Factors Influencing Brazilian Firms in their Decision to List on Foreign Stock Exchanges

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Abstract

The paper's purpose is to determine empirically factors that influence Brazilian firms in their decision to cross-border list their stock. The methodology adopted involves an economic analysis of Brazilian cross-listed firms, characterizing and differentiating them from non cross-listed firms, univariate and multivariate tests, using the *logit* model and a sample of 288 firms listed on Brazilian stock exchanges. The economic analysis shows that cross-listed firms invest substantially, and are profitable, dynamic, and highly valued on the domestic market. The results of the hypotheses tests indicate that size, stock market share, exposure on foreign markets, and best practices of corporate governance seem to be factors influencing Brazilian firms to cross list. Firms belonging to the Telecommunications industry sector seem to have a higher probability to cross-list. The relevance of the study is in improving the knowledge on the behavior of Brazilian firms in international capital markets.

Key words: Brazilian firms, cross-border list, cross-list, stock markets, *logit* model

1 Introduction

One of the characteristics of the world's economic globalization is the internationalization of capital markets, in which investors residing in certain countries purchase financial instruments issued in foreign countries, as well as firms based on different countries offer their stock in markets located in foreign countries, which is known in the literature as cross-border listing or simply cross-listing. Hence, American firms can be cross-listed in European or Asian stock exchanges and vice-versa. Depositary Receipt (DR) is the generic denomination of the certificate that allows firms to cross list their shares in foreign markets. Depending on the market where they are issued, they receive specific denomination, such as American Depositary Receipts (ADRs), Argentine DRs, Spanish DRs, Global Depositary Receipts (GDRs), in the European market, or Brazilian Depositary Receipts (BDR), when foreign firms list their stock in the Brazilian market. The initial ADR programs approved by CVM, the Brazilian stock market regulatory agency, occurred in 1992, and by the first semester of 2004 Brazil had reached 135 DR program open overseas, involving 80 firms. From the total of such programs, 86 refer to stock listed in American stock exchanges, involving 67 firms. There are also DR registered programs issued in Argentina, Spain, and Europe (CVM, 2004a). Exhibit 1 depicts the evolution of DR programs approved by CVM from 1992 to 2003.

The daily turnover of Brazilian ADRs in the US is nearing Bovespa's (*Bolsa de Valores de São Paulo*/Sao Paulo Stock Exchange) and affecting the domestic transactions. The daily ADR turnover of 36 Brazilian firms in March 2004, in the NYSE, reached US$ 296

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million against US$ 327 million in Bovespa. The higher liquidity on foreign stock markets allows arbitrage operations, which affect the local prices. The most important factors for foreign investors are firm size and operations profile: exporting firms and those with foreign exposure offer lower risks. Firms listed in American stock exchanges are transnational and compete with firms from other countries and, therefore, they need to capitalize in foreign markets, where capitalization rates are lower. Cross listing is considered advantageous, since firms must adopt higher degrees of transparency given requirements imposed by international accounting standards, which amplifies stock buying and selling potential, which induces better corporate governance practices (Velloso and Frisch, 2004).

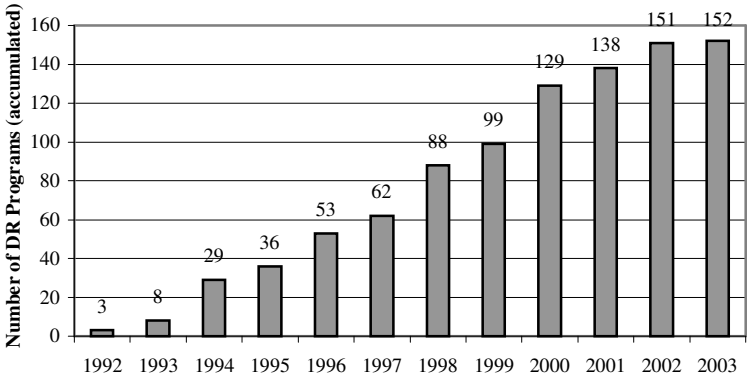

Exhibit 1 – DR Programs Approved from 1992 to 2003. Source: CVM

This important and growing strategic movement of Brazilian firms toward cross listing their stock leads immediately to the question: which are the factors influencing Brazilian firms to list their stock in foreign stock exchanges? Hence, attempting to answer to this question, the purpose of this paper is to identify empirically the factors influencing Brazilian firms to list their shares in foreign stock markets.

The remainder of the paper unfolds as follows: Section 2 surveys the various kinds of DRs, which are instruments related to cross listing; Section 3 presents a literature review; Section 4 describes the methodology adopted for the statistical tests; Section contains the empirical results obtained and their analysis; and Section 6 presents the conclusions.

2 Financial Instruments: Depositary Receipts

Depositary Receipt (DR) is the generic financial and legal instrument by means of which a publicly listed firm trades its stock on a market different from the domestic one. They are certificates representing rights to shares, issued overseas by a depositary institution, backed by securities deposited in special custody in the home country. In Brazil, the trading of these certificates depends on the program's approval by the Brazilian Central Bank (BACEN) and CVM and, in other countries, by their corresponding regulating authorities. The best-known types of DR are *American Depositary Receipt* (ADR) – for the American market; *International Depositary Receipt* (IDR) and *Global Depositary Receipt* (GDR) – for the European market (ANDREZO; LIMA, 1999). The ADRs first appeared in 1927, when JP Morgan made the first issue, making possible that Americans could purchase British firms' stocks. Since the American experience, other markets have disciplined their DR programs,

bringing about IDR, GDR and, in 1996, BDR (*Brazilian Depositary Receipt*). Within the DR program options (CVM, 2004), there are two other types of DR: the Argentine DR and the Spanish DR. The ADR types differ with respect to the level of requirements of transparency and obedience to the regulations of the *Securities and Exchange Commission* (SEC), of the local stock exchanges, as well as of adherence to the *United States Generally Accepted Accounting Principles* (USGAAP) (ANDREZO; LIMA, 1999):

- ADR level I (*Pink Sheet*) – involves only a conversion into ADRs of a firm's stock purchased in the Brazilian stock exchanges. The shares that back the ADR already exist on the secondary market. There is no acquisition of new resources by the issuing firm. The SEC formalities are smaller and there is no need to adjust accounting procedures to the US norms.
- ADR level II (*Lister*) – does not allow the acquisition of new resources, but entitles the firm to list its stock in the American stock exchanges (NYSE, AMEX or NASDAQ). It requires complete registration at the SEC and in one of the American exchanges, adoption of the USGAAP and supplying regular and detailed information to investors.
- ADR level III (*Fully Registered*) – allows the public offer of ADRs associated to issues of new shares and, hence, the gathering of capital resources by the issuing firm. It requires SEC registration, adapting to the USGAAP, and preparation the issue prospect.
- ADR "*Rule* 144A" – authorizes the trading of securities to institutional investors, aiming at increasing liquidity in the US private placing market. Costs and restrictions are lower, because it is considered that these investors are experienced enough to produce their own analyses. There is no need of registration at the SEC and of adjusting to the USGAAP.
- ADR Regulation S type (or REG S) – it does not require registration at the SEC nor obedience to the US accounting norms. This kind of ADR foresees the issuing of new shares, which are traded between non-Americans only (CVM, 2004a).

Firms adhering to the Bovespa's Distinguished Practices of Corporate Governance (Level 1, Level 2, or New Market) might be inclined to list in the foreign market, since they are concerned with improving their relationship with investors, which is an important condition for cross listing. At Level 1, firms take the responsibility of improving the disclosure of information to the market and of increasing stock dispersion. At Level 2, besides the requirements of Level 1, firms and their controllers adopt a far larger set of governance practices and additional shareholders rights. The entrance of a firm into the New Market means adhering to a set of societary rules, which are more stringent that those set by the ordinary Brazilian law. These rules amplify shareholders rights, improve the quality of the information disclosed and offer investors a safer and more agile alternative to the dispute of conflicts by means of the Arbitrage Chamber (BOVESPA, 2004c).

3 Literature Review

Saudagaran (1988) studied factors that influence firms' decision to cross-list their stock and observed that the large number of corporations with shares listed in foreign stock markets was making less clear the distinction between local and international capital markets. He proposed to answer to the following question – what does motivate a firm to have its stock listed on a foreign stock exchange? If a firm makes most of its commercial transactions and raises capital in its own country, it might be not necessary to cross list its stock in other countries. However, with the increasing business globalization processes, firms begun to

recognize the potential for growth by expanding overseas. As firms grow, they need to search for technology, personnel, raw materials, and capital in foreign countries. The quest for foreign capital, either in debt or equity form, is sufficiently important to motivate them to consider the cross listing. Saudagaran considered the following factors as relevant:

Financial – the level of liquidity and the degree of segmentation of the domestic capital market might be important for a firms' capital cost determination. Firms based in countries with relatively small capital markets might face an inelastic capital supply curve if the capital sources are restricted. A new stock issue might saturate the local market and lower their share prices. Hence, firms may join larger capital markets, to expand their potential investors' base and to increase the demand for their stock.

Marketing – to cross list their stock might be beneficial to increase the firms' visibility and image by amplifying identification of their product in the host country. By negotiating with authorities, distributing prospectuses, advertising on the press, and meeting journalists and financial analysts, a firm exposes itself strongly in the international financial community.

Political – insofar a foreign firm trades its stock in a host country, the firm gets local support and might neutralize eventual hostile nationalist sentiments that might exist in the host country. Most stock exchanges determine that listed firms, both local and foreign, distribute periodically financial information in a familiar format to the local investor. It is likely that a local listing might enhance the interest for the firm by local analysts and the financial media.

Human resources – a greater dependence on foreign personnel requires more attention with job relations in foreign branches. Without this, it could be extremely difficult for multinational corporations and their overseas subsidiaries to keep the necessary relations with employees required for the success of their operations. Many firms establish benefits where employees might become shareholders, with the expectation that they will be more interested in the firm's economic performance. Such factors might justify the costs of cross-border listings.

Saudagaran (1988) tested four hypotheses related to those factors: (i) firm participation in the domestic stock market; (ii) importance of foreign countries as markets for the firms' products; (iii) overseas investment relative to total investment (assets); and (iv) relative size of the foreign workforce. A firm's nationality (host country) might also affect its cross-listing decision. Possible reasons for this are the financial report's extension and the registration requirements, which could affect the cost of cross listing, as well as the capital and product markets size in the host country. Listing abroad can also vary by industry sectors. Firms from certain industries have shown a greater propensity to cross list their stock. Saudagaran's (1988) test results are consistent with the hypothesis that a firm's relative size in its domestic stock market has significant influence on its decision to list overseas. His results also support the marketing hypothesis: firms that are more dependent on foreign markets cross list more often than those that sell primarily on the domestic market. The statistical non-significance of the proportion of foreign assets in the univariate tests and a signal contrary to the expected in the multivariate tests contradicted the political motive hypothesis, which had predicted a positive relationship between this variable and the cross-listing decision. His main conclusions are that besides absolute firm size, firms' main business line and their nationality influence the decision to cross list their shares: (i) a firm's relative size in the domestic

exchange market; (ii) the firm's dependence on foreign markets. It was not possible to detect significant relationship between the proportion of foreign assets to total assets and the decision to cross list stock.

Pagano, Röell, and Zechner (2002) analyzed firm characteristics before and after the cross-border listing. They found out that high technology and exported oriented firms are attracted by American stock exchanges, but that export expansion was not affected by the cross listing. Firms cross listing their stock in Europe rarely present fast growth, but their competitive advantages grow after the cross listing. They raised hypotheses that firms might cross list because of financial issues (cheaper or more readily available financing) and because of issues related to strengthening the firm with regard to their suppliers, employees, and clients. They also observed that cross listing firms have high growth rates, which translates into higher price/earnings ratios, vis-à-vis purely domestic firms. Cross-border listings can also mitigate market segmentation by reducing barriers against foreign investors and transaction costs, as well as by increasing information availability. The stock exchange location can be determinant in the decision to cross list, if the host country possesses a higher technological level. High technology firms seem to have higher probabilities of listing in the US, where corresponding local firms are well developed. Firms might also cross list in order to achieve high accounting transparency and corporate governance standards. Firms located in countries with inadequate transparency and supervision standards could have higher propensity to cross list. If stock exchanges compete against each other for new firms by adjusting their regulatory standards, this motivation might diminish through time, due to the adjustment obtained. In this direction, they suggest that the present improvement in the European regulatory standards is attracting American institutional investors toward stock listed exclusively in Europe. Certain markets might be superior to others by offering liquidity for reasons of superior microstructure with an expanded shareholder and trading volume base. A temporary price advantage of a firm's stock abroad or a price devaluation in the home market can also explained the cross listing. The authors also analyze the record of cross listing of American and European firms in order to verify trends in cross-border listing throughout various continents, as well as the market characteristics where these shares were listed, with regard to accounting standards, degree of shareholder protection, market performance and transaction costs. They identified positive correlation between cross listings and transaction costs, accounting standards, and shareholder protection.

Pagano et al (2001), after analyzing 2,322 firms that cross listed their stock in American and European between 1986 and 1997, verified that the number of American firms that listed stock in European markets decreased by one third, whereas there was a considerable increase in listings of European firms on American stock markets. The lack of attractiveness of European stock exchanges, which also showed decline on their own domestic market listings, could explain this fact. Firm size and the recent privatization programs increased the probability of a firm to cross list. High technology firms seek the American market due to the presence of competent analysts and institutional investors specializing in evaluating these firms. The American market has higher liquidity, better accounting standards, and higher shareholder protection than the European. Insofar as these comparative advantages translate into a lower capital cost, they can be particularly important for firms in need to raise resources. They conclude that the firms' decision to cross list might be related to the characteristics of the stock market of destination. The most attractive stock exchanges could be those located in countries with higher liquidity, better shareholder protection, legal and bureaucratic systems that are more efficient, but not those with accounting standards that

are more restrictive, where negative correlations were identified. A possible explanation for this result is that the cost of adapting to accounting standards that are more stringent might exceed the benefits brought by a higher transparency.

Desai (2004) proposes some relevant factors related to firms seeking for foreign markets to list their stock. Among others, the author cites the following: (a) better shareholder protection – greater visibility on governance and accounting reports might improve firms assessments, increasing their credibility among investors; (b) product market – firms listing their stock in markets where they sell their products might amplify the visibility on themselves and their products among consumers; (c) labor market – firms with employees abroad might be interested in list their stock in theses foreign markets as an employees incentive program.

There are other studies on cross-border listing, but with different scopes from the present paper. For example, Bin, Morris and Chen (2003) treated issues related to the influence of exchange rate changes on ADR pricing. The exchange rate risk premium might be understood by investors as potential benefits of portfolio diversification and hedging opportunities provided by international investments. Karolyi (1998) and Viswanathan and Zychowicz (2003) studied cross listings aiming at analyzing market behavior rather than the firms' decision process. For this reasons, we have not discussed these papers in this study.

Sanvicente (1996) performed a study where, rather than seeking for factors explaining cross-border listings, investigates the characteristics of firms that decided for initial public offers (IPOs) in the Brazilian market, differencing them from those that remained non-listed. He utilized univariate and multivariate tests, and discriminant analysis to investigate the variables that help discriminate a listed from a non-listed firm and the (direct or inverse) relationship between each variable's value and firms' classifications (listed x non-listed). The hypotheses investigated by Sanvicente (1996) using univariate tests to explain why firms are publicly listed are related to size (Net Operating Revenue and Equity), profitability, sales growth, liquidity, debt, and investment level. His main conclusions are that larger firms (Net Operating Revenues and Equity) are likely to be listed; listed firms tend to show low profitability, as they are mature firms; listed firms tend to show slow growth, also for being mature; listed firms have lower liquidity, since they have more access to the financial market and are likely to manage their working capital better.

4 Methodology

Having in mind the paper's purpose of identifying factors that influence firms' decision to cross list their stock, the methodological procedure adopted consists of testing, by means of cross-section regression analysis, a set of hypotheses involving selected explanatory variables, so as to determine which of them influence, positively or negatively, the appropriate dependent variable. The dependent variable in question is qualitative and binary: the firm is cross-listed or not. This section contemplates the methodology adopted, focusing on the hypotheses formulated, data and variable description, and the *logit* regression model, which is appropriate when the dependent variable is binary.

4.1 Financial Analysis of Brazilian Cross-Listed Firms

Prior to formulating hypotheses that will permit test factors influencing Brazilian firms to cross list, we performed a financial analysis of the cross listed firms, intending to

characterize and differentiate them from the non-cross listed, analogous to Sanvicente (1996) with respect to publicly listed firms, differentiating them from the non-listed ones. The financial analysis was base on selected financial ratios and other variables and on univariate and multivariate tests performed with the *logit* model. The selected ratios and variables were Return on Equity (ROE), Annual Sales Growth, Stock Return, Earnings per Share (EPS) growth, Earnings Price Ratio (EPR), Current Liquidity, Total Debt Ratio, and Investment/Sources Ratio. The meaning of these ratios and variables is described as follows:

- ROE – is the firm's return rate relative to the equity capital invested;
- Annual Sales Growth – evaluates the firm's dynamics or growth potential on its product or service market;
- Stock Return – is the return rate for the shareholder holding the firm's stock;
- EPS Growth – measures the evolution of the firm's profitability relative to the number of shares outstanding;
- EPR – is the firm's EPS divided by its current share price, and it is used to compare the attractiveness of stock, bonds, and instruments in the money market (*earnings yield*). EPRs are lower for firms with high growth potential and higher for firms with greater degrees of risk.
- Current Liquidity– measures the proportion of current liabilities that can be covered by current assets.
- Total Debt Ratio – measures the proportion of total assets that can be covered by total liabilities.
- Investment/Sources Ratio – measures the proportion of sources of funds conveyed to investments.

Detailed discussion on those ratios and factors are largely available in the literature (Sanvicente, 1996; Brigham and Houston, 1996; Ross et al, 1993; Salmi and Martikainen, 1994). The above ratios and variables are described in grater detail in Section 4.4. The financial analysis results are shown in Section 5.1.

4.2 Hypotheses

The hypotheses on factors that might influence Brazilian firms to cross list and their respective justifications are based on the studies cited on the literature review, more specifically on Saudagaran (1988), Pagano et al (2001, 2002), and Sanvicente (1996). The hypotheses are listed below, together with their justifications:

H1: Absolute size – *larger firms have higher propensity to cross list their stock*. The proxies utilized were Net Operating Revenue, Equity, Total Assets, and Asset Tangibility. The justification for this test comes from the registration criteria for cross listing, which generally require that firms must be large. Besides, large firms have better conditions to bear the costs of cross listing and to adapt to international accounting regulations, besides transparency and governance requirements.

H2: Participation on the domestic stock – *firms with strong participation on the Brazilian stock market are more likely to cross list their shares*. Firms in this situation face

restrictions to raise resources locally, due to the limited size and liquidity of the Brazilian stock market, so they need alternative sources of capital.

H3: Market-to-book ratio (MBR) – *cross-listed firms have high MBRs*. This ratio signals that firms with high MBRs have highly valued shares, making it interesting for them to issue new stock (and possibly DRs) (De Medeiros e Daher, 2004; Rajan and Zingales, 1985).

H4: Exposure on the foreign market – *firms with large export volumes are more likely to cross list*. The justification for this relates to marketing and political issues where firms with strong overseas exposure need to improve their visibility on the markets they operate.

H5: Experience in local issues – *cross-listed firms are experienced in issuing stock on the domestic stock exchange*. Firms raising resources on the national capital market are more experienced and more familiar with this kind of operation, which might encourage them to search for foreign stock markets.

H6: Corporate governance – *cross-listed firms adopt best corporate governance* (Bovespa's Levels 1 or 2, or the New Market). Firms pursuing these practices in Brazil might find it easier to adapt to international requirements of disclosure and transparency.

H7: Industry – *firms belonging to certain industry sectors are more likely to cross list*. Certain industries are related to factors such as high technology, exports, or other specific factors, which might induce participants to cross list (Pagano et al, 2002).

We could not test in our study Saudagaran's (1988) hypotheses concerning the relative percentage of overseas assets with respect to total assets, and the number of employees abroad, since there is no availability of data on these factors in Brazil.

4.3 Data

Information on stock and DR issues were obtained by consulting CVM's reports (CVM, 2004). Information on corporate governance practices were obtained at Bovespa's internet site (BOVESPA, 2004c). Information on export levels were obtained at the internet site of the Ministry of Development, Industry and Commerce (MDIC, 2003). Accounting and financial data for the 288 sampled firms were extracted from Economatica®, with accounting figures adjusted for inflation according to the Augmented Consumer Price Index (IPCA – IBGE) as of 12/31/2003. Sampled firms are listed either on Bovespa or SOMA - *Sociedade Operadora do Mercado de Ativos S/A*, responsible for operating the over-the-counter stock market in Brazil.

4.4 Variable description

Dependent variable: the dependent variable is a binary variable, taking the value of 1 (one) if the firm is cross-listed and 0 (zero) if not. We considered firms cross-listed on the American, Argentine, Spanish and/or European (GDR) on 12/31/2003. Data were obtained from CVM (2004). Exhibit 2 presents a summary of sampled cross-listed firms, and the corresponding market where their DRs are listed.

Brazilian Firms in Sample:	Number of DR firms	% relative to sample (288)	% relative to all DR firms
Cross-border listed	71	24,65	100,00
Listed in the US (ADR)	60	20,83	84,51
Listed in other countries	11	3,82	15,49
DRs issued with resource raising	21	7,29	29,58
DRs issued without resource raising	46	15,97	64,79
DRs not specified by CVM	4	1,39	5,63

Exhibit 2– Brazilian Cross-Listed Firms. Source: CVM (2004)

Independent variables:

Participation on the domestic stock market - based on the quantity of ordinary shares outstanding as of 12/31/2003, multiplied by the closing share price quote on the same date, divided by total capitalization, which is the sum of market values of all sample firms. The data were obtained from Economatica®.

Exposure on the foreign market - the proxy for this variable are the firms' export levels, built from the Ministry of Development, Industry and Commerce's annual report (MDIC, 2003), and taking the following values: zero for non-exporting firms; one for firms exporting up to one million USD per year; two for firms exporting between one and ten million USD per year; three for firms exporting between ten and fifty million USD per year; and four for firms exporting over fifty million USD per year. From the 288 sample firms, 129 are non-exporting.

Absolute size – we considered alternatively Net Operating Revenue, Equity, Total Assets, and Asset Tangibility (Fixed Assets), average figures for 8 years, from 1996 to 2003.

Profitability – we considered alternatively Operating Margin (Operating Income/Net Operating Revenue) and Return on Equity (Net Earnings/Equity), average values for 8 years (1996 to 2003).

Sales growth – the proxy used was the Net Operating Revenue mean growth rate from 1996 to 2003.

Liquidity – measured by the Current Liquidity Ratio (Current Assets/Current Liabilities), 8-year average (1996 a 2003).

Total debt ratio (Liabilities/Total Assets) – 8-year average (1996 to 2003).

Investment Ratio – measured by Fixed Asset Acquisitions/Total Sources of Funds, and representing the level of investment relative to the total sources of resources – 8-year average, from 1996 to 2003.

Stock return – mean annual stock return, based on closing price quotes from 12/31/1996 and 12/31/2003, measured by $R_t = log(P_t/P_{t-1})$, which is stock return in continuous-time form, where R is stock return, *log* is the natural log operator, P is stock price, and subscript t refer to time period.

Earnings per share (EPS) growth rate – rate of change of the firm's earnings divided by the number of outstanding shares between 1996 and 2003.

Earnings/price ratio (EPR) – firm's profitability relative to its share price, 8-year average, from 1996 to 2003.

Market-to-Book ratio – market price of common stock per share divided by the book value of equity per common share, 8-year average, from 1996 to 2003.

Experience in issuing stock in the home market – we considered as firms experienced in raising capital via stock issues those that issued shares more than once during the period under analysis (01/01/1990 a 12/31/2003). It is a binary variable, taking the value of one if the firm has issued more than once in the period (37 firms) and zero for those that issued once (202) or just once (49). The source of data is CVM (2004b).

Corporate governance – indicates if the firm has adhered to the best practices of Bovespa's Corporate Governance requirements (Levels 1 or 2, or the New Market). Only 34 out of the 288 sample firms belong to the group since it was first created. It is a binary variable, taking the value of one if the firm has joined the program or zero if it has not. The source of data is BOVESPA (2004c).

Industry sector – these are dummy variables, indicating the industry to which the firm belongs. The dummy variable takes the value of one, if a firm belongs to a specific industry and zero, if it does not. The data were supplied by Economatica®, which assign firms in 19 industrial sectors.

The data referring to all accounting variables above were obtained from Economatica®, with their values being adjusted for inflation using Brazil's Augmented Consumer Price Index (IPCA/IBGE) as of 12/31/2003.

4.5 The *Logit* Model

The last 30 years have witnessed a proliferation of statistical methods for the analysis of qualitative data, among which the logistic regression model or *logit* model, which is appropriate to deal with one qualitative dependent variable and one or more qualitative or quantitative independent variables. If the dependent variable is a binary variable, there is a probability of occurring one specific result ($Y = 1$), and another probability of occurring the opposite result ($Y = 0$), so that:

$$\text{Prob}(Y = 1 \mid \text{x}) = F(x, \beta) \tag{1}$$

$$\text{Prob}(Y = 0 \mid \text{x}) = 1 - F(x, \beta) \tag{2}$$

where β is a vector of parameters or coefficients, and x a vector of independent variables. The parameter vector β transmits the impact of changes in x on the probabilities on the left hand side. The problem is to define an appropriate mathematical function $F(\cdot)$ for the right hand side of equations (1) and (2). When the dependent variable is a binary variable, the linear regression model is not adequate for a series of econometric problems. Among the most frequent functions used in this situation is the logistic function (Greene, 2002):

$$\text{Prob}(Y = 1 \mid \text{x}) = \frac{e^{x'\beta}}{1 + e^{x'\beta}} \tag{3}$$

where Y is the binary dependent variable (cross-listed = 1; non-cross listed = 0), x is the vector of explanatory variables, β is the coefficient vector, and e is the Neper number.

The continuous independent variables were submitted to logarithmic transformations, with the purpose of reducing possible heteroscedasticity problems, given the dispersion of data due to the existence in the sample of firms with quite different sizes (Greene, 2002).

The *logit* model is estimated by using the log likelihood function, given by:

$$L = \sum_{i=1}^{n_1} \log F(x_i.\beta) + \sum_{i=n_1+1}^{n_1+n_2} \log[1 - F(x_i.\beta)] \quad (4)$$

where log is the natural log operator, $F(\cdot)$ the logistic function, n_1 the number of observations for which $Y = 1$, and n_2 the number of observations for which $Y = 0$ (Dhrymes, 1986; Pindick and Rubinfeld, 1998). With the purpose of reaching the highest robustness possible for the results, the *logit* regressions were estimated with robust standard errors, which are obtained through Huber and White's Quasi -Maximum Likelihood (QML) (Huber, 1967; White, 1982).

Hypotheses testing:

The null hypothesis and the alternative hypotheses for the statistical tests are:

H_0: $\beta_i = 0$ – the independent variable *i* does not exert influence on the firm's decision to cross list;

H_a: $\beta_i > 0$ - the independent variable *i* exerts positive influence on the firm's decision to cross-border list;

H_b: $\beta_i < 0$ - the independent variable *i* exerts negative influence on the firm's decision to cross list.

β_i is the coefficient associated to the i-th independent variable. In each hypothesis test, the rejection of H_0 implies the confirmation of one of the hypothesis formulated in Section 4.1. Not rejecting H_0 means that the factor in question does not influence the decision to cross list. Rejecting H_0 implies accepting the alternative H_a, if the independent variable has a positive effect on the decision to cross list, or the alternative H_b, if the independent variable has a negative effect on the decision to cross list. Tests of hypotheses on coefficients in *logit* models use the z-test, based on the normal standard distribution (Brooks, 2002), with a significance level of 5%. Because of this, a normality test for models with limited dependent variables was applied to all residuals of the univariate and multivariate regressions, resulting that the null of normality could not be rejected in all cases (Bera, Jarque and Lee, 1984).

5 Results

The empirical results obtained and their analysis are divided into three parts: the first one discusses the results of a financial analysis intended to characterize the cross-listed firms in terms of a set of accounting ratios, distinguishing those firms from the non-cross listed ones. The second part presents the univariate test results with the hypotheses on factors that might influence firms to cross list, and the third shows the results of multivariate tests involving the same hypotheses.

5.1 Financial Analysis

This section presents the results of a brief financial analysis of Brazilian cross-listed firms. Initially, we performed univariate tests with the *logit* model, having as independent variables the ratios and factors described in Section 4.1. In these tests, Return on Equity (ROE), Annual Sales Growth, Earnings per Share (EPS) growth, Earnings Price Ratio (EPR), and Investment/Sources Ratio where found significant, whereas Stock Return, Current Liquidity, and Total Debt Ratio were found not significant, all at 5%.

A multivariate test was then performed, also using the *logit* model, in which all ratios were grouped together. Eliminating the ratios with non-significant coefficients at 5%, we came to the result depicted in Exhibit 3.

Dependent Variable: FL_NFL
Method: ML - Binary Logit
Date: 02/27/05 Time: 11:19
Sample(adjusted): 8 284
Included observations: 243
Excluded observations: 44 after adjusting endpoints
Convergence achieved after 6 iterations
QML (Huber/White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-6.481305	9.652782	-0.671444	0.5019
LOG(INVEST)	1.588482	0.711622	2.232199	0.0256
LOG(SALES GROWTH)	1.318959	0.574332	2.296509	0.0216
LOG(EPR)	-1.431249	0.915973	-1.562544	0.0182
LOG(ROE)	1.493083	0.576725	2.588899	0.0096
LOG(EPR GROWTH)	1.170734	0.583905	2.005006	0.0450

Mean dependent var	0.348837	S.D. dependent var	0.482243
S.E. of regression	0.329837	Akaike info criterion	0.917100
Sum squared resid	4.025325	Schwarz criterion	1.162848
Log likelihood	-13.71764	Hannan-Quinn criter.	1.007724
Restr. log likelihood	-27.80913	Avg. log likelihood	-0.319015
LR statistic (5 df)	28.18297	McFadden R-squared	0.506722
Probability(LR stat)	3.35E-05		
Obs with Dep=0	28	Total obs	43
Obs with Dep=1	15		

Exhibit 3– Financial Analysis of Cross-Listed Firms

This outcome confirms the relevance of the ratios verified in the univariate tests and shows that Investment/Sources Ratio, Sales Growth, EPR, ROE, and EPS Growth are factors that differentiate cross-listed from non-cross listed firms. The positive relationships indicates that the higher the ratio, the higher the probability that a firm is cross listed, and a negative relationship indicates that the higher the ratio, the lower the probability that a firm is cross listed. From these results, we can say that cross-listed firms, relative to non-cross listed ones, are firms investing substantially with respect to their sources of funds, present significant sales growth, have high returns on equity, have high earnings per share growth, and show low earnings price ratios. The negative signal of the EPR coefficient might indicate that cross-listed firms have low EPRs, which means they are highly valued stock. Therefore, cross-listed firms seem to be profitable, dynamic, both in terms of sales growth and investment, and with high valued stocks on the home market. It should be noticed that since Current Liquidity, Total Debt Ratio and Stock Return did not show significant coefficients, this means they are not relevant to differentiate cross-listed from non-cross listed firms.

5.2 Factors Influencing the Cross-Listing Decision - Univariate Tests

H1: Absolute size was confirmed for all proxies utilized (Net Operating Revenue, Equity, Asset Tangibility, and Total Assets), as their β coefficients were found to be positive and significant.

H2: Participation on the home stock market was confirmed, with a positive β.

H3: Market-to-Book ratio, which has an expected positive β, was confirmed, *i.e.* cross-listed firms have higher MBRs.

H4: Exposure on the foreign market (exports) – this hypothesis was confirmed, with a positive β, *i.e.* cross-listed firms have high exposure on the foreign markets.

H5: Experience in stock issues at home was confirmed with a positive β, which means that cross-listed firms are capital raisers on the domestic stock market.

H6: Corporative Governance was confirmed with a positive β, which means that cross-listed firms are likely to be those committed to best corporate governance practices in Brazil.

H7: Industry sector was confirmed for two sectors, the dummies of which had positive and significant βs: Pulp & Paper and Telecommunications, meaning that firms belonging to these sectors are likely to cross list their stock. With regard to firms of the remaining industries, it seems that there is no relationship between those sectors and the cross-border listing.

Exhibit 4 synthesizes the univariate tests' relevant results. It shows the expected and observed relationships and the significant level verified in the hypotheses tests (*p-values*).

Hypotheses	Expected Relation	Observed Relation	p-value
H1: Absolute Size (NOR, Equity, Total Assets, A.Tangibility)	Positive	Positive	0.0000
H2: Participation on the home stock market	Positive	Positive	0.0000
H3: Market-to-Book Ratio	Positive	Positive	0.0031
H4: Exposure on foreign markets (Exports)	Positive	Positive	0.0497
H5: Experience in stock issuing	Positive	Positive	0.0187
H6: Corporate Governance	Positive	Positive	0.0000
H7a: Industry sector: Pulp& Paper	Positive	Positive	0.0357
H7b: Industry sector: Telecommunications	Positive	Positive	0.0269

Exhibit 4– Summary of univariate-test results

The univariate results show that all size related hypotheses were validated, at the 5% level, showing that size seems to be a relevant factor in the cross-listing decision. The Market-to-Book Ratio hypothesis was confirmed, showing that firms where this ratio is high perceive that their shares are highly valued and might decide to issue stock (or DRs) to take advantage of the favorable opportunity, since issuing stock when shares are highly valued means raising capital issuing less shares, which reduces dilution and minimizes possible value destruction for current shareholders (Rajan and Zingales, 1995).

Corporate Governance is the variable that showed the highest significance of all, highlighting the importance of this item for firms searching for insertion on the international capital markets. Confirming the hypothesis of international exposure means that these firms really seem to adopt marketing and political strategies to improve their image on the foreign markets, whereas confirming the hypothesis of experience in issuing stock suggests that firms that issue stock regularly on the home market are likely to become DR issuers abroad. The identification of the Pulp & Paper and the Telecommunications industries as those where firms have high probability to cross list reflect the fact that these are respectively a strong exporting sector (Pulp & Paper) and a high-technology sector (Telecommunications), which

should have, for these reasons, high probabilities to seek the international market (Pagano et al, 2002).

5.3 Factors Influencing the Cross-Listing Decision - Multivariate Tests

The variables considered in the univariate tests were grouped together for the multivariate tests, performed with multiple *logit* regression. The multivariate regression included all variables tested in the univariate tests, except for absolute-size variables, which are strongly correlated with home-market participation, which would cause an econometric problem of multicolinearity (Brooks, 2002). The best result obtained is on Exhibit 5. It can be seen that participation on the home stock market (PART), international exposure (EXPORT), corporative governance (GOV_CORP), and belonging to the Telecommunications industry (D15) are factors affecting positively the decision to cross list. Some variables that had shown significant in the univariate tests were not confirmed in the multivariate test: Market-to-Book Ratio, experience in issuing stock, and belonging to the Paper & Pulp industry.

Dependent Variable: FL_NFL
Method: ML - Binary Logit
Date: 02/28/05 Time: 09:33
Sample: 1 288
Included observations: 245
Excluded observations: 43
Convergence achieved after 4 iterations
QML (Huber/White) standard errors & covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.314198	0.777639	-0.404041	0.6862
LOG(PART)	0.112469	0.045680	2.462076	0.0138
EXPORT	0.208314	0.109958	1.894483	0.0582
GOV_CORP	2.373215	0.464146	5.113079	0.0000
D15	1.461414	0.570449	2.561867	0.0104

Mean dependent var	0.261224	S.D. dependent var	0.440201
S.E. of regression	0.384621	Akaike info criterion	0.940426
Sum squared resid	35.50397	Schwarz criterion	1.011880
Log likelihood	-110.2022	Hannan-Quinn criter.	0.969201
Restr. log likelihood	-140.7118	Avg. log likelihood	-0.449805
LR statistic (4 df)	61.01917	McFadden R-squared	0.216823
Probability(LR stat)	1.77E-12		

Obs with Dep=0	181	Total obs	245
Obs with Dep=1	64		

Exhibit 5 – Factors Influencing the Decision to Cross List – Multivariate Test

5.4 Conclusions

In the first part of the empirical study here reported, we developed a financial analysis of Brazilian cross-listed firms. This analysis showed that, in general, these firms maintain high investment levels with respect to their sources of funds, they are profitable, dynamic, and have highly valued shares in the country. They do not distinguish from non-cross listed firms with regard to liquidity, debt, and stock return.

When it comes to the factors influencing the decision to cross list, Saudagaran's (1988) hypothesis of participation on the domestic stock market was confirmed in all tests, as well as the hypothesis of exposure on the foreign markets. The former indicates that Brazilian firms with high participation on the Brazilian stock market might have recurred to foreign stock exchanges because they might have reached their capital-raising limit on the local

market and found that they needed to seek other capitalization sources. It can also indicate that they felt sufficiently experienced and strong on the local market, which encouraged them to list their stock in other markets. The latter might be associated to the marketing and political reasons mentioned by Saudagaran (1988) and Desai (2004) that an effective strategy for firms exposed on foreign markets might be to list their shares on theses markets to increase their visibility among clients, government, and media.

With respect to absolute size, the univariate tests tested confirmed the hypothesis that this factor is an important characteristic of cross-listed firms, which was not tested in the multivariate regression due to multicolinearity involving size and market participation. The reasons for the importance of size are similar to those described for the participation on the domestic stock market, besides the fact that requirements for a firm to list on foreign stock markets generally impose large size. Pagano, Roell and Zechner (2002) also understand that cross-listing costs are high, especially because of accounting standards requirements, which is more problematic for smaller firms.

It is worth to stress the importance of confirming corporate governance as the relevant factor with the highest significance in all tests. This confirms the sayings of Desai (2004) and Pagano, Roell and Zechner (2002), who considered that firms could decide for cross listing to reach high levels of accounting transparency and corporate governance, and that a highly regulated environment might lower the cost of capital. This is also in accordance with Desai (2004) when he says that firms looking for foreign markets to list their stock are searching for more shareholder protection, with more visibility on governance and accounting reports, which increases credibility among investors.

With regard to the industry issue, Pulp & Paper and Telecommunications are those that have shown positive and significant relationship with being cross-listed in the univariate tests. Pulp & Paper is a strong exporting industry, whereas Telecommunications is a high-technology industry, and these are relevant factors for the cross listing decision (Saudagaran, 1988; Pagano et al. 2001). However, only Telecommunications was found significant in the multivariate test, indicating that belonging to a high-tech industry seems to be more important than to an exporting industry.

As a general conclusion, we can say that Brazilian firms cross listed abroad seem to be, on average, large-sized, investing, dynamic, profitable and highly valued firms in the home market, and that the strategic factors motivating them to cross list seem to be: a) to amplify their capacity to raise capital, by trading in more promising stock markets; b) to enhance their visibility abroad so as to increase their competitiveness on international markets; c) to exploit the comparative advantages obtained from adopting best practices of corporate governance. Besides, belonging to the Telecommunications industry seem to increase the likelihood to cross list.

It should be kept in mind that, in spite of the extant literature cited on the bibliographical review and of other studies, not cited, there is not yet on the international literature a theory on the factors leading firms to cross list, in the sense that different theories on capital structure exist, for example. The state of art on the issue is still in a phase of hypotheses formulation and testing, and these might become a theory in the future. Evidently, this paper does not close the issue on Brazilian firms' willingness to cross list, since there are various other methodologies, variables, and data that might be utilized to help finding other relevant factors for cross listing and to confirm or even to question those factors found here. We believe that this is a multi-area research, involving strategic management, finance,

accounting, and quantitative methods, which may motivate researchers from these areas to contribute to a better knowledge on the theme.

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