Electoral Contagion in Latin America

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Abstract

Latin America suffer before each democratic election due to its structural clivage, high social inequity and demands. The objective of this paper is to show that at elections, for some importants countries, the contagion effects increase the correlation of the return series markets.

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1 Introduction

During the last presidential run, Brazil suffered a heavy uncertainty about the running of economy at Lula's government, the first candidate on previous bullets. Lula is the great worker's leader of the PT ("'Workers Party"')[1] . At a proposed program for their administration, the leaders of PT proposed a new model for the brazilian economy based on the government investments and market misregulation [2]. The brazilian financial market index, called Bovespa, and the exchange rate reflected the political uncertainty . Brazilian exchange rate rose from 2.87 on 07/05/2002 to 3.69 at 10/04/2002[3].

Venezuela suffered in the same way at the electoral run before Chave's victory. Argentina after their crisis suffered due to populist promisses of Kirshiner's government.

The financial market of the three countries related above experienced days of high nervosism represented by an increase of volatility. One simple question arises after a look of this data: Do the others latin countries suffer due to this specific electoral uncertainty?

This paper will try to answer this question or simply clarify the problem. We may think that in these episodes the uncertainty at one market spilled to others. So this hypothesis will be discussed in a contagion framework.

The empirical methods of contagion stem from [Bek92], [ERFL90], [KW90] and from historical papers like [Sha64], [GR71]. The current research focuses on many branches: (i) Reactions to unexpected shocks or news (ii) Correlation analysis (iii) Probability tests (iv) Extreme return tests (v) Others tests, according to the classification of the World Bank [4]. This paper is based on the correlation analysis and reactions to unexpected news. The electoral run can be thought as a sussection of unexpected news of previous ballots or macroeconomic results which can influentiate the performance of the situation candidate.

Contagion is treated the same way of [Mas99] , i.e a crisis triggered that can not be explained by changes in fundamentals or any sort of "'mechanical"' spillover. This can be possibly caused by shifts in market sentiments. The mechanical effects cited above arise at balance of payments crisis, for

[1] See [Sam02] for a detailed view about PT

[2] "'The implementation of our government program for Brazil, by a democratic and popular, will represents a rupture to this economic model, founded at the market openness and radical desregulation of the brazilian economy and thus subordination of their dynamic to the globalized financial capital humors and interests."' Olinda government program 12/2001.

[3] See in graph the exchange rate series of the electoral year.

[4] www.worldbank.gov

example, transforms to deterioration of fundamentals in other countries.

The role of the investor in a electoral crisis episode can be appointed in two ways: (1) An increase of risk perception in this emerging country and/or increase of risk aversion by investors; (2) The implication of (1) is the need to rebalance portfolios to contain "‘Value at Risk"’ and/or move their investments to saffer countries. Due to the fact that each Latin economy is connected with a high degree of trade with others, investors may forecast that the other economies will suffer because of the electoral uncertainty at the "‘ground zero"’ and start a crisis cycle.

Another way of contagion is through trade. With high levels of trade, a financial crisis affects their trade partners by fall in demand. For the latin america countries, treated at this work, this is an important link. The exports of Argentina to Brazil represents about 30 percent of total exports. Further works should treat this channel. Only the financial channel will be taken in account, because it seems that the stock market is more sensitive to unanteciped news.[5]

At the second section the Forbes and Rigobon model used will be discussed and will be given explanation for the choice of this model instead of others like the probability model.

The results of the regression treated at the second section will be in the third section.

The last one concludes and gives same appointments for further research.

[5] See [Rij99] for a framework testing if the source of contagion is finance or trade.

2 Model

[FR02] defined crisis as an increase in correlation between two countries during a fixed period. So it's implemented by testing the contagion from the host market, to another asset market. The test is based on the (unconditional) correlation between pairs of assets returns in the crisis and non-crisis period. The correlation between the assets returns of country 1 to country 2 during the crisis period is

$$\rho_y = \frac{Cov(y_{1,t}, y_{2,t})}{\sqrt{Var(y_{1,t})Var(y_{2,t})}} = \frac{\sigma_{y,1,2}}{\sqrt{\sigma^2_{y,1}\sigma^2_{y,2}}} \tag{1}$$

whilst

$$\rho_x = \frac{Cov(x_{1,t}, x_{2,t})}{\sqrt{Var(x_{1,t})Var(x_{2,t})}} = \frac{\sigma_{x,1,2}}{\sqrt{\sigma^2_{x,1}\sigma^2_{x,2}}} \tag{2}$$

Represents the correlation in the pre-crisis period. If there's an increase in the volatility in the county's asset return, $\sigma^2_{y,1} > \sigma^2_{x,1}$ without having any change in the two countries fundamentals, then $\rho_y > \rho_x$ given the false appearance of contagion. To adjust for this bias, Forbes and Rigobon show that the adjusted (unconditional) correlation is given by

$$\nu_y = \frac{\rho_y}{\sqrt{1 + \left(\frac{\sigma^2_{y,1} - \sigma^2_{x,1}}{\sigma^2_{x,1}}\right)}} \tag{3}$$

To test that there is a significant change in correlation, the null hypothesis is

$$H_0 : \nu_y = \rho_x \tag{4}$$

$$H_1 : \nu_y > \rho_x \tag{5}$$

The t-statistic for testing these hypothesis is given by

$$FR_1 = \frac{\hat{\nu_y} - \hat{\rho_y}}{\sqrt{\frac{1}{T_y} + \frac{1}{T_x}}} \tag{6}$$

where the hat indicates the sample estimator, and T_y and Tx are the respective sample size of crisis and non-crisis periods. To improve the finite sample properties , [For02] suggest using the Fisher transformation

$$FR_2 = \frac{\frac{1}{2}ln\left(\frac{1+\hat{\nu_y}}{1-\hat{\nu_y}}\right) - \frac{1}{2}ln\left(\frac{1+\hat{\rho_y}}{1-\hat{\rho_y}}\right)}{\sqrt{\frac{1}{T_y-3} + \frac{1}{T_x-3}}} \tag{7}$$

An alternative way to implement the Forbes and Rigobon test is to scale the asset returns and perform the contagion test within a regression framework. This framework will perform a contagion test from the asset market of country 1 to the asset market of country 2, scalling the assets returns during the pre-electoral period by their respective standard deviations. Following the regression:

$$\left(\frac{z_{2,t}}{\sigma_{x,2}}\right) = \gamma_0 + \gamma_1 d_t + \gamma_2 \left(\frac{z_{1,t}}{\sigma_{x,1}}\right) + \gamma_3 \left(\frac{z_{1,t}}{\sigma_{x,1}}\right) d_t + \eta_t \tag{8}$$

where z_t is the all observed data, i.e. $z_t = x_1, x_2, ..., x_{T_x}, y_1, y_2, ..., y_{T_y}$. η_t is a normally distributed white noise. d_t is a crisis dummy with 1 for 30, 90, 180 days before elections. Thus Forbes and Rigobon contagion test can be implemented by estimating the equation above by OLS and performing a one-sided-t-test of:

$$H_0 : \gamma_3 = 0 \tag{9}$$

3 Results

The data used were the return series calculated by the stock market index of each country[6].

The model given at equation 8 was estimated with Newey and West(1987) estimator that is consistent in the presence of both heteroskedasticity and autocorrelation of unknown form. The three kinds of dummy variables used was the 30, 90 and 180 days before presidential elections[7].

The contagion test ($\gamma_3 = 0$) performed for all the seven countries gave interesting results. The contagion tends to persist withing groups, i.e. if the host effects other in 30 days it tends to effect on the mid and long run (90,180 days). Despite pointed view about the results, important countries effects others and aren't effected. Brazil and Argentina contagy all countries, Chile and Venezuela don't affect only Ecuador, Colombia and Ecuador effect any country. The three most important countries (Brazil, Argentina, Chile) in general are only affected by itself and by Venezuela. Remember that Venezuela is a great oil exporter. The contagion coefficient for the significative equations can be either positive or negative, but remember that we're working with the return series, so a 1 percent change on the foreign market at the elections episode change the home stock market around 0.003 percent on average, thus a very insignificant one.

[6]Brazil: BOVESPA, Argentina: Merval, Chile etc...

[7]See table ? for a short description about the governance pattern of the five Latin America countries treated here.

Another issue that can be treated using the framework given at the second section is the interaction between stock markets. The coefficient γ_2 gives the influence of a market to another, so if γ_2 is significative the stock markets are related. The results of this test are given at interdependence subsection of appendix. Save Colombia and Ecuador all the Latin America markets are related, an intuitive result.

4 Conclusion

Uncertainty derived by electoral campaign effects the others, if it is an important country, increasing the correlation between these markets. This effect cannot be related to changes on fundamentals. Given the information cost investors may choose to invest their resourses on more safety countries increasing the volatility at the short-run.

Many works in the literature shows that the crisis on 90's is due to a high correlation at the Latin America countries do not taken into account on portfolio management. The results presented reinforce this intuitive point of view.

One important issue which isn't regarded at this work is the source of uncertanity. [Dun99] shows that the source of contagion can be their own volatility or the effects of the partner. All the kinds of contagion models used on the literature can be used with this same idea[8].

It's also important to verify if political variables like fragmentation of parlament or coalition discipline affects the contagion effects at the pre-elections period.

[8] See [Dun03] for an excelent survey of the empirical literature of contagion.

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5 Appendix

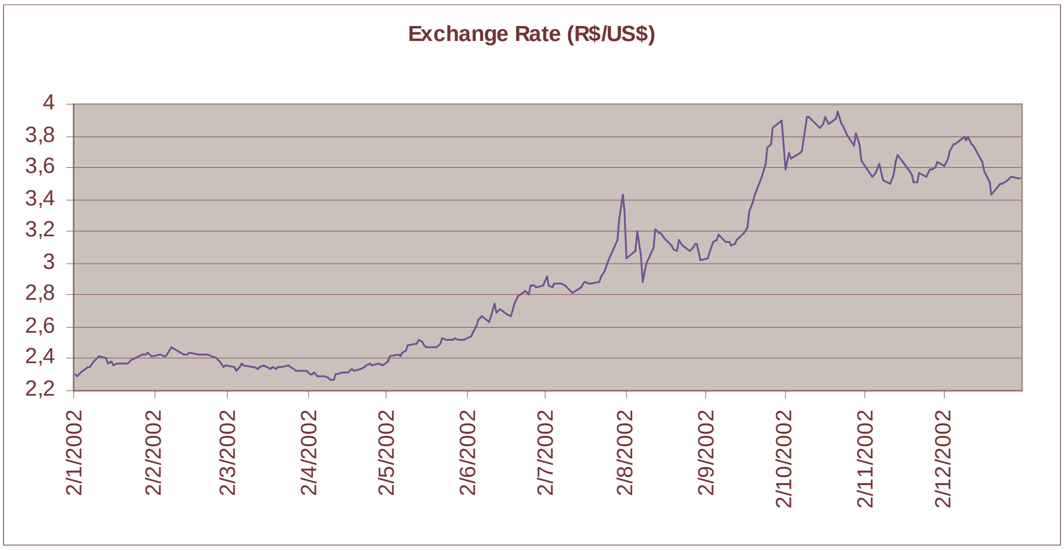

Table 1: Argentina Contagion Coefficient
Independent Variable: Argentina

	30 days	*90 days*	*180 days*
Brazil	0.218529	-0.189462***	-0.210917***
Chile	-0.047913	-0.070011	-0.119615*
Colombia	-0.571645***	-0.236845	-0.071792
Ecuador	2.320181***	-0.013511	-0.081506
Peru	0.02833	0.209199***	0.19574***
Venezuela	-0.048361	0.139241	0.178971***

**p-value≤0.05. ***p-value≤0.01.*

Table 2: Brazil Contagion Coefficient
Independent Variable: Brazil

	30 days	*90 days*	*180 days*
Argentina	-0.104585	0.258662***	0.23567***
Chile	-0.160461	-0.152713***	-0.112484***
Colombia	0.163529*	0.18594***	0.019497
Ecuador	2.430389***	0.197596***	0.000646
Peru	0.083649	0.157125***	0.152995***
Venezuela	-0.022278	0.114211	0.138536***

** p-value≤0.05. ***p-value≤0.01.*

Table 3: Chile Contagion Coefficient
Independent Variable: Chile

	30 days	*90 days*	*180 days*
Argentina	0.001787	0.45507***	0.35159***
Brazil	0.385304***	-0.106221	-0.12985
Colombia	NA	NA	NA
Ecuador	-0.189957	0.122415	-0.05282
Peru	0.187583	0.290995***	0.28984***
Venezuela	-0.049767	0.323566***	0.312916***

** p-value≤0.05. ***p-value≤0.01.*

Table 4: Colombia Contagion Coefficient
Independent Variable: Colombia

	30 days	*90 days*	*180 days*
Argentina	0.148062	0.136171	0.155355
Brazil	-0.276163	-0.146646	-0.054369
Chile	NA	NA	NA
Ecuador	-0.615335***	-0.19811	-0.028973
Peru	NA	NA	NA
Venezuela	NA	NA	NA

** p-value≤0.05. ***p-value≤0.01.*

Table 5: Ecuador Contagion Coefficient
Independent Variable: Ecuador

	30 days	*90 days*	*180 days*
Argentina	-0.119285	-0.048727	-0.107514
Brazil	-0.019116	-0.006125	0.024688
Chile	-0.01224	0.09127	-0.010395
Colombia	-0.0211	0.074314	0.05864
Peru	0.079733*	0.110126	0.145586
Venezuela	-0.045106	-0.051967	-0.05124

** p-value≤0.05. ***p-value≤0.01.*

Table 6: Peru Contagion Coefficient
Independent Variable: Peru

	30 days	*90 days*	*180 days*
Argentina	-0.069002	-0.049357	0.196562
Brazil	0.029839	0.041925	0.02379
Chile	-0.291527	-0.366828***	-0.276939***
Colombia	NA	NA	NA
Ecuador	-0.420996	-0.19719***	-0.189059***
Venezuela	0.167171***	0.110583	0.161827***

** p-value≤0.05. ***p-value≤0.01.*

Table 7: Venezuela Contagion Coefficient
Independent Variable: Venezuela

	30 days	*90 days*	*180 days*
Argentina	-0.124989	-0.220674***	-0.14573***
Brazil	0.155517	0.286918***	0.130246*
Chile	-0.286951	-0.196506*	-0.161039*
Colombia	NA	NA	NA
Ecuador	0.847297	0.095275	0.02014
Peru	-0.181823***	-0.128931***	-0.124309***

** p-value≤0.05. ***p-value≤0.01.*

Table 8: Argentina Interdependence Coefficient
Independent Variable: Argentina

	30 days	*90 days*	*180 days*
Brazil	0.298459***	0.330643**	0.3472***
Chile	0.301954***	0.301879***	0.304583***
Colombia	-0.006872	-0.002637	0.002397
Ecuador	0.00391	0.004659	0.006134
Peru	0.188215***	0.157591***	0.153539***
Venezuela	0.169059***	0.15047***	0.124516***

** p-value≤0.05. ***p-value≤0.01.*

Table 9: Brazil interdependence Coefficient
Independent Variable: Brazil

	30 days	*90 days*	*180 days*
Argentina	0.311152***	0.297205***	0.280068***
Chile	0.318021***	0.321612***	0.322375***
Colombia	0.004812	-0.001671	0.001342
Ecuador	-0.011931	-0.012664	-0.011667
Peru	0.216363***	0.191462***	0.186616***
Venezuela	0.142209***	0.127965***	0.10895***

** p-value≤0.05. ***p-value≤0.01.*

Table 10: Chile interdependence Coefficient
Independent Variable : Chile

	30 days	*90 days*	*180 days*
Argentina	0.301791***	0.282665***	0.269013***
Brazil	0.30101***	0.321223***	0.328863***
Colombia	NA	NA	NA
Ecuador	0.00114	0.0000839	0.00251
Peru	0.250626***	0.215875***	0.209195***
Venezuela	0.18566***	0.151338***	0.122725***

** p-value≤0.05. ***p-value≤0.01.*

Table 11: Colombia interdependence Coefficient
Independent Variable: Colombia

	30 days	*90 days*	*180 days*
Argentina	-0.015847	-0.016209	-0.025701
Brazil	0.033602	0.039352	0.028662
Chile	NA	NA	NA
Ecuador	-0.040382	-0.038095	-0.040103
Peru	NA	NA	NA
Venezuela	NA	NA	NA

** p-value≤0.05. ***p-value≤0.01.*

Table 12: Ecuador interdependence Coefficient
Independent Variable: Ecuador

	30 days	*90 days*	*180 days*
Argentina	0.008503	0.010143	0.026748
Brazil	-0.016981	-0.015402	-0.021661
Chile	0.001181	-0.000924	0.00192
Colombia	-0.038178	-0.041484	-0.048566
Peru	-0.002704	-0.018883	-0.03112
Venezuela	0.051921	0.056875	0.059246

** p-value≤0.05. ***p-value≤0.01.*

Table 13: Peru interdependence Coefficient
Independent Variable: Peru

	30 days	*90 days*	*180 days*
Argentina	0.256075***	0.263098***	0.228705***
Brazil	0.337256***	0.302647***	0.292261***
Chile	0.291073***	0.303999***	0.311242***
Colombia	NA	NA	NA
Ecuador	0.001369	0.002432	0.004954
Venezuela	0.175151***	0.167026***	0.142986***

** p-value≤0.05. ***p-value≤0.01.*

Table 14: Venezuela interdependence Coefficient
Independent Variable: Venezuela

	30 days	*90 days*	*180 days*
Argentina	0.221467***	0.2372***	0.243394***
Brazil	0.2241***	0.179786***	0.187595***
Chile	0.195783***	0.199255***	0.203374***
Colombia	NA	NA	NA
Ecuador	0.051696	0.052008	0.054644
Peru	0.218795***	0.224033***	0.230501***

** p-value≤0.05. ***p-value≤0.01.*