

Market Segmentation and Stock Return Behavior in Domestic and ADR markets: Evidence from Some Emerging Countries

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Abstract

This paper analyzes the stock return behaviors in domestic and international markets when companies from Brazil and Argentina have their stocks cross-listed in domestic Stock Exchange and International Stock Exchange. It also analyzes evidences of Market Segmentation Hypothesis in Brazilian stock market. The segmentation model of Hietala [3], tested by Jithendranathan, Nirmalanandan & Tandon [5], is extended in this paper. In the period from July, 1997 to June, 2000 the ADRs and their underlying stocks were influenced by their domestic market. Some differences between ADRs prices and underlying stocks prices were found.

1. Introduction

Stock listing processes outside the home country have been noticeable, mainly by firms in emerging economies that are attracted by the advantages of developed markets, such as the North American and some European markets. One way of listing stocks outside the home country is by attracting new shareholders through share offerings in stock exchanges of countries like the United States and the United Kingdom. Share offerings in the United States, from foreign companies, are called American Depositary Receipts – ADRs. And share offerings in other countries, from foreign companies, are generally called Global Depositary Receipts – GDRs. So, investors can become shareholders of these companies either by buying their stocks in the local market or by buying their depositary receipts.

In countries where there are no constraints to capital flows, investors can earn through arbitrage operations, i.e. speculating with the different quotations of the same company in two countries. For instance, one can buy shares of stock in a local market, convert them to ADRs and sell them for a higher price in a foreign market, e.g. New York. Or, in the reverse way, one can buy ADRs in New York and sell them in their local markets for a higher price, by converting into stocks. This process of arbitrage, in an integrated market, can become the price of ADRs to be the same of the underlying stock price in US\$ dollars. In this context, this paper aims to analyze the returns observed in the Brazilian and Argentine stock markets, when the companies of these two countries have their stocks listed in both, their domestic market and in the American market.

Most research about cross-listed securities has tried to show evidence of capital market segmentation/integration (Hietala [3], Jithendranathan, Nirmalanandan & Tandon [5]), or has analyzed returns by comparing them before and after ADRs offering dates (Jayaraman, Shastri & Tandon [4]. Hietala [3] analyzed the unrestricted stocks price premium related to restricted stocks in the Finish market. Empirical data were consistent with the implication that price premium is positively correlated with domestic betas of the stocks. Jithendranathan, Nirmalanandan & Tandon [5] when analyzed the Indian market pointed that, when markets are segmented, cross-listed securities may be traded at different prices.

In this paper, Brazilian and Argentine markets are analyzed during the period of July 1997 to June 2000. Correlations among domestic market returns and American market returns of cross-listed companies are analyzed. Market Segmentation Theory was tested in the Brazilian stock market. Brazilian ADRs used in the sample are issued and quoted in US dollars on the New York Stock Exchange – NYSE, their underlying stocks are quoted in Reals (R\$) on BOVESPA and were adjusted to the exchange rate.

2. Literature review

Most papers focusing cross-listed companies deals with the issue of capital market segmentation versus integration through the analysis of the behavior of prices in the domestic and in the foreign markets. The Finnish market was analyzed by Hietala [3]. Hietala[3] extended the Sharpe-Lintner-Mossim CAPM to drive the equilibrium asset prices for both the restricted and unrestricted stocks in the Finnish stock market. He showed that citizens of a small country are willing to pay less for their domestic securities than are foreign investors.

According to Hietala's model "an unrestricted stock is traded at a price premium relative to the corresponding restricted stock if foreign investors required a lower rate of return on this stock than domestic investors do. If the rate required by foreign investors is higher than or the same as the rate required by domestic investors, the unrestricted and restricted stocks are traded at identical price." (Hietala [3]). Also, international and domestic betas of the stock determine premium's size. In empirical tests he observed that betas of Finnish stocks was not significantly different from zero and examined that the price premium were positively correlated with the domestic betas of the stocks and in particular with the firm size and the liquidity of the unrestricted stock.

The theoretical and empirical models developed by Hietala [3] was tested by Jithendranathan, Nirmalanandan & Tandon [5]. They studied the segmentation of Indian capital market and found that GDRs returns of Indian companies are influenced by many domestic and international variables, but only the domestic market influences returns on their underlying Indian

stocks. Jithendranathan, Nirmalanandan & Tandon [5] showed that testes on Indian GDRs indicate that foreign investors, who hold these depositary receipts, estimate the expected returns at a lower level than the domestic investors do. This leads to the GDRs being priced at a premium over the exchange rate adjusted prices of the underlying Indian Securities. "Indian investors, who are constrained by their choice of securities to only domestic stocks, should command a higher risk premium on their investment. Foreign investors who are unrestricted in their choice of securities may settle for a lower risk premium due to the diversification benefits of their larger portfolios of investable securities." (Jithendranathan *et al* [5]).

Jayaraman, Shastri & Tandon [4] analyzed the risk-return relationship of stocks in their domestic market when the companies are offering ADRs. The authors found that the listing of ADRs is associated with positive abnormal returns to the underlying stock on the listing day. Costa Jr. et al. [1] examined the impact of the listing of ADRs on the risk and return of the underlying Brazilian stocks during the period of 1990-96. Their results suggest that the listing of ADRs cannot be associated with abnormal returns on the underlying stocks around the listing day. However, they found a reduction in the volatility of the underlying stocks after the beginning of ADR trading.

Domowitz *et al*[2] when examined the Mexican market concluded that unrestricted shares have a substantial premium over the restricted shares. On the other hand, some papers demonstrated that there is no difference between stock prices. Park and Tavakkol *apud* Jithendranathan *et al* [5] studied Japanese ADRs Market and they found no significant differences between exchange rate adjusted ADRs returns and their underlying stocks.

3. Method and findings

In this paper, the period analyzed ranges from July 1997 to June 2000. For each month, stocks of Brazilian companies cross-listed in their domestic and American markets (ADRs) were identified. Then, a portfolio of twenty-five companies was built for each market. The prices were collected and monthly average returns were calculated, composing the data set. Also, average monthly returns for the whole period of DOW JONES, S&P 500 and IBOVESPA - São Paulo Stock Exchange Index – were calculated. For IBOVESPA, and underlying stocks, values were calculated in the Brazilian currency (R\$) and converted to US Dollars.

Table 1 shows the monthly average and the standard deviation of closing prices of both underlying stocks and ADRs for each individual company. The mean monthly premium is presented too. Initially, the premium was calculated monthly for each company and for each month in which the companies' underlying stocks and ADRs were traded. The monthly premium for each pair of ADR and underlying stock were calculated using the following formula:

$$\text{premium} = \frac{\text{price of the ADR} - \text{price of the underlying stock}}{\text{price of the underlying stock}}$$

The mean premium for each individual company presented in table 1 is the average of the monthly premiums calculated according to the formula above.

Table 1 – Average Monthly price, standard deviations and premium (%) for each company from July 1997 to June 2000.

	Stock		ADRs		Average Premium (%)
	Average	Standard Deviation	Average	Standard Deviation	
1. Aracruz	1.5575	0.4712	1.6326	0.4920	4.98%
2. Brahma	0.5897	0.1226	0.6190	0.1274	5.08%
3. Brasil T Par	0.0117	0.0030	0.0120	0.0030	1.65%
4. Cemig	0.0212	0.0067	0.0171	0.0024	5.24%
5. Copel	0.0101	0.0034	0.0093	0.0032	3.13%
6. Copene	0.1901	0.0831	0.2237	0.1013	8.37%
7. Eletrobras	0.0247	0.0099	0.0190	0.0020	1.76%
8. Embratel Part	0.0170	0.0052	0.0174	0.0054	1.09%
9. Gerdau	0.0076	0.0030	0.0118	0.0021	4.01%
10. Globo Cabo	0.7577	0.5629	0.7233	0.5588	-0.09%
11. Pão de Açúcar	0.0214	0.0066	0.0216	0.0066	1.07%
12. Sid Nacional	0.0231	0.0071	0.0245	0.0069	8.95%
13. Tele Celular Sul	0.0026	0.0012	0.0027	0.0012	-0.04%
14. Tele Centroeste Cel	0.0018	0.0011	0.0019	0.0011	2.34%
15. Tele Leste Cel	0.0007	0.0002	0.0007	0.0002	-0.29%

16. Tele Nordeste Cel	0.0017	0.0010	0.0018	0.0010	0.43%
17. Tele Norte Cel	0.0006	0.0002	0.0007	0.0002	2.06%
18. Tele Sudeste Cel	0.0058	0.0024	0.0060	0.0025	0.95%
19. Telemar	0.0163	0.0048	0.0182	0.0050	10.41%
20. Telemig Cel Part	0.0019	0.0010	0.0020	0.0011	1.15%
21. Telesp Cel Part	0.0122	0.0048	0.0126	0.0048	0.29%
22. Telesp Oper.	0.0248	0.0068	0.0219	0.0052	7.30%
23. Ultrapar	0.0107	0.0014	0.0105	0.0014	-1.33%
24. Unibanco	0.0228	0.0069	0.0514	0.0160	127.47%
25. Votorantim C P	0.0232	0.0095	0.0343	0.0035	-0.25%
GLOBAL MEAN	0.1343	0.0530	0.1398	0.0542	7.83%
STANDARD DEVIATION	0.3499	0.1430	0.3617	0.1455	25.13%

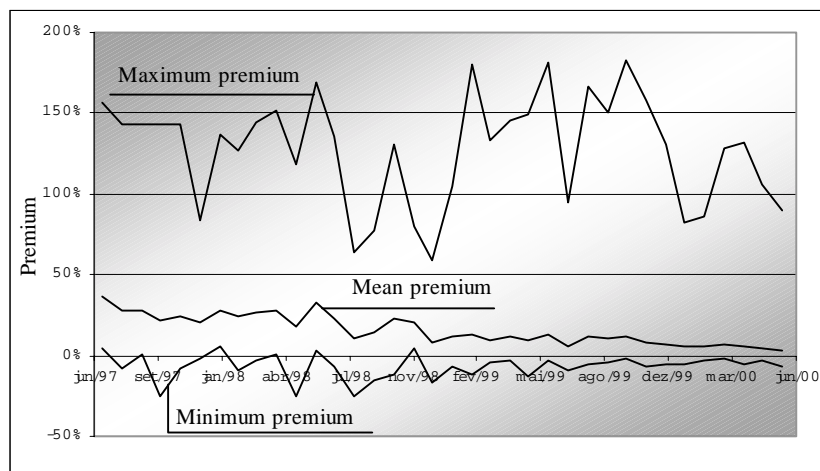
From table 1, one can notice that, for the majority of companies, the premium is positive. 20% or five companies out of a portfolio of 25 showed premiums less than zero. Unibanco showed an abnormal premium in comparison to the others, and 127% of ADR/underlying stocks price variation. The minimum monthly average premium was -1.33% and the maximum, from Telemar, was 10.41%. From table 2, there is no great variations in monthly premiums across companies. Apart of Unibanco, all companies showed monthly average premiums less than 12% (most of them varied from 0% to 2%).

Table 2 – Distribution of monthly average premiums for individual stocks

Average Premium	Number of companies	%
-1.5% – 0%	5	20%
0% – 2%	8	32%
2% – 4%	3	12%
4% – 6%	4	16%
6% – 8%	1	4%
8% – 10%	2	8%
10% – 12%	1	4%
Above 100%	1	4%
TOTAL	25	100%

Figure 1 shows the evolution of maximum, minimum and average premiums for each month from July 1997 to June 2000. Maximum and minimum curves were drawn from the greatest and the lowest premium, respectively, observed in each month for among all companies in the sample. The average premium curve was drawn from the average of all premiums calculated in each month. One can notice that along the average premium curve there is no non-positive point, hence, on average, ADRs' have traded at premium relative to the underlying stocks. Figure 1 also illustrated the fact that premium is decreasing over time. Along the average premium curve, the highest value was around 32% in June 1998 and the lowest value of 5% was observed in the first semester of 2000. The maximum premium curve was strongly influenced by one company (Unibanco), which premiums were abnormal compared to other companies. The highest maximum premiums were concentrated in the second semester of 1999, while the two lowest maximum – around 60% - were observed in August and December of 1998. Among all companies in the sample, the lowest average premium was -25%, observed in October 1997, May and August 1998.

Figure 1 - Maximum, minimum and monthly average premiums from July 1997 to June 2000



The following analyzes the returns of ADRs and their underlying stocks. The portfolio of companies is the same and just the months in which both the ADR and underlying stocks were traded were considered in the sample. Table 3 shows the average and standard deviations of monthly returns for each year within the time frame. The same procedure was used for the Argentine market, where MERVAL is the main stock index.

Table 3 – Average and standard deviations of monthly returns (%) for each year of the time frame.

	1997 *		1998		1999		2000*		Total Period	
	Avg. Return	S.D.	Avg. Return	S.D.	Avg. Return	S.D.	Avg. Return	S.D.	Avg. Return	S.D.
BRAZIL STOCKS	-3.72	9.76	-3.02	13.26	13.52	12.69	3.26	7.66	3.45	14.20
BRAZIL ADRs	-3.88	13.45	-2.97	17.62	5.29	14.30	6.98	20.57	1.80	16.38
ARG STOCKS	1.33	11.51	-0.36	12.53	1.94	9.61	-0.53	7.28	0.66	10.30
ARG ADRs (US\$)	1.32	11.62	-0.35	12.60	1.75	9.70	-0.48	7.22	0.61	10.35
IBOVESPA index return (R\$)	-2.47	14.58	-1.82	17.00	8.43	10.28	-0.02	8.89	1.79	13.74
IBOVESPA index return (US\$)	-3.03	14.57	-2.43	16.93	6.08	19.16	0.08	10.37	0.72	16.34
MERVAL (US\$)	-2.32	9.20	-2.52	15.64	2.68	11.90	-0.93	9.58	-0.49	12.33
S&P500 index return (US\$)	1.68	5.27	2.15	6.20	1.57	3.80	-0.05	5.37	1.51	5.03
DOW JONES Index return (US\$)	0.67	6.12	1.45	6.30	1.97	4.14	-1.47	5.16	1.01	5.33

* (We considered just the second semester of 1997 and the first semester of 2000)

By analyzing table 3, for the Brazilian market, the underlying stocks of ADRs showed a better performance than ADRs, considering the average monthly return for the total period. In the Argentine market, the results were very similar to the American market. Statistical tests showed that even though there were superior returns, the differences were not statistically significant.

Both, Argentine and Brazilian stocks showed greater returns than their local market index, i.e. MERVAL and IBOVESPA, respectively. The Brazilian ADRs showed greater returns than IBOVESPA and similar returns with respect to S&P500, while the Argentine ADRs showed returns greater than MERVAL and lower than S&P500.

Tables 4 and 5 are the correlation matrices among the portfolios – domestic and Americans – using the data set of 36 months. The former presents correlations for Brazilian and US markets, and the latter for Argentine and US markets.

Table 4 – Correlation Matrix for Brazil

	BRA STOCKS	BRA ADRs	IBOV.	IBOV. US\$	S&P500	DOW JONES
BRAZIL STOCKS	1	0.7855	0.9026	0.6720	0.4555	0.5297
BRAZIL ADRs	0.7855	1	0.8218	0.9464	0.5050	0.6074
IBOVESPA index return (R\$)	0.9026	0.8218	1	0.8272	0.6142	0.6348
IBOVESPA index return (US\$)	0.6720	0.9464	0.8272	1	0.5299	0.5832
S&P500 index return (US\$)	0.4555	0.5050	0.6142	0.5299	1	0.9099
DOW JONES Index return (US\$)	0.5297	0.6074	0.6348	0.5832	0.9099	1

Table 5 – Correlation Matrix for Argentina

	ARG STOCKS	ARG ADRs	MERV. US\$	S&P500	DOW JONES
ARGENTINA STOCKS	1	0.9977	0.9368	0.5574	0.6573
ARGENTINA ADRs	0.9977	1	0.9339	0.5385	0.6403
MERVAL (US\$)	0.9368	0.9339	1	0.4647	0.6041
S&P500 index return (US\$)	0.5574	0.5385	0.4647	1	0.9099
DOW JONES Index return (US\$)	0.6573	0.6403	0.6041	0.9099	1

Table 4 reveals that the underlying stocks of Brazilian ADRs have a high positive correlation with IBOVESPA and a low positive correlation with the American market, like it was expected. The ADRs are positively correlated with IBOVESPA and the American market indexes – S&P500 and DOW JONES.

Table 5 shows a high positive correlation between Argentine stocks and the local market index – MERVAL. The Argentine ADRs are positively correlated with the local index and the American indexes.

Table 6 shows the results of simple linear regression models applied to both countries. In a first stage, the dependent variable was the return of underlying stocks of ADRs in their domestic markets. And, in a second stage, the dependent variable was the return of ADRs. The independent variables were the two US indexes and the local index for each country, respectively.

Table 6 – Results for the regression model

Dependent variable: Brazilian stocks									
Independent variable:	constant	Std. Error	<i>t</i>	β	Std. Error	<i>t</i>	R ²	F	Significance
IBOVESPA index return (R\$)	1.7752	1.0428	1.702**	0.9325	0.0763	12.2243	0.8146	149.43	0.0000
IBOVESPA index return (US\$)	3.0240	1.7799	1.699**	0.5841	0.1104	5.2918	0.4516	28.00	0.0000
S&P500 index return (US\$)	1.5007	2.2348	0.6715*	1.2873	0.4314	2.9837	0.2075	8.80	0.0052
Dow Jones Index return (US\$)	2.0279	2.0736	0.9780*	1.4101	0.3873	3.6414	0.2807	13.26	0.0009
Dependent variable: Brazilian ADRs									
Independent variable:	Constant	Std. Error	<i>t</i>	β	Std. Error	<i>t</i>	R ²	F	Significance
IBOVESPA index return (R\$)	0.0471	1.5917	0.0296*	0.9791	0.1164	8.4090	0.6753	70.71	0.0000
IBOVESPA index return (US\$)	1.1161	0.8950	1.2471*	0.9487	0.0555	17.0924	0.8958	292.15	0.0000
S&P500 index return (US\$)	-0.6856	2.4988	-0.274*	1.6458	0.4824	3.4118	0.2550	11.64	0.0017
Dow Jones Index return (US\$)	-0.0739	2.2396	-0.033*	1.8648	0.4183	4.4586	0.3690	19.88	0.0001
Dependent variable: Argentine Stocks									
Independent variable:	constant	Std. error	<i>t</i>	β	Std. Error	<i>t</i>	R ²	F	Significance
MERVAL index return (US\$)	1.0442	0.6101	1.711**	0.7824	0.0501	15.6064	0.8775	243.5600	0.0000
S&P500 index return (US\$)	-1.0646	1.5118	0.7042*	1.1424	0.2919	3.9144	0.3107	15.3220	0.0004
Dow Jones Index return (US\$)	-0.6145	1.3365	0.4598*	1.2692	0.24962	5.0850	0.4320	25.857	0.0005
Dependent variable: Argentine ADRs									
Independent variable:	constant	Std. error	<i>t</i>	β	Std. Error	<i>t</i>	R ²	F	Significance

MERVAL index return (US\$)	0.9896	0.6265	1.5795*	0.7841	0.0515	15.2314	0.8722	231.9900	0.0000
S&P500 index return (US\$)	-1.0706	1.5424	0.6940*	1.1096	0.2978	3.7265	0.2900	13.88700	0.0007
Dow Jones Index return (US\$)	-0.6437	1.3692	0.4701*	1.2430	0.2557	4.8611	0.4100	23.6300	0.0000

* Not significant at 5%

** Not significant at 5%, but significant at 10%

The Beta of the regression models above are significant at 5%. One can notice, in table 6, that 89.58% of the variation in Brazilian ADRs returns and 45.16% of the variation in underlying stocks can be explained by IBOVESPA.

The American indexes did not show a great explanatory power, neither for Brazilian ADRs, nor for their underlying stocks, than the explanatory power of the local index.

For the Argentine market, 87.22% of the variation in ADRs returns and 87.75% of the variation in their underlying stocks' returns can be explained by MERVAL.

Although the regression is significant at 5% in most of the cases, the constant value of the regression models did not show statistical significance at 5% in any model.

Table 7 and 8 present the results of a multi-factor regression model with domestic Index and global index - S&P 500 or Dow Jones. In table 7 the results showed that only the domestic index is statistically significant in both ADRs market and underlying stocks market. In the Argentine market, when we analyzed the ADRs and the S&P 500, It was statistically significant only at 10%.

Table 7 – Results of the Multi-factor regression model with Domestic Index and S&P500 Index

Dependent variable: Brazilian stocks									
Independent variable:	constant	Std. Error	<i>T</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
IBOVESPA index return (US\$)	2.4798	1.8793	1.3195*	0.5205	0.1305	3.9897	0.4654	14.36	0.0000
S&P500 index return (US\$)				0.3906	0.4241	0.9210*			
Dependent variable: Brazilian ADRs									
Independent variable:	Constant	Std. Error	<i>T</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
IBOVESPA index return (US\$)	1.0941	0.9569	1.1434*	0.9461	0.0664	14.2429	0.8958	141.80	0.0000
S&P500 index return (US\$)				0.0158	0.2160	0.0732*			
Dependent variable: Argentine Stocks									
Independent variable:	constant	Std. Error	<i>T</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
MERVAL index return (US\$)	0.5326	0.6060	0.8789*	0.7220	0.0528	13.6670	0.8965	142.92	0.0000
S&P500 index return (US\$)				0.3190	0.1296	2.4609			
Dependent variable: Argentine ADRs									
Independent variable:	constant	Std. Error	<i>T</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
MERVAL index return (US\$)	0.5491	0.6391	0.8592*	0.7321	0.0557	13.1423	0.8861	128.37	0.0000
S&P500 index return (US\$)				0.2746	0.1367	2.009**			

* Not significant at 5%

** Not significant at 5%, but significant at 10%

Table 8 – Results for the Multi-factor regression model with Domestic Index and Dow Jones Index

Dependent variable: Brazilian stocks									
Independent variable:	constant	Std. Error	<i>T</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
IBOVESPA index return (US\$)	2.5417	1.7946	1.4163*	0.4783	0.1343	3.5623	0.4804	15.25	0.0000
Dow Jones Index return (US\$)				0.5557	0.4112	1.3512*			
Dependent variable: Brazilian ADRs									
Independent variable:	constant	Std. Error	<i>t</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
IBOVESPA index return (US\$)	0.8923	0.9060	0.9848*	0.8996	0.0678	13.2702	0.9004	149.18	0.0000
Dow Jones Index return (US\$)				0.2579	0.2076	1.2420*			
Dependent variable: Argentine Stocks									
Independent variable:	constant	Std. Error	<i>t</i>	β_1, β_2	Std. Error	<i>t</i>	R^2	F	Significance
MERVAL index return (US\$)	0.7295	0.6061	1.2036*	0.7098	0.0603	11.7642	0.8906	134.37	0.0000
Dow Jones Index return (US\$)				0.2777	0.1395	1.991**			
Dependent variable: Argentine ADRs									

Independent variable:	constant	Std. Error	<i>t</i>	β_1, β_2	Std. Error	<i>t</i>	R ²	F	Significance
MERVAL index return (US\$)	0.7258	0.6348	1.1434*	0.7233	0.06319	11.4465	0.8813	122.51	0.0000
Dow Jones Index return (US\$)				0.2327	0.1461	1.5928*			

* Not significant at 5%

** Not significant at 5%, but significant at 10%

We show the results of a multi-factor regression model with other global Index - Dow Jones in table 8. The results were similar with table 7.

In Table 9 and 10, we ran regressions individually for underlying stocks and ADRs that they had been traded in the period analyzed. The number of observations from July, 1997 to June, 2000 are showed in the next tables.

Table 9 – Results of the Multi-factor regression model with Domestic Index and S&P500 Index

ADRS	Nº Obs.	Constant	Std. Error	<i>t</i>	β_1, β_2	Std. Error	<i>t</i>	R ²	F	Significance
Aracruz	36	-1.2300	3.1700	-0.388*	0.1333	0.2200	0.6057*	0.2664	5.9933	0.0060
					1.8385	0.7154	2.5699			
Brahma	36	0.1466	1.5614	0.094*	0.5752	0.1084	5.3064	0.6123	26.057	0.0000
					0.4718	0.3524	1.3389*			
Brasil T Part.	19	-0.2086	2.2163	-0.094*	0.6622	0.1295	5.1129	0.6704	16.276	0.0001
					0.6455	0.5195	1.2426*			
Cemig	10	1.8330	2.4764	0.7391*	0.5461	0.1281	4.2627	0.7392	9.9183	0.0090
					-0.927	0.6559	-1.414*			
Copel	14	0.1762	2.8547	0.0617*	1.2847	0.2216	5.7963	0.8745	38.315	0.0000
					0.6710	0.9944	0.6748*			
Copene	17	5.6910	3.2139	1.771**	1.0254	0.2008	5.1064	0.6624	13.737	0.0005
					-0.514	0.7741	-0.664*			
Eletrobras	09	-1.6416	2.3328	-0.704*	0.5050	0.1825	2.7674	0.6532	5.6515	0.0417
					0.1942	0.5005	0.3880*			
Embratel Part.	18	0.3182	2.8809	0.1104*	0.8785	0.1669	5.2644	0.6966	17.223	0.0001
					0.8659	0.6629	1.3062*			
Gerdau	09	1.4139	3.4422	0.4108*	0.8036	0.2692	2.9845	0.6132	4.7564	0.0579**
					-0.526	0.7385	-0.712*			
Globo Cabo	32	9.8040	6.7349	1.4557*	2.1089	0.6483	3.2529	0.3036	6.3219	0.0053
					-2.258	1.7703	-1.275*			
Pão de Açucar	36	1.9926	1.9451	1.0244*	0.8599	0.1350	6.3684	0.6287	27.944	0.0000
					-0.024	0.4390	-0.054*			
Sid. Nacional	31	-0.7203	4.4563	-0.162*	-0.121	0.2977	-0.406*	0.2001	3.5032	0.0439
					2.4280	1.0094	2.4053			
Tele Celular Sul	19	3.0326	3.9627	0.7653*	0.8933	0.2316	3.8577	0.5054	8.1734	0.0036
					0.2395	0.9289	0.2578*			
Tele Centroeste Cel	19	4.1515	3.9322	1.0558*	1.1363	0.2298	4.9446	0.6289	13.558	0.0004
					0.3777	0.9217	0.4098*			
Tele Leste Cel	19	-0.6980	3.8974	-0.179*	1.1542	0.2278	5.0674	0.6525	15.020	0.0002
					0.7519	0.9136	0.8230*			
Tele Nordeste Cel	19	5.3911	5.2099	1.0348*	1.3385	0.3045	4.3962	0.5631	10.310	0.0013
					0.072	1.2212	0.0589*			
Tele Norte Cel	19	1.3690	5.4547	0.2510*	0.9725	0.3188	3.0508	0.3981	5.2902	0.0172
					0.4731	1.2786	0.3700*			
Tele Sudeste Cel	19	0.5512	5.3856	0.1024*	1.2435	0.3147	3.9509	0.5126	8.4125	0.0032
					0.1654	1.2624	0.1310*			
Telemar	19	0.0780	2.0992	0.0372*	1.0635	0.1227	8.6688	0.8434	43.074	0.0000
					0.5704	0.4921	1.1592*			
Telemig Cel Part	19	6.0414	3.5745	1.6901*	1.1223	0.2089	5.3726	0.6451	14.544	0.0003
					-1.456	0.8379	-1.738*			
Telesp Cel Part	19	2.7217	3.8852	0.7005*	0.7209	0.2271	3.175	0.3988	5.3059	0.0171
					-0.043	0.9107	-0.047*			
Telesp Oper.	19	-2.0709	3.1909	-0.649*	0.7487	0.1665	4.0152	0.5065	8.2112	0.0035

					-0.316	0.7479	-0.422*			
Ultrapar	08	-4.1942	4.6466	-0.903*	0.5941	0.3482	1.7063*	0.3799	1.5315	0.3028*
					-0.658	1.0779	-0.610*			
Unibanco	36	0.3235	1.9922	0.1624*	1.0588	0.1383	7.6557	0.7471	48.749	0.0000
					0.5538	0.4496	1.232*			

* Not significant at 5%

** Not significant at 5%, but significant at 10%

Table 10 – Results of the Multi-factor regression model with Domestic Index and S&P500 Index

Underlying Stocks	Nº Obs.	Constant	Std. Error	t	β_1, β_2	Std. Error	t	R²	F	Significance
Aracruz	36	0.8627	6.6655	0.1294*	-0.754	0.4627	-1.629*	0.1330	2.5312	0.0949*
					3.2784	1.5043	2.1793			
Brahma	36	0.9807	2.1282	0.4608*	0.1346	0.1477	0.9112*	0.3003	7.0822	0.0028
					1.2554	0.4803	2.6139			
Brasil T Part.	19	2.5964	3.3563	0.7736*	0.1635	0.1961	0.8335*	0.1885	1.8578	0.1881*
					1.1721	0.7867	1.4899*			
Cemig	10	5.5885	5.5409	1.0086*	-0.031	0.2866	-0.109*	0.0062	0.0217	0.9786*
					-0.256	1.4676	-0.174*			
Copel	14	3.8601	3.3430	1.1547*	0.8406	0.2596	3.2382	0.5086	5.6914	0.0201
					-1.833	1.1645	-1.574*			
Copene	17	9.7693	3.0338	3.2201	0.4289	0.1896	2.2625	0.2882	2.8338	0.0926*
					-0.066	0.7307	-0.091*			
Eletrobras	09	-1.0731	2.7751	-0.387*	0.3449	0.2171	1.5888*	0.5229	3.2881	0.1086*
					0.6148	0.5954	1.0326*			
Embratel Part.	18	3.6965	4.5407	0.8141*	0.2826	0.2630	1.0746*	0.1433	1.2541	0.3136*
					0.9227	1.0448	0.8831*			
Gerdau	09	1.5747	3.3641	0.4681*	0.6095	0.2632	2.316**	0.5396	3.5157	0.0976**
					0.0388	0.7218	0.0537*			
Globo Cabo	32	10.2427	6.0670	1.6883*	1.9823	0.5840	3.3942	0.2967	6.1171	0.0061
					-2.862	1.5947	-1.79**			
Pão de Açucar	36	2.5587	2.2899	1.1174*	0.4378	0.1590	2.7538	0.3412	8.5473	0.0010
					0.5975	0.5168	1.1561*			
Sid. Nacional	31	1.8050	3.4759	0.5193*	-0.207	0.2322	-0.890*	0.1755	2.9802	0.0671**
					1.8796	0.7874	2.3871			
Tele Celular Sul	19	7.1401	6.0933	1.1718*	0.3039	0.3561	0.8535*	0.0891	0.7824	0.4741*
					0.9786	1.4283	0.6852*			
Tele Centroeste Cel	19	8.1168	4.4242	1.835**	0.5903	0.2586	2.2832	0.2695	2.9511	0.0811**
					0.2730	1.0370	0.2632*			
Tele Leste Cel	19	2.1338	4.4180	0.4830*	0.6043	0.2582	2.3405	0.3331	13.9957	0.0391
					1.0181	1.0356	0.9831*			
Tele Nordeste Cel	19	8.2687	5.6961	1.4516*	0.7197	0.3329	2.1619	0.2746	3.0293	0.0766**
					0.8395	1.3352	0.6288*			
Tele Norte Cel	19	4.2127	5.9498	0.7080*	0.5301	0.3477	1.5244*	0.1710	1.6498	0.2231*
					0.8324	1.3947	0.5969*			
Tele Sudeste Cel	19	3.1296	5.1964	0.6023*	0.6112	0.3037	2.012**	0.2311	2.4043	0.1222*
					0.4464	1.2180	0.3665*			
Telemar	19	3.2271	3.4074	0.9471*	0.4465	0.1991	2.2421	0.3726	4.7518	0.0240
					1.2154	0.7987	1.5217*			
Telemig Cel Part	19	8.5641	4.1216	2.078**	0.6245	0.2409	2.5927	0.3130	3.6441	0.0496
					-1.302	0.9661	-1.348*			
Telesp Cel Part	19	6.1128	5.7747	1.0586*	0.113	0.3375	0.3299*	0.0483	0.4064	0.6728*
					0.9968	1.3536	0.7364*			
Telesp Oper.	19	1.1934	3.4264	0.3484*	0.2916	0.2002	1.4563*	0.1232	1.1236	0.3495*
					-0.556	0.8032	-0.692*			

Ultrapar	08	-3.8576	4.5067	-0.856*	0.4824	0.3377	1.4285*	0.2929	1.0357	0.4204*
					-0.973	1.0454	-0.930*			
Unibanco	36	3.5956	2.4261	1.4821*	1.1292	0.1684	6.7051	0.6209	27.021	0.0000
					-0.546	0.548	-0.997*			

* Not significant at 5%

** Not significant at 5%, but significant at 10%

In the tables 9 and 10 we didn't analyze the Votorantim company because it isn't traded in sufficiently months.

By the table 9 we can observe that 21 of 24 companies have presented significant betas when ADR are related too domestic index - IBOVESPA- and most of companies didn't present significance in the betas when related whit a global index - S&P500.

In table 10 we conclude in the same way, more companies are significantly related whit the IBOVESPA than the S&P500.

4. Final results

This paper focuses on two emergent countries in Latin America, both with big companies that have issued stocks outside their home country. We analyzed the stocks return behavior in domestic and ADRs markets and we verified if the Segmentation Market Hypothesis holds good in the Brazilian market, i.e. if there was any difference between ADRs prices and underlying securities, adjusted for exchange rates.

All correlations were positive and significant at 5% level, revealing a similar behavior for stocks and their local index and for ADRs and their underlying stocks. The findings suggest that, in Brazil and Argentina, the ADRs and their underlying stocks are strongly influenced by their domestic market.

We found differences between the underlying and ADRs stock prices, but when we run the multi-factor regression analyses for each company, in general the betas were significant only with domestic index.

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