Journal of Applied Economics, Vol. IV, No. 1 (May 2001), 125-162

COUNTRY RISK: ECONOMIC POLICY, CONTAGION EFFECT OR POLITICAL NOISE?

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The opening of the capital account was one of the important structural reforms implemented by Argentina. This liberalization increased the linkage of the real economy with the changing conditions of the international financial markets. In particular, recent data show a clear relation between interest rates and the business cycle on the one hand, and sovereign spreads on the other. In order to understand better these linkages, it is necessary to analyze the determinants of these spreads also known as country risk. Using monthly data for the period 1994 to 1998, we find that this spread is explained by: 1) growth expectations, 2) fiscal deficits, 3) the debt service to export ratio and its growth rate, 4) contagion effects, 5) external shocks including movements of international interest rates, and 6) political noise. Based on these findings, we offer a discussion of some of the policies that should be implemented in order for the spreads to start declining and for the country to eventually reach an "investment grade" rating for its sovereign bonds.

JEL classification codes: C220, C500, E430, E440, F300

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We want to thank Jorge Rodríguez, Juan C. Barboza, Ariel Abelar, María Luisa Streb, Omar Caíno, Lior Zima and Nadina Mezza for the valuable remarks to a preliminary version of this paper. We acknowledge also the collaboration of Pablo Nicholson in econometric aspects of this paper, and suggestions received at seminars held at the Ministry of Economy and Public Works and Universidad San Andres. Finally, we appreciate comments from anonymous referees.

I. Introduction

The goal of this paper is to gain knowledge of the determinants of Argentina's country risk, measured by the spread of sovereign bonds in relation to comparable bonds of the U.S. Treasury. The importance of the subject lies on the crucial role that this risk plays in determining financial costs and real business cycles.

A review of the empirical literature shows that this subject has not been studied enough. Only few economists have emphasized —taking into account the domestic and international context of the 90s and the lessons from the 80s— the relevance of country risk on the dynamics of the Argentine economy.[1] These authors base their analysis on three approaches (which do not exclude each other). A first group, has found a significant (negative) correlation between the large macroeconomic aggregates and the risk premium (Avila, 1997; Grandes, 1999; and Rodríguez, 1999). A second group has emphasized the currency risk, arguing that once this disappears with dollarization, there will be a lower Argentine risk and, therefore, a higher growth and employment rate (Rubinstein, 1999). The third approach analyzes the relationship between capital flows, contagion effects and the incidence on sovereign risk of emerging countries (Calvo and Reinhart, 1996; Calvo, 1999). Also, an increasing number of studies have analyzed the determinants of the sovereign risk, using cross-section of countries. However, these papers have not focused on the determinants of Argentina's country risk.

We organize our contribution as follows. In Section II, we discuss the scope of the subject and the theoretical framework, while in Section III we present the analysis of the determinants of sovereign or country risk. In Section IV, we present estimates of the econometric model. Using this model, Section V offers an alternative analysis of the possible effects that a

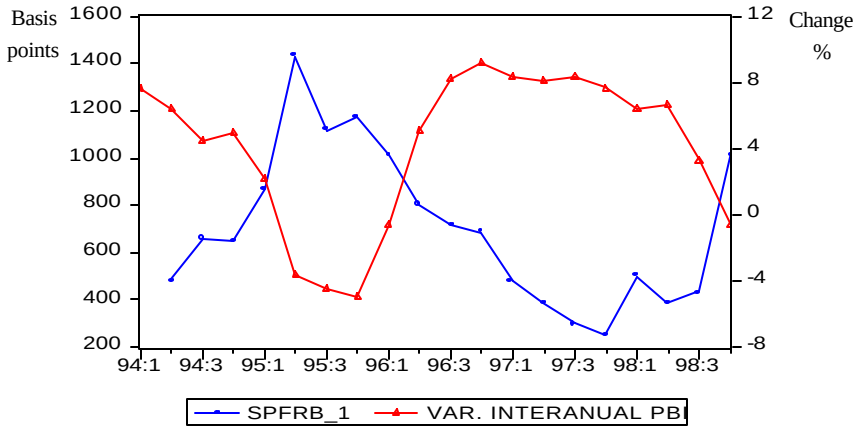
[1] From now on, we will refer to country risk as a synonym of sovereign risk. Nevertheless, these concepts are not necessarily equivalent. For instance, "country" risk can include the risk of the provincial debt or the private debt.

dollarization policy could have. Finally, in Section VI, we draw the main conclusions and policy recommendations.

II. Relevance of the Subject and Theoretical Framework

Figure 1 shows for the 1994-1998 period, the relation between country risk (SPFRB, approximated by the spread between the floating rate bond and a similar bond of the U.S. Treasury), and the interannual variations of the Gross Domestic Product (GDP).[2]

Figure 1. Country Risk and the Variations of the GDP



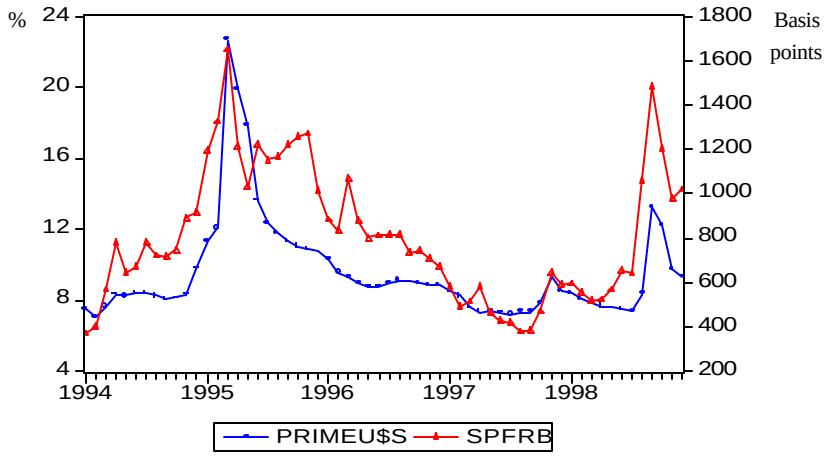
This negative correlation is not surprising when we recall that the most important components of GDP —private consumption and investment in equipment— are negatively correlated with country risk. For instance, the simple correlation between the interannual variations of these variables and

[2] The pioneer paper analyzing the relation between these variables is by Avila (1998). More recently, Nogués (1999) presented Figure 1 in an article in *La Nación*, and Rodríguez (1999) developed a model of the economy also based on the central role of country risk.

the country risk lagged one period, are -0,61 and -0,80 respectively.[3] On the other hand, the correlation between the interannual variation of GDP and country risk —also lagged one period— is -0,86.

Are these spurious correlations or are there solid grounds to argue that there should be an association between country risk and the behavior of macroeconomic variables? The relationships between financial variables and country risk helps to explain why changes in this last variable has an impact on the main components of aggregate demand. In an economy like Argentina, open to international capital flows, the evolution of interest rates is closely determined by country risk (and if we considered a group of bonds with different maturities, the corresponding spreads would determine the structure of interest rates). Figure 2 shows, for instance, that during the period under analysis, the behavior of the 30 day domestic prime rate in dollars (PRIMEU$S) is associated with country risk.

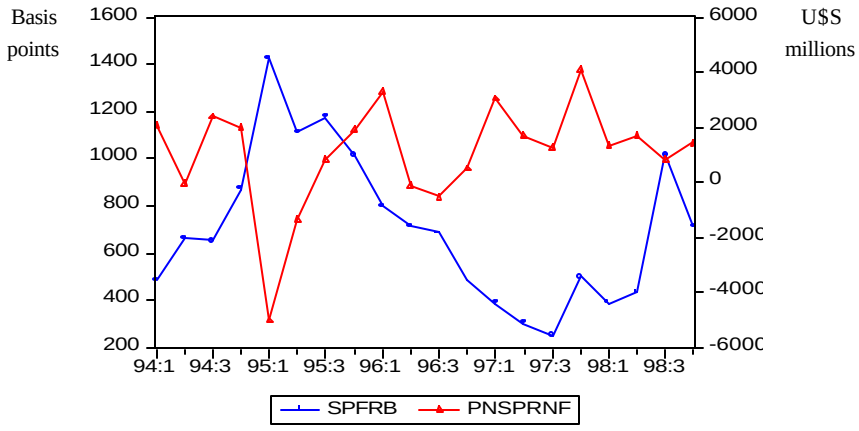
Figure 2. Domestic Prime Rate and Country Risk



[3] The coefficients of correlation presented in this section use quarterly observations for the 1994-I to 1998-IV period. For a multivariate analysis of the determinants of investment in equipment, including the independent role of country risk, see Grandes (1999).

In a nutshell, being a small country, Argentina faces a very elastic supply of financing (except in times of rationing), and therefore the upward and downward shifts of this schedule determine the equilibrium interest rate. In other words, the analysis of the determinants of country risk is also an analysis of the variables determining the shifts of the supply of loanable funds faced by the country. Therefore, increases in country risk should be negatively associated with capital flows. Figure 3 shows that this has in fact happened in connection with flows from the non-financial private sector (PNSPRNF).[4,5]

Figure 3. Country Risk and Capital Flows



[4] In this case, the simple correlation coefficient between these capital flows and country risk is -0.58.

[5] The Federal Government has the possibility of financing itself through multilateral credit institutions. These capital flows tend to be positively associated with country risk. When country risk increases and the private sector has difficulties financing itself in the international markets, the Federal Government lessens the recessive effects by borrowing from multilateral credit institutions. Obviously, given the loanable restrictions of these institutions, this kind of financing has a limit, which Argentina has approached in recent years.

Therefore, to make headway towards the knowledge of country risk determinants, also means to make progress on the determinants of capital flows and consequently, on Argentina's business cycles.

III. The Determinants of Country Risk

A. The Risk Premium in Equilibrium

For an economy with high capital mobility and imperfect substitute assets, assuming that lenders are risk neutral, the rate of return rate on a sovereign bond depends on the following arbitrage condition (see Edwards, 1986, and Min, 1998):

$$(1-p)\ (1 + i^* + s) = 1 + i^* \qquad (1)$$

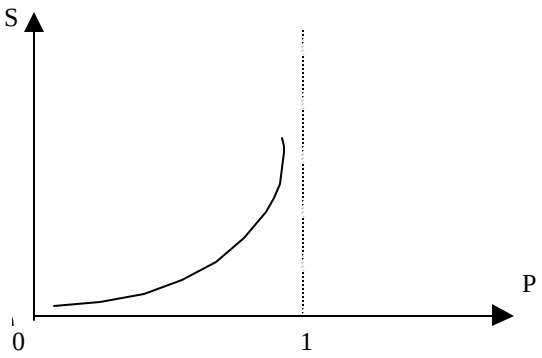
where i^* is the risk free rate of return on the U.S. Treasury, s is the country risk premium and p is the probability of default (linked to the capacity and willingness for debt repayment). Therefore:

$$s = (p/(1-p))\ k \qquad (2)$$

where $k = 1 + i^*$. As the probability of default tends to one, the risk premium approaches infinity. Graphically, we observe that the relation between s and p implies a variation of the supply of funds —for a given i^*—, because when the size of the debt increases (in relation to GDP), the probability of default also increases (Figure 4). As this approaches one, the borrower will see his possibilities of placing bonds restrained ("rationing").[6]

[6] In practice, this would not necessarily have to approach one. In times of financial crises, due to contagion effects or other channels of transmission, countries could be rationed even though their relative debt size is not significant. Likewise, this analysis assumes that in case of default, the lender loses all the capital plus the interest accrued by the bond. If the lender recovered part of the debt, p would be multiplied by a delta factor between 0 and 1 in (2).

Figure 4. Size of the Debt and Probability of Default



According to Edwards (1986), p can be approached with a logistic function:

$$p = (\exp \sum_{i=1}^{n} \beta_i X_i) / (1 + \exp \sum_{i=1}^{n} \beta_i X_i) \quad (3)$$

where X_i are the determinants of the sovereign risk premia and β_i the respective impact coefficients.

Finally, combining (2) and (3), applying natural logs, the equation turns out to be:[7]

$$\text{Log } s = \alpha + \log k + \sum_{i=1}^{n} \beta_i X_i \quad (4)$$

B. Which Would be the X_i to Consider?

A first idea about the determinants of country risk emerges from the analysis of sovereign rating agencies. These agencies monitor the evolution of governments' debt and their economies, issuing recommendations about the quality of the debt. Usually, those recommendations –appropriate or not—

[7] Our regression model, will be a slightly modified version of this equation.

have a notorious impact on investors'portfolio decisions and in general, they bring about changes in relative asset demands and bond prices (see, for instance, Reisen and Von Maltzan, 1999; Cantor and Packer, 1996).

Rating agencies like Standard & Poor's (see Standard & Poor's 1999b) focus their analysis on three determinants of country risk, which are common sense: (1) Indicators of liquidity/solvency: these are macroeconomic variables, related to the possibilities of debt repayment; (2) Political uncertainty; and (3) Structural reforms.[8]

Our paper will also analyze other factors determining risk levels, including the contagion effect. These are described in Section IV.

As noted before, these theories have been devised using alternative methods to evaluate sovereign risk determinants. First, a cross section of countries has been used to explain: a) the ratings of agencies (Haque, Mark and Mathieson, 1998; Cantor and Packer, 1996; and Kiguel and Lopetegui, 1997), b) the bond spreads (Calvo and Reinhardt, 1996; and Calvo, 1999), and, c) the relationship between both (Kiguel and Lopetegui, 1997; and Reisen and Von Maltzan, 1999). Second, there have been few country specific studies (Barbone and Forni, 1997, and Rubinstein, 1999). Finally, others have used a combination of both methods (Min, 1998; and Eichengreen and Mody, 1998).

IV. Econometric Estimation

A. Selected Variables

The proposed model explains country risk as a function of the behavior of a set of variables (X_i), classified according to the theoretical framework

[8] Other approaches to evaluate the price of sovereign bonds or their risk premium include: a) the theory of options: an application of the theorems of Black and Scholes and Modigliani-Miller and, b) a relatively new approach, characterizing the function of sovereign risk according to the distributions of Schwartz or generalized functions, emphasizing the qualitative changes in sovereign ratings (Abelar, 1999).

outlined above. That is, the sovereign risk premium, measured by the spread of the floating rate bond (SPFRB)[9] is a function of:

Macroeconomic fundamentals

Essentially, we propose that reductions in budget surplus (DFISCSA), or increases in fiscal deficit (when DFISCSA takes on negative values), will raise the country risk, even more so under convertibility, where fiscal policy is the main macroeconomic instrument.[10] A fiscal deficit that investors deem high, increasing or unsustainable (even though this perception is not accurate) would frame the most pessimistic scenario. It is also possible to present arguments in favor of analyzing the role of public expenditures, the tax structure, or the fiscal responsibility of the Federal Government and the provinces separately. However, our hypothesis is that these are, from the point of view of investors, of second order importance. In their generation of short and medium term expectations, they do not care so much on how the deficit is going to be reduced, but if this is going to happen in a sustainable way. We will return to this issue in the last section.

We also argue that growth expectations affect country risk[11]. If investors

[9] We used the FRB because of its high liquidity and its role as a determinant of the tendency of the bonds of Argentine debt. In any case, this selection is not free of criticism, (see Abelar, 1999). Alternatively, we could have used the EMBI (emerging market bond indicator), from JP Morgan. However, this index includes a variety of bonds (Global, Brady, Bocones, and other bonds) with different degrees of maturity and guarantees. Although there are problems with any selection, it is important to know that for Argentina, there is a high correlation between the FRB and the EMBI.

[10] The fiscal deficit is from the Federal Administration without taking into account privatizations, and without consolidating the provinces. It comprises the seasonally adjusted deficit accumulated over a period of three months.

[11] We do not infer from here causality between country risk and the growth rate. Moreover, these variables might be clearly endogenous, and this fact could bring about some consequences to the econometric estimation. Some authors (Avila, 1998 and Rodríguez,

expect the economy to grow, then the country risk should decline among other things, because of the effects that this growth generates over the size of the fiscal deficit.

To capture growth expectations, we assume that investors have perfect foresight. We apply this assumption by recalling that GDP data is known with one-quarter lag. Therefore, growth expectations in period T-1 for period T, would be the growth rate in T, which in fact is published with a lag. Consequently, we have included the GDP growth rate estimated as a seasonally adjusted monthly value, as an explanatory variable. The growth rate is the difference between the logs of GDP in T and T-1 (DLGDP93SA). We have considered that alternative monthly data such as the industrial survey are too partial and therefore, they would capture growth expectations in an imperfect way.

Intertemporal liquidity/solvency variables

Among the possible variables that capture the intertemporal liquidity situation of a country, analysts assess external debt services (capital and interest) to exports ratio (SERVEXPOSA)[12]. Increases in this ratio are expected to increase country risk. During the period under analysis, both variables have grown but the ratio has been increasing. The reason is due to

1999) suggest that country risk determines the short term growth rate (for instance, through the effect on physical investments). However, a Granger casuality test between country risk premium and the growth rate did not provide definite results to conclude causality in one direction or the other. We think that there are reasons to argue that this causality is two way. See appendix (e) for the results of the test.

[12] Interests and capital services come from the balance of payments estimates. For 1994, there is no data on debt amortizations of the non-financial private sector. Also, due to lack of information, capital services of the financial sector –excluding the Central Bank– are not included. The capital services of the public sector exclude the conversions of debt due to privatizations or former debt repurchasing. Exports were seasonally adjusted. Otherwise, the fluctuations of that indicator would be magnified by seasonal factors. On the other hand, debt service is estimated on an accrual basis.

an important rise in public external debt, mainly to finance fiscal deficits, and the increase of private external debt[13], associated to a group of firms, most of them linked to foreign direct investment (Secretary of Economic and Regional Programming, 1999a).

Another solvency variable is the current account surplus to GDP ratio (CCGDP). Some analysts even mention certain negative values of this ratio (usually around -5%) below which it becomes too risky to lend to the country. We believe that there may be non-linearities but not discontinuities in these economic relationships. As shown in Figure 5, in Argentina as in many other countries, the current account deficit is shaped by the trade deficit. Therefore, the current account includes significant information that is not captured by the ratio of debt service to exports.

The trade balance depends on prices and quantities. Being a small country, Argentina is a price taker and consequently, we could say that the terms of trade (TI) are a determinant of country risk.

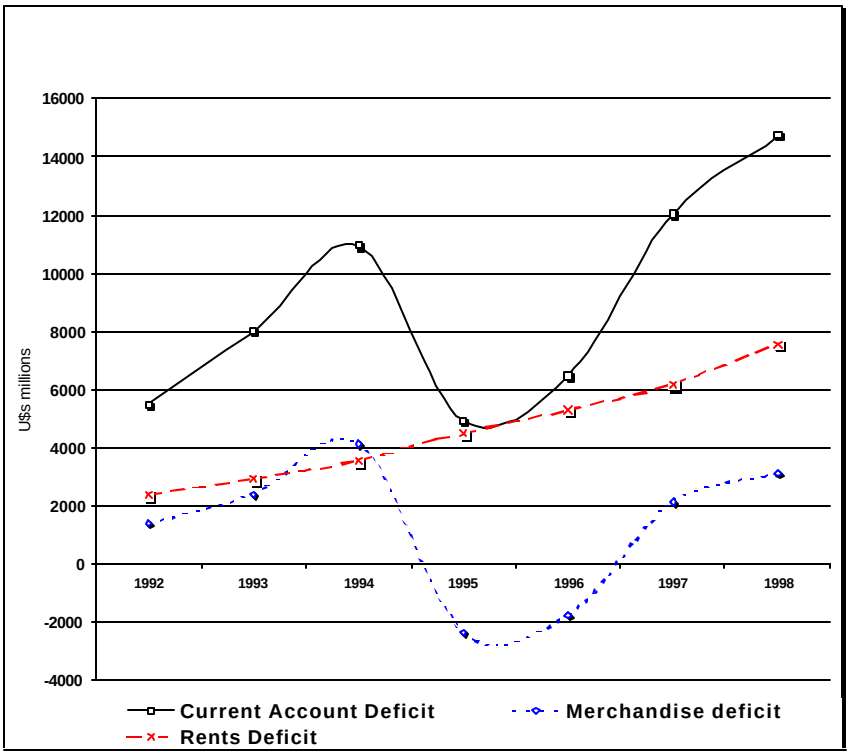
Contagion effects

We have captured these effects through the J. P. Morgan's price index of Mexican bonds (EMBIMEX) and other non-Latin American countries (EMBINONLAT). We chose Mexico because of the historical similarities with Argentina in terms of economic policy and response to external shocks (Brazil, despite its influence on the Mercosur, has differed, for instance, in foreign capital regulations, the trade openness degree, dollarization extent, etc).[14] Obviously, we expect increases in these sovereign risks to have a positive

[13] In the case of Argentina, there is simultaneity between the fiscal deficits and the increases of the public external debt, but the debt service is determined mainly by the accumulated stock. There are other simultaneous effects, which we will comment as we discuss the results.

[14] The Mexican EMBI is correlated with the Brazil EMBI and, if we replace one with the other, the results are only marginally affected.

Figure 5. Current Account Deficit



effect on Argentina's country risk. According to this theory, the path of emerging bond prices would be influenced by "herd behavior", resulting from the simplistic similarities that large international operators of financial funds find between "emerging" countries. The most recent example of this kind of behavior was observed during the Russian "default" and later in the southern cone, while Brazilian devaluation was taking place.[15]

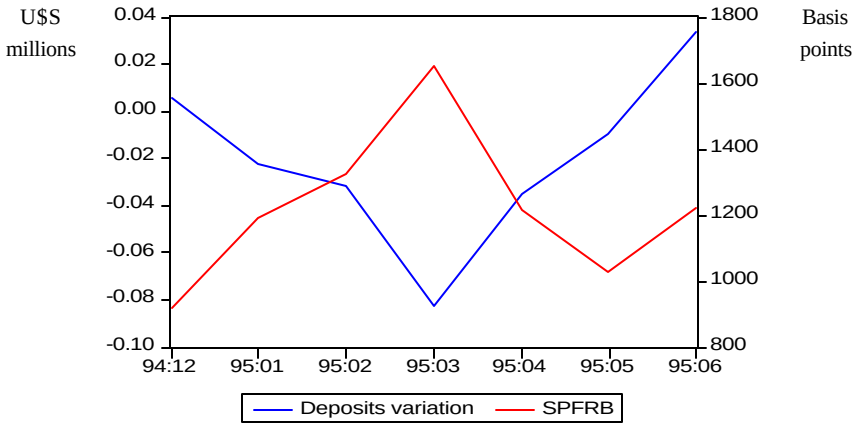
[15] Although the econometric treatment of the possible existence of credit rationing is beyond the scope of this paper, the contagion variable is also capturing the reduction in the supply of loanable funds, particularly in times of financial market turmoil.

Other external shocks

Other external shocks can arise from changes in the conditions of international financial markets. We have tried to capture these conditions by including the rate of the 30-year U.S. Treasury bond (UST30) as an explanatory variable. We expect, through a substitution effect, that increases in the interest rate make the investment in these bonds more attractive, so that the supply of loanable funds for emerging countries would diminish and, therefore, the country risk would increase. On the other hand, we observe that, in periods of extreme crises, investors take refuge in risk free bonds, in detriment of the emerging markets, pushing U.S. bond rates down and increasing country risk of emerging markets. Then, the expected sign of this variable is ambiguous.

We have also introduced a dummy variable to reflect the impact of the Mexican crisis. This variable (TEQUILA) would be capturing the effects on country risk caused by the abnormal and significant reduction of domestic deposits (Figure 6).

Figure 6. Country Risk and the Variation of Domestics Deposits



After the Tequila, the banking system became stronger due to the adoption of more stringent regulations than the Basle ones, and the larger concentration and presence of foreign capital in the local banking sector. Because of this, the strength of the financial system is no longer an important concern of the rating agencies (see Standard & Poor's, 1999a). In fact, the correlation between deposits and SPFRB drops significantly after the Tequila.

Political noise

Although there are numerous situations when the untimely statements or the turmoil among political leaders could have provoked a negative perception among investors, we chose to test the political noise associated to the resignation of former Minister Cavallo (CAVALLO).[16]

Sovereign risk's own story

We have included lags of the spreads of FRB bonds ($SPFRB_{t-j}$) in order to test for persistent factors that may not be captured by other variables.

Summing up, the following is the econometric model we propose with the expected signs in parentheses:

$$SPFRB = F\ (EMBIMEX\ (-),\ SERVEXPOSA\ (+),\ DLGDP93SA\ (-),\ CCGDP\ (-),\ DFISCSA\ (-),\ UST30\ (+\ -),\ TI\ (-),\ EMBINONLAT\ (+),\ TEQUILA\ (+),\ POLITICAL\ NOISE\ (+),\ SPFRB_{t-j}\ (+))$$

The equation was estimated by ordinary least squares, setting a log-linear relationship among the variables, with the exception of CCGDP and DFISCSA, whose values are mostly negative and thereby cannot be transformed to logs. The monthly data comprise the period running from

[16] A continuous political noise variable would had been preferable, but it does not exist.

January 1994 to December 1998. In appendix (a) we explain the data sources and the method of transforming quarterly to monthly values used for some variables including GDP.[17] Considering the fact this is a time series model, we also controlled for stationarity and checked the existence of a long run structural relation through a relatively new methodology developed by Pesaran et al (1999).[18]

The Tequila effect and the exit of former Minister Cavallo are captured by binary variables where Tequila = 1 between 1995:1 and 1995:5 and zero otherwise, and Cavallo = 1 in 1996:3 and 4, due to the rumors associated to the differences between the former Minister and the President, and 1996: 7 and 8, moment of Cavallo's resignation and its immediate effects.

The estimated coefficients can be read as elasticities, except for CCGDP and DFISCSA which are semielasticities (percent change of the dependent variable due to an absolute change in the independent variable). Time lags of the independent variables were also included with the purpose of capturing partial adjustment effects.[19] Remaining lags were chosen through tests of omitted/redundant variables, beginning with a more restricted model, and going from particular to general, to minimize the loss of freedom degrees.

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[17] GDP, the current account, the debt service, and the terms of trade index were transformed to monthly data with MATLAB (mathematical software), using the cubic Spline algorithm. See Appendix a.

[18] To verify if the variables presented stochastic tendencies (unit roots) or some kind of deterministic tendencies, we performed the augmented Dickey-Fuller test (see Appendix b). Afterwards, irrespective of the integration order we tested the existence of a long run association among the variables (Appendix c) to estimate the restricted model, adding up the error correction model which fitted better (Appendix c').

[19] This could be testing markets' efficiency for long term bonds. However, the typical test consists of analyzing whether the series follows a random walk process (the price today is equal to the price yesterday plus a white noise), which is verified (although the shocks do not show such a high persistence, according to ADF statistic value, Appendix a).

B. Result of the Estimations

Table 1 shows the best outcome of the econometric estimations. The estimated coefficients are significant both individually and globally at a 1% confidence level, and the regression does not have problems of serial correlation, heteroskedasticity or instability (see statistical Appendix d).[20]

Table 1. Spreads Function Estimates 1994-1998

Variable	Coefficient	T-Statistic	Probability
LEMBIMEX	-2.163204	-29.19129	0.0000
DLSERVEXPOSA	0.507456	4.672421	0.0000
LSERVEXPOSA(-1)	0.174321	2.333700	0.0239
DLGDP93SA	-20.545940	-9.657788	0.0000
VDFISCSA	-0.000173	-5.674725	0.0000
DFISCSA(-1)	-0.000184	-8.455935	0.0000
LUST30	-1.978578	-13.419070	0.0000
TEQUILA	-0.388229	-7.306245	0.0000
CAVALLO	0.127047	3.251272	0.0021
C	20.208630	42.693180	0.0000

R^2	0.9721	Adjusted R^2	0.9667
F-statistic	182.1	Durbin-Watson	2.0232

In the estimation of the whole model, LTI, CCGDP, LEMBINONLAT and the lagged dependent variable were not significant. As said, the terms of trade effects are implicit in the current account deficit. However, the variable CCGDP was not significant either, and our hypothesis is that investors pay

[20] LSERVEXPOSA (-1) is significant at 2.5% confidence level.

more attention to indicators of intertemporal solvency like SERVEXPOSA, than to variables that have important cyclical variations. On the other hand, EMBINONLAT is strongly correlated to EMBIMEX and the estimations corroborate that this country had, during the period under analysis, more cross contagion effects with Argentina.

Dismissing the statistically non-significant variables, the estimates had the outcome presented above. Except for the Tequila effect, the signs of the estimators are the expected ones and that of LUST30 is explained later. Our hypothesis on the negative sign of the Tequila variable is that, when "clouds" were visualized over the Argentine economy, political determination to overcome the crisis, as well as clear signals from international financial institutions in support of the economic program, were combined to diminish the negative consequences caused by contagion effects. We recall that the President, his Minister of Economy and the Congress acted decisively. Likewise, the IMF, the World Bank and the IDB prepared their assistance program in record time. We think that this determination was crucial to lessen and to overcome an extremely serious financial-banking crisis.

Other results suggest first, that a 1% increase in the price of Mexican bonds ("less emerging risk") produces a drop of Argentine risk of 2.16%.[21] Second, a variation of the same magnitude in the debt service to export ratio of the previous month and in its rate of growth (DLSERVEXPOSA) generates a 0.17% and 0.5% increase in that risk respectively.[22] That is, a permanent

[21] It is fair to acknowledge that LEMBIMEX accounts for almost half the R-squared, as the Mexican risk co-moves rather similarly with the Argentinean one. However, from early 1998 on –and especially in the aftermath of the Russian default– the first has been clearly differing from Argentinean spreads due to a lot of good news for the Mexican economy (e.g. growth, investment grade in March 2000). So the idea of including LEMBIMEX was exactly to be aware of the impact of emerging risk on Argentinean total risk.

[22] Taking into account that debt service data for 1994 is not strictly comparable with those in 1995-1998 (see note 12), we estimated the same equation in this last period to confirm the strength of the results (see Appendix f).

1% increase in this variable and in its growth rate, causes a permanent 0.67% increase in the spread of the FRB. This result, as we will emphasize in the last section, has important policy implications.

The effects of macroeconomic fundamentals on LSPFRB are also important. An increase in growth expectations of 1 point (i.e. growth of 2% instead of 1%) would reduce country risk by almost 20%. The reduction of the fiscal deficit (i.e. DFISCSA less negative or more positive in case of surplus) has also a positive impact on the evolution of LSPFRB: for each 300 millions pesos decrease in the three months accumulated deficit, the sovereign risk would go down by approximately 5.4%.[23] The variation of this deficit also has an influence on LSPFRB (investors analyze not only the level of the deficit, but also its change). As said, part of the short-term impact of fiscal deficits may be captured by the growth expectation variable.

The negative sign of the 30 year U.S. Treasury bond rate needs some comment. A priori, we expected that an increase in this rate attracted additional investment to this instrument in detriment of capital flows to emerging countries. Nevertheless, as we see in Figure 7, the correlation between the spread of the FRB and the rate of the 30-year U.S. Treasury bond is very low. However, there are clear inverse relations in periods of turmoil or extreme financial crises (Mexico, Asia, Russia). In these cases, what we have seen is that as the perceived risk of investing in emerging markets increases, investors "fly to quality" by buying Treasury bonds. Other contributions like Min's (1998) have also found that U.S. Treasury bonds rates don't have significant substitution effects with emerging bonds.

In a panel data study, Eichengreen and Mody (1998) find a similar result. These authors assert that movements in U.S. Treasury bonds rate should be

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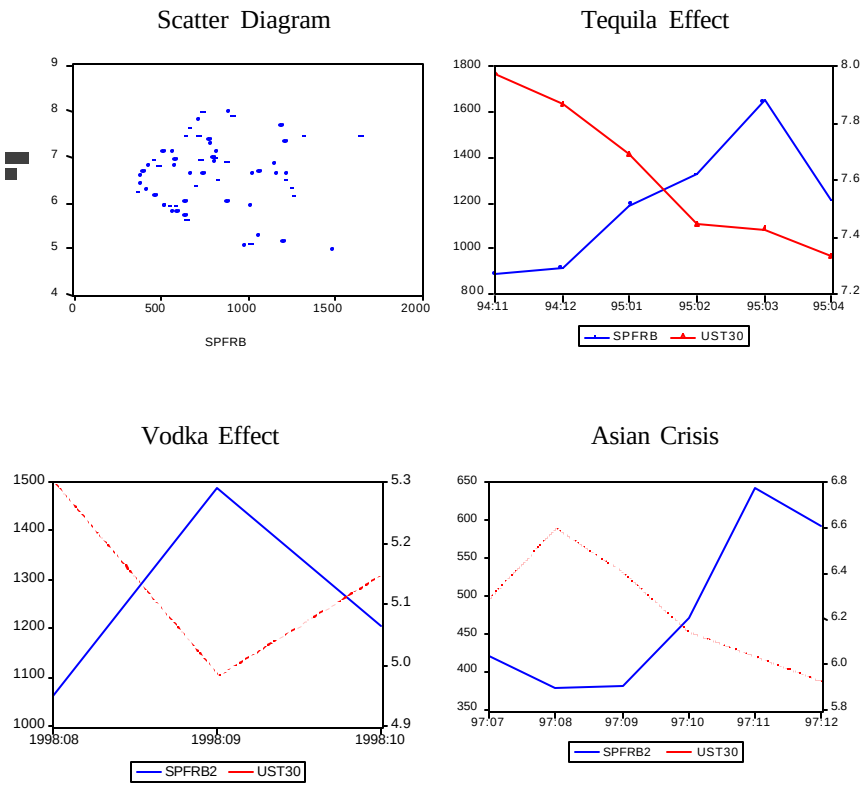
[23] The estimate is 300 (low dfiscsa)* -0.000184 = -0.0552. Although this means an increase of 0.05526 in the log, when we are close to the point where the variable changes, the linear approximation to the function $y = e^{\beta x}$ –being y = spread, x = dfiscsa and β=0.000184– is good.

Figure 7



understood in terms of supply and demand. On the supply side, when the rate goes up, the increased debt servicing costs reduces the supply of external debt. This in turn would increase the price of emerging bonds reducing their spreads. On the demand side, when Treasury bonds rate goes up, there would be investors' tendency to substitute emerging bonds with U.S. Treasury bonds, and the spreads would increase. According to those authors, in recent years supply factors have prevailed.

C. Forecasts

An alternative way of evaluating the model is to analyze the in-sample forecasts emerging from it, using indicators such as the mean square error as criterions. The forecast shown is recursive, that is, the model is recalculated for the period T and T + 1 with known data of the independent variables for that period. If, for example, the year 1998 is projected, the values observed in Table 2 show the results.

Table 2. Actual and Forecasted Spreads

Obs.	SPFRB	SPFRBF
1998:01	595	647.08
1998:02	554	572.60
1998:03	520	514.53
1998:04	522	484.91
1998:05	569	574.27
1998:06	651	615.78
1998:07	641	688.31
1998:08	1063	1023.49
1998:09	1485	1342.16
1998:10	1207	1189.98
1998:11	981	1031.67
1998:12	1019	979.51

V. An Observation on the Project of Dollarization

The sovereign risk can be broadly considered the sum of 1) the default risk, 2) the risk of devaluation or currency risk, 3) the political risk and, 4) other domestic and foreign institutional risks.

A non-anticipated devaluation can compromise debt repayment. The larger the proportion of debt denominated in foreign currency and the less dollarized are fiscal revenues (current and capital), the higher the default risk. In other words, the government would have to make a bigger fiscal effort in order to serve the debt. Under those conditions, investors would demand an additional risk premium to maintain assets of the country that face a possibility of devaluation.

Recently, due to the Brazilian crisis and the important external volatility, in Argentina the project of dollarization has been gaining ground. One of the eventual advantages of dollarization would be the disappearance of currency risk with a corresponding –according to the advocates of this policy– reduction of country risk. This statement has been discussed in the academic-professional literature, and some recent papers have explored the impact of implementing a policy of dollarization on the interest rate (see, for instance, Rubinstein, 1999).[24] Regarding these papers, we have some remarks:

- *The way to measure the currency risk is partially incorrect*: In general, those studies use the difference between the returns of the Bocon in pesos (PRE1) and the Bocon in dollars (PRE2).[25] However, that difference is not exactly the risk of maintaining an asset in one currency or another, because the spread of these bonds also includes other risks such as the default risk, the political risk, and others. Precisely, in the event of a devaluation, the repayment of PRE2 could be compromised more than the repayment of PRE1.
- At the same time, there would be a *simultaneity bias* in determining the sovereign risk and the currency risk, because this is a component of the first one. As a solution to this shortcoming, an instrumental variable (for instance, the lags) is usually used. The *forward exchange rate*, though it

[24] Some economists have argued that the elimination of the currency risk could be more than compensated by increases in the total risk due to lack of competitiveness, fiscal insolvency or probability of reestablishing the peso if dollarization is implemented unilaterally.

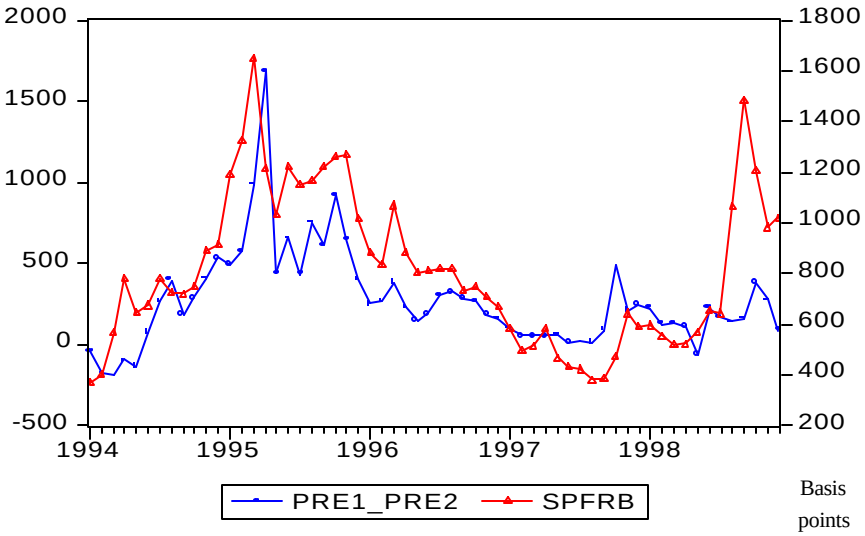
[25] Rubinstein (1999) uses the following indicator: (((1 + PRE1)/(1 + PRE2)) - 1)*10000.

represents a thinner market, is a more genuine way of measuring the expectation of devaluation.[26]

- The *order of temporal precedence* is not clear (Figure 8). Even assuming simultaneity, causality in a Granger sense can be tested. Taking the spreads of the FRB (SPFRB) and the bocones, we conclude that the order of causality is reverse to the one assumed: with a 1% significance, SPFRB Granger-cause PRE1_PRE2, in the period 1994:1 to 1998:12 (Table 3).

Furthermore, in the model of the previous section, the joint effect of the variable PRE1_PRE2 and its lags (up to t-3) was redundant.[27] That is, in a

Figure 8



[26] Another problem with the series of the forward exchange rate is the sample size. The one compiled by JP Morgan begins in 1997.

[27] Strictly speaking, since the FRB is issued in dollars, the currency risk is null. However, we want to verify that this did not have another indirect effects on SPRFB, which were not captured by the rest of the explanatory variables.

Table 3

Null Hypothesis	Obs	F	Probability
PRE1_PRE2 does not Granger cause SPFRB	54	0.74251	0.61862
SPFRB does not Granger cause PRE1_PRE2	54	4.19727	0.00222

joint test, the currency risk measured by this difference, turned out not to be a statistically significant variable to explain LSPFRB (Table 4). This means that its elimination would not have a statistically significant impact on country risk.

Table 4

Redundant Variables: LPRE1_PRE2 (0 to -3)			
F-statistic	0.457169	Probability	0.766512
Log likelihood ratio	2.514626	Probability	0.642019

The explanation we offer is that the currency risk is explained by almost the same variables that explain country risk. The econometric evidence supporting this hypothesis is shown in appendix g. This does not necessarily mean that a dollarization project would not decrease sovereign risk. Our results indicate that if the fundamental variables explaining country risk do not improve, then dollarization will not revert the situation. Obviously, the effects of a policy of dollarization also depend on the institutional characteristics that go together with its implementation. This is an important subject which is beyond the scope of this paper.

VI. Summary and Policy Recommendations

Several economists, including the authors, have emphasized the relevance of the fact that country risk is correlated with the business cycles. That happens because Argentina is a country open to international capital flows and therefore, the structural conditions of the financial markets faced by agents are associated to these flows.

Under this situation the key question is: Which factors determine country risk? The purpose of this paper has been to provide an answer to this question and as far as we know, it offers the first econometric analysis for Argentina. Using monthly data for the period 1994-1998, we conclude that the important fluctuations observed in country risk have been determined by: (i) the external debt service (capital and interests) to export ratio as a variable reflecting the burden of the debt, (ii) the fiscal deficit of the Federal Government as a variable reflecting the disequilibrium of public accounts, (iii) growth expectations as a variable reflecting the potentiality of the economy, (iv) the rate of the 30 year U.S. Treasury bond as a variable reflecting the conditions and substitution possibilities of international financial markets, (v) the contagion effect and, (vi) political noise.

Regarding the impact of a possible dollarization policy, we recall that the devaluation risk is a component of country risk. However, we find that eliminating the devaluation risk (measured through the differential of the returns on bocones in pesos and in dollars) would not have a statistically significant impact on country risk. The explanation we offer is that devaluation risk is determined by practically the same variables that explain country risk. This evidence suggests that what is important in order to diminish this risk is not the implementation of a unilateral dollarization policy, but a sound administration of economic fundamentals.

Going now to the implications of our basic findings, we stress in the first place, that during the period under analysis, the variables capturing the situation of external payments of the country have deteriorated significantly. For

instance, between 1995 and 1998, the debt service practically doubled, while the value of exports increased by only 26%. This deterioration of solvency indicators plus the more restrictive conditions in the international financial markets, imply that the country risk has suffered a structural increase and, unless extraordinary conditions develop, it will be very difficult to lower this risk to the levels observed during say 1997 when the average spread of the FRB was around 360 basis points.

Given the impossibility of significantly reducing the debt service in the short and medium term, we conclude that one of the main factors leading to lower country risk is the export growth. Although Argentina is a price taker, this does not mean that important productivity enhancing and market opening policies should be disregarded. For example, at the Uruguay Round, Argentina received no concessions of economic significance. During the next years, these negotiating weaknesses will have to change in order to improve Argentina's export and growth performance.

Our paper also shows that fiscal deficit has direct negative effects in the short and medium run (through an increase in the debt stock as well as its service). In the short run, the deficit should be reduced significantly in order to stabilize and revert the growing external debt. Eventually, the deficit should turn into a surplus, part of which could be used to diminish the debt stock. In that sense, the approval of the law of fiscal solvency is a major step forward which if implemented, will put an asymptotic limit to the stock of external public debt of the National Government. The sooner equilibrium and fiscal surpluses are achieved in a credible and sustainable way, the faster will be the reduction in country risk. Here the key words are credible and sustainable and that depends not only on economic factors, but also on social and political situations. In this context, the worst scenario is one where the fiscal responsibility law is not enforced, or the uncertainty generated by the legislative process is such that the political noise ends up raising the country risk. Recently, we have observed several episodes when this has happened. Therefore, besides good policies, it is important for the political leaders to be aware of the magnitude of what is at stake for the country. Only then and after a consistent

effort over several years, the country will achieve the desired "investment grade" rating.

Appendix

A. Information Sources

The information comes from the following sources: (1) FRB spreads, national accounts, balance of payments accounts, fiscal deficit and debt service from the Ministry of Economy and Public Works (MEyOSP); (2) terms of trade from the National Institute of Statistics and Census (INDEC); (3) EMBI (Emerging Market Bond Indicator) from JPMorgan, monthly averages, base 100 index, December, 1993 and; (4) 30 year U.S. Treasury bond rate from Yahoo-Finance-Stock Quotes.

Quarterly based series like GDP (current and constant prices), debt service, current account, and the terms of trade were transformed to monthly observations using an algorithm supplied by the MATLAB 4.0 program. This algorithm interpolates values within a quarter using a polynomial function –usually cubic– that adjusts the data, adding the missing values in between the endpoints, according to a desired frequency.

B. Unit Roots Tests

For all the variables we performed ADF (Augmented Dickey-Fuller) and joint significance tests to check whether the data presented stochastic or deterministic (linear, exponential, etc.) tendencies. The general specification was the following:

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \beta t + \sum_{j=1}^{n} \Delta Y_{t-1} + \varepsilon_t$$

The results obtained, including the statistically relevant data and the

optimum lags for $\sum_{j=1}^{n} \Delta Y_{t-1}$, are shown next:[28]

Table A-1

Variable	Optimum lags	H_0: $\gamma = 0$; τ value	Limit value at 5%
LSPFRB	2	-1.6284	-2.89
LTI	7	-1.2242	-2.89
LEMBIMEX	6	-0.4224	-2.89
LEMBINONLAT	11	-2.0227	-2.93
LSERVEXPOSA	15	0.1820	-2.93
LUST30	0	-0.1767	-2.89
CCGDP	16	-2.2700	-2.93
PRE1_PRE2	0	-3.3154	-2.89
LGDP93SA	7	-0.1744	-2.89
DFISCSA	5	-3.4120	-2.89

Table A-2

Variable	Optimum lags	H_0: $\gamma=\alpha=0$; θ_i values	Limit value at 5%
LSPFRB	2	1.4900	4.71
LTI	7	0.7600	4.71
LEMBIMEX	6	1.1592	4.71
LEMBINONLAT	11	2.4140	4.86
LSERVEXPOSA	11	0.7124	4.86
LUST30	0	0.2829	4.71
CCGDP	16	3.0000	4.86
PRE1_PRE2	0	5.4900	4.71
LGDP93SA	7	0.7226	4.71
DFISCSA	5	6.3041	4.71

[28] The optimum number of lags is chosen according to the minimum value of information criteria like Schwartz or Akaike, comparing equal size samples.

Table A-3

Variable	Optimum lags	H_0: $\gamma=\beta=0$; θ_i values	Limit value at 5%
LSPFRB	2	1.5165	6.49
LTI	7	1.6200	6.49
LEMBIMEX	6	2.3145	6.49
LEMBINONLAT	11	1.9900	6.73
LSERVEXPOSA	15	1.4460	6.73
LUST30	0	6.3473	6.49
CCGDP	16	2.5076	6.73
PRE1_PRE2	0	6.2423	6.49
LGDP93SA	7	4.8400	6.49
DFISCSA	5	5.8600	6.49

C. Pesaran, Shin and Smith Test

The traditional approach to verify the existence of a long-term relationship among a set of variables is based on cointegration techniques (Engle and Granger, 1987; Phillips and Ouilaris, 1990; Johansen, 1991 and 1995; among others). These techniques require variables to be integrated of order one, I(1). Pesaran et al (1999) have proposed a new approach to test the existence of a long-term relation that can be applied independently from the order of integration of the regressors. This means that it is not transcendental if they are I(0), I(1) or mutually cointegrated. The underlying statistic is the Wald or F-statistic in a Dickey-Fuller regression (ARDL model).

The authors supply two sets of asymptotic critical values for the polar cases: the first assumes that all the variables are I(1), while the second assumes that all are I(0). So all the possibilities are delimited for any classification from a combination of these limit values. If the Wald or the F statistic computed falls outside the area delimited by those values, then a conclusive inference on the long term relationship could be induced independently of whether the

regressors are I(0), I(1) or mutually cointegrated. Nevertheless, if the Wald and the F statistics fall within the delimited area, the inference would be inconclusive and it would be necessary to know the order of integration of the regressors.

Likewise, the test can be performed whether the dependent variable follows a deterministic tendency, or not. In the case of the spread of a bond, we opted for the second choice. Therefore, we estimated the following equation selecting the quantity of lags according to the above-mentioned Akaike-criteria (the minimum):

$$\Delta \text{ Lspfrb}_t = \alpha + \lambda \text{ Lspfrb}_{t-1} + \beta W_{t-1} + \sum_{j=1}^{n} \gamma_j \Delta Z_{t-j} + \delta \Delta W_t + \varepsilon_t \qquad (1)$$

where Z_t = (LSPFRB, LTI, LEMBIMEX, LEMBINONLAT, LSERVEXPOSA, LUST30, CCGDP, DFISCSA, DLGDP93SA) = (LSPFRB, W_t); β is a parameter vector.

The null hypothesis is Ho: $\lambda = \beta = 0$

The number of optimum lags was 6 (according the Akaike's minimum criteria) and as a question of parsimony –so that we do not use excessive parameters in the model– non-significant variables were excluded in the equation (1), that is: LTI, CCPBI and LEMBINONLAT). The result of the test shed the following value for F:

F 6.474187 Probability 0.001297

As the asymptotic F distribution under the null hypothesis is not standard, we used the critical values estimated by Pesaran et al in Table C1.iii, page [T.2]. For k = 5 regressors and 5% significance, those values are 2.62 –lowest limit when the regressors are I(0)– and 3.79 –highest limit when the regressors are I(1). Given the estimated F, we conclude that there could be a long run relation among the variables irrespective they are cointegrated, or they are from different order of integration.

C'. Associated Error Correction Model

Once the long-run relationship was regressed (Table 1) we went forward to estimate the corresponding ECM (error correction model) in order to see the short-term dynamics of sovereign spreads corresponding to the structural model. The ECM representation can be defined as follows:

$$\Delta \text{ Lspfrb}_t = \alpha + \rho \text{ Resid}_{t-1} + \Delta \text{ Lspfrb}_{t-j1} + \sum_{j=0}^{n} \gamma_j \Delta X_{t-j} + \varepsilon_t$$

There, Resid_{t-1} are the residuals from equation in Table 1, Δ means the first difference of any variable, X refers to the remaining independent variables and ε_t is an independently identically distributed error. For a matter of stability it is expected ρ to be negative and smaller than one, as it works like the mechanism which takes Lspfrb back to its long-run equilibrium level when a short-term deviation occurs. After carefully carrying out this two-step estimation and with a parsimonious purpose –but ensuring no autocorrelation or heteroskedasticity were in– we concluded in the restricted model below with a significant ρ equal to -0.71. This means that 71% of the gap is closed in one month.

Variable	Coefficient	Std. Error	t-Statistic	Probability
RESID (-1)	-0.711632	0.234243	-3.038004	0.0038
D(LSPFRB(-1))	0.105576	0.081557	1.294512	0.2016
D(LSPFRB(-2))	-0.179360	0.074159	-2.418608	0.0193
D(FISCSA)	-0.000134	3.83E-05	-3.488068	0.0010
D(LEMBIMEX)	-2.185844	0.282332	-7.742113	0.0000
D(LSERVEXPOSA)	0.162499	0.144585	1.123897	0.2665
D(DLPBI93SA)	-5.162769	6.275792	-0.822648	0.4147

R-squared	0.709466	F-statistic	19.94251
Durbin-Watson stat	1.705763	Adjusted R-squared	0.67389

D. Diagnostic Tests of the Estimated Model

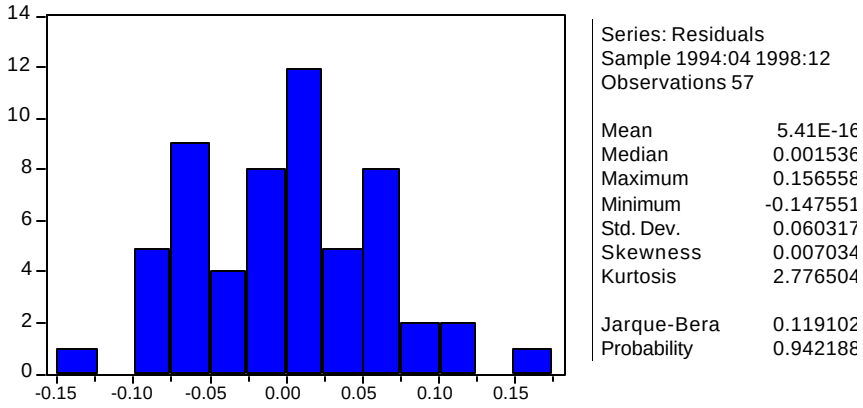
1. Breusch-Godfrey Serial Correlation LM Test (3 lags): given the value of the Chi square statistic the null hypothesis is accepted in absence of a second order serial correlation.

F statistic	0.593101	Probability	0.622835
Obs*R^2	2.215419	Probability	0.528918

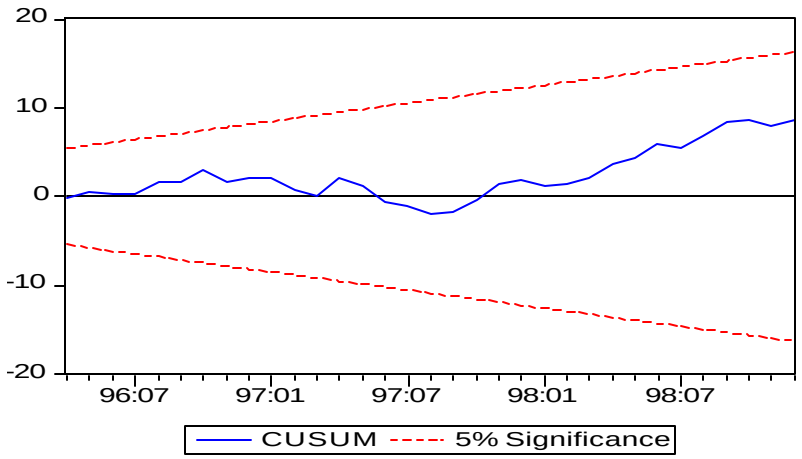
2. White Heteroskedasticity Test: given the value of the Chi square statistic, the null hypothesis of homoskedasticity is accepted.

F statistic	1.158257	Probability	0.340381
Obs*R^2	18.04703	Probability	0.321150

3. Residual Normality (Jarque-Bera): given Jarque-Bera's value, distributed like Chi-Square, we conclude that residuals have a normal distribution.



4. Cusum Test: we find stable parameters given the sum of recursive residuals (CUSUM) falls within the confidence interval.



E. Granger Causality Tests

In our study case, we performed the test between SPFRB and real GDP growth. For the last, we took both the seasonal adjusted rate (DLGDP93SA) and interannual rate (DLGDP93SAINT). Moreover, we included lags to evaluate whether the prediction improved (ensuring that conclusions were robust).

Lags: 4

Null Hypothesis	Obs	F-Statistic	Probability
SPFRB does not Granger Cause DLGDP93SA	55	0.55455	0.69669
DLGDP93SA does not Granger Cause SPFRB		4.92695	0.00217
SPFRB does not Granger Cause DLGDP93SAINT	44	0.90667	0.47073
DLGDP93SAINT does not Granger Cause SPFRB		4.34634	0.00586

Lags: 7

Null Hypothesis	Obs.	F-Statistic	Probability
SPFRB does not Granger Cause DLGDP93SA	52	1.39898	0.23503
DLGDP93SA does not Granger Cause SPFRB		6.46503	5.3E-05
SPFRB does not Granger Cause DLGDP93SAINT	41	3.68189	0.00679
DLGDP93SAINT does not Granger Cause SPFRB		4.67331	0.00169

Lags: 8

Null Hypothesis	Obs.	F-Statistic	Probability
SPFRB does not Granger Cause DLGDP93SA	51	1.06819	0.40772
DLGDP93SA does not Granger Cause SPFRB		5.50715	0.00017
SPFRB does not Granger Cause DLGDP93SAINT	40	5.00916	0.00110
DLGDP93SAINT does not Granger Cause SPFRB		5.53131	0.00058

Lags: 9

Null Hypothesis	Obs.	F-Statistic	Probability
SPFRB does not Granger Cause DLGDP93SA	50	1.01778	0.44769
DLGDP93SA does not Granger Cause SPFRB		4.73020	0.00053
SPFRB does not Granger Cause DLGDP93SAINT	39	3.28360	0.01283
DLGDP93SAINT does not Granger Cause SPFRB		6.66205	0.00021

We conclude that there is Granger-bicausality when we take the interannual GDP growth rate (DLPBI93SAINT) and causality from GDP growth to SPFRB when considering the seasonal adjusted rate (DLGDP93SA). Therefore, we cannot conclude that there is causality in one or other direction. This does not necessarily mean there wouldn't be economic bicausality, as explained above.

F. Model's Estimates for 1995-1998

While running this regression we tested parameter stability by reestimating the model for the period 1995:1 to 1998:12. We did so to be sure that using 100% comparable data regarding debt service series, the original estimation was robust.

Variable	Coefficient	T-Statistic	Probability
LEMBIMEX	-2.215928	-29.314590	0.0000
DLSERVEXPOSA	0.496346	3.648050	0.0008
LSERVEXPOSA(-1)	0.290093	2.963182	0.0052
DGDP93SA	-22.624350	-8.938552	0.0000
VDFISCSA	-0.000161	-5.266922	0.0000
DFISCSA(-1)	-0.000187	-7.458693	0.0000
LUST30	-1.818091	-10.591830	0.0000
TEQUILA	-0.444245	-6.978366	0.0000
CAVALLO	0.111986	2.940082	0.0056
C	20.04015	42.001500	0.0000

R^2	0.979	Adjusted R^2	0.974
F-statistic	199.1080	Durbin-Watson	1.772

G. Currency Risk Equation

Dependent Variable: LPRE1_PRE2

Variable	Coefficient	T-Statistic	Probability
LEMBIMEX	-3.923817	-5.103475	0.0000
DLSERVEXPOSA	0.923980	0.787861	0.4350
LSERVEXPOSA (-1)	-1.300550	-1.698315	0.0965
DLGDP93SA	-25.453530	-1.174684	0.2464
VDFISCSA	-0.000588	-1.863310	0.0691
DFISCSA (-1)	-0.000477	-2.029404	0.0485
LUST30	-5.593929	-3.732279	0.0005
TEQUILA	-0.064951	-0.118684	0.9061
CAVALLO	0.549872	1.388512	0.1720
C	35.136530	7.332828	0.0000

R^2	0.6432	Adjusted R^2	0.57
F-statistic	8.81	Durbin-Watson	1.30

As observed above, the results are globally quite good though some variables turn out to be not significant at the individual level. We confirm the negative effects from those variables connected with contagion effects, fiscal deficit and debt service to exports ratio, as well as the UST 30 years bond rate, over PRE1-PRE2. Therefore, we could preliminary ascertain that currency risk would be associated to a group of the same variables which account for SPFRB variations.

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