It is probable that firm-specific characteristics, such as managerial capability, will affect the management of own capital, and also financial leverage choices, thus affecting investment decisions. Thus, the fixed effect model would be more appropriate for our study. Although this choice seems to be the most appropriate from an economic point of view, a test rejected the null hypothesis that there is no difference between the models (Wooldridge, 2002).

Despite the significance of the parameters of the fixed effect model, the criticism remains that the parameters may be biased or even inconsistent, due to endogeneity, since the error term could be correlated with the lagged dependent variable. This correlation arises as from the transformation of the model to eliminate the firm-specific and time effects, as well as because of the short period considered, even though $N \rightarrow \infty$ ⁷. An alternative way of correcting for the possible problem of inconsistent parameters is to use an instrumental variable for the endogenous explanatory variable. Anderson and Hsiao (1982) proposed the use of the second lag of the dependent variable, y_{t-2} or $(y_{t-2} - y_{t-3})$ as instruments for y_{t-1} ; Arellano and Bond (1991) proposed a procedure in which the first difference is obtained and the Generalized Method of Moments (GMM) applied, using lags in levels as instruments for the dependent and independent variables.

In estimating model the endogenous variable with two lags was used as an instrument for the endogenous variable, and lagged values as instruments for the independent variables. The use of y_{t-2} seems more appropriate since it avoids the loss of more than one time period. The GMM estimation used the method proposed by Arellano and Bond (1991) that have the main criticism related to the existence of a weak correlation between the first differences of the variables and their lagged levels, as well as the fact that it compromises the economic meaning of the transformed variable. The use of larger lags in the Arellano and Bond's estimator could raise suspicions regarding the validity of both the instruments and the results. Since the Sargan test rejects the validity of the instruments in the GMM estimation, we chose the Instrumental Variable model (IV).

⁷ While the time dimension (T) is not so short, it is probable that the estimated parameters are biased. Hsiao, Pesaran and Tahmiscioglu (2002) and Kiviet (1995) present results for simulations for $T=3$ and $T=6$, when $N \rightarrow \infty$.

Since the companies are heterogeneous in terms of their characteristics, the suspicion remains that heteroskedasticity is present, implying that the standard error and hypothesis tests are invalid. Applying the Cook-Weisberg test, we confirmed the presence of heteroskedasticity. In order to reduce this problem, we have grouped firms by sector and by region. The Durbin test for autocorrelation in the presence of a lagged dependent variable indicated no sign of autocorrelation.

The results are presented in tables 2 and 3. In Table 2 we present the results involving the variables traditionally used in investment decision studies. The estimated coefficients replicate those of other studies in the same field in Brazil, as in Kalatziz et al (2006a and 2006b), for the period 1987-1996. Sales, Cash Flow and Indebtedness present positive and significant coefficients in all cases. Firms more capital intensive present higher investment, controlling for the other variables in the model, and this does not change across the three versions of the model, and for all types of firms.

In the first column of each group we run the model with the traditional variables only; the second version includes the regional environment in which the firm operates; the third version includes the regional interaction dummies. In the case of firms in the manufacturing sector, the inclusion of these variables changes the magnitude of the estimated coefficients of the traditional variables, but does not change the sign and statistical significance. In the case of firms in commerce and services, Indebtedness turns out to be non-significant, and Cash Flow even changes sign with the inclusion of the interaction dummies. In general, the model performs better for manufacturing firms, with more significant variables, although the differences are impressive. For example, the R^2 is higher for manufacturing regressions, especially so when all variables are included.

As for the variables with regional interest, the growth of the firm in relation to other firms in the region is significant for manufacturing firms, but not so for firms in commerce and services. Thus, for manufacturing firms investment is more intense in for firms growing faster than their regions. The results for the interaction dummies are presented in Table 3. It shows that Sales is less important for firms in the richer South and Southeast regions than for the average and, for that matter, than for firms in the poor region of the country. The difference is more important for manufacturing firms: the coefficient for all firms is 0.16, and for firms in the South and Southeast, it becomes 0.04.

In the case of Commerce and Services, the general coefficient is 0.05, but it is only 0.025 for firms in the South. For all firms grouped, the general coefficient is 0.7, and for firms in the South and Southeast it is 0.03 and 0.04, respectively. There are no significant differences across regions in the importance of Cash Flow. Finally, there are differences in the importance of indebtedness across regions, especially in the manufacturing sector. For all firms as a group, the general coefficient is 0.2, but it becomes 0.06 for firms in the South and 0.09 for firms in the Southeast. In the case of manufacturing firms, the general coefficient is 0.18, but it becomes only 0.01 for firms in the South.

One key aspect discussed in the specific investment decision literature is whether or not firms are financially restricted. A firm is considered to be financially restricted if the cost or availability of external financing prevents it from realizing new projects that it would have selected if internal financing had been available (Kaplan and Zingales, 1997). For Bond and Reenen (2002), a firm is financial restricted if an unexpected increase in the availability of internal funds causes an increase in investment spending, not related to potential future profitability. Considering the importance of Sales for investment decisions of firms, it is clear that firms in the richer regions of the country are less financially restricted than firms in the poor region of the country. In previous studies in Brazil, it was confirmed that capital intensive firms are less financially restricted than firms with lower capital intensity (Kalatzis et al. 2006a and 2006b). Since we are controlling for capital intensity in these regressions, this factor is controlled for, that is, it can not be said that firms in the poor region are less capital intensive. In terms of indebtedness (defined as the debt/equity ratio in the previous year), the results indicate that firms in the richer South and Southeast region rely less on

Table 2 – Investment variables results

	All Firms			Commerce and Services			Manufacturing		
Constant	0.2580*** (0.069)	0.158** (0.0697)	0.149** (0.071)	-0.0885 (0.14)	-0.1124 (0.142)	-0.129 (0.149)	0.374*** (0.078)	0.259*** (0.079)	0.156* (0.082)
Investment -1	-0.1048** (0.053)	-0.15*** (0.053)	-0.144 (0.054)	-0.1394 (0.088)	-0.153* (0.089)	-0.1538 (0.099)	-0.0876 (0.065)	-0.145** (0.065)	-0.13** (0.065)
(Investment -1) ²	-0.0141* (0.008)	-0.0112 (0.0079)	-0.0122 (0.008)	-0.0189 (0.0129)	-0.018*** (0.013)	-0.0162 (0.014)	-0.0164 (0.010)	-0.013 (0.010)	-0.015 (0.010)
Sales	0.0456*** (0.0033)	0.0399*** (0.0034)	0.069*** (0.0098)	0.0399*** (0.005)	0.038*** (0.005)	0.052*** (0.0097)	0.049*** (0.0043)	0.043*** (0.0044)	0.163* (0.026)
Cash Flow	0.067*** (0.0186)	0.080*** (0.0198)	0.0794 (0.055)	0.174*** (0.0569)	0.171*** (0.057)	-0.1201 (0.39)	0.055*** (0.0199)	0.071*** (0.0197)	0.096*** (0.057)
Indebtedness	0.092*** (0.014)	0.096*** (0.014)	0.197*** (0.055)	0.142*** (0.0256)	0.143*** (0.026)	0.1570 (0.164)	0.073*** (0.017)	0.079*** (0.017)	0.177*** (0.059)
Capital Intensity	1.192*** (0.065)	1.261*** (0.065)	1.263*** (0.065)	0.729*** (0.134)	0.733*** (0.134)	0.73*** (0.134)	1.285*** (0.074)	1.369*** (0.074)	1.39*** (0.073)
Growth in relation to region	- -	0.105*** (0.0149)	0.107*** (0.015)	- -	0.0525 (0.045)	0.0552 (0.045)	- -	0.11*** (0.016)	0.109*** (0.016)
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional interaction dummies	No	No	Yes	No	No	Yes	No	No	Yes
R ²	0.4798	0.4933	0.4980	0.4473	0.4492	0.4582	0.5052	0.5210	0.5302
N. of Observations	2238	2238	2238	510	510	510	1728	1728	1728

Table 3 – Regional differences

		All Firms	Commerce and Services	Manufacturing
Sales	South	-0.04*** (0.0114)	-0.027** (0.012)	-0.12*** (0.028)
	Southeast	-0.03*** (0.011)	-0.0106 (0.013)	-0.12*** (0.026)
Cash Flow	South	0.0067 (0.070)	0.4482 (0.432)	-0.037 (0.073)
	Southeast	-0.0038 (0.0595)	0.2769 (0.393)	-0.031 (0.061)
Indebtedness	South	-0.14** (0.072)	0.0679 (0.204)	-0.164** (0.078)
	Southeast	-0.102* (0.057)	-0.0190 (0.165)	-0.098 (0.061)

Thus, the above conclusion might indicate difficulties in accessing capital sources in the poor area of the country, making firms in that region to rely more heavily in internal sources of funds. This conclusion sort of corroborates the results of Agarwal and Mohtadi (2004) and Harrison et al. (2004). However, firms in the rich South region tend to present lower importance for loans, as the regional differences in the coefficients of Indebtedness indicate. Thus, as a general conclusion, it can not be said that there are no differences in the importance of variables influencing investment decisions of firms across space.

5. Conclusions

This paper analyzes the investment decision-making process of private firms belonging to different parts of the territory as a possible source of regional inequality. We present a discussion of the factors traditionally considered in the investment decision literature and introduce some arguments to explain a possible regional differentiation in the importance of those investment factors. Based on a sample of 373 large Brazilian firms, we estimate a panel model introducing two types of regional variables: the growth of the firm in relation to the regional economy, and interaction dummies between the investment variables and the regions.

The results indicate that for manufacturing firms investment is more intense for firms growing faster than their regions. Considering the importance of Sales for investment decisions of firms, it is clear that firms in the richer regions of the country are less financially restricted than firms in the poor region of the country, since they rely more intensively on internal sources of fund generation, what might indicate difficulties in accessing capital sources in the poor area of the country. These preliminary findings suggest that the analysis of the regional differences in the importance of investment factors is an issue worth pursuing. This is important information for regional policy, since a national long term credit policy could not lead to optimal results.

References

- Agarwal, S. and Mohtadi, H. (2004) "Financial markets and the financing choice of firms: evidence from developing countries", *Global Finance Journal*, Vol. 15, Issue 1, p. 57-70
- Almazan, A. and Molina C. A. (2005) "Intra-industry capital structure dispersion", *Journal of Economics and Management Strategy*, 14 (2):263-297, Summer
- Anderson, T. and Hsiao, C. (1982) Formulation and Estimation of Dynamic Models Using Panel Data, *Journal of Econometrics*, 18, 47-85.
- Arellano, M. and Bond, S. (1991) Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economics Studies*, 58, 277-97.
- Azzoni, C. R. and Servo, L. M. S. (2002) "Education, cost of living, and regional wage inequality in Brazil in the 90s", *Papers in Regional Science*, Vol. 81, p. 157-175
- Azzoni, C. R., Menezes-Filho, N., Menezes, T. and Silveira-Neto, R. (2000) "Geografia e convergência da renda entre os estados brasileiros", in R. Henriques (Editor), *Desigualdade e Pobreza no Brasil*, IPEA
- Bitzenis, A. (2004) "Explanatory variables for low western investment interest in Bulgaria", *Eastern European Economics*, 42 (6): 5-38
- Bond, S. and Reenen, V.J. (2002) Microeconomic Models of Investment and Employment. www.ifs.org.uk/innovation/bondvanr.
- Carr, C. (2005) "Are German, Japanese and Anglo-Saxon strategic decision styles still divergent in the context of globalization", *Journal of Management Studies*, 42 (6):1155-1188, September
- Chen, M. (2006) "Managerial ownership and firm performance: an analysis using switching simultaneous-equations models", *Applied Economics*, Vol. 38, N. 2, February
- Colombo, E. (2001) "Determinants of corporate capital structure: evidence from Hungarian firms", *Applied Economics*, Vol. 33 No. 13, October 20, page 1689-1701

- Escobal, J. and Torero, M. (2005) "Adverse geography and differences in welfare in Peru", in R. Kanbur and A. J. Venables (Editors), *Spatial Inequality and Development*, UNU-Wider Studies in Development Economics, Oxford University Press, p. 77-122
- Fazzari, S. M.; Hubbard, G.; Petersen, B. Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, 1988, n.1, p. 141-95.
- (1988) Financing Constraints and corporate investment: Response to Kaplan and Zingales. *National Bureau of Economic Research*, Working Paper Series n.5462.
- Gallup, J. L., Gaviglia, A. and Lora, E. (2003) *Is Geography Destiny? Lessons from Latin America*, Interamerican Development Bank.
- Harrison, A. E., Love, I. and McMillan, M. S. (2004) "Global capital flows and financing constraints", *Journal of Development Economics*, 75 (1):269-301, October
- Kalatzis, A. G., Azzoni, C. R. and Aschcar, J. (2006a) "Financial constraints and investment decisions: evidence from a highly unstable emerging economy", *Applied Economics*, forthcoming.
- (2006b), Investment decisions in troubled times: a Bayesian approach applied to Brazilian firms, *Journal of Financial and Quantitative Analysis*, forthcoming
- Kaplan, S. and Zingales, L. (1997) Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics*, 1997, v. 122, p. 169-215, n.1.
- Mackay, P. and Phillips, G. M. (2005) "How does industry affect firm financial structure?" *Review of Financial Studies*, 18 (4): 1433-1466, Winter
- Menezes, T. A. and Azzoni, C. R. (2006) "Evolução da desigualdade de salários entre regiões metropolitanas brasileiras: custo de vida e aspectos de demanda e oferta de trabalho", The University of São Paulo Regional and Urban Economics Laboratory - NEREUS (www.econ.fea.usp.br/nereus/), Working Paper TD-Nereus 05-2005
- Russo, P. F. and Rossi, P. (2001) "Credit constraints in Italian industrial districts", *Applied Economics*, Vol. 33, No. 11, September 15, p. 1469-1477
- Shen, C. and Wang, C. (2005) "The impact of cross-ownership on the reaction of corporate investment and financing constraints: a panel threshold model", *Applied Economics*, Vol. 37 No. 20, November, page 2315-2325
- Silveira-Neto, R. and Azzoni, C. R. (2005) "Decomposing regional growth: labor force participation rates, structural changes, and sectoral factor reallocation", *Annals of Regional Science*, Vol. 39, p. 1-19
- Stiglitz, J.; Weiss, A. Credit rationing in markets with imperfect information. *American Economic Review*, 1981, v.71, p.393-410, n.3.
- Trevino, L. H. and Mixon, F. G. (2004) "Strategic factors affecting foreign direct investment decisions by multi-national enterprises in Latin America", *Journal of World Business*, 39 (3): 233-243, August