

# IPO Determinants of Brazilian Companies

## (Fatores Determinantes para a Realização de Ofertas Iniciais de Ações (IPO) de Empresas Brasileiras)

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### Abstract

The literature on Initial Public Offerings (IPOs) is still rather limited in Brazil because significant growth in the stock market occurred only recently. The purpose of this study is to identify the determining factors for the IPOs of Brazilian companies based on logistic regression methods and using a sample of private and public companies. The results indicate that firms undertook their IPOs in periods when they had made significant capital expenditures, when they had the highest levels of profitability and/or when they had increased their levels of indebtedness. The IPOs were used as an alternative to improve their capital structures and/or raise funds to continue investing in their growth. The companies that went public seized the opportunities offered during the significant period, and the size of the companies was not significant for undertaking an IPO.

**Keywords:** IPO; decision to go public; Brazilian companies.

**JEL code:** G32.

### Resumo

A literatura sobre ofertas iniciais de ações (IPOs) ainda é pouco explorada no Brasil haja vista que o crescimento do mercado de capitais ocorreu apenas recentemente. O objetivo deste artigo é identificar quais os fatores determinantes para as ofertas iniciais de ações das empresas brasileiras através do método de regressão logística utilizado em uma amostra com empresas listadas e não listadas. Os resultados indicam que as empresas fizeram seu IPO em períodos de altos investimentos, alto nível de rentabilidade e/ou quando estavam com alto nível de endividamento. A captação de recursos nos IPOs foi usada como alternativa para

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adequar a estrutura de capital e/ou captar recursos para continuar investindo em seu crescimento. As empresas que se tornaram públicas aproveitaram a janela de oportunidade oferecida no período e o tamanho não foi significativo para determinar a listagem de ações.

**Palavras-chave:** IPO; decisão de listar ações; empresas brasileiras.

## 1. Introduction

The decision whether a company should go public is one of the most important in a company's life cycle. For the purposes of this study, a company is considered a listed company once it sells a share to the public for the first time with the expectation that a liquid secondary market will be created after the issuance of such shares (Ritter, 1998).

The decision to go public involves several factors, among which we highlight the following: raising funds to adjust the company's capital structure (Kim & Weisbach, 2005), raising funds to develop new projects and make investments in research and development (Kim & Weisbach, 2008), raising funds for the acquisition of other companies (Celikyurt *et al.*, 2010), reducing risks related to the information asymmetry between potential investors and current shareholders (Chemmanur & Fulghieri, 1999), going public based on the level of prices in the industry in which the company operates, because companies go public when the market-to-book indicator of their industry is high (Pagano *et al.*, 1998), going public based on the size of the capital market and the possibility of accessing resources and investors (Roel, 1996), and diversifying the investment portfolio of the controlling shareholders (Bodnaruk *et al.*, 2008).

The vast majority of studies focus on the institutional aspects of the decision to become a publicly traded company, assuming that an IPO is a stage in companies' growth cycle. In fact, becoming a public company can be part of companies' growth cycle, but if this was the only factor that influenced the decision to go public, all major companies would be listed on the stock exchange; however, this does not occur in Brazil because even in a country with millions of enterprises, only 374 companies were listed on the Sao Paulo Stock Exchange at the end of June 2011 (BM&FBOVESPA, 2011c).

The determining factors for a company to become a listed enterprise are related to the company's structural aspects before the IPO and the consequences of such an action on the company's investments and financing policy. Because information on privately held companies is very restricted,

researchers either investigate the consequences of going public or, when studying the pre-IPO characteristics of listed companies, their results are biased because only the companies that actually went public are studied.

Many IPO papers have been published in the Brazilian finance literature, including studies that examine initial returns, such as Leal (1994), Carvalho & Pinheiro (2010), Rossi Junior & Marotta (2010), Tolentino & Carvalho (2010), Pinheiro & Carvalho (2011). None of those papers attempted to study the decision to go public. Thus, the purpose of this study is fill the gap in the Brazilian financial literature and identify the determining factors for the IPOs of Brazilian companies based on accounting indicators, market indicators and the business characteristics of private and publicly traded companies.

In addition to this introduction, the study is divided into four other sections. The second section contains a theoretical review of a company's decision to become a listed firm. The third section explains the methodology used to analyze the data. Then, the research results are presented, and, finally, the final considerations are discussed.

## 2. Literature Review

The decision to go public is an important strategy for companies. Between 2004 and 2010 in Brazil, there were approximately 130 IPOs (BM&FBOVESPA, 2011a), which was much more than in previous decades, when there were few IPOs due to the few incentives because of the country's macroeconomic situation (high inflation and high interest rates), a low level of corporate governance and low liquidity in the domestic market, among other factors. However, despite the large number of companies that recently went public, many companies still have the potential to undertake an IPO, especially if we compare the number of publicly traded companies in Brazil with those in developed countries.

Several authors have studied the reasons why businesspeople choose to turn their companies into publicly held enterprises through an IPO (Pagano *et al.*, 1998, Chemmanaur & Fulghieri, 1999, Fischer, 2000, Kim & Weisbach, 2005, Bodnaruk *et al.*, 2008, Celikyurt *et al.*, 2010). There are various lines of study, ranging from informational issues, the structure of industries and companies and their capital structures.

## Information and the Initial Public Offering

The ideal time to undertake an IPO varies from country to country and from industry to industry. A company must consider the influence of several variables before making this decision. One of these variables is information. When a company goes public, it must divulge its financial and operational data to the market to meet the requirements of legislation (CVM 2003) as well as the demands of investors who will require the disclosure of significant amounts of information before allocating their capital to a particular company to carry out evaluations and decide whether to invest. Companies must disclose the information that investors need to carry out their evaluations, but they also must be careful to not disclose strategic information that competitors can use to compete in the market.

Thus, an inside business person has information about a company that external investors do not have. However, because external investors do not have all of the information, the company's valuation becomes more uncertain. The external investor requires a lower price to compensate for the risk of the investment. Therefore, the ideal time to go public is when there is a balance in the relationship between the "evaluation uncertainty" cost and the decrease in risk required by investors (Chemmanaur & Fulghieri, 1999).

A company should go public when information can be used by investors outside the organization for a correct valuation of the company's assets, reducing the risk premium and the possible existence of significant underpricing (large appreciation in the share price when the company's stock begins to be traded, i.e., the pricing of the IPO is below its market value).

Maug (2001) developed a model considering the possibility of a business owner's decision to turn a company into a publicly traded enterprise. The decision to continue as a privately traded company can be temporarily beneficial for a company's owner and for those who have specific information within the company. However, when an organization advances in its life cycle, this benefit no longer exists. Therefore, going public becomes more advantageous. This perspective provides a link between the underpricing phenomenon and the decision to become a publicly traded company.

An IPO will be beneficial to a company if the offering provides incentives to buy the stock and analyze the information used to evaluate the company. The fact that such information is available may reduce the monitoring cost to be borne by shareholders after the IPO and reduce the costs resulting from the underpricing of the offering. Lowry & Schwert (2002)

concluded in their study that most companies undertake their IPOs after periods of high underpricing in offerings because significant amounts of information were released during the previous IPOs and there has been a decrease in uncertainty as to new market entrants.

### Industry and Company Structure

The decision to become a publicly traded company can also be influenced by the industry in which the company operates. The fact that one or more companies have undertaken an IPO within a specific industry causes the market to learn more about it, which can lead to a new wave of IPOs within the industry.

Companies that are the first to undertake an IPO in a given industry may be at a competitive advantage because the funds raised in the offering can be used for new projects or even to acquire other companies.

Pagano *et al.* (1998) conducted an extensive study to understand the reasons why Italian firms undertake IPOs. The sample was based on data from 2,181 public and private companies, including 89% of the companies that undertook an IPO between 1982 and 1992 in that country. The authors found that the likelihood of a company undertaking an IPO is linked to an evaluation of the company's industry in the stock market as well as the size and age of the company; that is, Italian companies go public when they are older and bigger, as expected.

According to Pagano *et al.* (1998), the probability of a company undertaking an IPO is positively related to the relationship between the market value and the equity value of the companies in its industry because IPOs occur in clusters, i.e., sometimes there is a large number of IPOs, and sometimes there are few or no offerings.

Additionally, the authors found that a company's size and age significantly affect the results of an IPO because Italian companies tend to become large firms before undertaking an IPO, and they only go public after they have operated in the market for some time. A company's size is important for an IPO both because the operation is costly and because of the implied cost of the visibility that an IPO brings to government authorities, particularly those that oversee the payment of taxes and contributions. With respect to market timing, the authors stated that a possible reason for their result was the lack of protection of minority shareholders (corporate governance) at the time the study was conducted. Because there was little protection, investors tended to rely more on companies that had already been

in the market for a long time and had demonstrated more credibility and reliability in their financial results.

### **Capital Structure of a Company**

A company's capital structure is also an important factor in the decision to become a publicly traded company. In a study of 984 CFOs of U.S. companies that undertook an IPO, 44.4% of them said that one benefit of the IPO was a reduction in the company's level of indebtedness (Brau 2010). When a company is in debt and debt funding costs rise, an IPO can be a good alternative to attract new partners and adjust the company's capital structure. In addition, an IPO can also be an important source of funds to develop a company's expansion projects.

Kim & Weisbach (2005) studied why raising funds is an important reason to undertake an IPO. By analyzing a sample of 16,958 IPOs in 38 countries between 1990 and 2003, the authors found that 89% of the issuances were of the primary type, and the money raised was added to the companies' cash to meet funding needs. The primary issuance of shares by the companies in the sample correlated with the companies' capital needs, with strong growth in the investments made by such companies and with the payment of debts, that is, with a correction of the companies' capital structure. Additionally, a primary issuance is associated with the later raising of funds in subsequent offerings.

Following this line of study, Fischer (2000) compared the financial statements of 661 public and private German companies to analyze the reasons why technology companies undertook IPOs in Germany. The author concluded that, for the sample of firms in the study, the probability of undertaking an IPO was proportional to the companies' intensity of intangible assets and investments in research and development. In general, German companies invest and grow significantly before going public, and the stock market becomes an accessible and urgent source of capital to meet the need for funds to make new investments. IPOs in Germany usually occur when companies are financially prepared, and the market is conducive to the raising of funds.

### **Other Relevant Factors**

The decision to become a publicly held company is also related to the diversification of the investment portfolio of the controlling shareholders. In a sample of all of the IPOs that took place in Sweden between 1995

and 2001, Bodnaruk *et al.* (2008) analyzed the portfolio composition of the controlling shareholders of public and private companies in detail and concluded that investors with less wealth and who are less diversified sell shares in an IPO. Companies with controlling shareholders who fit this profile of investor are more likely to undertake an IPO, and such companies tend to have higher underpricing in their initial offering.

Another line of study examines the role of IPOs in company acquisitions. Celikyurt *et al.* (2010) used a sample of all of the IPOs of U.S. companies that were valued over US\$ 100 million between 1985 and 2004. The results suggested that acquisitions play a central role in the growth of IPOs. The companies' M&A operations grew significantly compared with the period before the IPOs.

Celikyurt *et al.* (2010) also claimed that IPOs make it easier to engage in mergers and acquisitions due to the inflow of funds into companies and the fact that the companies are able to access the stock market. Additionally, when companies begin trading their shares, they create a currency that facilitates their M&A operations. The authors found that a company with overvalued stock tends to make acquisitions via the exchange of shares with the acquired company and that IPOs increase the firm's ability to reduce problems with valuation uncertainty that were previously encountered because they were private companies.

In the same line of study, Hovakimian & Hutton (2010) claimed that over one-third of the companies that undertake an IPO participate in the market as buyers of other companies during the three years following the IPO. In addition, Hovakimian and Hutton explained that IPOs facilitate acquisitions because the company obtains money raised from investors, the company can obtain new funding in the stock market and the company can pay for acquisitions through the exchange of shares. Moreover, by becoming publicly traded companies, companies also benefit from the exposure and feedback from the market to become potential buyers of companies that are to be sold.

Brau (2010) analyzed whether companies that undertake IPOs also become targets to be acquired. Based on a sample of 4,795 IPOs, the results indicated that only 45 (3%) of the companies were acquired during the first year of trading, which is consistent with the theory that companies that go public are more likely to behave as purchasers and less likely to be acquired in the market.

In addition to the possibility of using the funds raised in an IPO for

acquisitions, companies that undertake initial offerings and subsequent offerings of shares often use a portion of the funds raised for research and development and for other investments required for the company's health, which is consistent with the theory that offerings of shares are conducive to raising funds to finance new investments (Kim & Weisbach, 2008).

Finally, other factors that may influence a company's decision to go public are related to the company's marketing strategies because of the media publicity and increased attention for listed companies (Demers & Lewellen, 2003), to the fact that publicly traded companies can obtain lower borrowing costs from third parties (Pagano *et al.*, 1998), to the relationship between the level of firms' risks and their executive compensation (Beatty & Zajac, 1994), and to the fact that business owners want their companies to be listed on a stock exchange to establish a price for their shares (reducing valuation uncertainties) as a first step to later sell the company (Zingales, 1995, Mello & Parsons, 1998).

### 3. Methodology

The econometric technique used in the research is the logistic regression with pooled data, which uses a binary dependent variable, assuming values that are necessarily between 0 and 1, to estimate the probability of response to a given phenomenon as demonstrated in the formula.

Because the data were pooled from the companies over time, the panel logistic regression model is also used in this study. The estimation of the panel data was performed using the random effects model. According to Baltagi (2008), when estimating a random effects panel logistic regression, the result will be suitable only if the variable  $y_{it}$  varies over time, and the log likelihood function is calculated based on the equation below:

$$L = \prod_{i=1}^N Pr(y_{i1})Pr(y_{i2})$$

If the binary dependent variable does not vary over time, i.e.,  $y_{i1}$  and  $y_{i2}$  are equal to zero, we will have  $P[y_{i1} = 0, y_{i2} = 0 / y_{i1} + y_{i2} = 0] = 1$ ; or if  $y_{i1}$  and  $y_{i2}$  are equal to 1, we will have  $P[y_{i1} = 1, y_{i2} = 1 / y_{i1} + y_{i2} = 2] = 1$ . Thus, in matrices whose dependent variables do not vary, the fixed effects model would not be recommended because for the logarithm of 1, the result is equal to 0 (Baltagi, 2008).

## Description of Variables

Because binary response model is used, the dependent variable can only assume values between 0 and 1. The dependent variable used in this study is related to the IPOs of Brazilian companies, in which  $y_{it} = 1$ , if company “ $i$ ” is a publicly traded company in year “ $t$ ”, and  $y_{it} = 0$ , if company “ $i$ ” is NOT a publicly traded company in year “ $t$ ”.

The dependent variables used, as well as the descriptions of how they are calculated, are listed in Table 1:

**Table 1**  
Variable descriptions

Variable	Description
GENERAL DEBT $t - 1$	The sum of one-year-lagged current liabilities divided by one-year-lagged noncurrent liabilities. The result is divided by the one-year-lagged total assets.
CAPEX/FIXED ASSETS $t - 1$	The one-year capital expenditures divided by fixed assets, both lagged by one year.
EBITDA MARGIN $t - 1$	The one-year-lagged earnings before interest, taxes, depreciation and amortization divided by the one-year-lagged net revenue.
LN ASSETS $t - 1$	The natural logarithm of total assets lagged one year.
LN AGE	The natural logarithm of the age of the company (time since its founding).
PRICE TO BOOK	The median price to book of the market (includes all listed companies from BM&FBovespa)
SUBSIDIARY	A dummy variable that equals 1 if the company is a subsidiary of either a national or multinational company and zero otherwise.
STATE-OWNED COMPANY	A dummy variable that equals 1 if the company is a state-owned firm and zero otherwise.
SOUTHEAST	A dummy variable that equals 1 if the company is located in the southeast region of Brazil and zero otherwise.
CRISIS	A dummy variable that equals 1 if the the period is equal to or later than 2008 and zero otherwise.

Source: prepared by the authors.

To account for the differences between publicly and privately traded firms, it was necessary to lag the accounting indicators of the companies by one year because these indicators are strongly affected by an IPO. Therefore, for the companies that decided to go public, we used pre-IPO accounting data.

With the variables defined, the model analyzed is shown as Equation 1:



$$\begin{aligned}
Pr(IPO) = & F(\beta_0 + \beta_1 GDEBT_{it} + \beta_2 CAPEX_{it} \\
& + \beta_3 EBITDA_{it} + \beta_4 ASSETS_{it} + \beta_5 AGE_{it} \\
& + \beta_6 PB_{it} + \beta_7 SUB_{it} + \beta_8 STATE_{it} \\
& + \beta_9 SOUTHEAST_{it} + \beta_{10} CRISIS_{it} + \epsilon)
\end{aligned}$$

where  $Pr(IPO)$  = the probability of a firm undertaking an IPO;

$GDEBT$  = the company's overall debt expressed as the sum of current liabilities lagged by one year, plus long-term liabilities lagged by one year, divided by the company's total assets lagged by one year.

$CAPEX$  = the investments made by the companies in their expansion, represented by investments in fixed assets lagged by one year divided by the company's fixed assets lagged by one year;

$EBITDA$  = the company's profitability expressed by one-year-lagged earnings before interest, taxes, depreciation and amortization divided by the company's net revenues lagged by one year;

$ASSETS$  = the size of the firm expressed by the natural logarithm of total assets adjusted by the IPCA (consumer price index), lagged by one year;

$AGE$  = the amount of time the company has been operating in the market, represented by the natural logarithm of 1 plus the age of the firm in year  $t$  since its founding;

$PB$  = the price-to-book indicator of the market, expressed by the median of the price-to-book indicator of the market in year  $t$  (median of the stock price divided by the book value per share of all firms traded on the Sao Paulo stock exchange in year  $t$ );

$SUB$  = the subsidiary variable. It is a dummy variable that is equal to 1 if the company is the subsidiary of a national or multinational company; otherwise, it is equal to zero;

$STATE$  = the state variable. It is a dummy variable that is equal to 1 if the company is controlled by federal, state or municipal Brazilian governments; otherwise, it is equal to zero;

$SOUTHEAST$  = the southeast variable. It is a dummy variable that is equal to 1 if the company is located in the southeastern region of Brazil; otherwise, it is equal to zero;

$CRISIS$  = a dummy variable that equals 1 if the period is equal to or later than 2008; otherwise, it is equal to zero;

$\epsilon$  = the regression error term.

It should be noted that, to mitigate the effect of outliers, the winsorization technique was used. The  $\alpha$  used in this work was 2%, i.e., the values that were between the lowest 2% and the highest 2% were replaced with the value immediately after (before).

### Sample and Data Collection

The financial data of privately held companies used in this study were collected from the Research Institute of Accounting Actuarial and Financial Foundation (FIEPECAFI). For purposes of this study, publicly traded companies are considered to be only those that have undertaken an initial public offering on the stock exchange, i.e., companies that went to the stock exchange to issue other securities (debentures, corporate bonds, etc.) were excluded from the research.

With respect to publicly traded companies, the data were collected from IPO prospectuses and from the Economatica software. It is worth emphasizing that only firms that went public during the period analyzed were included in the sample because the purpose of the study is to describe what factors led to the IPOs of Brazilian companies.

In addition, it was necessary to look up the companies individually on the website of the Federal Revenue of Brazil using the companies' tax ID number (CNPJ) to collect information on the year of companies' founding and the location of the companies in the five regions of the country. Table 2 shows the source of each variable, divided by the sample of privately traded companies and publicly traded companies.

In total, the sample contains 347 companies, 70 of which belong to the group of companies that went public. The total number of firm-years in the sample is 1,688. Companies that went public in the period were taken out of the sample in the year following their issuance of shares because the statistical model showed the characteristics of publicly traded and privately traded companies. Except for companies that went public during the period analyzed, the data for most of the privately traded companies in the sample refer to the period 2005 to 2010.

**Table 2**

Source of variables used in the research

Variable	Source – Nonlisted Companies	Source – Listed Companies
GENERAL DEBT $t - 1$	FIPECAFI“MAIORES & MELHORES”	Economática Software and Companies’ Prospectuses
CAPEX / FIXED ASSETS $t - 1$	FIPECAFI“MAIORES & MELHORES”	Economática Software and Companies’ Prospectuses
EBITDA MARGIN $t - 1$	FIPECAFI“MAIORES & MELHORES”	Economática Software and Companies’ Prospectuses
LN ASSETS $t - 1$	FIPECAFI“MAIORES & MELHORES”	Economática Software and Companies’ Prospectuses
LN AGE	Federal Revenue of Brazil	Federal Revenue of Brazil
PRICE TO BOOK	Economática Software	Economática Software
SUBSIDIARY	FIPECAFI“MAIORES & MELHORES” MAGAZINE	Companies’ Prospectuses Investor Relations Website
STATE-OWNED COMPANY	FIPECAFI“MAIORES & MELHORES” MAGAZINE	Companies’ Prospectuses Investor Relations Website
SOUTHEAST	Federal Revenue of Brazil	Federal Revenue of Brazil

It is worth highlighting that the Brazilian stock market experienced 116 IPOs between 2005 and 2010, but we excluded some of the publicly traded companies, including financial institutions and companies in the insurance sector (based on specific characteristics of the companies’ financial statements), IPOs conducted through the issuance of Brazilian Depositary Receipts (BDR) and companies whose data, especially the lagged variables we needed for the model, were unavailable.

Table 3 shows the IPOs that occurred during our sample period and that could be used in our sample, meaning that we had access to the companies’ pre-IPO data.

**Table 3**

Number of IPOs in our sample by firm-year

Year	2005	2006	2007	2008	2009	2010	Total
# of IPOs	6	19	33	2	4	6	70
# of Non IPOs	279	302	261	250	270	256	1,618

Source: prepared by the authors.

Table 4 shows the number of companies we analyzed in each sector as classified by the software program Economática. We show the number of companies in each sector that undertook an IPO and the number of companies that remained private.

**Table 4**  
Number of IPOs by sector

Sector	Fishing & Agriculture	Food & Beverage	Retail	Construction	Eletronics	Energy Equipments	Industrial	Mining Paper	Others	Pulp &
IPO	1	4	3	18	2	4	1	0	19	0
Non IPO	2	30	15	20	11	15	5	3	41	6
Total	3	34	18	38	13	19	6	3	60	6
Sector	Oil & Gas	Agricultural Production	Chemistry	Chemical & Petrochemical	Steel & Metallurgy	Telecommunication	Textiles	Transport & Services	Vehicles &	
IPO	0	0	2	1	1	5	1	2	6	0
Non IPO	12	15	12	18	20	11	7	4	21	9
Total	12	15	14	19	21	16	8	6	27	9

Source: prepared by the authors.

Finally, Table 5 shows the subsidiaries and state-owned companies in the sample, including the number of companies that undertook an IPO and the number of companies that remained as non-listed firms.

**Table 5**  
Subsidiaries and state-owned companies

Companies	IPO	Non IPO	Total
Subsidiaries	2	61	63
State owned	1	35	36

Source: prepared by the authors.

#### 4. Analysis of Results

This section presents the results obtained in the study, and it is divided into two parts: descriptive analysis and empirical analysis.

##### Descriptive Analysis

Table 6 shows the descriptive results of the variables used in the model for two distinct groups of companies: companies that undertook an IPO and companies that did not undertake an IPO.

The sample contains a total of 347 companies, 70 of which belong to the group of companies that went public during the period analyzed. When the companies were separated into publicly traded and privately held companies, it was possible to observe that the median of the one-year-lagged total assets of the companies that undertook an IPO was R\$ 445 million, compared with R\$ 600 million for the privately held firms. In addition, it is possible to state that, on average, the companies that went public were more indebted, with a median of 64%, compared with 53% for the privately held companies. However, the median of the EBITDA margin for companies that undertook an IPO was significantly higher (19.4%) than that of firms that did not choose to go public (11.0%). Finally, the median of the companies' age variable was higher for the privately held firms (37 years) than for the publicly traded firms (19 years).

**Table 6**

Descriptive statistics of the sample

Panel A – IPO Companies						
	Average	Median	Std. Deviation	Minimum	Maximum	# Companies
TOTAL ASSETS $t - 1$	831,053	445,325	1,168,621	840,199	7,762,000	70
EBITDA MARGIN $t - 1$	24.0%	19.4%	17.4%	-3.0%	82.8%	70
GENERAL DEBT $t - 1$	62.0%	64.3%	20.8%	4.6%	94.7%	70
CAPEX/FIXED ASSETS $t - 1$	43.7%	33.0%	32.4%	0.0%	153.5%	70
AGE + 1	22	19	16	2	73	70
Panel B – Non IPO Companies						
	Average	Median	Std. Deviation	Minimum	Maximum	# Companies
TOTAL ASSETS $t - 1$	1,533,342	600,109	3,007,739	49,736	27,634,923	277
EBITDA MARGIN $t - 1$	13.2%	11.0%	13.8%	-35.3%	90.1%	277
GENERAL DEBT $t - 1$	53.4%	52.8%	22.3%	4.5%	93.3%	277
CAPEX/FIXED ASSETS $t - 1$	15.4%	2.1%	28.2%	0.0%	148.9%	277
AGE + 1	33	37	13	3	104	277

Total Assets  $t - 1$  is the company's total assets, lagged by one year, in Brazilian Reals, adjusted by the IPCA index. EBITDA MARGIN  $t - 1$  is the earnings before interest, taxes, depreciation and amortization, lagged by one year, divided by the annual net revenues, lagged by one year. General Debt  $t - 1$  is the general indebtedness of the company lagged by one year, measured by the sum of the current liabilities and long-term liabilities, both lagged by one year, divided by the total assets lagged by one year. Capex/Fixed Assets  $t - 1$  is the investment in fixed assets lagged by one year divided by the company's fixed assets, also lagged one year. Age + 1 is the year of the information obtained minus the year when the company was founded plus one year.

The greater profitability of the publicly traded companies may precisely reflect the preparation for their IPOs, with the sale of shares being conducted when the companies were more profitable and more attractive to investors.

In addition to the descriptive statistics, it is important to note that in our sample, the correlations between the explanatory variables are weak, so there is no multicollinearity in the model.

### Logistic Regression Analysis

In this section, we estimated a logistic regression model with pooled data on the likelihood of a company to go public, indicating which variables have the greatest impact on the decision of a company to start trading its shares on the market. In addition, the panel logistic regression model was used to compare the results, considering that the companies' data were monitored over time.

Table 7 presents the results of the maximum likelihood obtained from the equation above, as well as the standard errors, the Z statistics and the p values of the proposed model. The results presented are related to the mod-

els estimated both by panel logistic regression (random effects) and the logistic regression with pooled data. The table indicates the variables that contributed to the IPOs of sample's Brazilian firms during the period analyzed.

**Table 7**

Panel logistic regression and logistic regression results with pooled data

VARIABLES	Panel Logistic Regression	Logistic Regression with Pooled Data
GDEBT	1.65** (2.42)	1.08*** (2.85)
CAPEX	2.43*** (3.29)	1.70*** (4.34)
EBITDA	7.36*** (3.24)	5.05*** (4.45)
ASSETS	-0.06 (-0.28)	-0.14 (-1.02)
AGE	-1.83*** (-3.66)	-1.12*** (-6.33)
PB	3.12*** (3.71)	2.06*** (5.71)
SUB	-3.93*** (-3.01)	-2.70*** (-3.59)
STATE	-3.16** (-2.00)	-2.40* (-1.88)
SOUTHEAST	2.04*** (2.79)	1.35*** (3.41)
CRISIS	-0.49 (-0.81)	-0.75* (-1.85)
COEFF.	-6.26* (-1.83)	-3.29* (-1.77)

GDEBT is the general indebtedness of the company lagged by one year, measured by the sum of the current liabilities and long-term liabilities, both lagged by one year, divided by the total assets of the company, also lagged by one year. CAPEX is the investment in fixed assets lagged by one year divided by the fixed assets lagged one year. EBITDA is the earnings before interest, taxes, depreciation and amortization, lagged by one year, divided by the annual net revenues, lagged by one year. ASSETS is the natural logarithm of the total assets adjusted by the IPCA, lagged by one year. AGE is the natural logarithm of the result obtained by subtracting the year the company was founded from the year of the information, plus one year. PB is the median of the indicator (share price divided by book value per share) for all of the companies traded on the Sao Paulo Stock Exchange in the year of the information. SUB is a dummy variable equal to 1 if company "i" is the subsidiary of a national or multinational company in year "t"; otherwise, it is equal to zero. STATE is a dummy variable that is equal to 1 if company "i" was controlled by the federal, state or municipal government; otherwise, it is equal to zero. SOUTHEAST is a dummy variable that is equal to 1 if the company is located in the southeastern region of Brazil; otherwise, it is equal to zero. CRISIS is a dummy variable that is equal to 1 if the period is after the 2008 crisis; otherwise, it is equal to zero. \*\*\*, \*\*, and \* indicate levels of significance of 1%, 5% and 10%, respectively.

As shown in Table 7, the results of the coefficients are very similar when the model is obtained with panel logistic regression and with logistic

regression with pooled data. To determine whether the estimates of the random effects are the same as those of the logistic regression with pooled data, we calculated the Hausman test. The Hausman test analyzes the hypothesis that the coefficients of the two estimated models differ substantially. The result of this test was a p-value of 0.9898, indicating that it is not possible to reject the hypothesis that the estimates for the panel logistic regression and the logistic regression with pooled data are statistically similar. Thus, the analysis is conducted together.

The results shown in Table 7 indicate that the firms that undertook an IPO were the most indebted firms. An IPO was an alternative to adjusting the company's capital structure. In addition, the investment variable was statistically significant, confirming that companies made investments before the IPO, and, when they began trading their shares, they had a new method to raise funds to continue investing in their expansion. Both the "GDEBT" variable and the "CAPEX" variable were statistically significant, with 99% confidence.

Due to the weak correlation between the indebtedness variable and the investment variable, it is not possible to prove that the Brazilian companies that went public were those that had incurred debts to make investments. Companies may be indebted for a reason that is specific to the firm or the sector of activity, and their level of indebtedness may be low or they incur debts to make investments. Therefore, the debts may or may not have resulted from funds that were used for investment purposes. These results corroborate those found in a sample of Italian companies in the study conducted by Pagano *et al.* (1998) and in samples of U.S. companies in the studies conducted by Brau (2010) and Kim & Weisbach (2005).

In terms of aftermarket performance, Leal (1994) affirmed that less leveraged firms that opted to go public had a greater price run-up than in other IPOs. Comparing our results, leverage may increase the probability of going public, but the less leveraged firms may present better initial returns than more leveraged firms.

The price-to-book variable showed a positive and significant coefficient, with 99% confidence. This result indicates that Brazilian companies undertook their IPOs at a time when the median value of the shares of all of the companies listed on the BM&FBovespa was higher than their book value per share. When the market is highly rated, companies take advantage of this window of opportunity and make their stock offerings. This result corroborates the studies on market timing with U.S. companies conducted

by Lowry (2003) and those carried out by Rossi Junior & Céspedes (2008) and Rossi Junior & Marotta (2010) with Brazilian companies. In addition, the result corroborates the study of Pagano *et al.* (1998), who found that the “market-to-book” variable (market value of listed companies divided by their book value) was significant to increase the likelihood of a firm going public.

It is important to note that companies that went public waited for the appropriate time to undertake their IPOs, both because the market was more optimistic and receptive to the entry of new companies and because the companies themselves benefited from the net present value (NPV) of projects while they were able to do so, that is, while they were still able to borrow at competitive rates.

Because our sample accounts for IPOs from 2005 to 2010, it is important to create a variable to differentiate the period after the world financial crisis. Our results show that after 2008, there was a lower propensity to undertake an IPO because the markets were highly unstable, investors were more risk averse and fewer companies went public.

With respect to the profitability of the companies as measured by the EBITDA margin, Pagano *et al.* (1998) stated that the effect of this variable on the probability of undertaking an IPO is ambiguous. On the one hand, profitable companies that generate cash would not need to go public to raise funds for their investments, indicating that such companies would be less likely to go public. On the other hand, companies that are experiencing high profitability could benefit from the publicity from the market that they are very profitable and that they will continue to be profitable to sell their shares at a high price. This case would positively affect the probability of going public. The results of our study indicate that the Brazilian companies went public during a period of high profitability because the coefficient of the EBITDA margin variable was significantly positive and statistically significant with 99% confidence. Together with the probability of undertaking an IPO, the profitability of a company may also contribute to higher initial IPO returns, as shown by Leal (1994).

With respect to the size of the companies as measured by their total assets, contrary to expectations, this variable was not significant in increasing the likelihood of Brazilian companies undertaking an IPO. The ASSETS variable did not obtain a p-value that could have confirmed its statistical significance. This result does not corroborate the study of Italian companies carried out by Pagano *et al.* (1998).

To explain the result related to the “size” variable, it is important to highlight some aspects of the Brazilian market during the period analyzed. During the first decade of the 21st century, some pre-operational companies undertook IPOs with very small asset accounts before the IPO. In addition, other companies that went public also had small asset accounts, as in the case of some construction and real estate companies and even some service companies. This specific characteristic of the Brazilian market in the period analyzed contributed to this variable not being significant in the model. Nevertheless, it is also important to note that several large companies did not choose to go public during the period, which also influenced the outcome for this variable.

Together with the company’s size, it is also important to analyze the company’s market time, i.e., the period, in years, between the year to which the accounting data refer and the year the company was founded. Also contrary to expectations, this variable (age) did not contribute positively to companies’ IPOs. In the study conducted by Pagano *et al.* (1998), the age variable was significant. According to these authors, Italian investors required that companies were already operating in the market for some time so there was more confidence because at the time of the study, the rules of governance, especially the protection of minority shareholders, were fragile and did not inspire confidence in investors. Thus, the companies’ market time should be longer for an increased likelihood of undertaking an IPO.

However, in the period analyzed for the sample in this study, Brazil already had well-established rules of governance through the deployment, in December 2000, of listing segments differentiated according to the level of corporate governance required. Thus, investors were not afraid to invest funds in companies that were relatively new, as there were even IPOs for pre-operational companies, as noted previously. Moreover, the market in Brazil was experiencing a moment of high liquidity during the sample period, and Brazil was experiencing a period of economic growth that attracted investors to allocate capital to companies in the country.

One question that can be asked about the result obtained from the variable of the companies’ market time is why some of the firms that were large enough and that had existed for a long time did not choose to go public. The possible reasons are related to internal problems of corporate governance and the fact that some business owners were against undertaking an IPO. However, the scope of this study does not include such variables because there is little data available for privately held companies.

The results of the study also indicate that companies located in the southeastern region of the country were more likely to undertake an IPO than those located in other regions. It is important to note the concentration of wealth in the southeastern region of Brazil. In 2008 (the latest data available), this region accounted for 56% of Brazil's gross domestic product (GDP), while the southern region, the second richest region, accounted for only 16.6%. The State of São Paulo alone, the richest in the country, represented approximately twice the GDP of the entire southern region and approximately 2.5 times the GDP of the entire northeast region in 2008 (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA – IBGE, 2011).

Despite the tax incentives that have existed in the north and northeast regions since the 1960s (Harber Junior, 1982), the stimulus to migrate the production system to these regions has not been successful enough to reduce the wealth disparities of the regions in recent years. According to the IBGE (2011), the northeast region accounted for 12.7% of the national economy in 2004, increasing to 13.1% four years later. The northern region, in turn, increased its share of the Brazilian market from 4.9% to 5.1% between 2004 and 2008.

The economic concentration in the southeast contributes to the hypothesis of resistance to IPOs. The closer a company is to the financial hub of the country (especially the state of São Paulo), the more intense the business environment. Therefore, businesspeople in this region are more likely to seek financing alternatives and less likely to attach importance to the benefits of raising funds in the stock market.

Moreover, the actual costs of going public and the competition with public financial institutions can derail Brazilian companies' IPOs. The listing costs (BM&FBOVESPA, 2011b), distribution costs (underwriters, auditors, lawyers, etc.), corporate restructuring costs and the underpricing itself may discourage business owners from undertaking an IPO unless there is a specific reason. As noted in this study, the companies that began trading their shares made significant investments and may have increased their indebtedness due to the possible implementation of projects with positive NPV and the exhaustion of the company's borrowing capacity. However, companies that are not in this situation and that can still finance their projects by incurring debt do not have strong economic reasons to go public.

Firms that are capable of financing their projects by incurring debt will

do so, especially if there is a financial institution that offers them attractive lending rates. The federal government, through the BNDES (Brazilian Development Bank), offers several lines of credit at very low cost to encourage business owners to borrow money from the institution instead of raising funds in the stock market. The question is not the importance of funds from the BNDES or from other governmental institutions to the development of the country, but the fact that these incentives decrease the possibilities of companies going public.

Finally, the “subsidiary” variable, which was used to indicate firms that were subsidiaries of national and multinational companies, and the “state” variable, as expected, had negative coefficients. Carve-out operations are still very new in Brazil, and, by 2010, only two companies had undertaken an IPO as a result of this corporate restructuring operation. Thus, the subsidiaries of companies are less likely to go public (see Table 5).

In addition, state-owned enterprises are less likely to go public because the government has a controlling interest in such companies. Consequently, the government ends up using such companies to defend political interests or the country’s interests, and such actions are not related to the maximization of shareholder value or profitability. Politicians may be interested in preventing such companies from going public because then they are not obliged to disclose all of the companies’ financial and operational data to the public. Thus, to sell part of such a company in the stock market, the shares would have to be priced below their real value because of the companies’ risk, especially the risk related to changes in the government. The results confirm what we have presented in Table 5, which indicates that only one state-owned company from our sample undertook an IPO.

The fit of the model was statistically significant at a level of 1%, and the p-value of the chi-squared test statistic = 0.0000. In addition, the pseudo- $R^2$  of the model was 0.3833, which is higher than that found by Pagano *et al.* (1998) with a sample of Italian companies, whose pseudo- $R^2$  was 0.10.

In addition, to ensure the overall quality of the fit of the proposed model, the Hosmer-Lemeshow GOF (goodness of fit) test was calculated. According to Hair *et al.* (2006), “this statistical test measures the match between actual and predicted values of the dependent variable.” The higher the p-value of the test, the more appropriate the model is, given that the hypothesis tested is that there is no difference between the predicted and observed values (Dias Filho & Corrar, 2007). According to this test, the

model is adequately fit because its p-value is 0.8151; therefore, it is not possible to reject the hypothesis that the model is fit.

In addition, we calculated the classification table of the model to assess its accuracy. In the classification table, the rows indicate the model's prediction and the columns indicate what actually occurred. The logistic regression model calculates the probability of a company going public. The classification table is drawn according to the probability cut proposed by the researcher. As a default, the logistic regression model adopts a 50% probability that a company will be included in the prediction that the event will occur. For the purposes of this study, it was predicted that companies that went public would be those whose probability of undertaking an IPO was greater than or equal to 50%. However, it is important to emphasize that regardless of the cutoff point adopted for the model, the probability calculation is the same. In addition, the cutoff point of 50% probability is not a statistical rule and may vary according to the objectives of the researcher.

The results in Table 8 demonstrate the analysis according to the companies' data with cutoff points of 30% and 50% probability.

**Table 8**

Classification table of the logistic regression

Cut off = 30%		Real		
		IPO	NON IPO	Total
Forecast	IPO	30	6	36
	NON IPO	40	271	311
	Total	70	277	347
Correctly Classified = 95.3%				
Cut off = 50%		Real		
		IPO	NON IPO	Total
Forecast	IPO	19	2	21
	NON IPO	51	275	326
	Total	70	277	347
Correctly Classified = 95.7%				

Source: prepared by the authors.

According to the results shown in Table 8, the general model was approximately 94% correct in its estimation of whether company "i" undertakes or does not undertake an IPO in year "t". The forecast level of the model for companies that did undertake an IPO was 42.9% (30% cutoff) and 27.1% (50% cutoff). On the other hand, the forecast level for companies that did not undertake an IPO in year t was 97.8% correct (30% cutoff) and 99.2% correct (50% cutoff).

It is worth noting that we also ran the regression without the dummies 'state' and 'southeast' to see whether those variables would influence the model. The results did not differ much from the original.

To conclude the discussion, although we studied many important variables in a unique database of IPO companies and private companies that decided not to go public, it is important to note that, unfortunately, we could not access some other variables of private companies, such as those related to corporate governance, that could decrease or even eliminate the effect of some accounting, market and company characteristics variables that we used in this research. This is a limitation of the study that we suggest as an avenue for future research in Section 5 of this paper.

## 5. Conclusion

The present study aims to identify the determining factors for IPOs in Brazil. Based on accounting information, information about the market and the specific characteristics of a sample of firms that went public between 2005 and 2010 and privately held enterprises in the same period, the work helped to identify the characteristics of firms that undertook an IPO in Brazil, using the multivariate technique of panel logistic regression and logistic regression with pooled data.

The results obtained in the study indicate that firms that went public invested significantly in their growth and were increasing their indebtedness. An IPO became an option to adjust the companies' capital structures and/or to raise new funds to continue investing and growing. In addition, the profitability levels of the companies that began trading their shares were higher, which meant that such companies were worth more to investors, and the companies were able to seize an opportunity in the market to undertake their IPOs (market timing).

The study also showed that companies located in the southeastern region of the country are more prone to undertake IPOs. The economic concentration in this region of the country may cause businesspeople from other regions to be resistant to IPO, either because of the distance from the major financial hub or because they are less involved in an environment with stock market operations.

On the other hand, this study also showed that subsidiaries are less likely to undertake an IPO because subsidiaries are controlled by companies that already are publicly traded firms in other countries. In addition, state-owned enterprises are also less likely to undertake an IPO because such

companies are controlled by the state and they are often used to safeguard the interests of politicians or the country's interests, neither of which are related to the maximization of shareholder value.

Finally, the study showed that company size is not statistically significant for undertaking an IPO because small, pre-operational Brazilian companies have undertaken IPOs, while many large companies have not chosen to begin trading their shares on the stock exchange.

This study covered only Brazilian companies, and its conclusions cannot be extrapolated to companies in other countries. Moreover, the study was limited to the period between 2005 and 2010, but the future reality of companies may change with advances and changes in the Brazilian economy.

As a contribution to future studies, we suggest the elimination of one limitation of our study: the inclusion of corporate governance variables of pre-IPO firms and firms that opted not to go public to see whether those variables are significant in terms of explaining the probability of Brazilian companies' decisions to go public. Additionally, including the results of the probability of undertaking an IPO, there is an opportunity to analyze the post-IPO performance of companies that had a higher probability of going public compared with other companies that had a lower probability. Finally, we suggest adopting the methodology used here to identify determining factors for debt issuances by type of debt (debentures, Eurobonds, etc.). In addition, we suggest analyzing the use of the funds raised in stock offerings to determine whether IPOs are intended primarily for the organic growth of a company (as before the IPO) or for the company's growth through acquisitions.

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