Séminaire de recherche du LARE - efi

LARE efi
Laboratoire d'Analyse et de Recherche Economiques
Economie et Finance Internationales

In Search of the Currency Risk Premium in Latin America Is There

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26 novembre 2007

CS 0407

UNIVERSITE MONTESQUIEU BORDEAUX IV

In Search of the Currency Risk Premium in Latin America
Is There?[§]

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October 10, 2007

Abstract

How to evaluate the currency risk premium is the main goal of the paper. We propose a new calculation technique to alleviate some existing problems. We use a Logistic Smooth Transition representation to model the classical relationship between the forward premium and the expected depreciation, to allow for different regimes. After that, we extract the currency risk premium from the residual of the regression.

We apply our technique to some Latin American countries. Our findings are consistent with our previsions. The currency risk premium is small both with fixed and flexible exchange rates. It only rises when fixed regimes are near to collapse

JEL Codes: C50, F31, G15

Keywords: *Currency Risk Premium, Forward Premium, LSTAR, Latin America*

[§]I would like to thank especially Martin Grandes. We worked together in the early stages of the project, making it possible. Many thanks also to Stéphanie Prat for help with some parts of the dataset..
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1. Motivation

The currency risk premium matters for emerging economies, where it is very difficult to issue in domestic currency. However, saying that these premiums matter is not equivalent to show that the premium exists. Recent evidence from Frankel and Poonawala (2006) leads to the unintuitive result that the forward premium anomaly (i.e. the forward rate is a poor predictor of the expected rate) is smaller in emerging markets. Since there's only one Latin American country in their sample, we find interesting to verify their results with a broader sample of Latin American economies.

The debate on the forward premium anomaly originated with the contribution of Fama (1984). Using the uncovered interest parity (UIP), this author found a negatively significant relationship between the forward premium and the expected devaluation rate, when the normal result would be a coefficient not statistically different from one. Since this seminal work, hundreds of papers attempted to explain the anomaly. Some other hundreds of authors worked with one goal: show that there's no forward premium anomaly.

Today, there's still a debate. With the generalization of new econometric models, we are able to move towards new directions. There are pros and cons. There can be situations leading to the anomaly and others driving to normality. This idea came from Bansal and Dahlquist (2000). These authors showed that the anomaly is closely related to the nature of the differential between domestic and foreign currencies interest rates. So the idea behind exploitation of the intuition given by Bansal and Dahlquist (2000) is that there exist several regimes leading to several models. In the econometric terminology, the model is non linear. This idea led to the work of Baillie and Kiliç (2006), showing that there are several regimes but with a smooth transition between them.

Our purpose here is to measure the currency risk premium using recent progress in the literature to measure it correctly. Some arguments will be verified. Firstly, there's no reason to find a currency risk premium with a credible fixed exchange rate regime. There's virtually no risk, so there's no need for a premium. Secondly, risk might rise sharply before exchange rate regime changes. Thirdly, risk has to be very small after some years with floating rates, since forward markets are now well developed and fairly used.

We will proceed as follows. Section 2 presents basic arguments. Section 3 explains the choice of the regression equation. Section 4 describes the dataset. Section 5 presents empirical evidence of non linearities in our sample. Section 6 gives our results. Finally, section 7 concludes.

2. Some Basic Arguments

The existing debate on the forward premium puzzle took a new direction with the use of non linear econometric models such as in Baillie and Kiliç (2006). These models allow finding new results, explaining things differently than before. The consequence of the forward premium puzzle is that the forward exchange rate is a poor predictor of the expected exchange rate. There's no efficiency of financial markets, leading to the existence of a significant currency risk premium, and the arbitrage remains possible. However, this can be a matter of regimes. Using uncovered interest parity (UIP), one could think that the puzzle will disappear for particular values of the differential between domestic and foreign currencies interest rates.

One other argument is the one used by Frankel and Poonawala (2006) to explain their results. They find a smaller forward premium anomaly for emerging markets than for developed ones. However, they do not take care sufficiently to endogeneity in their regression technique. Using a basic approach, they do not give attention to exchange rate crises. As we will see, there's virtually no currency risk premium in economies with credible fixed exchange rates and a high premium when the crisis time is near. Ignoring this can be a source of misinterpretation of their evidence. However, these authors give an interesting comment on the fact that the currency risk premium is not the sole responsible for the forward premium anomaly. We give particular attention to this possibility, estimating the currency risk premium with an indirect method, as we will show further.

These two works give us two arguments of particular importance. When we attempt to estimate the currency risk premium, we first have to consider non linearities seriously. We also need a calculation technique that disentangle the currency risk premium from possible other reasons for a forward premium anomaly.

3. The Calculation Technique

Since Fama (1984), ones could test the existence of the forward premium anomaly with the following equation:

$$ed_{t+1} = \alpha + \beta\, fp_{t+1} + u_{t+1} \qquad (1)$$

where ed_{t+1} denotes the expected depreciation from t to t+1, fp_{t+1} is the forward premium from t to t+1. However, such a linear model will lead to misleading results if the data generating process is non linear. So, we need a more general model allowing for different outcomes. Logistic Smooth Transitions (LST) models have this property. As showed by Baillie and Kiliç (2006), other models (linear or with a threshold) are particular cases of this one, depending on the value of the estimated coefficients. With a LST model the equation becomes:

$$ed_{t+1} = \alpha_1 + \beta_1\, fp_{t+1} + \left[\alpha_2 + \beta_2\left(fp_{t+1}\right)\right] F\left(fp_{t+1}, \gamma, c\right) + u_{t+1} \qquad (2)$$

where F(.) is the transition function between two regimes. γ is the positive transition parameter. With an increasing one the transition becomes tougher. c denotes a threshold. These two last parameters are estimated along with the α_i and β_i coefficients. The logistic function can be written as follows:

$$F\left(fp_{t+1}, \gamma, c\right) = \left(1 + exp\left(-\gamma\left(fp_{t+1} - c\right) / \sigma_{fp_{t+1}}\right)\right)^{-1} \qquad (3)$$

where $\sigma_{fp_{t+1}}$ is a time varying standard deviation of fp_{t+1} coming from the best fitting garch(1,1). We include that, as in Baillie and Kiliç (2006), to have a scale-free γ. However, we do not need to verify UIP. So, the values of the coefficients and parameters are not a source of concern for us.

We now turn to the following proposition: the risk is in the residual. If our final results are consistent with the three affirmations coming from the end of the introduction, we will consider *ex-post* that the proposition is true. The logic is as follows. In tranquil times, there is no risk. So, the estimated relationship holds and the residual is very small. In times of distress, the estimated model no longer holds and the absolute value of the residual rises.

This indicates that the arbitrage condition is no longer sufficient for efficiency allowing a room for a significantly positive currency risk premium.

We also apply the final argument of Frankel and Poonawala (2006) to our problem, since other things can be in the residual. To disentangle our estimation of the currency risk premium from these other things, we use one more time a best fitting garch(1,1) approach to estimate a time varying standard deviation that we will label as our currency risk premium measure.

We have an unresolved problem, since we do not explain how we can estimate the expected depreciation. We take this information from the equity markets, where we consider that some room for arbitrage appears when the risk rises. This last consideration comes from the recent Argentine crisis[1]. Argentineans used the equity market to withdraw their savings from Argentina, converting shares of Argentinean firms issued in Buenos Aires to American Depositary Receipts (ADRs) at a discounted rate. These lasts are USD counterparts of domestic shares, traded in a U.S. exchange. So, comparing quotes in Buenos Aires and in New York, we can calculate an implicit exchange rate. However, we have to use a broader as possible sample of firms to alleviate non liquid assets or specific evolutions. More specifically, we can calculate an implicit exchange for a given firm:

$$S_{ADR_i} = \left(\frac{ADR_i}{E_i} \right) * R_i \tag{4}$$

where S_{ADR_i} is the implicit exchange rate for firm i, ADR_i denotes the value of the share in New York and E_i in the domestic market. R_i is the number of ADR's shares for one domestic market's share. The aggregate implicit exchange rate is given by the following expression:

$$S_{ADR} = \sum_{i=1}^{n} \left(MVS_i * S_{ADR_i} \right) \tag{5}$$

where MVS_i is the total market value of the ADR's shares of firm i. We will consider this formula as our measure of the expected exchange rate.

4. Data Description

In order to use our calculation technique we have to find some time series. We need forward and spot exchange rates to measure the forward premium. The spot rates come from Datastream and the forward rates are extracted from Datastream and Bloomberg. To calculate the implicit exchange rate we used domestic quotes and ADR quotes coming from Datastream. The reasons behind the restriction of our analysis periods and the choice of the countries included in the study are lack of data or reasons described in section 5. Our sample is described in table1.

[1] See Auguste and others (2006)

Table 1: Sample Description

Country	Period	Sources			Firms included
		Spot rate	Forward rate	Quotes	
Argentina	07/21/00 to 03/04/04	Datastream	Bloomberg (NDF)	Datastream	*from 07/21/00 to 03/04/04* BBVA Banco Frances, Metrogas, Telecom Argentina B, Telefonica de Argentina B, Transportadora Gas del Sur *others* Central Costanera B (07/21/00 to 12/06/00) Grupo Fi. Galicia CL B (07/26/00 to 03/04/04) Tenaris (12/16/02 to 03/04/04) YPF 'D' (04/25/01 to 03/04/04)
Brazil	06/16/99 to 03/04/04	Datastream	Bloomberg (NDF)	Datastream	*from 06/16/99 to 03/04/04* Aracruz, Cemig, Comp. Brasil Distrib., Copel PNB, Eletrobas, Petrobas PN, Siderurgica Nacional, Tele Centro Oeste, Tele Sudeste, Telesp CL, Telesp PN *others* Banco Itau (07/02/01 to 03/04/04) Brasil Telecom (11/16/98 to 03/04/04) CIA Sanmt. Basico (04/12/02 to 06/16/03) Embraer PF (07/21/00 to 03/04/04) Perdigao (09/14/01 to 03/04/04) Petrobras ON (08/10/00 to 03/04/04) Sadia SA (11/08/02 to 03/04/04) Vale do Rio Doce (03/21/02 to 03/04/04)
	03/29/04 to 05/02/06	Datastream	Datastream	Datastream	*from 03/29/04 to 05/02/06* Aracruz, Braskem SA, Banco Bradesco, Banco Itau, Brasil Telecom, Brasil Telecom PF,Cemig, Comp. Brasil Distrib., Copel PNB, Eletrobas, Embraer PF, Petrobras ON, Petrobras PN, Sadia SA, Siderurgica Nacional, Telesp CL, Usiminas, Vale de Rio Doce On, Vale de Rio Doce PF *from 03/29/04 to 04/11/06* Perdigao SA
Chile	03/29/04 to 05/02/06	Datastream	Datastream	Datastream	*from 03/29/04 to 05/02/06* Andina A, Andina B, Banco de Chile, Banco Santander Chile, CTC A, Empresa Nac. de Elec. de Chile, Enersis, LAN Chile, Madeco, Provida, Quinenco, SQM A, SQM B *from 11/03/04 to 05/02/06* Corpbanca (11/03/04 to 05/02/06)
Mexico	09/04/98 to 03/04/04	Datastream	Bloomberg (NDF)	Datastream	*from 09/04/98 to 03/04/04* Coca Cola Femsa, Grupo Imsa, Grupo Televisa, Industrias Bachoco, Kimberly Clark de Mex., Maseca B, Telmex A, Telmex L, Tvaztca SA, Vitro Sociedad, Wal Mart de Mexico *others* Cemex (09/15/99 to 03/04/04) Gruma SA (01/25/01 to 03/04/04)

We choose to use the one year forward for the same reasons explained in Grandes (2004), since this author found that the one year forward rate is the one that best reflect expectations (p. 227). We were able to find that for

Argentina, Brazil, Chile and Mexico for different periods of time as we can see in table 1. With the help of this dataset, we built the expected depreciation and the forward premium measures. We now turn to the examination of the data generating process.

5. Non Linear Adjustments or Unit Roots?

Using time series, very unstable dynamics are not always the case for the presence of unit roots. A change of regime can be responsible for that. The data generating process can be non linear. We have seen that the LST model is the more general form of non linear models. So, when time series are unstable a good test would be of LST against linear model with unit root. Such a kind of test exists. We owe that to Eklund (2003). This author used a first order Taylor approximation to transform a LST auto regressive (LSTAR) model in a reduced form. With the help of this approximation and some simplifications, he finds the following expression:

$$y_t = \alpha + \delta \Delta y_{t-1} + \phi y_{t-1} \Delta y_{t-1} + \rho y_{t-1} + \varepsilon_t \tag{6}$$

where y_t is a given variable and Δ stands for the first difference. This equation is very near to an ADF specification with an intercept and one lag. If $\phi = 0$, the data generating process is linear. If $\rho = 1$, there is a unit root. The logic behind the test of Eklund is as follows. With H_0, the data generating process is linear with a unit root. Under the alternative H_1, there's no unit root and the process in non linear. So, Eklund proposes two tests. With the first, H_0 is consistent with a random walk without drift and the test is called F_{nd}:

$$H_0 : \phi = \alpha = 0, \rho = 1 \tag{7}$$

There is one other possibility if we take into account the fact that we can have a random walk with a drift, which is consistent with F_d and $H_0^{'}$:

$$H_0^{'} : \phi = 0, \rho = 1 \tag{8}$$

Eklund (2003) built tables of critical values for these two tests that we can use to show that the data generating process behind our series is mainly non linear and that there is no real problem of unit roots. These tables are included in appendix table 1. If the critical value is below the estimated values, then we can reject H_0.

When results are different for the expected depreciation and the forward premium we leave the estimation here since we can think that one variable is $I(0)$ when the other is $I(1)$. We present in table 2 the evidence for countries and periods described in table 1.

Table 2: Results of the Eklund Test

Argentina (2000-2004), T=943

	F_{nd}	F_d
ED	15,54875***	23,32312***
FP	4,345821**	6,517993**

Brazil (1999-2004), T=1230

	F_{nd}	F_d
ED	107,8782***	161,8173***
FP	18,46472***	27,69526***

Mexico (1998-2004) T=1435

	F_{nd}	F_d
ED	107,7062***	161,5585***
FP	6,493614***	8,648943***

Brazil (2004-2006) T=540

	F_{nd}	F_d
ED	86,60373***	129,9047***
FP	14,7581***	21,87983***

Chile (2004-2006) T=545

	F_{nd}	F_d
ED	47,83163***	71,72201***
FP	3,637566**	5,429231**

*** means that we can reject H_0 à 1%

** means that we can reject H_0 à 5%

6. Estimating Time Series of the Currency Risk Premium in Latin America

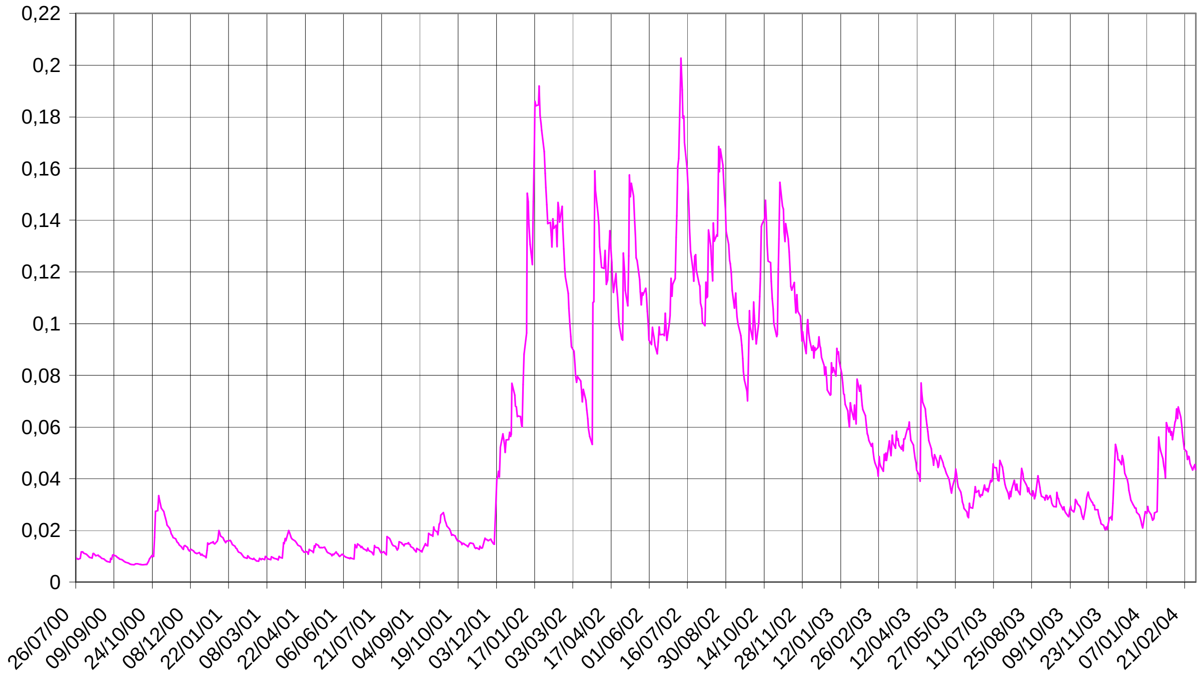
Since we have non linear stationary time series, we are able to use the model described in equation (2). We applied also our calculation technique of the currency risk premium in two periods of time, before and after 2004, due to different sources for the forward rate. Our final results are presented here.

Before 2004

Argentina (2000-2004)

The period is very heterogeneous. From July 2000 to December 2001, Argentina's exchange rate policy followed a Currency Board. After the exchange rate crisis Argentina adopted a floating rate. The Currency Board, from 1991 to 2001, was characterized by a poor valuation of risks coming from the exchange rate, as showed in Burnside, Eichenbaum and Rebelo (2001). So, there was no room for a forward market, since the currency risk was undervalued. So, as long as the Currency Board remained credible, there was no reason to find a high currency risk premium. This is what we can see in figure 1 below:

Figure 1: the Argentinean currency risk premium (2000-2004)



However, when the situation deteriorated sufficiently to imply serious expectations of an exchange rate crisis, the premium rose very sharply. In fact, we can observe in figure 1 a first slight deterioration in October 2000, after the resignation of the Vice President Alvarez. The real beginning of the currency crisis was on November 30, 2001, when one was able to observe capital flights from Argentina to other markets[2]. The government introduced measures against these flights along with other measures within the *corralito* plan. The main measure was to freeze partly bank deposits. After that, the probability of failure of the Currency Board was so high that the currency risk premium remained very high. The debt default on December 23, 2001, the end of Convertibility on January 06, 2002, and capital controls[3] on January 08, 2002, favoured a new deterioration. After that the currency risk premium was still very high, since legal risks and macroeconomic uncertainty also remained very high. From the end of 2002, the fact that the time of the crisis has gone became clear and the currency risk premium decreases to lower levels. So, we can conclude that the three points presented in the

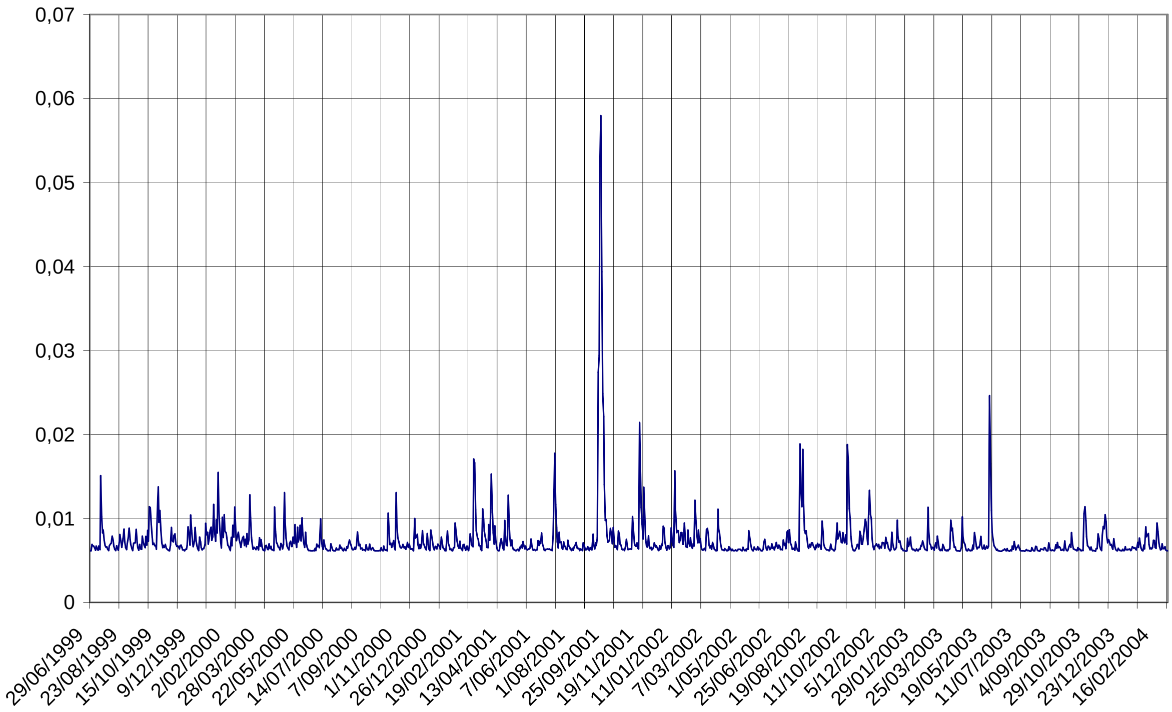
[2] We owe here to the chronology of Auguste and others (2006)

introduction are consistent with the Argentinean evidence. The currency risk premium is smaller as it could under credible fixed exchange rate regimes, it rises sharply when credibility is under stress since there is no market to hedge, and it lowers under floating regimes with the development of the forward market.

Brazil (1999-2004)

Studying our results for this country, we do not observe very high levels of currency risk premium. As we can see in figure 2, the only problem appeared at the moment of the terrorist attack in New York on September 11, 2001, when some markets were closed and others not.

Figure 2: the Brazilian currency risk premium (1999-2004)



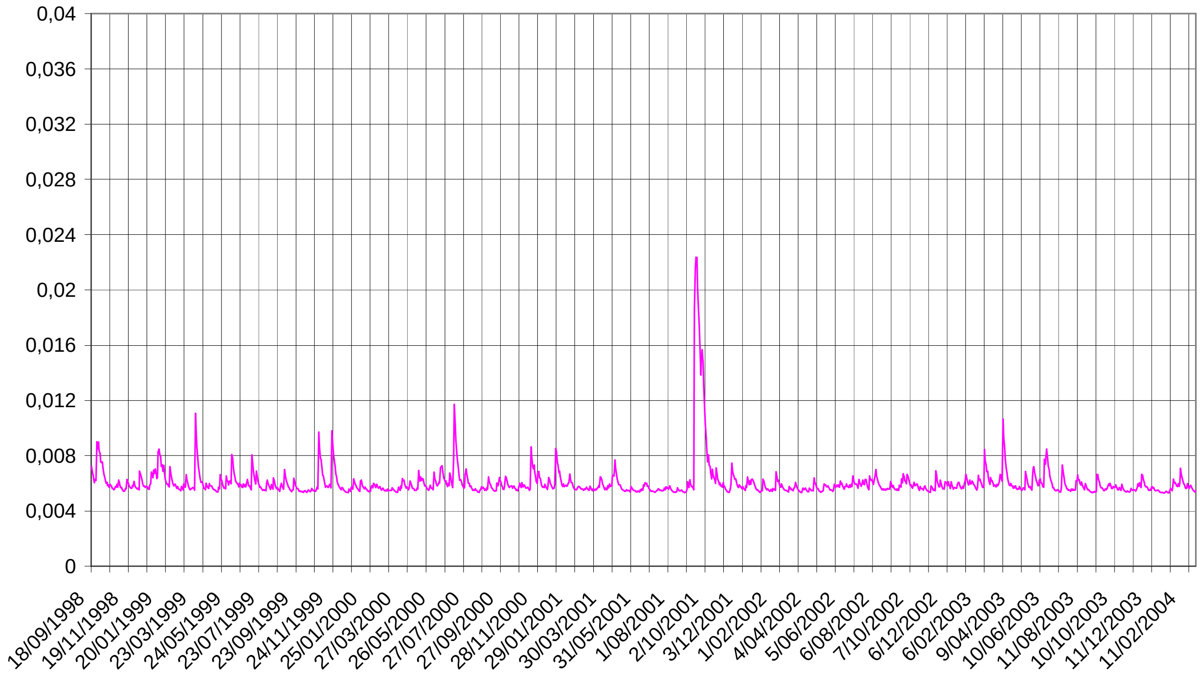
Brazil had a floating exchange rate regime from January 1999. The low levels of currency risk premium reflect the fact that the evolutions of the forward market are consistent with the expectations. Political Instability in 2000 leading to higher EMBI+ spreads implied no increase of the currency risk premium.

Mexico (1998-2004)

Things seem to be very identical to the Brazilian case. As we can see in figure 3, the currency risk premium is very low with the exception of the 09/11. The reason is the same: Mexico had a floating exchange rate.

[3] ADRs were not included in the capital controls.

Figure 3: the Mexican currency risk premium (1998-2004)

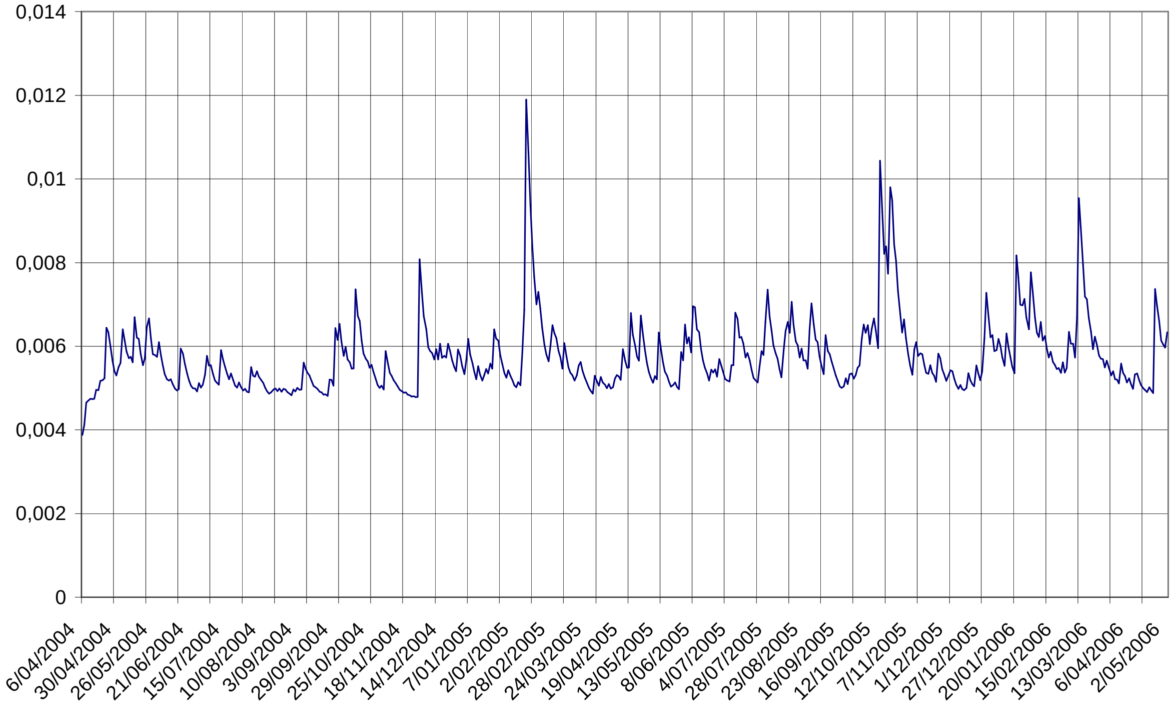


After 2004

Brazil (2004-2006)

Here we use data of deliverable forwards instead of the Non Deliverable Forwards (NDF) market. We change the scale of values in figure 4 to allow an easier interpretation. Comparing these results with those of the preceding period of time, we can note a further decrease of the currency risk premium, becoming very small.

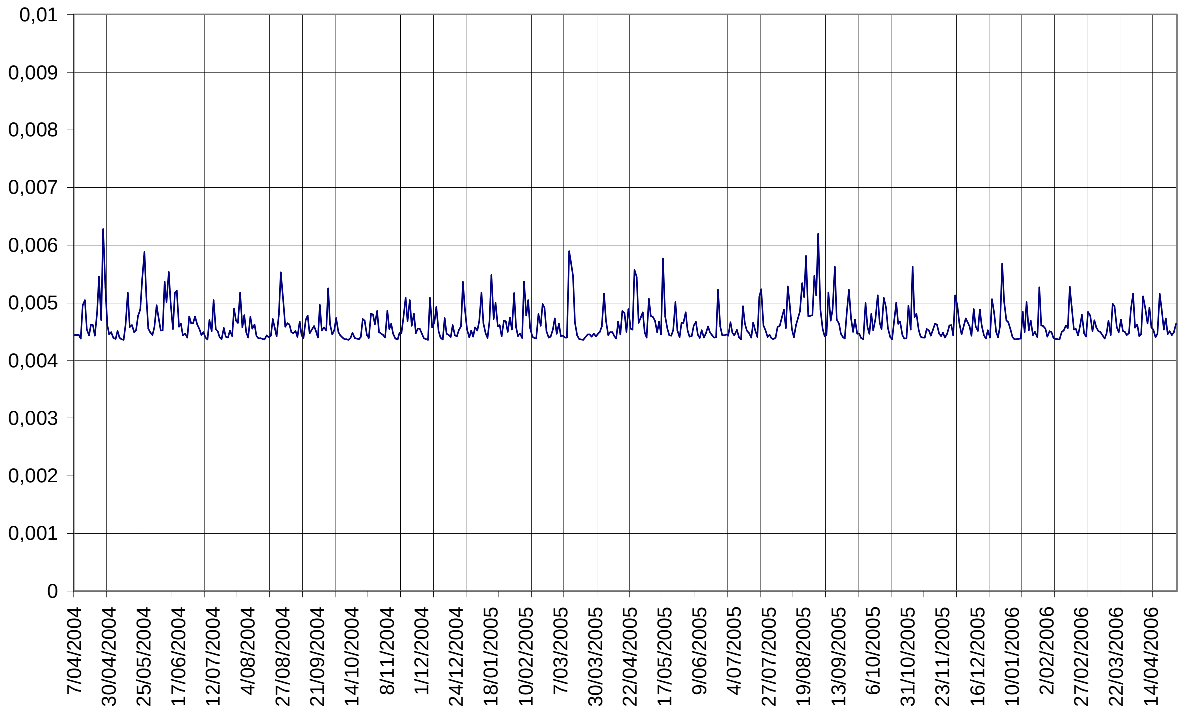
Figure 4: the Brazilian currency risk premium (2004-2006)



Chile (2004-2006)

Results for Chile are comparable with Brazilian ones, as it can be seen in figure 5. Chilean results are even better, since the currency risk premium is lower and very stable.

Figure 5: the Chilean currency risk premium (2004-2006)



7. Main Conclusions

In this paper, we proposed our own method to estimate the currency risk premium in Latin America. There are two basic ideas behind our approach. The first argument is that the forward premium anomaly is the result of a non linear relationship between the expected depreciation and the forward premium. The second denotes the fact that the currency risk premium is not the only driver of the forward premium anomaly.

Using an indirect approach to estimate the currency risk premium our results could be thought somewhat surprising. The estimated time series follow an intuitive path, since the currency risk premium increases only when the risk rises without markets to hedge. This was the case in Argentina, during the exchange rate crisis. However, in all other cases the currency risk premium is very small, except when very particular events occur like the 09/11.

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Appendix Table 1: Critical Values of the Eklund test

	F_{nd}					F_d				
T	0.10	0.05	0.025	0.01	0.001	0.10	0.05	0.025	0.01	0.001
25	3.24	4.04	4.87	6.02	9.34	4.23	5.38	6.58	8.25	12.99
50	3.09	3.76	4.43	5.33	7.72	4.08	5.06	6.05	7.36	10.81
100	3.04	3.66	4.27	5.07	7.05	4.04	4.96	5.85	7.03	10.01
250	3.02	3.62	4.20	4.95	6.79	4.03	4.92	5.78	6.90	9.63
500	3.02	3.61	4.18	4.91	6.72	4.03	4.92	5.77	6.86	9.55
∞	3.00	3.58	4.14	4.86	6.62	4.03	4.90	5.74	6.83	9.43