Cousin Risks: The Extent and the Causes of Positive Correlation between Country and Currency Risks[1]

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ABSTRACT

Emerging markets exhibit country risk, i.e., domestic interest rates are higher than covered interest parity's predictions. When country risk premium is positively correlated with currency risk premium, a negative shock that provokes the reversal of capital flows harms twice the small open economy, causing both risk premiums to increase, thereby substantially increasing interest rates. Those periods are usually associated with low economic activity, which makes the increase in real interest rates even more detrimental since it increases the vulnerability to recessive shocks. The phenomenon of positive correlation between country and currency risk premiums observed in some countries is called cousin risks. First, we identify the extent of this phenomenon by separating a sample of countries into two groups: the one where the positive correlation is observed and the one where it is not. Based on this taxonomy, we investigate the determinants of this phenomenon. The results indicate that currency mismatch and low level of financial deepening are strongly associated with the cousin risks phenomenon.

Keywords: Country Risk, Currency Risk, Cousin Risks, Original Sin

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1. Introduction

In times of reversal of capital flows and worldwide economic slowdown, as in 2001 and 2002, some emerging markets are burdened with higher real interest rates precisely when growth is faltering.[4] This combination of bad outcomes constitutes the opposite of the smoothing effect that financial markets are expected to provide. However, the impact of the reversal of capital flows is felt differently across emerging markets, as some countries are more vulnerable than others. In order to overcome these fragilities, it is imperative to identify their sources.

The covered interest rate parity (CIP) condition can be used to decompose the domestic interest rate into three components: the international interest rate, the forward premium, and a residual that proxies for the sovereign credit risk premium (the so called *country risk*). The forward premium—measured by the difference between the log of the forward exchange rate and the log of the spot exchange rate—encompasses both the expected depreciation, and the currency risk premium. The joint behavior of country and currency risk premiums can be used to analyze the effect of shocks to both the supply of and the demand for international capital flows. Under this framework, vulnerability to external shocks is identifiable through the high level and volatility of both premiums.[5]

Nonetheless, it is very plausible that an additional fragility comes up when a country presents positive correlation between country risk and forward premium. That is because, given the CIP, shocks on those two components would occur at the same time and in the same direction, magnifying the necessary interest rate reaction to avoid capital flight. Contrasting with the myriad of papers that aim at understanding how each of these two risks behaves separately, the ones that focus on their co-movement, as the present work does, are scarce.

Powell and Sturzenegger (2000) analyzes the relation between currency risk and country risk in light of dollarization. Their target was to find a causality relation. Based on event-study methodology, they conclude that the patterns are quite diverse. Garcia and Didier (2003) identified a large and positive correlation between the two risks in Brazilian data. The authors held that this result is probably due to the fact that those risks share a common generator factor. For the authors, an important implication of this fact is that if one country improves the fundaments responsible for the risks, a sharp decline of the interest rate would follow, since the country would be killing two birds – country and currency risks – with one stone. Due to the likely existence of a common root for the two risks, the authors named them *cousin risks*.

Deepening that line of research, our paper has two main goals. The first one relates to the analysis of the correlation pattern of those two risks among a sample of countries, while the second one aims at finding the factors that are behind their common root. In short, we will first investigate how widespread the cousin risk phenomenon is. Having identified its prevalence, we will go on to examine the possible causes of the positive correlation between country and currency risk premiums.

Such an empirical study only recently became possible, since it presupposes the existence of forward exchange rate markets in different currencies. Notwithstanding the creation of forward exchange rate markets in many currencies, the binding restriction to

[4] The same argument applies to foreign borrowing in hard currency.
[5] See, e.g., Domowitz, Damavhan, and Glenn (1997), and Garcia and Didier (2003).

construct the sample remains the existence of daily data on the forward exchange rate. Usually, studies of currency risk have relied on the nominal interest differential between countries to proxy for the forward premium. This is valid only under covered interest parity, which does not hold for the emerging markets that exhibit country risk. Therefore, up to now our paper analyzes the following 25 countries:

> Australia, Argentina, Brazil, Canada, Chile, Colombia, Czech Republic, Great Britain, Indonesia, Japan, Mexico, New Zealand, Norway, Peru, Philippines, Poland, Russia, Singapore, South Africa, South Korea, Sweden, Switzerland, Thailand, Turkey, and Venezuela.

This paper has five sections, including this introduction. Section 2 puts the term cousin risk in context, showing a decomposition of the interest rate, and presenting a survey of the relevant literature. Section 3 investigates how widespread the cousin risks phenomenon is. Having identified the extent of the cousin risks phenomenon, Section 4 studies the determinants of the cousin risks. Finally, Section 5 concludes and draws policy implications.

2. Cousin Risks

2.1. The Determinants of Interest Rates and the Covered Parity Decomposition

Capital account liberalization requires that the domestic interest rate obey a parity condition with the international interest rate. For countries that are internationally financially integrated and have no credit risk, covered interest parity (CIP) holds.[6] However, mainly for the so-called emerging markets, there is usually a positive differential, which is a measure of the country credit risk premium. Accordingly, the domestic interest rate may be broken into three components: the international interest rate, the forward premium**,** and the country risk premium.[7] In turn, the forward premium may be decomposed into the expected depreciation and the currency risk premium.

$$1+i_t = (1+i^*_t)\,(f_{t+1}/\,s_t)\,(1+\theta_t) \rightarrow\ i \cong i^* + (\textit{Forward Premium}) + (\textit{Country Risk}) \quad [1]$$

Where:

- *(Forward Premium)* = (Expected Depreciation) + (Currency Risk Premium);
- i_t is the internal interest rate of a domestic bond denominated in its own currency, from t to t+1;
- i_t^* is the risk free international interest rate from t to t+1;
- f_{t+1} is the forward exchange rate traded in t;
- s_t spot exchange rate in t;
- θ_t is the country risk or sovereign default risk premium.

[6] Frankel (1991)

[7] Henceforth, we shall drop the term "premium" and refer only to country risk, as it became usual in international finance jargon.

Therefore, through CIP, it is possible to decompose the interest rate and identify how its components account for its statistical moments. Moreover, it is also possible to identify which of its components are responsible for the shocks. Many papers analyze the decomposition of the interest rate through the aforesaid theoretical framework.[8] In the following sections we present the methods for decomposing these risks and analyze their determinants.

2.2. Forward Premium and Currency Risk Premium

Interest rates corrected for forward premiums are calculated due to the fact that foreign investors are normally concerned with the return of their investments once converted to their own currencies. Since exchange rate fluctuates, if there are no arbitrage opportunities, the level of interest rate must compensate the investor for the loss (or gain) due to currency depreciation (appreciation). If investors are risk averse they demand an even higher interest rate to compensate for that uncertainty, i.e., they will demand a risk premium.[9]

Studies of the currency risk premium (e.g., Fama (1984)) have traditionally made use the nominal interest differential between countries to proxy for the forward premium. This approximation assumes covered interest parity, which does not hold for the emerging markets that exhibit country risk. Recently, the development of derivative markets for emerging market currencies has rendered possible the direct calculation of forward premiums on a daily basis.

It is a stylized fact that forward exchange rates are biased estimators for the actual spot exchange rate in the future. This puzzle, known as the *Forward Premium puzzle*, has even more intriguing results. Indeed, Fama's (1984) classical paper found a negative correlation between forward premium and actual depreciation in developed countries. Bansal and Dahlquist (2000) used Fama's (1984) methodology to analyze emerging countries and found that these do not present the above-mentioned negative correlation. Nevertheless, they also found evidence that forward exchange rates were biased estimators for those countries' actual spot exchange rate in the future.

The literature considers many possible explanations for the forward premium puzzle: existence of a risk premium, market inefficiency, lack of rational behaviour, learning, the peso problem, and others.[10] We focus on the first explanation, i.e., the existence of a currency risk premium. As it is widespread analyzed in the theory of finance, investors decide their portfolio allocation problem based on the trade-off between expected return and risk, which can be understood as an asset's non-diversifiable potential variation. In fact,

[8] Domowitz, Glen, and Madhavan (1998) and Garcia and Didier (2003) analyzed Mexico and Brazil, respectively.

[9] We will assume that the exchange rate risk is not completely diversifiable, which is a very reasonable assumption for emerging markets, where episodes of reversal of capital flows are associated with large depreciations and abrupt recessions, called sudden stops (see Calvo (1998)).

[10] For a review, see Engel (1995).

celebrated models such as the Capital Asset Price Model,[11] indicates that the higher the non-diversifiable potential volatility of an asset,[12] the higher its implied return.

Based on such models of risk diversification, we can justify the statement that the forward premium is equal to expected depreciation plus currency risk premium, which, in turn, is a result of exchange rate uncertainty. Thus in order to analyze the forward premium determinants, we should study its two components[13].

$$FP = (\textit{expected depreciation}) + (\textit{risk premium}) \qquad [2]$$

However, the measurement of this unobservable currency risk premium is not a trivial task, requiring econometric estimation[14] or other forms of identification, as surveys of market expectations. Nevertheless, the expected depreciation and the currency risk premium are jointly captured by the forward exchange rate traded in derivative markets. In this paper, so long as the evolution of interest rates components and determinants are concerned, exchange rate analysis will be concentrated on forward premium as a whole, i.e., on the expectation of depreciation and the risk premium relating to its uncertainty. We do that because we consider that the available econometric frameworks to disentangle the currency risk premium from the expected depreciation would not lead to results that we could rely on. Therefore, we prefer to conduct the analysis using the observable forward premium. Thus, henceforth "currency risk" and "forward premium" will be used interchangeably.

2.3 Country Risk

If agents foresee a possibility of default, i.e., the possibility of no payback at some time during the bond's life, another premium must enter the analysis: the credit risk premium. In the case of a sovereign government, this risk is called sovereign credit risk or country risk. One of the ways of measuring it is through the interest rate deviation *vis-à-vis* the value predicted by the non-arbitrage condition stated by the CIP on de absence of credit risk. This is called Covered Interest Rate Differential (CID), and is calculated as following:

$$CID_t = i_t - i^*_t - (\textit{Forward Premium})_t \qquad [3]$$

CID is a measure of country risk,[15] but it is not the only one. Alternatively, we could measure a country's sovereign credit risk through one of its issued bonds denominated in a foreign currency. Such a bond would not be subject to currency risk since it is denominated

[11] For a description of CAPM model, Cochrane (2001) is a good reference.

[12] The non-diversifiable potential volatility of an asset is understood as the covariance between the returns of the asset and market portfolio's.

[13] Garcia and Olivares (2001) estimated a forward premium decomposition as being the depreciation plus a Brazil's exchange rate risk premium for a fixed period of time. As we already said, we do not follow this decomposition since we analyze these two components jointly instead.

[14] Garcia and Olivares (2001) presents a brief review of the literature that tries to disentangle the currency risk premium from the expected depreciation.

[15] Frankel (1991) claims that the differential (or deviation) of the covered interest rates parity is the best measure of the lack of perfect capital mobility *...because it captures all barriers to integration of financial markets across national boundaries: transactions costs, information costs, capital controls, tax laws that discriminate by country of residence, default risk, and risk of future capital controls*.

in a foreign currency, instead, is subject to issuer's credit risk. Thus country risk would be equal to the implicit rate of this bond exceeding the international risk free interest rate of same duration, i.e.:

$$Country\ Risk_t = i_t^{us} - i^*_t \qquad [4]$$

Where:

- i_t^{us} is the interest rate of one of its issued bonds denominated in a foreign currency (usually the US dollar), from t to t+1,
- i_t^* is the international risk free interest rate from t to t+1.

The best measure of country risk depends on how liquid the markets of each of the financial instruments are. For most of the countries, the secondary market of emerging-markets-dollar-denominated bonds suitably expresses investors' perception of sovereign default risk because these markets are, in general, very liquid and not subject to domestic government interventions that could affect prices.

The literature on the determinants of country risk is very large. Many papers resort directly to econometric modeling without an explicit model. The aim is to evaluate each variable's net effect over credit risk. Garcia and Didier (2003), Westphalen (2001), Kamin and von Kleist (1999) and Mauro, Sussman, and Yafeh (2000) are a few papers that follow this methodology. In all of the aforementioned papers, explanatory variables can be classified into three groups: 1) liquidity and solvency variables; 2) macroeconomic performance variables and; 3) global risk aversion variables. In group 1, the main variables affecting country risk are debt over GDP ratio, debt service over exports ratio, debt service over GDP ratio, and the level of international reserves. In group 2, the following variables stand out: GDP growth, inflation rate, and terms of trade. Lastly, the junk bond or high yield spread is largely used as a measure for global risk aversion.

Another framework is bond pricing under credit risk models, such as structural and reduced models. Structural models first appeared in Black and Scholes (1973) and Merton (1974). In these famous papers, a default would have occurred if the difference between assets and liabilities (modeled as Ito processes) at maturity had been below a certain threshold. Longstaff and Schwartz (1995) and Saá-Requejo and Santa-Clara (1999) further developed the above model by hypothesizing that a default should occur every time the difference between a firm's assets and liabilities is higher than the threshold from start to maturity dates. Rocha and Moreira (2001) use a structural model adapted to Brazil's sovereign risk in their paper. They analyzed what should be the most suitable macroeconomic variable for explaining C-Bond[16] spread behavior. Moreover, by using structural models, they captured a non-linear dependence between C-Bond spread and its explanatory variables. They conclude that net external debt over tradable GDP is the best variable to explain C-Bond spread behavior.

In reduced models, such as Duffie and Singleton (1999), default is defined as the first 'jump' of a Poisson process. This is a widespread procedure used for pricing derivatives subject to default risk. Nevertheless, even though it allows asset pricing, it is not possible to directly identify which factors are responsible for risk premium dynamics. Duffie, Pedersen,

[16] C-Bond is the jargon for capitalization bond, the most liquid instrument of emerging markets foreign debt, widely used to infer Brazilian country risk.

and Singleton (1999) uses reduced models to carry out a case study of the behavior of dollar-denominated Russian bonds before and after the 1998 default. After having decomposed country risk, they analyzed the evolution of the determinants of that risk, estimating a simple linear regression and a VAR model in order to show that risk premium presents a correlation with level of international reserves and the international oil price.

2.3 Why these risks should follow a similar trend? Theoretical arguments for the existence of *Cousin Risks*

So far, besides having analyzed covered interest parity condition, this section has briefly reviewed the literature on the determination of the forward premium and the country risk premium. In regard to the analysis of their co-movement, the literature is still very incipient. In this subsection, we present some theoretical arguments that could justify a correlation between forward premium and country risk.

From a logical point of view, we can conclude that a strong correlation between forward premium and country risk – or between any two series – can only arise under one of two conditions: the first is the existence of a common generating factor, and the other possibility is the existence of a causality relation between the two series, i.e., movements in one series influence the behavior of the other.

In regard to the first possibility, country risk and forward premium are analyzed in the literature and their respective individual determinants are well known. These would be the natural candidates of being a common factor, i.e., a factor that would have generated both series. Nevertheless, as the above literature review showed, one series' determinants are different from the other's. The main determinants of country risk are solvency and liquidity variables (level of net indebtedness, fiscal deficits, etc.), while the main components of forward premium dynamics are related to the balance of payments uncertainties. In Section 4 we will formally test if the occurrence of the positive correlation phenomenon is associated with a high (or low) level of these variables.

The causality relation has received support in the literature. Two articles have examined how forward premium shocks could trigger off country risk shocks. In the aftermath of a *dollarization*, i.e., the abandonment of local currency in favor of a hard currency, the US dollar, the disappearance of the *forward premium* is uncontestable. But what is the effect on country risk? Powell and Sturzenneger (2000) and Neumayer and Nicolini (2000) try to answer this question.

Making use of event-study methodology, Powell and Sturzenneger (2000) analyzes the causality effect of currency risk on country risk. Basically, they choose a date when an event had undoubtedly influenced (positively or negatively) the forward premium and estimate the evolution of the abnormal country risk return.[17] Their next step was to observe the direction of country risk movements relative to forward premium movements. Their result indicates that there are various patterns. Some countries present positive correlation while others present negative correlation or no-correlation at all. Table 1 presents their results.

[17] Generally, abnormal return is calculated as the observed return above the expected return predicted by CAPM model. Therefore, it is imperative to estimate every country's 'beta'.

Table 1: Powell e Sturzenneger's (2000) results

		currency risk - coutry risk causality signal as results of Powell and Sturzennegar sugest
European Countries (Pre-EMU)	Austria	+
	Belgium	+
	Denmark	-
	Finland	0
	Ireland	+
	Portugal	-
	Spain	0
	Sweden	-
Latin-American Countries	Argentina	+
	Brazil	+
	Chile	0
	Colombia	0
	Ecuador	+
	Mexico	+

source: Powell e Strzennegar (2000), pg 15 and 18

Section 3 presents an analysis of forward premium and country risk joint behavior for a larger sample of countries. However, it will not proceed to an empirical analysis of causality relation between those two variables.

Regarding the theoretical reasons for positive or negative relation between the two risks, there are arguments in favor of both effects. Indeed, in the case of a negative impact (an increase of country risk), two factors stand out. The first one is still on *dollarization*. The abandonment of national currency means the abolition of *seignoriage* and, as a consequence, a possible worsening of the country's credit rating. The second factor argues that the absence of monetary policy (due to the adoption of another currency) implies less nominal flexibility and higher real response to shocks, causing GDP's volatility to increase. In turn, this volatility could result in a soaring country risk.

Conversely, there are arguments that justify a reduction of the country risk due to the abolition of the domestic currency, such as the increase in financial efficiency, the elimination the possibility of suffering speculative attacks, and the end of the government's balance currency mismatch. The benefit of the abolition of speculative attacks is immediate. Increase financial efficiency, whether achieved by dollarization[18] or not, ease government funding, which could lead to a reduction of future solvency uncertainty, ultimately reducing the country risk.

The most interesting argument is the so-called balance sheet effect, which states that the effect of the forward premium on the country risk is due to government balance currency mismatches. This currency mismatch occurs when a significant part of government liabilities are denominated in a foreign currency while assets and future proceeds are denominated in local currency. Under these circumstances, oscillations of the local currency could affect government balance sheet, potentially leading the government to

[18] Dollarization makes the country become financially more integrated and that is why it is usually argued that dollarization increases financial efficiency.

default on its debt. Following this, the main channel through which the forward premium might affect country risk is established. Krugman (1999)[19] highlights the importance of currency mismatches. Broadening the exchange rate crisis model, Krugman (1999) presents a model in which balance currency mismatches in firms' balance sheets help to explain an exchange rate crisis. In Neumayer and Nicolini (2000), theoretical arguments are presented regarding the relation between balance currency mismatches and country risk.

The 'balance sheet' argument is in line with Eichengreen, Hausmann, and Panizza's (2002) observation of the original sin phenomenon. The latter argument states that the majority of countries cannot borrow internationally in their own currency. They state that only a few countries, referred to as major financial centers, do not face this problem: the USA, countries in the Eurozone, the United Kingdom, Japan, and Switzerland. According to them:

> *...while the major financial centers issued only 34 percent of the total debt outstanding in 1993-1998, debt denominated in their currencies amounted to 68 percent of total . ... Developing countries accounted for 10 percent of the debt but less than one per cent of currency denomination in 1993-1998 period. This, in a nutshell, is the problem of original sin*.

Eichengreen, Hausmann, and Panizza (2002) creates an index to measure the degree of 'original sin' for every country, which is defined by the degree of aggregated exchange rate mismatch. Thus movements in the exchange rate would cause an income effect, and so GDP and solvency conditions become more volatile (causing a worsening in country's credit rating). By the same reason, Hausmann (2002) claims that the composition and currency-denomination of the stock of debt could explain why, in spite of Latin American fiscal improvement efforts during the 90s, there were no significant improvements in country risk measures.

In spite of the fact that many theories justify, by different arguments, correlation between currency risk and country risk, none of the papers reviewed here carried out an empirical investigation on the determinants of the positive correlation between the two risk premiums.[20] Such an analysis will be carried out in Section 4, where we will estimate the pattern of currency and country risks' joint behavior in a sample of countries. The initial objective is to identify the extent of the cousin risks phenomenon.

3 How widespread is the cousin risks phenomenon?

3.1 The risks' decomposition, the sample and the difference between the two measures

We now investigate the extent of the cousin risks phenomenon, through an analysis of the country and currency risks' joint behavior in a sample of 25 countries. The countries analyzed are listed in Table 2, where the timeframe of analysis and a description of their

[19] In fact, Krugman (1999) only considered firms.

[20] Eichengreen, Hausmann, and Panizza (2002) estimated which factors could cause an exchange rate mismatch, but they do not estimated if this stylised fact is associated with the correlation between country risk and risk premium.

monetary policies (according to IMF data) are also presented. The sample contains daily data, with the exception of data related to the analysis of deviations from covered interest parity condition in Colombia, which are weekly. The United States is excluded from the sample since every exchange rate was denominated in terms of US dollars. Moreover, many European countries were not included in the sample since they had adopted Euro currency since 1999.

Table 2 - Sample Description

			Monetary Regime	Period and number of observations on CID-FP analysis	Period and number of observations on embi+ - FP analysis
Emerging economies with embi+	1	Argentina	Currency board (until 2001) then Free float	6/07/01 - 5/08/02	4/1/99 - 5/08/02
				132 observations	905 observations
	2	Brazil	Inflation target	7/6/99 - 5/7/02	7/6/99 - 5/7/02
				661 observations	654 observations
	3	Colombia	Inflation target	08/26/99 - 10/10/02	8/26/99 -10/11/02
				162 obs (weekly)	694 observations
	4	Chile	Inflation target	22/06/99 - 16/12/99	21/07/00 -02/05/03
				107 observations	702 observations
	5	Mexico	Monetary agregate target	11/5/97 -10/08/02	12/31/97 - 10/08/02
				1149 observations	1139 observations
	6	Peru	Monetary agregate target	10/17/00 - 09/02/02	07/21/00 - 10/11/02
				460 observations	549 observations
	7	Phillipines	Monetary agregate target	03/29/99 - 10/11/02	05/28/99 - 10/11/02
				707 observations	832 observations
	8	Poland	Inflation target	10/18/00 - 10/08/02	08/20/98 - 10/08/02
				431 observations	933 observations
	9	Russia	Fund Supported	-	09/12/99 - 3/04/03
				-	853 observations
	10	South Africa	Inflation target	2/14/95 - 10/08/02	04/30/02 - 10/08/02
				1820 observations	113 observations
	11	South Korea	Inflation target	4/14/99 - 10/02/02	4/14/99 - 06/11/02
				507 observations	492 observations
	12	Turkey	Monetary agregate target	11/28/98 - 10/11/02	07/08/99 - 10/11/02
				724 observations	586 observations
	13	Venezuela	Crawling peg	-	21/12/98 - 5/08/02
				-	905 observations
Emerging economies without embi+	14	Indonesia	IMF support	08/23/96 - 3/8/01	-
				1023 observations	-
	15	Czech Republic	Inflation target	05/14/97 - 10/8/02	-
				1016 observations	-
	16	Singapore	Other	1/4/95 - 10/08/02	-
				1845 observations	-
	17	Thailand	Inflation target	5/23/96 - 5/17/01	-
				1121 observations	-
Developed economies	18	Australia	Inflation target	1/5/95 - 10/8/02	-
				1892 observations	-
	19	Canada	Inflation target	1/6/95 - 10/8/02	-
				1884 observations	-
	20	England	Inflation target	1/24/97 - 10/8/02	-
				1417 observations	-
	21	Japan	Other	5/15/95 - 10/8/02	-
				1843 observations	-
	22	Norway	Inflation target	15/12/95 - 8/10/02	-
				1635 observations	-
	23	New Zealand	Inflation target	1/15/95 - 10/8/02	-
				1879 observations	-
	24	Sweden	Inflation target	12/15/95 - 10/8/02	-
				1848 observations	-
	25	Switzerland	Other	5/29/97 - 10/8/02	-
				1580 observations	-

In order to calculate the correlation between the risks for each country in the sample, we first have to calculate the time-series currency risk and country risk. This can be done through a myriad of financial instruments quoted daily in international financial markets subjected to different kinds of risk and by consequence with different prices and different implicit rates of return.

In order perform such decomposition, five financial indicators were used:

1. 1 year forward exchange rate (source: Bloomberg);
2. Spot exchange rate (source: Bloomberg);
3. 1 year Swap rate (source: Bloomberg);
4. 1 year US Treasury rate (source: Federal Reserve);
5. EMBI+ and EMBI GLOBAL stripped spread (source: JPMorgan).

Currency risk (i.e., the forward premium) was calculated as follows: [21]

$$Forward\ Premium_{\ 1\ year,,t} = (forward\ rate_{1\ year,\ t} - spot\ rate_t)/\ spot\ rate_t \qquad [5]$$

The country risk was calculated through two procedures:

1. EMBI+ spread or EMBI GLOBAL spread;
2. Covered interest parity differential.

EMBI+ is an index constructed by JPMorgan, which tracks total returns for the most liquid U.S. dollar-denominated Brady bonds, loans, Eurobonds, and U.S. dollar-denominated local market instruments. JPMorgan's EMBI global tracks total returns for U.S. dollar-denominated Brady Bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities. EMBI's stripped spread[22] is simply the difference between that index and a US Treasury rate of same duration. Therefore, it is an instrument subject to country risk but not subject to currency risk since it is denominated in dollars. Thus, as mentioned in Section 2, the deviation of this index from the international risk free interest rate of same duration is a measure of country risk.

EMBIs are a very important variable for our analysis for two reasons. The first one is that this variable is calculated from the country's most liquid bonds, thus if investors change their preferences during the period of analysis, JPMorgan adjusts the sample accordingly. EMBI+ is also interesting because it is a variable calculated from secondary market data, a market in which governments have little or no influence at all. Thus EMBIs accurately depicts investors' risk perception. Table 2 shows that JPMorgan computes the EMBIs for thirteen countries in our sample.

The other risk measure used in our analysis is the covered interest rate differential (CID). This measure is calculated from Equation 3 presented in Section 2 and repeated below:

[21] The Brazilian forward premium is calculated from interpolated dollar coupon "DDI" rates and Brazil's "DI" interest rates term structure.

[22] The EMBIs stripped spread data series were computed by JPMorgan.

$$CID_{1\ year\ t} = i_{1\ year,t} - i^*_{1\ year,t} - (Forward\ Premium_{1\ year,t}) \quad [3]$$

Where:

- $i_{1\ year,t}$ is the 1 year swap rate,[23]
- $i^*_{1\ year,t}$ is the one-year US Treasury rate.

The swap rate, used in the CID calculation, follows a similar trend to the rate determined by each country's central bank since the swap rate is the expectation (in risk neutral terms) of future spot rates. Therefore, the Central Bank has a great influence over this variable.

Garcia and Valpassos (1998) analyzes the evolution of CID and the C-Bond spread[24] in Brazil during the controlled exchange rate regime. Undoubtedly, there is a close relationship between these variables and a high mismatch[25] between them should cause other economic variables such as the exchange rate and international reserves to absorb the shock[26]. During that period, the regularity was that, in the event of bad shock, e.g. the start of the Asian crisis, the C-Bond Spread was the first to jump, and covered-interest-rate-parity differential moved later, as domestic interest rate were raised to avoid further foreign reserves losses. Therefore, the increase in the difference between the C-Bond spread and the covered-interest-rate-parity differential had served as a very good coincidental, and sometimes leading, indicator of currency crisis.

This paper does not extend the above study to a broader set of countries. Nevertheless, the results in Garcia and Valpassos (1998) and Garcia (2002) indicate that CID is a risk measure that responds more slowly than the EMBI+ spread does. The implication being that the EMBI+ spread is a more reliable variable for capturing investors' risk perception on a daily basis.

An unfortunate characteristic of CID is that this variable usually exhibits a negative correlation with the forward premium because of the calculation procedure used: the forward premium is calculated as the residual of Equation 5. Therefore, whenever the forward premium is impacted by a shock, unless the internal interest rate instantly reacts by at least the same magnitude of the forward premium's shock, their correlation (forward premium and CID) is diminished. These findings are very important for the interpretation of results presented later in this paper since, *ipso facto*, we can expect that the correlation between the forward premium and the EMBI+ spread to be higher than the correlation between the forward premium and CID.

3.3 Results

[23] There are some exceptions: Brazil (one-year dollar coupon rate), Mexico (TIIE 28 days), Colombia (CD 360 days), Peru (Deposit Rate one-year) and Turkey (Overnight).

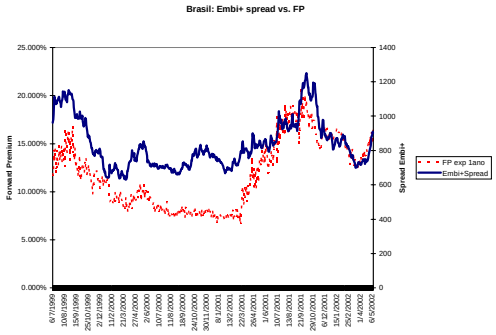
[24] C-Bond spread is a risk measure similar to the EMBI+ variable used in our study.

[25] Undoubtedly, as the authors highlighted in their paper, we must take account of many factors that cause differences between those variables: bonds' duration, tax systems, investors' risk perception towards internal and external public debt default and, lastly, the possibility of capital controls which could harm investors expected returns.

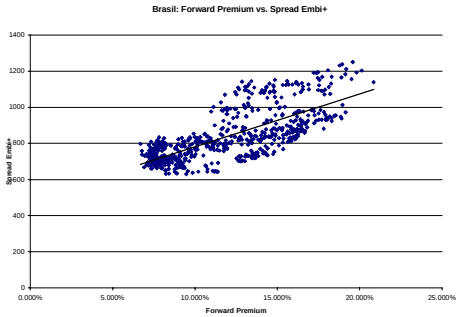
[26] The authors estimated an econometric model that indicates that, in Brazil, during the 90's, the main responsible for capital influx was a high CID, above the EMBI+ spread.

We now turn to the analysis of the two risks' co-movement. The following graphs[27] indicate how different the patterns of joint behavior can be from one country to another. Based on them, we can confirm that the *cousin risks phenomenon* is **not** pervasive for emerging economies.

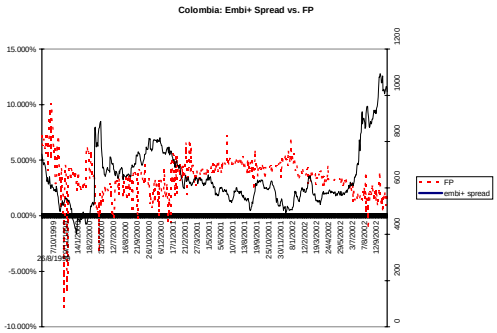
Graph 1a: Brazil Risks Evolution



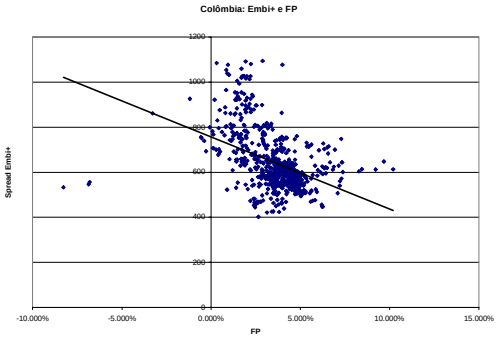
Graphs 1b: Brazil Risks Scatter Diagram



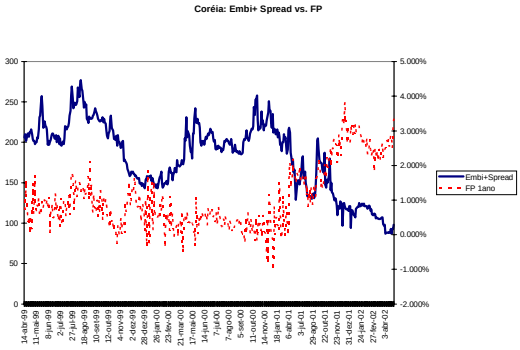
Graph 2a: Colombia Risks Evolution



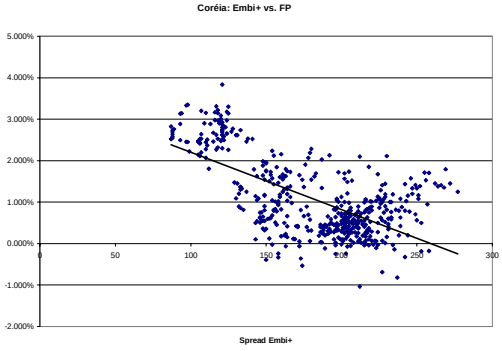
Graph 2b: Colombia Risks Scatter Diagram



Graph 3a: South Korea Risks Evolution



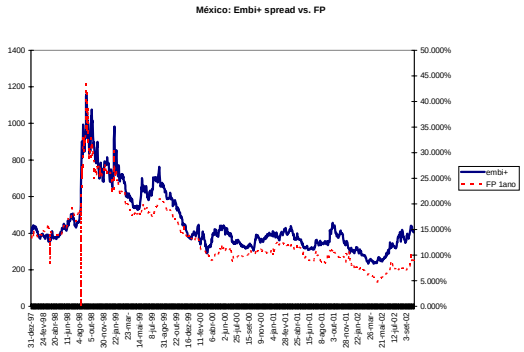
Graph 3b: South Korea Risks Scatter Diagram

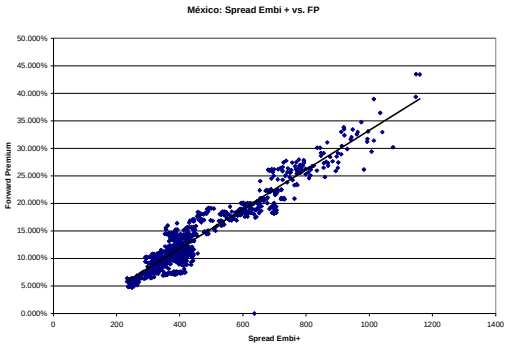


Graph 4a: Mexico Risks Evolution

Graph 4b: Mexico Risks Scatter Diagram

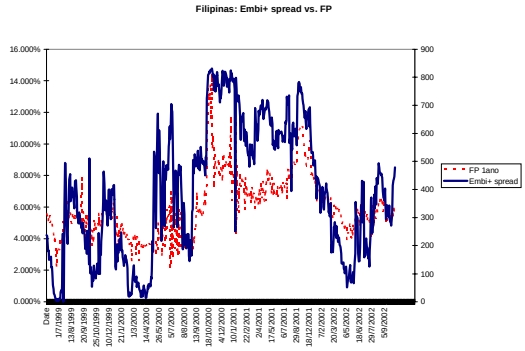
[27] The graphs for all countries are presented in Appendix 1

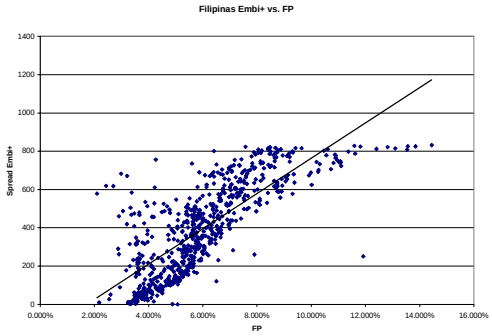




Graph 5a: Philippines Risks Evolution

Graph 5b: Philippines Risks Scatter Diagram





From the above graphs we can infer that there is a strong positive correlation between country risk and currency risk in Brazil, Mexico, and the Philippines. But in other countries, such as Colombia and South Korea, the cousin risks phenomenon does not seem to occur. Graphs 1a, 2a, 3a, 4a, and 5a present country and currency risks time series where each risk refers to a separate axis.[28] In Brazil, Mexico, and the Philippines, country risk and currency risk curves follow almost identical paths while in Colombia and South Korea they do not. Moreover, the graphic evidence from scatter diagrams 1b, 2b, 3b, 4b, and 5b confirm our preliminary diagnoses of the strong relationship between the two risks in these countries. The positive linear pattern in Brazil, Mexico, and Philippines is remarkable. Even though this result stands out clearly from the above graphs, we shall carry out a a formal econometric analysis.

In doing so, we will follow two procedures: calculation of their correlation coefficient and cointegration analysis.[29] First, we not only calculate the coefficient of correlation between CID and the forward premium but also between the EMBI+ spread and the forward premium. The ultimate objective is to capture the degree of linear association

[28] This is done because we are mostly interested in jointly co-movements, not so much in levels. When we work with two axes is easier to perceive their co-movements.

[29] Another possibility, which we have not yet done, is the use of *copulae* methods. This would allow us to depart from the usual, yet unrealistic, assumptions of multinormality and linearity.

between these series. Table 3 presents the statistics relating to this analysis, including their correlation coefficients.

We perform the Phillips-Perron unit root test. The results are presented in Table 4. Since a few series are non-stationary, we have to perform cointegration analysis in lieu of the analysis of the correlation coefficient. Two non-stationary variables are cointegrated whenever there is at least one linear combination of these two series that is stationary. The so-called cointegration vector[30] estimated through the Johansen test measures this relation. Through this methodology, the cousin risks phenomenon becomes identifiable whenever we do not reject the null hypothesis of cointegration between the two integrated series and the cointegration vector shows a positive relation between country risk and currency risk. Table 5 presents the cointegration test results.

For all countries, we analyzed the relation between the forward premium and CID, which is a measure of country risk. For those countries that possess an EMBI+ index, we also analyzed the relation between the respective EMBI+ spread and the forward premium. As stated earlier, the EMBI+ spread is a better proxy for country risk and, moreover, it must be taken into account that the analysis with CID is expected to generate lower correlation values. Tables 3, 4, and 5 display these results.

[30] Whenever we refer to cointegration vector, we mean normalised cointegration vector.

Table 3. Correlations and Risk's Statistics

			Cousin Risks1: (CID vs. FP)			Cousin Risks 2: (Embi+ Stripped Spread vs. FP)		
			Forward Premium mean (s.e.)	Covered Interest Differential mean (s.e.)	Correlation Coeficient	Forward Premium mean (s.e.)	Embi+ Spread mean (s.e.)	Correlation Coeficient
Emerging economies with embi+	1	Argentina	97.710% (40,50%)	-6.39% (16,33%)	+0.124	29.860% (43.05%)	1704.2 (1818.1)	+0,967
	2	Brazil	11.814% (3,599%)	4.573% (1,750%)	+0.0591	11.810% (3.553%)	833.4 140.6	+0,739
	3	Colombia	3.383% (1,845%)	6.001% (2,396%)	-0.4495	3.4% (1.8%)	644.9 (125,5)	-0,427
	4	Chile	2.460% (0,29%)	-1.060% (0,33%)	-0.6740	2.634% (1.249%)	185.7 (29.1)	+0,308
	5	Mexico	13.696% (6,161%)	0.067% (2,366%)	+0.447	13.721% (6,281%)	452.7 (166,6)	+0,950
	6	Phillipines	5.978% (1,938%)	2.225% (2,109%)	+0.263	8.017% (4,456%)	492.1 (107,9)	+0,697
	7	Peru	4.694% (2.348%)	1.270% (1.357%)	+0.171	4.949% (2,211%)	630.7 (117,8)	+0,596
	8	Poland	4.848% (1,279%)	4.732% (1,609%)	+0.829	4.886% (1,160%)	238.5 (41,8)	+0,849
	9	South Africa	8.007% (2,615%)	0.385% (0,563%)	-0.548	10.676% (0,749%)	249 (27,02)	+0,899
	10	South Korea	1.125% (0,963%)	0.520% (0,463%)	-0.744	1.066% (0,925%)	181.9 (43,1)	-0.646
	11	Turkey	57,76% (27,36%)	-0,38% (28%)	-0,798	49.947% (23,887%)	665.3 (200,7)	+0,607
	12	Russia	-	-	-	18.163% (28,36%)	917.1 (515,1)	+0,748
	13	Venezuela	-	-	-	23.220% (16,797%)	969.8 (161,2)	+0,726
Emerging economies without embi+	14	Indonesia	15.394% (13,581%)	0.346% (1,756%)	-0.611			
	15	Czech Republic*	0.533% (1,112%)	1.883% (2,899%)	+0.822			
	16	Singapore*	-1.768% (1,501%)	0.267% (0,387%)	-0.227			
	17	Thailand	4.528% (5,492%)	0.648% (0,654%)	-0.271			
Developed economies	18	Australia	0.629% (1,232%)	0.389% (0,199%)	-0.664			
	19	Canada	-0.312% (0,910%)	0.415% (0,223%)	-0.138			
	20	England	0.863% (0,938%)	0.602% (0,221%)	-0.710			
	21	Japan	-4.701% (1,173%)	0.299% (0,225%)	-0.350			
	22	Norway*	0.721% (2,127%)	0.512% (0,259%)	-0.005			
	23	New Zealand	1.645% (1,340%)	0.522% (0,209%)	-0.709			
	24	Sweden	-0.540% (1,503%)	0.507% (0,244%)	-0.462			
	25	Switzerland	-2.837% (1,310%)	0.363% (0,243%)	-0.111			

Table 4: Phillips-Perron Unit Root Test

	FP			CID			embi+ spread		
	PP statistic	1% critical value	Unit root?	PP statistic	1% critical value	Unit root?	PP statistic	1% critical value	Unit root?
South Africa	-2.263305	-3.4369	Yes	-23.7929	-3.4369	No	-0.44469	-3.4895	Yes
Argentina	-0.514571	-3.4403	Yes	-5.36423	-3.4811	No	2.238951	-3.4403	Yes
Chile	-5.960438	-3.4422	No	-3.10107	-3.4928	Yes	-2.65705	-3.4422	Yes
Russia	-4.984909	-3.4406	No	-	-	-	-4.73196	-3.4406	No
Venezuela	-2.995225	-3.4403	Yes	-	-	-	-2.79303	-3.4403	Yes
Australia	-0.455566	-3.4368	Yes	-10.0601	-3.4368	No	-	-	-
Brazil	-1.610118	-3.443	Yes	-1.00745	-3.4406	Yes	-0.09802	-3.4416	Yes
Canada	-1.210805	-3.4368	Yes	-3.78589	-3.4368	No	-	-	-
Colombia	-5.322425	-3.4424	No	-3.57932	-3.4743	No	-1.19534	-3.4424	Yes
South Korea	-1.055245	-3.446	Yes	-3.38658	-3.4457	No	-1.2949	-3.446	Yes
Phillipines	-4.347248	-3.4409	No	-2.89936	-3.4422	No	-1.90495	-3.4409	Yes
Indonesia	-2.070469	-3.4395	Yes	-8.32947	-3.4395	No	-	-	-
Japan	0.418228	-3.4369	Yes	-4.87067	-3.4369	No	-	-	-
Mexico	-1.568615	-3.4389	Yes	-3.57774	-3.4389	No	-1.96246	-3.4389	Yes
Norway	0.539124	-3.4373	Yes	-5.93715	-3.4373	No	-	-	-
New Zealand	-0.487868	-3.4368	Yes	-3.55232	-3.4368	No	-	-	-
Peru	-1.71997	-3.4447	Yes	-3.52262	-3.4463	No	-1.24136	-3.4447	Yes
Poland	-0.76833	-3.4479	Yes	-1.67814	-3.4478	Yes	-1.48501	-3.4479	Yes
UK	-0.551816	-3.4379	Yes	-1.61449	-3.4379	Yes	-	-	-
Singapore	-1.930963	-3.4369	Yes	-7.5573	-3.4369	No	-	-	-
Sweden	-1.010648	-3.4373	Yes	-5.85619	-3.4373	No	-	-	-
Switzerland	-0.375007	-3.4374	Yes	-5.99769	-3.4374	No	-	-	-
Thailand	-1.917303	-3.439	Yes	-11.2015	-3.439	No	-	-	-
Turkey	-2.701588	-3.444	Yes	-4.26252	-3.442	No	-1.22316	-3.444	Yes

Table 5: Johannsen Cointegration Test

	CID vs. FP								embi's spread vs. FP							
	Cointegration Test					Cointegration Vector			Cointegration Test					Cointegration Vector		
	Likelihood Ratio	5% Critical Value	1% Critical Value	N. de Relações de Cointegração na Ho	Cointegrate?	CID	FP	cte	Likelihood Ratio	5% Critical Value	1% Critical Value	N. de Relações de Cointegração na Ho	Cointegrate?	embi+	FP	cte
Argentina	-	-	-	-	-	-	-	-	33.88804	15.41	20.04			1	-43.0303	-411.505
	-	-	-	-	-	-	-	-							(1.92)	
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-								
Brazil	22.01936	19.96	24.6	None	Yes	1	-8.40382	82.41446	26.23862	19.96	24.6	None	Yes	1	-46.4451	-279.5
	2.911235	9.24	12.97	At most 1			(13.32)	(143.84)	2.533303	9.24	12.97	At most 1			(7.67)	(84.15)
Canada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colombia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	-	-	-	-	-	-	-	-	34.7623	15.41	20.04	None		1	-11.7599	-686.546
	-	-	-	-	-	-	-	-	7.526277	3.76	6.65	At most 1			(1.91)	
Russia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Korea	-	-	-	-	-	-	-	-	57.47173	19.96	24.6	None	Yes	1	0.015466	-3.87406
	-	-	-	-	-	-	-	-	3.156272	9.24	12.97	At most 1			(0.00)	(0.41)
Philipines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idonesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Japan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mexico	-	-	-	-	-	-	-	-	106.0218	19.96	24.6	None	Yes	1	-27.2213	-79.8112
	-	-	-	-	-	-	-	-	3.844423	9.24	12.97	At most 1			(0.85)	(12.72)
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Zealand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	-	-	-	-	-	-	-	-	176.6391	19.96	24.6	None	Yes	1	-0.41087	0.397222
	-	-	-	-	-	-	-	-	2.516928	9.24	12.97	At most 1			(0.07)	(0.06)
Poland	172.504	19.96	24.6	None	Yes	1	-0.78383	-1.1194	18.9292	19.96	24.6	None	No	-	-	-
	16.01248	9.24	12.97	At most 1			(0.03)	(0.17)	3.374834	9.24	12.97	At most 1		-	-	-
UK	45.36316	19.96	24.6	None	Yes	1	0.167913	-0.74314	-	-	-	-	-	-	-	-
	0.869406	9.24	12.97	At most 1			(0.02)	(0.03)	-	-	-	-	-	-	-	-
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Switzerland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turkey	-	-	-	-	-	-	-	-	110.5795	19.96	24.6	None	Yes	1	-13.5939	9.313906
	-	-	-	-	-	-	-	-	1.861659	9.24	12.97	At most 1	-		(1.60)	(82.94)
South Africa	-	-	-	-	-	-	-	-	19.88825	19.96	24.6	None	No	-	-	-
	-	-	-	-	-	-	-	-	3.260082	9.24	12.97	At most 1		-	-	-

It must be highlighted that for Argentina, Brazil, the Philippines, Mexico, Peru, Russia and Venezuela, the correlation coefficient between the EMBI+ spread and the forward premium is very high: 0,96, 0.74, 0.70, 0.95, 0.60, 0,74 and 0,72 respectively. Moreover, for Argentina, Brazil, Mexico and Peru these two series are non-stationary and we cannot reject the null hypothesis of cointegration. In turn, the cointegration vector indicated a positive long-term relation between the EMBI+ spread and the forward premium. The estimated relation between CID and the forward premium is positive for all these countries, with exception of Russia and Venezuela (since these two countries do not have liquid swap rate historical data needed to calculate CID). The fact that for Brazil that correlation is only slightly positive and is attenuated by the long-term positive relation stated by the co-integration vector.[31] Following this, for all of these seven countries we label the country risk and the forward premium as *cousin risks*.

South Korea and Colombia present a strong negative correlation, not only between the EMBI+ spread and the forward premium, but also between CID and the forward premium. For South Korea we accepted the hypothesis of cointegration with the cointegration vector, indicating long-term negative relation between the EMBI+ spread and the currency risk. Therefore, for these two countries, there is no evidence of the cousin risks phenomenon.

Indonesia, the Czech Republic, Singapore, Thailand, Australia, Canada, the United Kingdom, Japan, Norway, New Zealand, Sweden, and Switzerland did not present the pattern that could possibly indicate a positive relation between country risk and currency risk. With the exception of the Czech Republic, whose coefficient of correlation is zero, all countries presented a negative correlation between these risks. Indeed, in the United Kingdom, this result is enhanced by the non-rejection of the null hypothesis of cointegration, with the cointegration vector indicating a negative long-term relation between the risks. In short, in these countries, the cousin risks phenomenon is not observed.

The classification of these risks' behavior in Chile, Poland, South Africa, and Turkey are less immediate since we obtained opposite signs depending on which proxy for country risk we used (EMBI+ or CID). For Turkey, the correlation between the EMBI+ spread and the forward premium is positive and high 0.60. However, given the non-stationarity of both series, this evidence must be put aside. Nevertheless, we did not reject the cointegration hypothesis and the cointegration vector indicated a positive long-term relation between the risks. The observed CID and forward premium negative correlation is mitigated by some factors. First, the non-stationarity of the Turkish forward premium renders the correlation coefficient uninterpretable. Second, the EMBI+ spread is preferred to CID as we explained earlier. Third, we do not have a one-year swap rate for Turkey as most countries do, and so the overnight interest rate was used instead (since it is the only rate quoted on a daily basis). Even though overnight interest rates are annualized, we are actually comparing different points on the term structure: overnight interest rates have zero duration and the forward premium has a one-year duration. Thus the calculated CID for Turkey reflects this fact and its mean is negative. Turkey was therefore placed in the cousin risks countries based on the positive cointegration coefficient between its EMBI+ spread and its forward premium..

For South Africa, the correlation between the forward premium and CID is negative, and the correlation between the forward premium and EMBI+ spread is positive. The

[31] Rigorously, the correlation coefficient is meaningless when one or both series are non-stationary.

cointegration test between the EMBI+ and the currency risk indicated that these two series do not cointegrate. Thus South Africa is placed together with those countries not presenting cousin risks phenomenon

Chile presents only a small positive correlation coefficient (0.30) between the EMBI+ spread and forward premium. The correlation of CID and FP for Chile is very negative. Since Chile's EMBI and FP positive correlation is small, we follow Powell and Sturzenneger (2000) and classify Chile as not presenting cousin risks.[32]

For Poland, the correlation between the forward premium and CID is positive, and so is the long-term relation. However, EMBI+ spread and forward premium correlation indicated the absence of any definite relation between these variables, and the same result was found when we applied cointegration vector analysis. Since we believe that EMBI+ spread is a more reliable proxy for country risk, Poland is placed into the group of countries that do not present the cousin risks phenomenon.

Having explained the ontology that lead to the cousin risks taxonomy , we now move on to a comparative analysis. Powell and Sturzenneger (2000) also studied Brazil, Colombia, Mexico and Sweden and their results are compatible with ours, and the final proposed classification is as follows:

Table 6: Classification Proposed for the Countries Analysed

Cousin Risks Phenomenon	No Cousin Risks Phenomenon
Argentina, Brazil, Mexico, Peru, Phillipines, Russia, Turkey* and Venezuela	Australia, Canada, Chile*, Colombia, South Korea, Indonesia, UK, Japan, Norway, New Zealand, Poland*, Singapore, South Africa*, Sweden, Switzerland and Thailand

** means classifications more problamatic and subject to roboustness test*

One of the main goals of our taxonomy is to permit the implementation of a statistical test to justify which structural or conjuncture variables determine the cousin risk phenomenon, and such task is undertaken in the next section. Subsequently, a country's classification is vital for the next section's results. For this reason, we present a robustness test for our taxonomy in the appendix 4 where we check how the results would differ if Chile, Poland, South Africa and Turkey were excluded from the sample. The tests carried out in the appendix do not point to significant changes in the results.

4 Determinants of the Cousin Risks Phenomenon

4.1 Methodology and Data Description

[32] In view of the unit root test, the correlation coefficients are all spurious, since the forward premium is stationary, while the two measures of coutry risk for Chile are not.

Once identified which countries present the cousin risks phenomenon, the next step is to apply a "DNA test" and determine what links their behavior. In other words, what are the determinants[33] of country risk and currency risk co-movement?

The most intriguing feature of last section's results is the fact that the cousin risks phenomenon does not constitute a rule among emerging countries. Therefore, we will exploit the cross-sectional dimension to uncover the cousin risks' determinants.

The discussion in Section 2 points to variables that could be responsible for the cousin risks so, in the present section, we test if they are empirically associated with the presence of the phenomenon. This is done first trough the presentation of their statistics among the different groups and a non-parametric hypothesis test. Then, in last subsection, we present an econometric binary choice model.

The main data sources are The World Bank's World Development Indicators (WDI), and IMF's International Financial Statistics (IFS). Internal and external indebtedness data were obtained from each country's central bank, ministry of finance or national statistics agency. Appendix 2 provides the data source for every series, as well descriptions for some of the variables.

4.2 Descriptive Statistics, Non-Parametric Densities and the Kolmogorov-Smirnov test

This subsection presents macroeconomic and financial data of the countries in our sample. The data analyzed are the countries means[34] from 1995 to 2001,[35] almost the same time horizon we used in the last section to identify cousin risks phenomenon. The statistics are presented not only by country but also classified into 5 groups:

1. Countries that present the cousin risks phenomenon, following the last section's taxonomy.
2. Countries that do not present the cousin risks phenomenon, following the last section's taxonomy.
3. Emerging market countries that do not present the cousin risks phenomenon, following the last section's taxonomy.
4. Emerging market countries.
5. Developed countries.

Since each group is composed by a series of countries, we can estimate the group's mean, median and density for each variable analyzed. We present countries means and medians in tables at each one of following subsections. Non-parametric kernel density estimation[36] is done and the densities are also presented.

The next step is to compare the distribution of each variable among the group of countries presenting cousin risk phenomenon and the group of countries not presenting cousin risks. The method used is Kolmogorov-Smirnov test, which tries to determine if two

[33] Since we will not perform causality tests, we are, strictly speaking, only uncovering which variables are associated with the cousin risks phenomenon.
[34] WDI data are on annual basis while IFS data are on quarterly basis. Public debt data, whose sources are central banks and statistical agencies, are on monthly or quarterly basis.
[35] Until February 2003, World Bank (our main data source) had not released data referring to 2002.
[36] The bandwidth of this estimation is chosen as suggested by Silverman (1986)

datasets differ significantly. This test makes no assumption about the distribution of data, i.e., it is a non parametric test. The null hypothesis is that the samples have the same continuous distribution.

In order to control for developed countries characteristics not captured in the sample (such as reputation), we also face the distribution of countries presenting the cousin risks phenomenon against the distribution of emerging countries not presenting cousin risks.

4.2.1 Balance of Payment

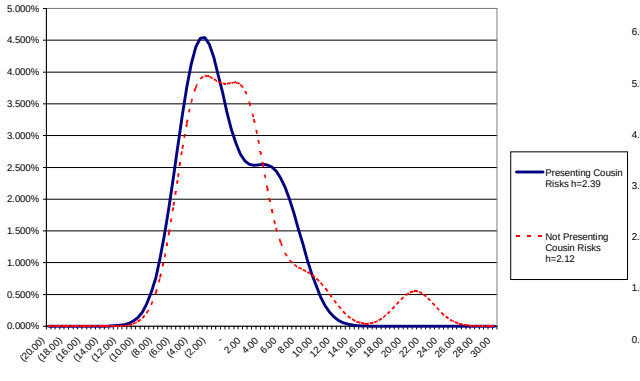
This subsection analyzes if a country's external 'health' (which is believed to be the main determinant of exchange rate expectations) is an important factor for the explanation of cousin risks phenomenon. Table 7 below presents some Balance of Payments accounts statistics, the graphs below display their density and table 8 present Kolmogorov-Smirnov test results.

Table 7: Macroeconomic Statistics - External Sector

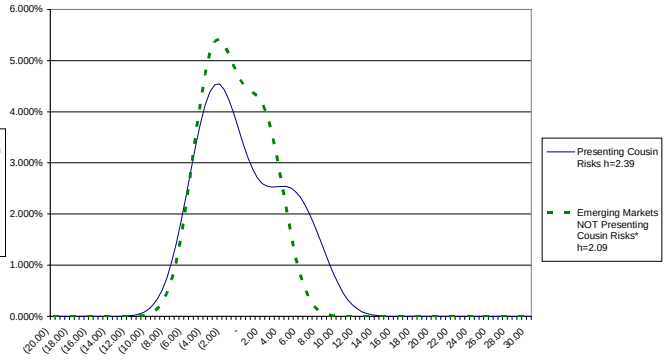
mean 1995-2000		Exports (% GDP)	Imports (% PIB)	Exports + Imports (% GDP)	Current Account Balance (% GDP)	Mean Import Tariff 1999 - 2000	International Reserves (% GDP)
Argentina		10.43%	11.44%	21.87%	-3.22%	12.20%	7.61%
Australia		19.63%	20.79%	40.42%	-4.04%	5.80%	4.53%
Brazil		9.21%	11.04%	20.25%	-3.89%	14.40%	6.63%
Canada		40.48%	37.83%	78.31%	0.38%	3.90%	3.95%
Chile		29.35%	29.80%	59.15%	-2.96%	11.00%	21.98%
Colombia		16.64%	20.36%	37.00%	-3.13%	11.70%	10.02%
Czech Republic		60.69%	62.89%	123.58%	-4.43%	6.50%	23.87%
Indonesia		35.99%	31.03%	67.01%	1.36%	8.40%	15.27%
Japan		10.04%	8.76%	18.80%	2.23%	4.50%	6.12%
Mexico		30.45%	30.92%	61.37%	-2.27%	16.20%	6.66%
New Zealand		30.12%	29.58%	59.70%	-5.33%	3.30%	7.47%
Norway		40.36%	32.82%	73.19%	6.68%	2.90%	13.81%
Peru		14.25%	17.96%	32.21%	-4.88%	13.00%	17.53%
Phillipines		48.72%	52.55%	101.28%	2.52%	7.60%	16.21%
Poland		25.25%	29.43%	54.69%	-3.68%	10.00%	15.25%
Russia		33.22%	24.08%	57.30%	6.84%	7.80%	6.29%
Singapore		169.49%	152.80%	322.29%	20.84%	0.00%	85.16%
South Africa		25.69%	23.88%	49.57%	-1.00%	8.50%	4.45%
South Korea		39.17%	36.44%	75.61%	2.23%	8.60%	13.92%
Sweden		42.84%	36.45%	79.30%	2.56%	2.40%	7.41%
Switzerland		38.59%	34.28%	72.87%	9.88%	0.00%	23.09%
Thailand		54.49%	50.17%	104.66%	2.54%	16.60%	24.46%
Turkey		24.48%	28.58%	53.07%	-0.93%	8.10%	11.05%
UK		27.60%	28.50%	56.09%	-1.28%	2.40%	3.30%
Venezuela		26.38%	19.46%	45.84%	4.73%	15.70%	15.02%
Countries presenting Cousin Risks	mean	24.64%	24.50%	49.15%	-0.14%	11.88%	10.88%
	median	25.43%	21.77%	49.45%	-1.60%	12.60%	9.33%
Countries without Cousin Risks*	mean	33.56%	32.06%	65.62%	0.13%	6.66%	12.43%
	median	33.05%	30.41%	63.36%	-0.31%	6.15%	11.91%
Emerging Countries without Cousin Risks*	mean	35.91%	35.50%	71.41%	-1.13%	10.16%	16.15%
	median	32.67%	30.41%	63.08%	-1.98%	9.30%	15.26%
Emerging Countries*	mean	30.28%	30.00%	60.28%	-0.64%	11.02%	13.51%
	median	27.87%	29.01%	55.99%	-1.63%	10.50%	14.47%
Developed Countries	mean	31.21%	28.63%	59.83%	1.39%	3.15%	8.71%
	median	34.36%	31.20%	66.29%	1.31%	3.10%	6.76%

* without Singapore

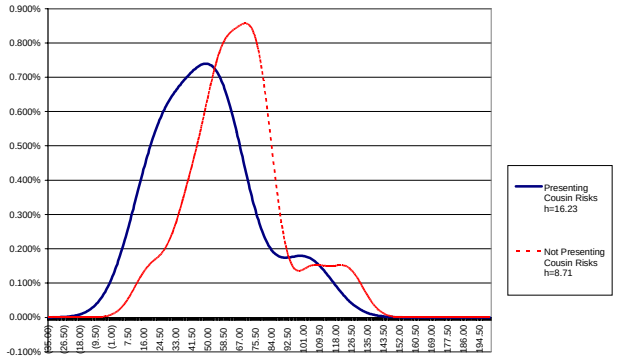
Non-Parametric Kernel Density: **Current Account Balance**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



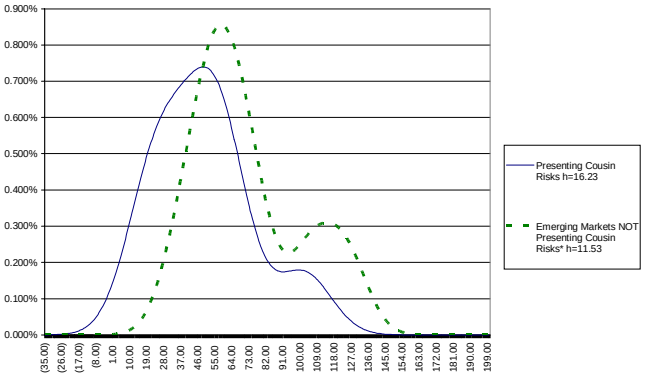
Non-Parametric Kernel Density: **Current Account Balance**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



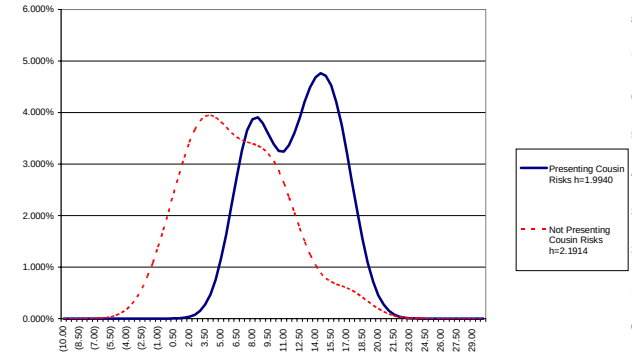
Non-Parametric Kernel Density: **Export+Import (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Export+Import (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Mean Import Tariff**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Mean Import Tariff**
Counties Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks

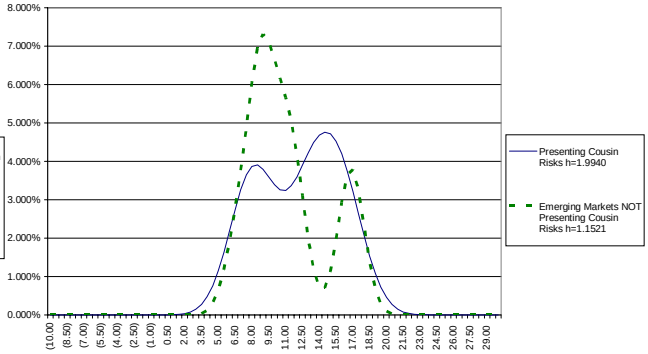


Table 8: Kolmogorov-Smirnov Test on Balance of Payment

H_0	K-S stat	p-value
Current Account (% GDP) Density of Coutries Presenting Cousin Risk = Current Account (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.1544	0.9984
Current Account (% GDP) Density of Coutries Presenting Cousin Risk = Current Account Density of Emerging Coutries NOT Presenting Cousin Risk	0.1528	0.9998
Exports+Imports (% GDP) Density of Coutries Presenting Cousin Risk = Exports+Imports (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.4044	0.2586
Exports+Imports (% GDP) Density of Coutries Presenting Cousin Risk = Exports+Imports (% GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.4306	0.3145
Mean Import Tariff Density of Coutries Presenting Cousin Risk = Mean Import Tariff Density of Coutries NOT Presenting Cousin Risk	0.5882	0.0265
Mean Import Tariff Density of Coutries Presenting Cousin Risk = Mean Import Tariff Density of Emerging Coutries NOT Presenting Cousin Risk	0.5139	0.1441

The above data change only slightly as we move from one group to another. Although table 7 values indicates that countries presenting positive correlation between the country and the currency risk present a smaller degree of openess[37] than emerging countries that do not present the phenomenon, their densities (on every variable) are almost coincidental.

Indeed, Kolmogorov-Smirnov test results, presented in Table 8, indicate that we cannot reject the null hypothesis that current account balance sample (%GDP) and exports plus imports sample (%GDP) among the group of countries presenting and not presenting cousin risks are statisitcally identical. The result is the same when we compare the countries exhibiting the phenomenon and emerging countries not exhibiting the phenomenon.

These results only change when we analyze the import tariff. We reject the hypothesis that tariff import samples are identical among countries exhibiting and not exhibiting positive correlation between the country and the currency risk. However, when we compare only emerging markets we cannot reject the hypothesis that their sample are the same. We can conjecture that this result can be due to the fact that the sample of countries not exhibiting cousin risk is largely composed by developed countries, that usually have smaller import tariffs than emerging economies.

Thus the results of this section indicates that balance of payment indicators from countries that do exhibit the cousin risks does not differ significantly from countries in which the cousin risks phenomenon is not observed.

[37] For the cousin risks countries, exports plus imports over GDP is 49.15% and import tariff is 11.88% on average while on emerging countries not presenting cousin risks these figures are 71.41% and 10.16%, respectively.

4.2.2 Solvency Variables

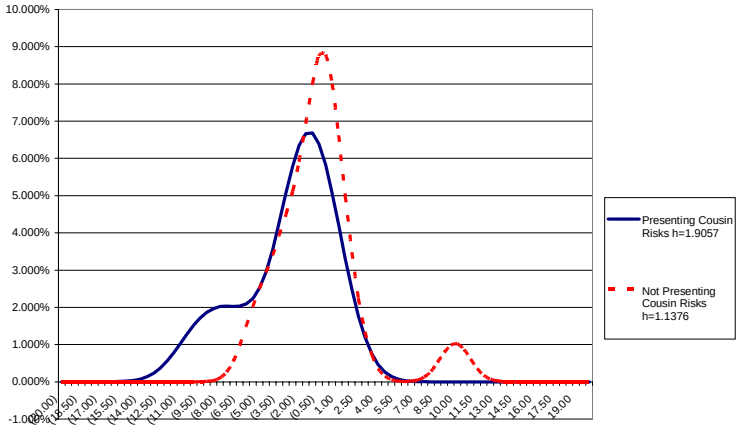
Since the country risk is a central variable to our study, government borrowing requirements and solvency variables are natural candidates to become the determinants of the cousin risks. A possibility could be that countries with a fragile fiscal position exhibit positive correlation between country and currency risks. This subsection analyzes the solvency variables.

Table 8: Macroeconomic Statistics - Governemnt Solvency

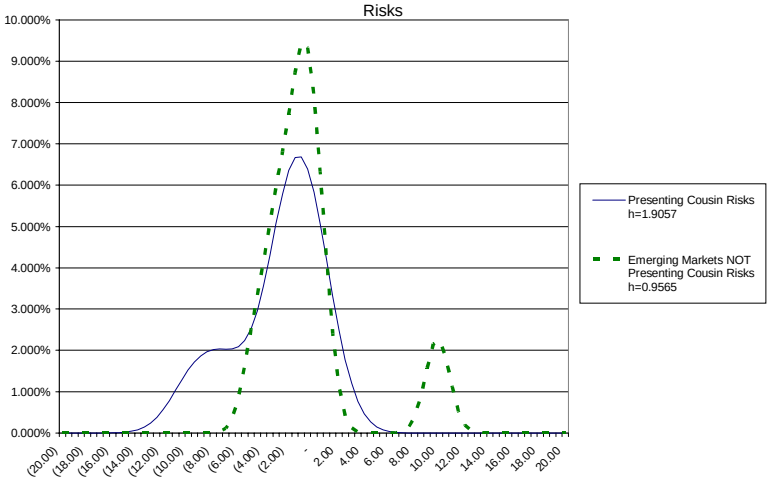
mean 1995-2000		Total Public Debt (Internal + External %GDP)	Overall Budget Balance (% GDP)	Total External Debt (Government + Private % GDP)	External Government Debt (% GDP)	Internal Government Debt (% PIB)
Argentina		43.09%	-2.49%	46.37%	39.65%	3.44%
Australia		22.59%	0.74%	-	5.82%	16.78%
Brazil		50.93%	-6.85%	33.20%	20.65%	40.60%
Canada		60.19%	-0.17%	-	2.28%	57.91%
Chile		14.61%	-0.27%	41.78%	4.10%	10.52%
Colombia		26.22%	-4.87%	35.24%	13.34%	12.88%
Czech Republic		12.02%	-1.33%	39.24%	1.52%	10.49%
Indonesia		79.41%	-1.00%	90.33%	44.19%	35.22%
Japan		36.23%	-5.71%	-	-0.69%	36.91%
Mexico		28.40%	-0.95%	38.13%	20.35%	8.05%
New Zealand		34.67%	1.92%	-	7.92%	26.75%
Norway		-48.66%	0.35%	-	0.29%	-48.95%
Peru		49.71%	-0.70%	52.60%	39.11%	10.60%
Phillipines		132.80%	-1.82%	62.70%	70.14%	62.66%
Poland		41.04%	-1.50%	35.44%	21.49%	19.55%
Russia		43.10%	0.41%	46.77%	36.78%	6.32%
Singapore		70.92%	9.59%	-	0.00%	70.92%
South Africa		47.75%	-3.20%	18.46%	2.67%	45.09%
South Korea		-21.40%	0.34%	28.53%	3.05%	-24.45%
Sweden		44.10%	-3.25%	-	28.69%	15.42%
Switzerland		-	-0.50%	-	-	-
Thailand		13.99%	-2.97%	69.64%	5.89%	8.09%
Turkey		68.85%	-9.70%	53.29%	45.24%	23.61%
UK		-	-0.84%	-	-	36.31%
Venezuela		31.38%	-2.84%	37.04%	24.27%	7.11%
Countries presenting Cousin Risks	mean	56.03%	1.10%	46.33%	20.77%	35.59%
	median	46.40%	-1.33%	39.24%	7.92%	26.75%
Countries without Cousin Risks*	mean	25.91%	-2.27%	46.84%	20.03%	13.19%
	median	30.45%	-1.00%	42.45%	20.35%	14.15%
Emerging Countries without Cousin Risks*	mean	26.71%	-2.24%	32.41%	14.12%	14.70%
	median	20.42%	-2.49%	32.41%	2.67%	25.86%
Emerging Countries*	mean	41.37%	-0.72%	39.12%	15.52%	24.62%
	median	42.06%	-1.14%	38.13%	5.29%	26.75%
Developed Countries	mean	24.85%	-2.50%	-	26.14%	11.48%
	median	35.45%	-1.25%	-	29.14%	11.74%

* without Singapore

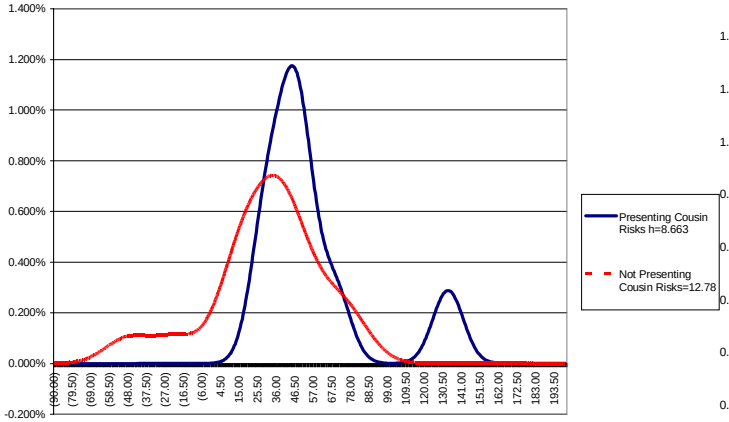
Non-Parametric Kernel Density: **Overall Budget Balance (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



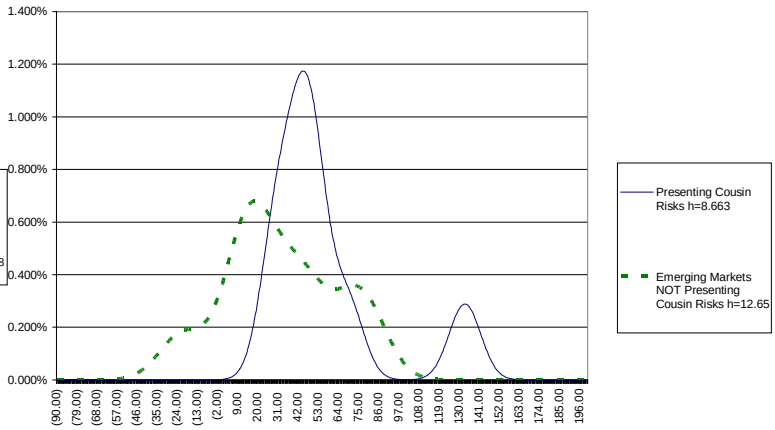
Non-Parametric Kernel Density: **Overall Budget Balance (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Total Government Debt (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Total Government Debt (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Total External Debt (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks

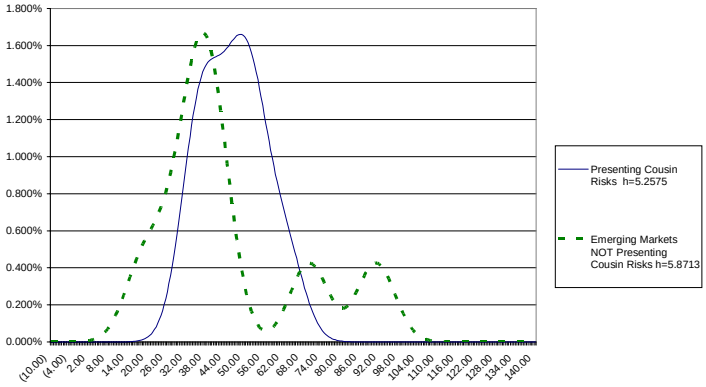


Table 10: Kolmogorov-Smirnov Test on Solvency Variables

H_0	K-S stat	p-value
Overall Budget Balance (% GDP) Density of Coutries Presenting Cousin Risk = Overall Budget Balance (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.3456	0.4446
Overall Budget Balance (% GDP) Density of Coutries Presenting Cousin Risk = Overall Budget Balance (%GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.2917	0.7907
Total Government Debt (% GDP) Density of Coutries Presenting Cousin Risk = Total Government Debt (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.4667	0.1456
Total Government Debt (% GDP) Density of Coutries Presenting Cousin Risk = Total Government Debt (% GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.5556	0.0925
Total External Debt (%GDP) Density of Coutries Presenting Cousin Risk = Total External Debt (%GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.375	0.5189

The countries exhibiting cousin risks are more indebted than the ones without cousin risks. Total government debt medians are 46.40% where the phenomenon is observed, 30.45% where it is not and 20.42% in emerging economies without the phenomenon. In the above graphs, we can also see that the cousin risks countries density is more leftish than the non-cousin risks countries densities. Indeed the Kolmogorov-Smirnov test rejects the hypothesis that total government debt sample from countries presenting cousin risks is equal to emerging countries not exhibiting cousin risks at 10% significant level. This result is weakened since we do not obtain a similar result when we compare cousin risks countries with the whole sample of countries not exhibiting cousin risks. In effect, Indonesia has a debt over GDP ratio of 79.41%, but does not exhibit the cousin risks phenomenon, while Mexico, which has a much smaller debt over GDP ratio (28%), does.

Kolmogorov-Smirnov test results shows that there is no distinction between these two groups in terms of the overall budget balance and total external indebtness. This can also be seen in the above densities graphs. Therefore, solvency variables do not seem to determine the presence / absence of the cousin risk phenomenon. The only doubt is about the total indebtness, which seems to have some effect (p-value of 0.09 in the comparison of the samples of emerging countries), so this will be further investigated in multivariate binary choice models in next section.

4.2.3 Financial Development and Currency Mismatch Variables

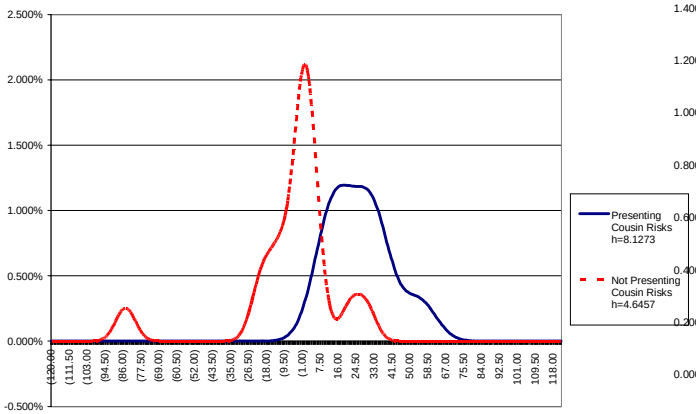
Table 11, the following density distribution graphs and Table 12 display the comparison of patterns of currency mismatch and financial development among the countries included in our sample.

Table 11: Macroeconomic Statistics - Financial Deepening and Currency Mismatch

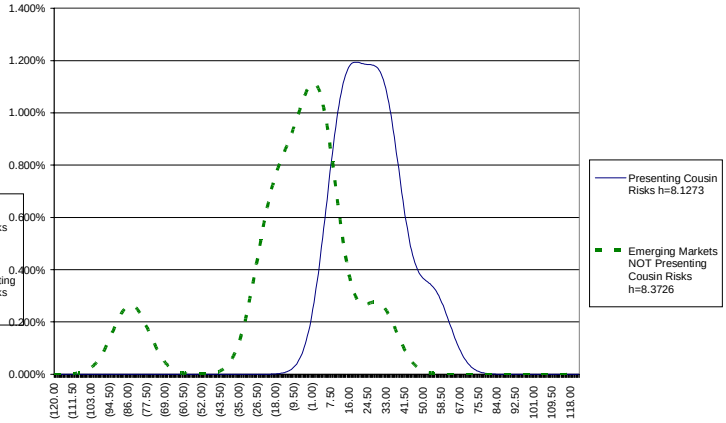
mean 1995-2000		Govt. External Debt - International Reserves (% GDP)	Gross Domestic Savings (% GDP)	Domestic credit to private sector (% GDP)	Market capitalization (% GDP)
Argentina		32.04%	16.66%	18.82%	32.30%
Australia		1.28%	22.19%	80.12%	85.82%
Brazil		14.02%	19.42%	33.50%	31.32%
Canada		-1.68%	22.49%	82.24%	95.03%
Chile		-1.33%	24.10%	56.15%	90.70%
Colombia		3.32%	15.14%	33.00%	15.68%
Czech Republic		-22.34%	27.44%	54.89%	23.74%
Indonesia		28.92%	26.98%	40.65%	26.98%
Japan		-6.80%	29.06%	194.75%	72.60%
Mexico		13.69%	22.49%	18.33%	28.39%
New Zealand		0.45%	21.61%	109.97%	47.53%
Norway		-13.52%	31.94%	78.67%	37.85%
Peru		21.58%	18.46%	24.19%	22.59%
Phillipines		53.93%	16.91%	48.92%	61.59%
Poland		6.24%	20.45%	19.17%	12.08%
Russia		30.49%	29.47%	16.26%	18.24%
Singapore		-85.16%	51.10%	114.16%	161.81%
South Africa		-1.78%	17.63%	118.36%	153.55%
South Korea		-10.87%	33.03%	86.19%	43.05%
Sweden		21.27%	22.94%	93.54%	115.53%
Switzerland		-	24.94%	166.77%	224.71%
Thailand		-18.57%	33.39%	135.15%	41.29%
Turkey		34.19%	19.12%	22.50%	29.51%
UK		-	16.43%	125.29%	161.53%
Venezuela		9.25%	25.73%	12.16%	8.89%
Countries presenting Cousin Risks	mean	26.15%	21.03%	24.33%	29.10%
	median	26.04%	19.27%	20.66%	28.95%
Countries without Cousin Risks	mean	-1.10%	24.36%	92.18%	77.98%
	median	-1.50%	23.52%	84.22%	60.06%
Emerging Countries without Cousin Risks*	mean	-2.05%	24.77%	67.95%	50.88%
	median	-1.56%	25.54%	55.52%	34.13%
Emerging Countries*	mean	12.05%	22.90%	46.14%	39.99%
	median	11.47%	21.47%	33.25%	28.95%
Developed Countries	mean	0.17%	23.95%	116.42%	105.07%
	median	-0.61%	22.72%	101.76%	90.42%

* without singapore

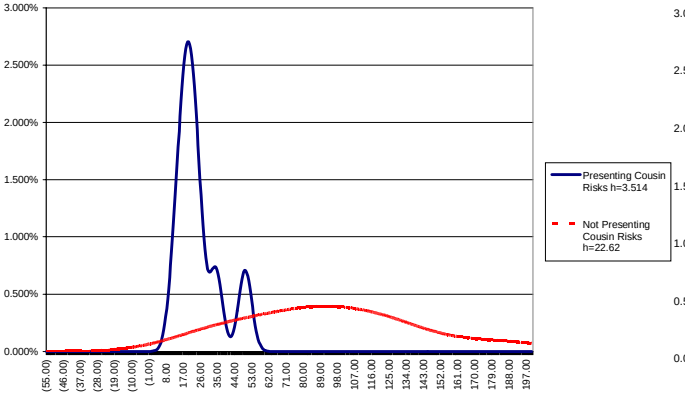
Non-Parametric Kernel Density: **External debt- International Reserves (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



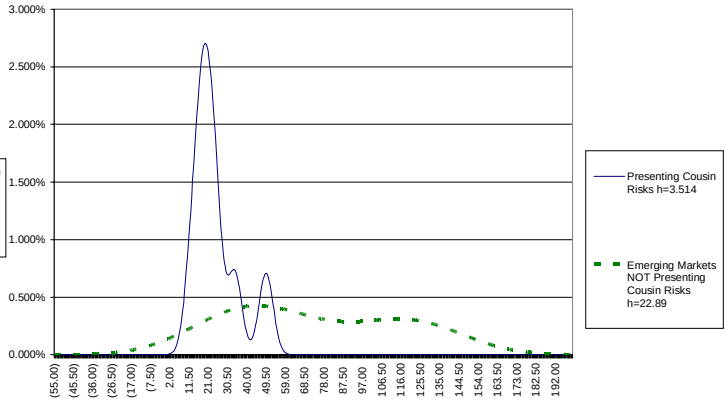
Non-Parametric Kernel Density: **External debt-International Reserves (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



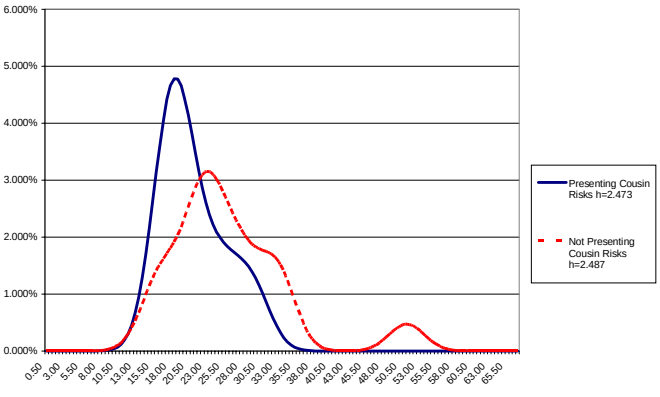
Non-Parametric Kernel Density: **Domestic Credit to Private Sector (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **Domestic Credit to Private Sector (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **National Savings (%GDP)**
Countries Presenting Cousin Risks vs Counties NOT Presenting Cousin Risks



Non-Parametric Kernel Density: **National Savings (%GDP)**
Countries Presenting Cousin Risks vs Emerging Counties NOT Presenting Cousin Risks

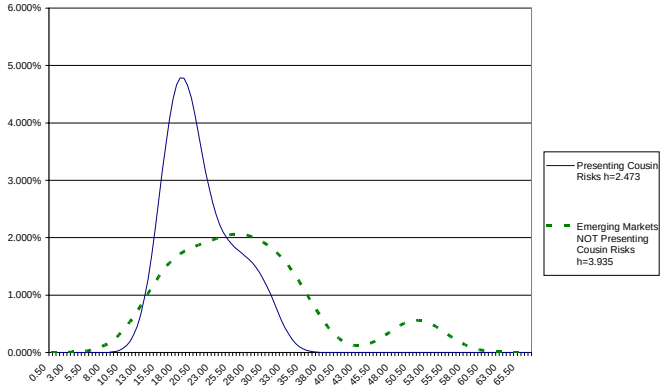


Table 12: Kolmogorov-Smirnov Test on Currency Mismatch and Financial Deepening

H_0	K-S stat	p-value
Goverment External Debt - International Reserves (% GDP) Density of Coutries Presenting Cousin Risk = Goverment External Debt - International Reserves (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.8824	0.00012
Goverment External Debt - International Reserves (% GDP) Density of Coutries Presenting Cousin Risk = Goverment External Debt - International Reserves (%GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.8889	0.00077
Domestic Credit to Private Sector (% GDP) Density of Coutries Presenting Cousin Risk = Domestic Credit to Private Sector (% GDP) Density of Coutries NOT Presenting Cousin Risk	0.8235	0.00042
Domestic Credit to Private Sector (% GDP) Density of Coutries Presenting Cousin Risk = Domestic Credit to Private Sector (% GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.6667	0.02390
National Savings (%GDP) Density of Coutries Presenting Cousin Risk = National Savings (%GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.4485	0.16180
National Savings (%GDP) Density of Coutries Presenting Cousin Risk = National Savings (%GDP) Density of Emerging Coutries NOT Presenting Cousin Risk	0.4306	0.31450

The above results highlight a striking difference between debt exposure to exchange rate movements among the countries. The median of net external liabilities, calculated as the government external debt minus international reserves, is 26.15% for countries that exhibit the cousin risks phenomenon and –1.56% for the remaining emerging countries that do not exhibit cousin risks. The currency mismatch density from the cousin risks countries is to the right of the densities of countries not exhibiting this phenomenon (be they only emerging or not). The hypotheses that currency mismatch sample from cousin risks countries is equal to the ones from countries not presenting cousin risks (be they only emerging or not) are rejected at the 1% significance level.

Financial development is less intense in countries classified as having cousin risks phenomenon. These countries displayed 24.33% of mean domestic credit for the private sector over GDP, while the countries without the presence of cousin risk phenomenon registered 92.18%. Even emerging countries without cousin risks exhibit a much higher mean domestic credit to private sector (67.55%). These observations are reinforced by the location of the density distributions of cousin risk countries on the left of the non-cousin risk countries. Indeed, the Kolmogorov-Smirnov test rejects the hypothesis that these distributions are statistically equal: on the comparison of cousin risks countries with non-cousin risks countries it is rejected at the 1% significance level, on the comparison of cousin risks countries with non-cousin risks emerging countries at the 3% significance level.

When we analyze gross domestic savings, although the means and medians are smaller on countries presenting cousin risks, Kolmogorov-Smirnov tests do not reject the hypothesis that their samples are equal.

Thus the data indicate that the presence of the cousin risks phenomenon is associated with government´s currency mismatch (external government debt minus international reserves) and the level of financial development (domestic credit for private sector).

4.3 Binary Choice Models

In this section we apply a binary choice (*Probit*) model using the same variables analyzed in last section. Following the taxonomy discussed in Section 3, the dependent variable assumes the value one for countries that present the cousin risks phenomenon and zero for those that do not. A robustness test was carried out on our models, and the results are presented in Appendix 4, where we excluded from the analysis the countries subjected to doubts concerning their classification.

An alternative to binary choice models would be to use correlation as the dependent variable. Under such methodology, we apply the limited dependent variable models (such that the correlation is limited between -1 and +1) using cross-sectional data or we apply a more robust joint estimation of correlation, using the hierarchical linear model.[38] However, in doing so, our already small sample would be tremendously reduced, thus affecting the analysis' legitimacy. For example, in the case when the dependent variable is the correlation between the forward premium and the EMBI+ spread, only thirteen observation points can be included in the regression model. On the other hand, the adoption of the correlation between the forward premium and the CID would not reduce the sample size to the same extent, but the results would nonetheless be full of noises and less representative of investors' risk perception since CID measure is subject to regulatory and interventionist peculiarities of each country.

Therefore, we decided to classify countries into two groups: countries that exhibit the cousin risks phenomenon and countries that do not. In order to do so, we added a new binary variable that assumes unity value when the country belongs to the first group and zero when the country belongs to the second one. The best models to cope with binary variables are the so-called *Probit* and *Logit* models. The difference between these two models resides in the likelihood function used. While the former used normal distribution, the latter used logistic distribution of probability. According to Greene (2000), "...it is difficult to justify the choice of one distribution or another on theoretical grounds. … In most applications, it seems not to make much difference" (p. 815). Thus our results refer to the *Probit* model output but the adoption of the *Logit* model does not significantly alter the results[39].

As mentioned in Section 2, the explanatory variables are the same ones analyzed in the previous sections. Models contemplating different combinations of explanatory variables were estimated. The two tables below present the results. Table 13 presents models with only one explanatory variable while Table 14 shows the results of multivariate analysis.

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[38] These models deal adequately with grouped data, in different levels. In our case, the first level would be the study of a univariate simple regression between country risk and currency risk, using panel data. In turn, the second level would be modelled by each country's "beta" in the light of their own national characteristics. For a good reference, see Raudenbush e Bryk (2002).

[39] *Logit* model was estimated and coefficients' signs did not change. The only difference was that p-value sometimes increased. *Logit* model outputs are showed in Appendix 3.

Table 13: Probit Univariate Models

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)
number of observations: 25

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
constant	-1.318753	1.397137	2.101986	-1.311253	-0.776632	0.532655	-0.449209	-2.156276
p-value	*0.0025*	*0.2645*	*0.0024*	*0.0267*	*0.0283*	*0.466*	*0.1004*	*0.0037*
External Debt-Reserves (%GDP)	0.080538	-	-	-	-	-	-	-
p-value	*0.0006*	-	-	-	-	-	-	-
Savings (% GDP)	-	-0.080568	-	-	-	-	-	-
p-value	-	*0.1392*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-	-0.057412	-	-	-	-	-
p-value	-	-	*0.0026*	-	-	-	-	-
Total Debt (% PIB)	-	-	-	0.020622	-	-	-	-
p-value	-	-	-	*0.0791*	-	-	-	-
Overall Budget Balance (% PIB)	-	-	-	-	-0.164334	-	-	-
p-value	-	-	-	-	*0.1285*	-	-	-
Exports+Imports (% GDP)	-	-	-	-	-	-0.016657	-	-
p-value	-	-	-	-	-	*0.1611*	-	-
Current Account Balance (% GDP)	-	-	-	-	-	-	-0.032057	-
p-value	-	-	-	-	-	-	*0.552*	-
Mean Tariff Import	-	-	-	-	-	-	-	0.185956
p-value	-	-	-	-	-	-	-	*0.0083*
Akaike criteria	0.76305	1.292842	0.687510	1.259113	1.290124	1.289907	1.397313	1.079025
Schwartz criteria	0.86056	1.390352	0.78502	1.357284	1.387635	1.387417	1.494823	1.176535
McFadden's R2	0.518999	0.096429	0.57925	0.141852	0.098597	0.09877	0.013101	0.266973

Table 14: Probit Multivariate Models

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)
number of observations: 25

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
constant	-0.320948	1.909751	1.873102	0.898335	-36.34646	-1.628293	1.755246
p-value	*0.8459*	*0.0427*	*0.0301*	*0.5943*	*0.2439*	*0.0046*	*0.0244*
External Debt-Reserves (%GDP)	0.083882	0.115055	0.106144	-	0.66633	0.080556	-
p-value	*0.0016*	*0.0557*	*0.0022*	-	*0.2732*	*0.001*	-
Savings (% GDP)	-0.047175	-	-	-	-	-	-
p-value	*0.5429*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-0.111958	-0.119056	-0.049203	-	-	-0.054909
p-value	-	*0.0426*	*0.0027*	*0.0222*	-	-	*0.0053*
Total Debt (% PIB)	-	-0.007048	-	-	-	-	-
p-value	-	*0.8495*	-	-	-	-	-
Overall Budget Balance (% PIB)	-		-	-	-	-0.134947	-0.104533
p-value	-		-	-	-	*0.3088*	*0.4006*
Exports+Imports (% GDP)	-		-	-	-	-	-
p-value	-		-	-	-	-	-
Current Account Balance (% GDP)	-		-	-	-	-	-
p-value	-		-	-	-	-	-
Mean Tariff Import	-		-	0.089394	2.050597	-	-
p-value	-		-	*0.4508*	*0.2054*	-	-
Akaike criteria	0.833229	0.619004	0.514671	0.622699	0.365617	0.814875	0.750368
Schwartz criteria	0.979494	0.815347	0.660936	0.722177	0.511882	0.961140	0.896633
McFadden's R2	0.526832	0.775597	0.780918	-	0.899806	0.541471	0.592924

Due to the adoption of the *Probit* model, the estimated coefficients have to be carefully interpreted since their meaning differs from the meaning of those coefficients estimated through the classical least square linear regression model. A positive coefficient – and significantly different from zero – indicates that an increase in the explanatory variable

should increase the probability of the country to present cousin risks phenomenon.[40] Moreover, a negative and significantly different from zero coefficient indicates that the reduction in the explanatory variable should decrease the probability of the country to present cousin risks.

The results presented in Tables 13 and 14 support the findings in the last subsection. Univariate models, showed in Table 10 indicate that, with 5% significance level, no solvency variable (Total debt or Fiscal result) significantly contributes to the explanation of the presence (or the absence) of the cousin risks phenomenon. Further more, the only external accounts variable that is significantly different from zero is the tariff level: the bigger the mean import tariff, the bigger the probability of a country to present cousin risks. Current account, as well as exports plus imports over GDP ratio, does not affect the country's probability of having the cousin risks phenomenon even at the 10% significance level. The results also show that gross domestic savings do not affect the probability of the cousin risks phenomenon occurrence on 10% significance level.

Government external debt minus international reserves, domestic credit for private sector, and import tariffs are all statistically significant at 1% significant level. The higher the currency mismatch – understood as external debt minus international reserves – the higher the probability of the cousin risks phenomenon. Higher levels of financial development – calculated as credit for private sector – reduce the probability of a positive correlation between country risk and currency risk.

We now turn to multivariate models, whose results are presented in Table 14. The most interesting feature is that government external debt minus international reserves and domestic credit to private sector are significantly different from zero in every model, except for model 13. Indeed, under Akaike and Schwartz criteria the best model is model 11 (again except for model 13 where no variable shows up significant) and these two variables jointly explain[41] more than 78% of the presence of cousin risks phenomenon. In all of the models, currency mismatch increases while domestic credit to private sector reduces the probability of a country present cousin risks.

Model 9 indicates that when we analyze currency mismatch and gross domestic saving jointly, the former is positive and significant (p-value 0.0016) while the latter is not significantly different from zero (p-value 0.5429). Model 10 jointly estimates the effect of currency mismatch, financial deepening and total government debt. While the first two remain significant, the total government debt is not significantly different from zero (p-value 0.8495). Models 14 and 15 show that overall budget balance is not significantly different from zero in multivariate analysis. In sum, these results show that the overall budget deficit, the gross domestic savings and the total government debt lost significance and do not help to explain the occurrence of cousin risk phenomenon when analyzed jointly with currency mismatch and financial deepening.

Univariate models suggested that mean tariff import was important in determining the phenomenon. But Models 12 and 13 indicate that when we jointly analyze import tariff

[40] Note that the convention was to apply 'zeros' for countries that do not present cousin risks phenomenon and 'ones' to countries that do present cousin risks. In the case of the opposite convention, say 'zeros' for countries that present cousin risks and 'ones', otherwise, coefficients interpretation would have to be inverted as well.

[41] McFadden´s R2

level with currency mismatch or domestic credit, the tariff is no longer statistically significant[42].

All the models are robust *vis-à-vis* the exclusion of Chile, South Africa, Poland, and Turkey as can be seen in Appendix 4. Hence, we can conclude that the most important factors in determining the positive correlation between country risk and currency risk seems to be government currency mismatch and domestic credit to private sector. Except for model 13, in all other models, these two factors were significant (the biggest p-value is 0.0557). Their sign indicate that the higher the government currency mismatch is, the higher the probability of positive correlation between country risk and the forward premium. Excluding model 13 (where no variable is significant), Model 11 is the most suitable to analyze the positive correlation between country risk and currency risk under Akaike and Schwartz criteria. Furthermore this model explains more than 78%[43] of the probability of the presence of cousin risks.

Based on the results we can conjecture that under the presence of currency mismatch, exchange rate shocks also affect the sovereign credit risk since it changes a country's level of indebtedness, subsequently influencing investors' risk perception. Since a higher level of gross domestic savings embodies a higher level of domestic credit supply, we also conjecture that the existence of domestic credit supply reduces the need for external funding in moments of crisis.

5 Conclusion

The positive correlation between country and currency risk premiums is referred to as cousin risks. Both risks are components of the domestic interest rate according to the covered interest rate parity condition. Therefore, a country is more vulnerable to external shocks when these two risks are positively correlated, since negative shocks, as the reversal of capital flows, increase both risk premiums simultaneously while output is faltering. This paper focused on two main goals. The first one was to investigate how widespread the cousin risk phenomenon is, and the second goal was to identify the determinants of the correlation between these two risk premiums.

We identified that, among the countries in our sample (currently with 25 countries), Argentina, Brazil, Mexico, Russia, Peru, the Philippines, Turkey and Venezuela exhibit positive correlation between the country risk and the currency risk premiums. It is important to highlight that Chile, Colombia, South Korea, and South Africa do not exhibit a positive correlation between these two risks premiums. Therefore, the cousin risks phenomenon is not omnipresent among emerging markets.

In Section 4 we investigated the determinants of the cousin risks phenomenon. An interesting conclusion was that the sources of the cousin risks phenomenon are not the ones normally presented in the literature as determinants of country risk and currency risk premiums when they are independently analyzed. More specifically, the hypothesis that the balance of payments variables (which are believed to be the main sources of the currency risk premium) are responsible for the positive correlation between country risk and currency risk premiums is rejected. Based on our tests results, neither the level of

[42] Import tariff level has p-value equal to 0.4508 in model 12 and 0.2054 in model 13.
[43] According to McFadden's R^2 of model 1.

indebtedness or surplus on fiscal accounts (which are the main determinants of the sovereign risk default) were accepted as being responsible for the cousin risks phenomenon.

Our empirical results indicate that the determinants of this phenomenon are:

1. Currency mismatch, measured as the difference between external government debt and international reserves (over GDP);
2. The level of financial deepening, measured by the credit to the private sector (over GDP);

Based on these results, we conjecture that when the government presents currency mismatch in its balance sheet, an increase in the expectation of exchange rate depreciation or an increase in exchange rate risk (both features are captured by forward premium), increase the perception of future government solvency condition, what, in turns, increases the sovereign credit risk. This would be the main channel through which currency risk would be associated with country risk.

The results are also an indication that cousin risks may be related to the original sin phenomenon (Eichengreen et al. (2002)). A country's inability to borrow in international financial markets in its own currency (original sin) causes a potential exchange rate mismatch. Eichengreen et al. (2002) holds that this can be harmful for those countries, and this paper claims that one of the main problems associated with the original sin is the occurrence of cousin risks. Indeed, cousin risks (which produce high and risky interest rates) and original sin appear to be different aspects of the same, more complex, *phenomenon*. If this is indeed the case, further examination of cousin risks may shed more light on the determinants of the original sin, as well as on the policy measures necessary to mitigate the deleterious effects of both *phenomena*.

Finally, the high levels of credit to the private sector may represent a substantial domestic supply of funds and efficiency in using this supply of funds. The higher the level of financial deepening, the smaller the necessity of borrowing in international capital markets, ultimately resulting in reduced expectations concerning the deleterious effect of the currency mismatch. In this event, market participants may not associate the forward premium with the country risk premium, leading to the conjecture that financial deepening softens the cousin risk problem even under the presence of currency mismatch.

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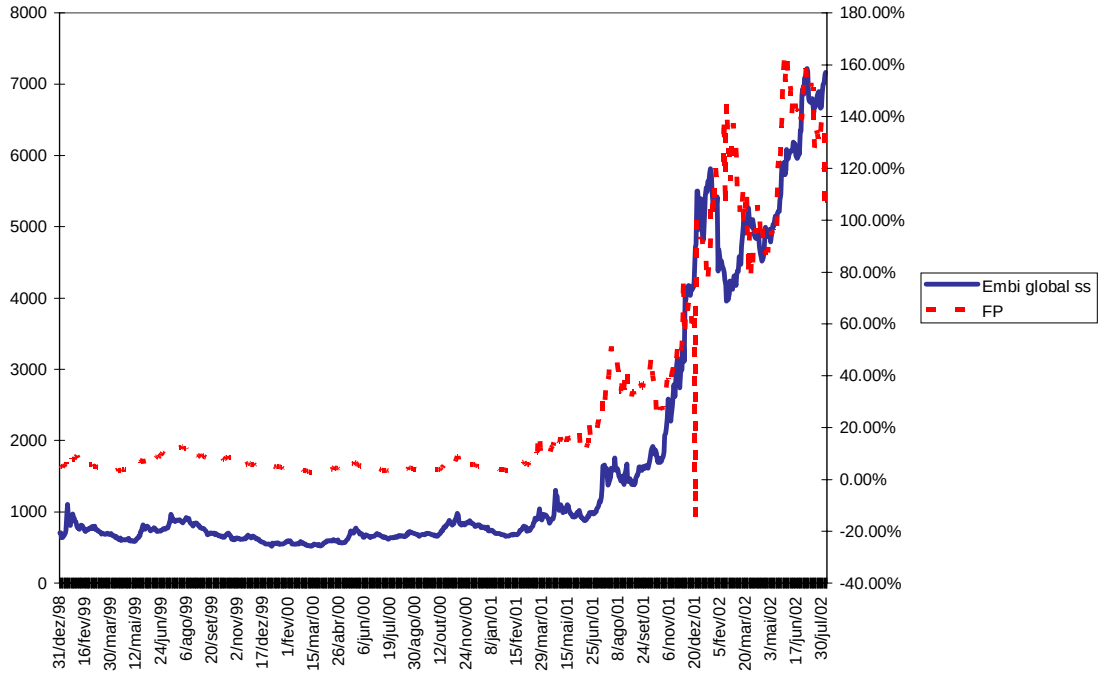
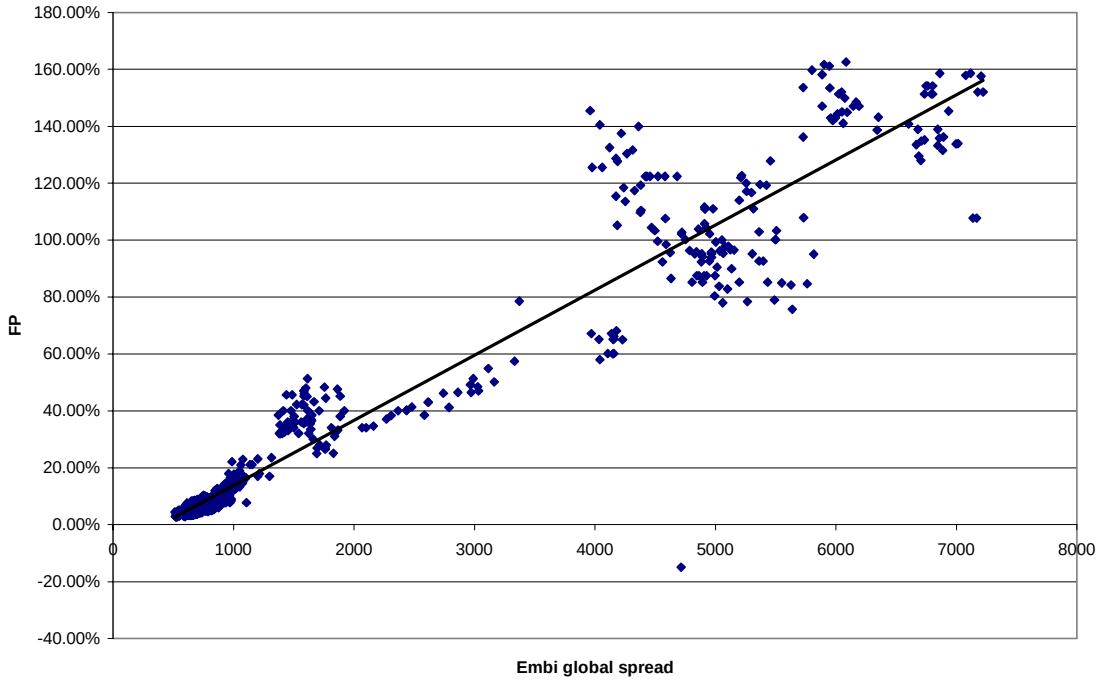
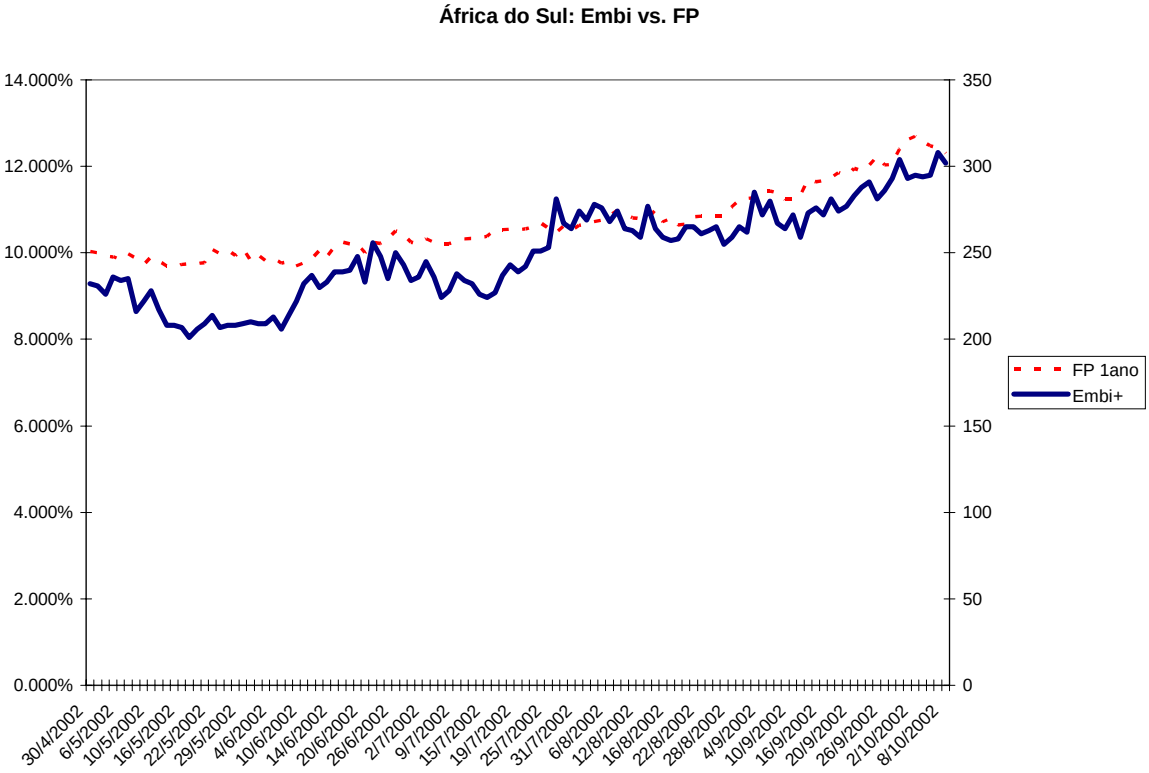
Apendix 1
Graphics: Risks Evolution

Argentina: Embi global vs. FP



Argentina: Embi global vs. FP




África do Sul: Embi vs. FP
14.000%
12.000%
10.000%
8.000%
6.000%
4.000%
2.000%
0.000%
350
300
250
200
150
100
50
0
FP 1ano
Embi+
30/4/2002
6/5/2002
10/5/2002
16/5/2002
22/5/2002
29/5/2002
4/6/2002
10/6/2002
14/6/2002
20/6/2002
26/6/2002
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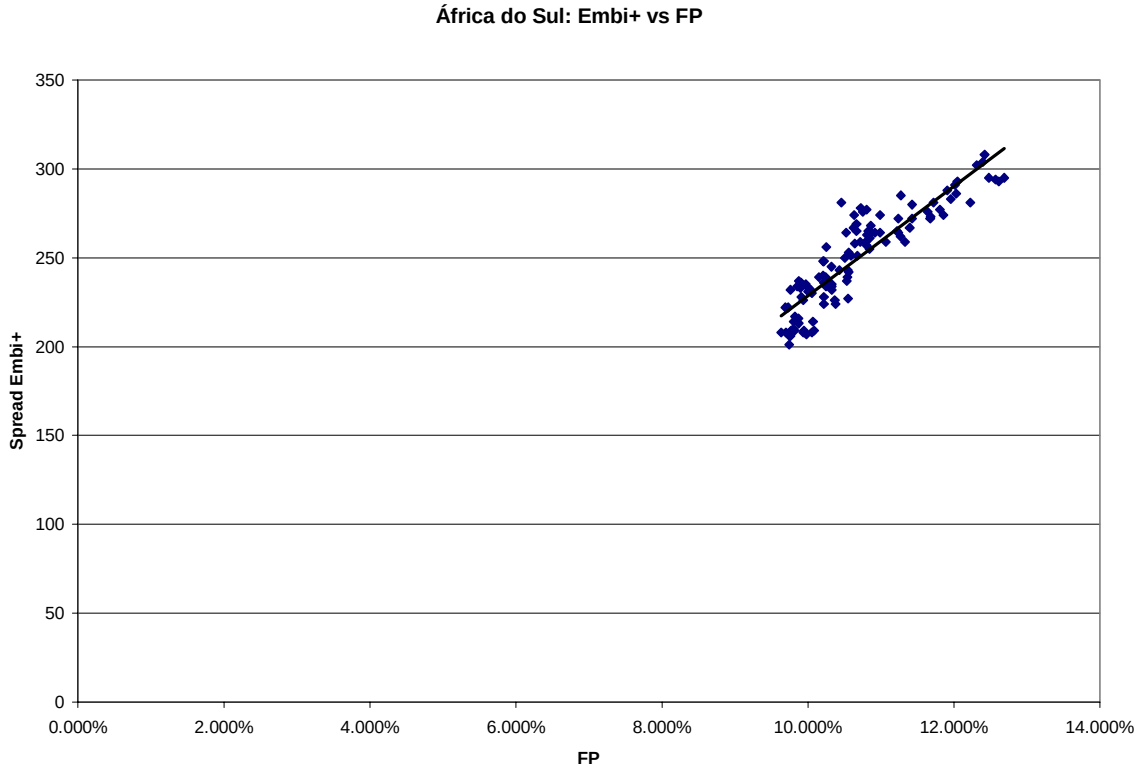
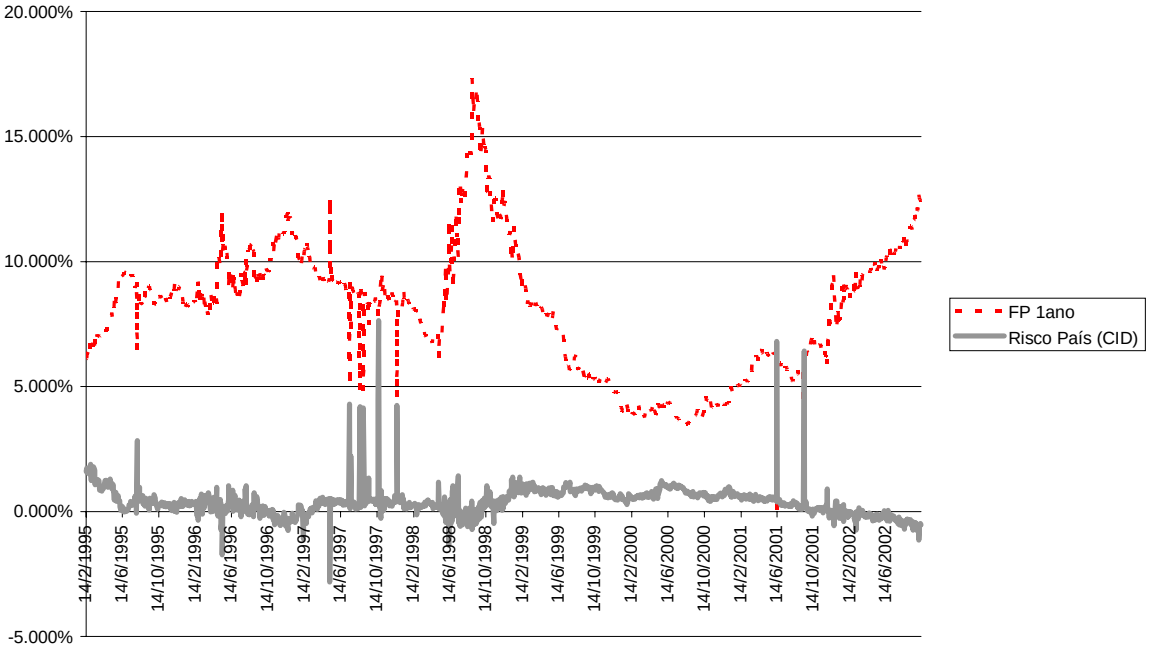
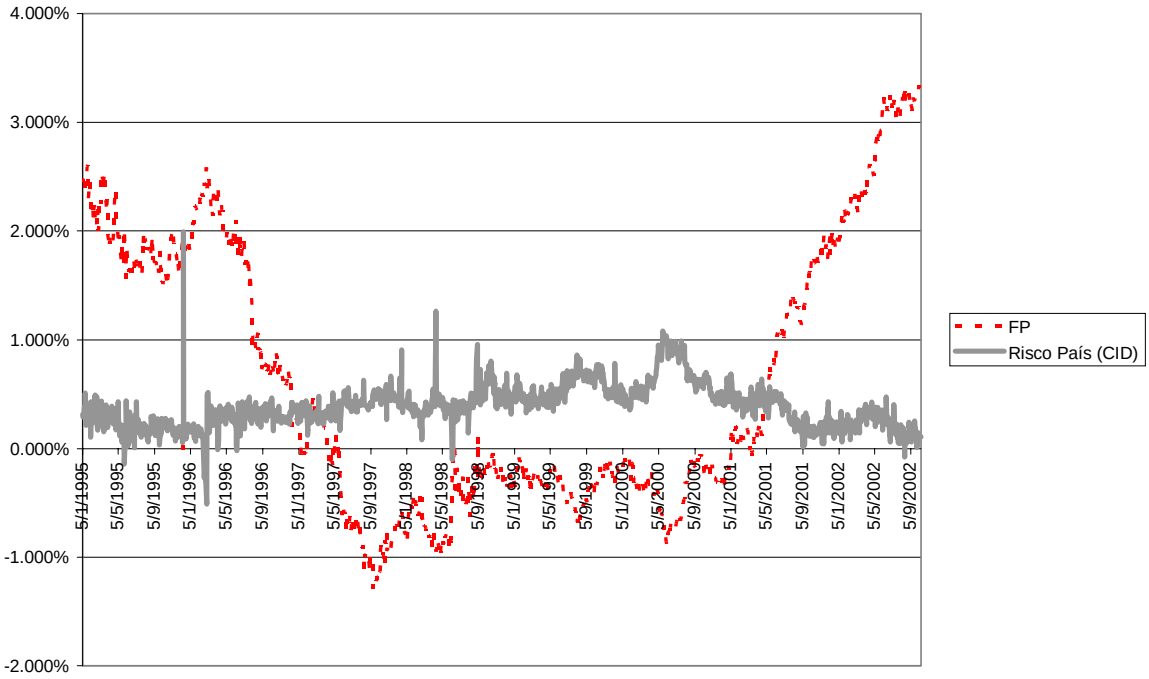

África do Sul: Embi+ vs FP
Spread Embi+
350
300
250
200
150
100
50
0
0.000%
2.000%
4.000%
6.000%
8.000%
10.000%
12.000%
14.000%
FP

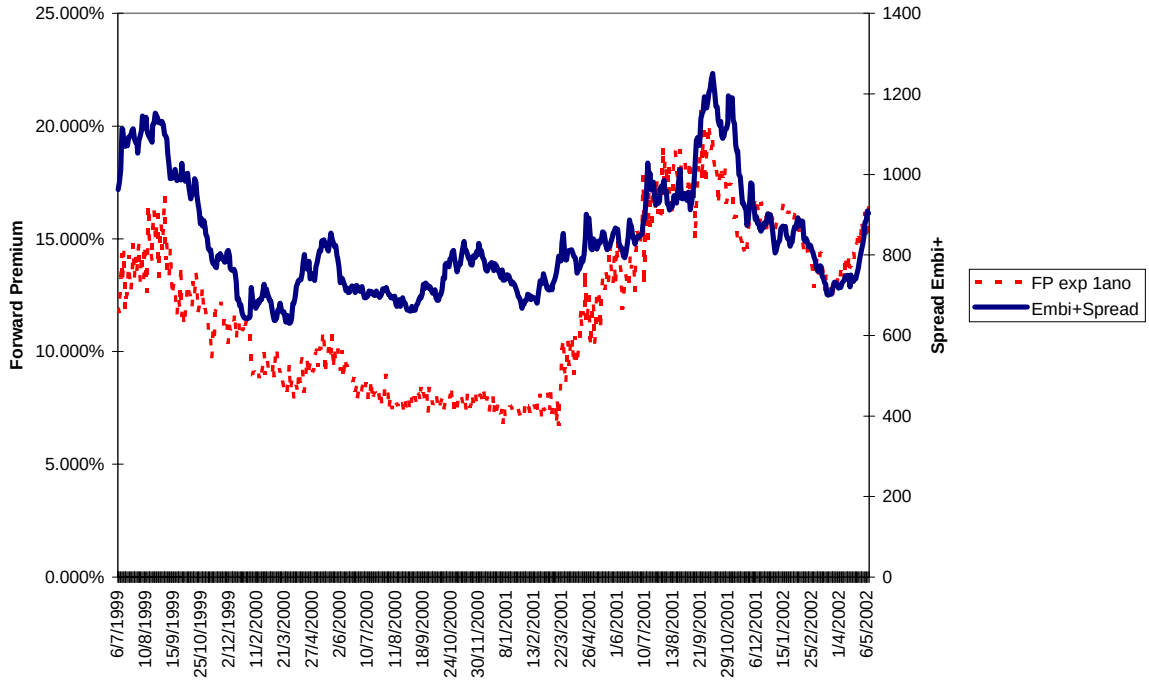
África do Sul: CID vs. FP



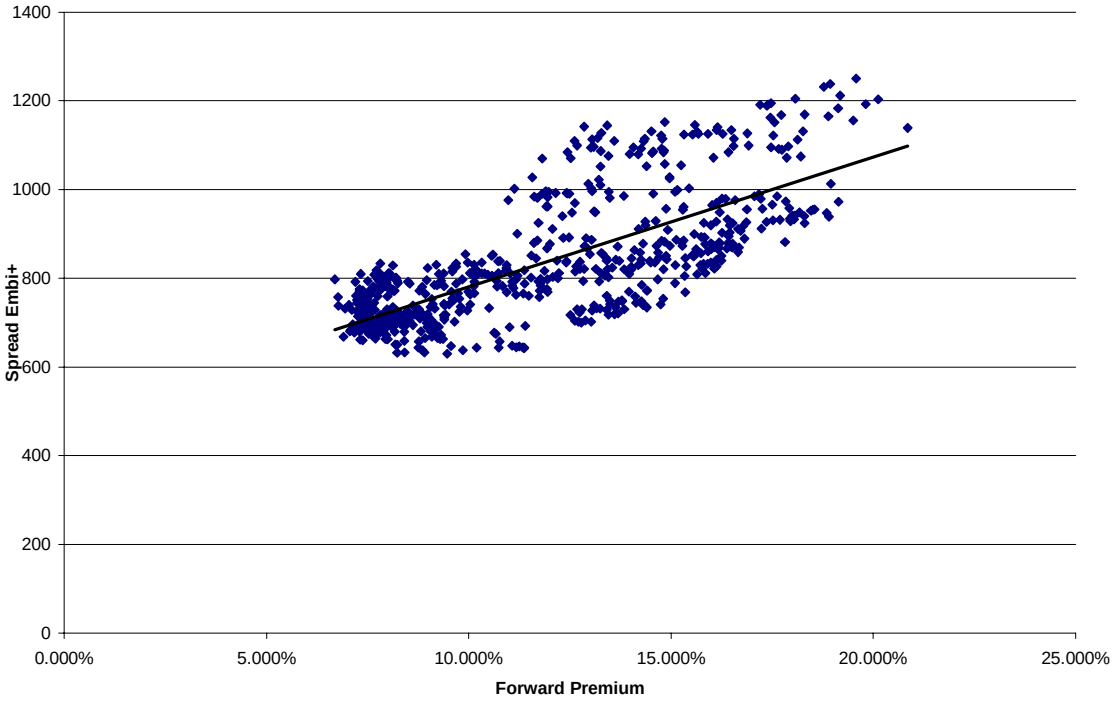
Aurtalia: CID vs. FP



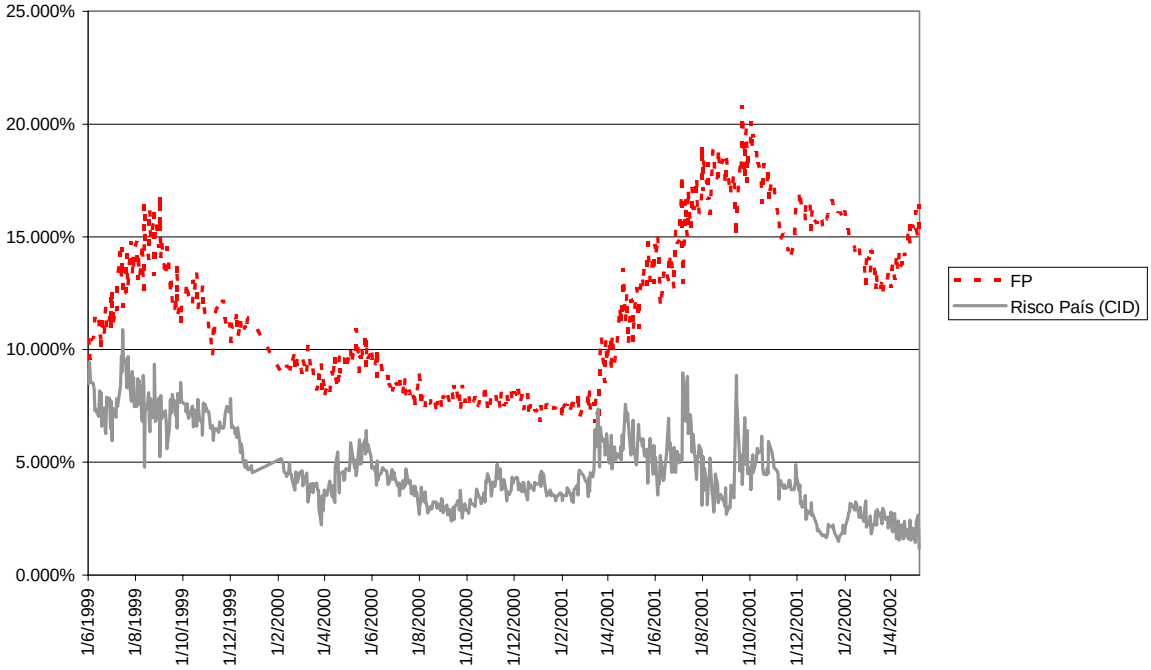
Brasil: Embi+ spread vs. FP



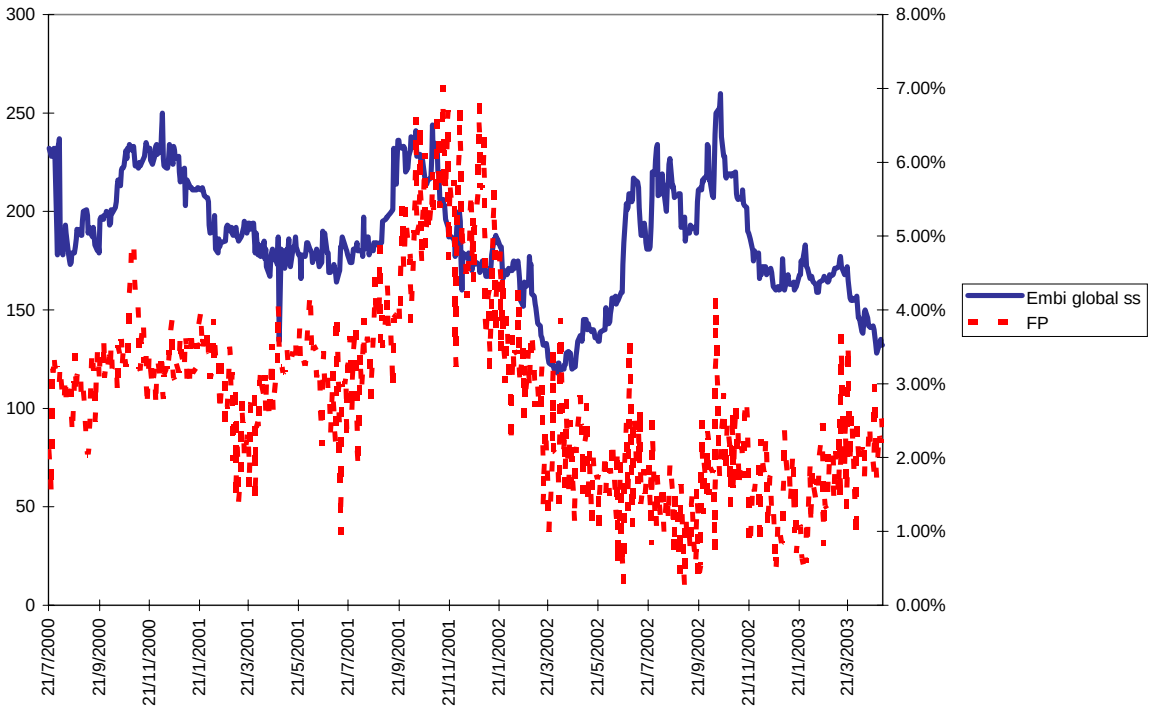
Brasil: Forward Premium vs. Spread Embi+



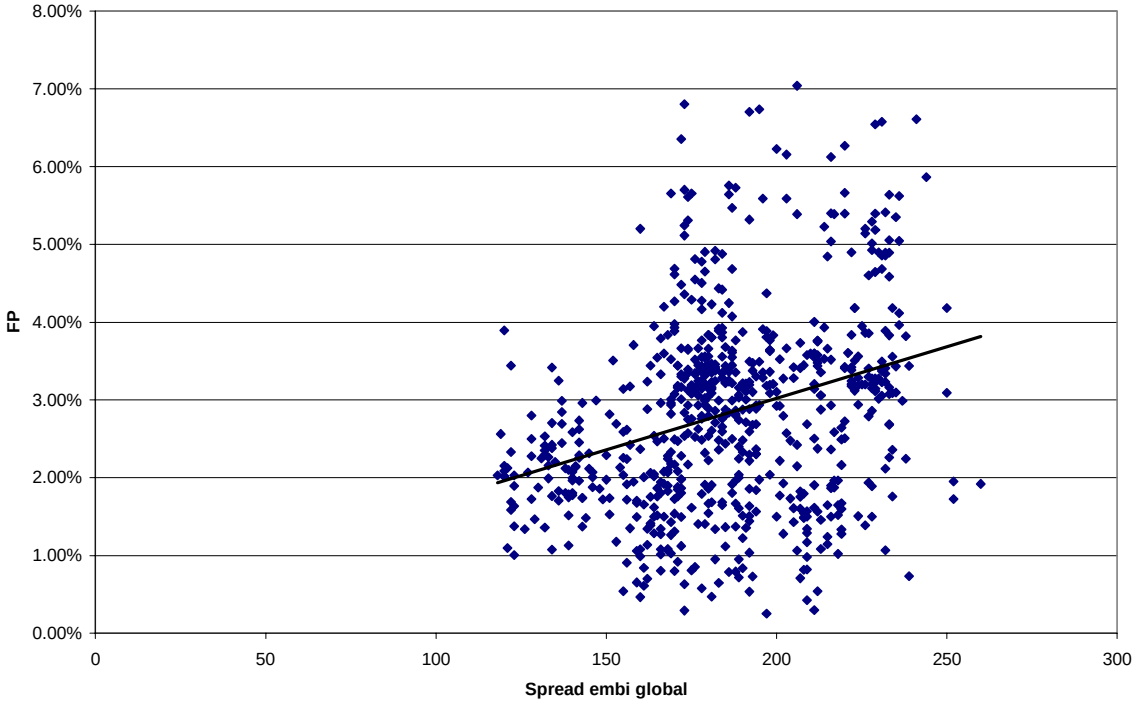
Brasil: CID vs. FP



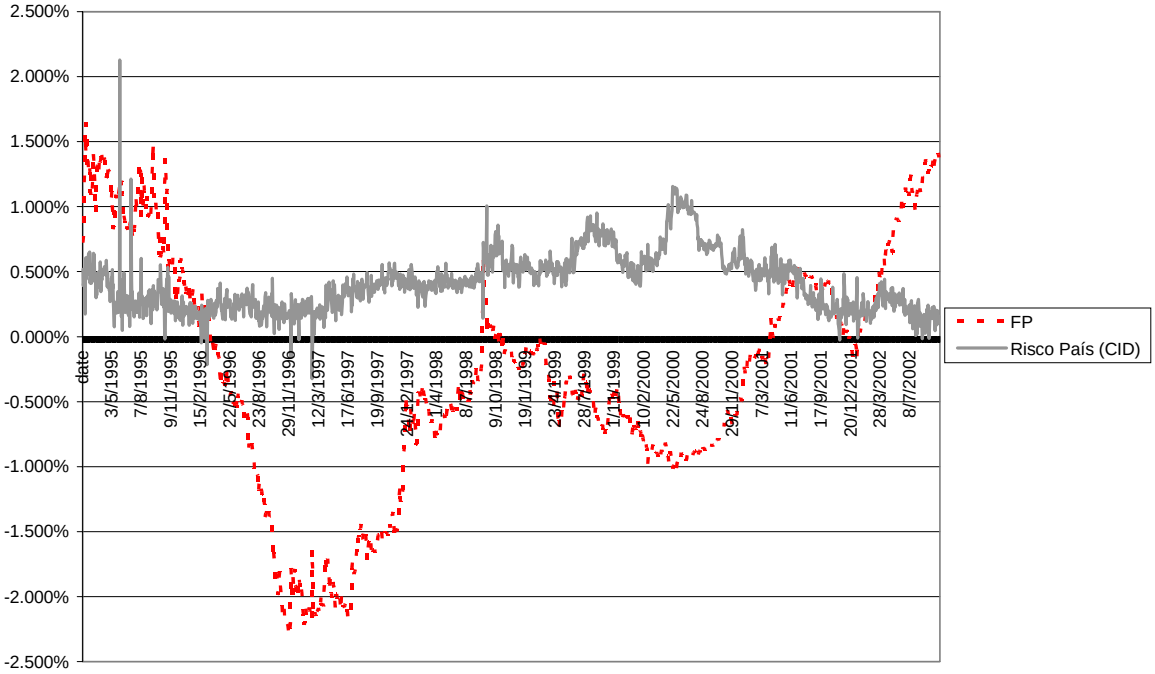
Chile: Embi global vs. FP



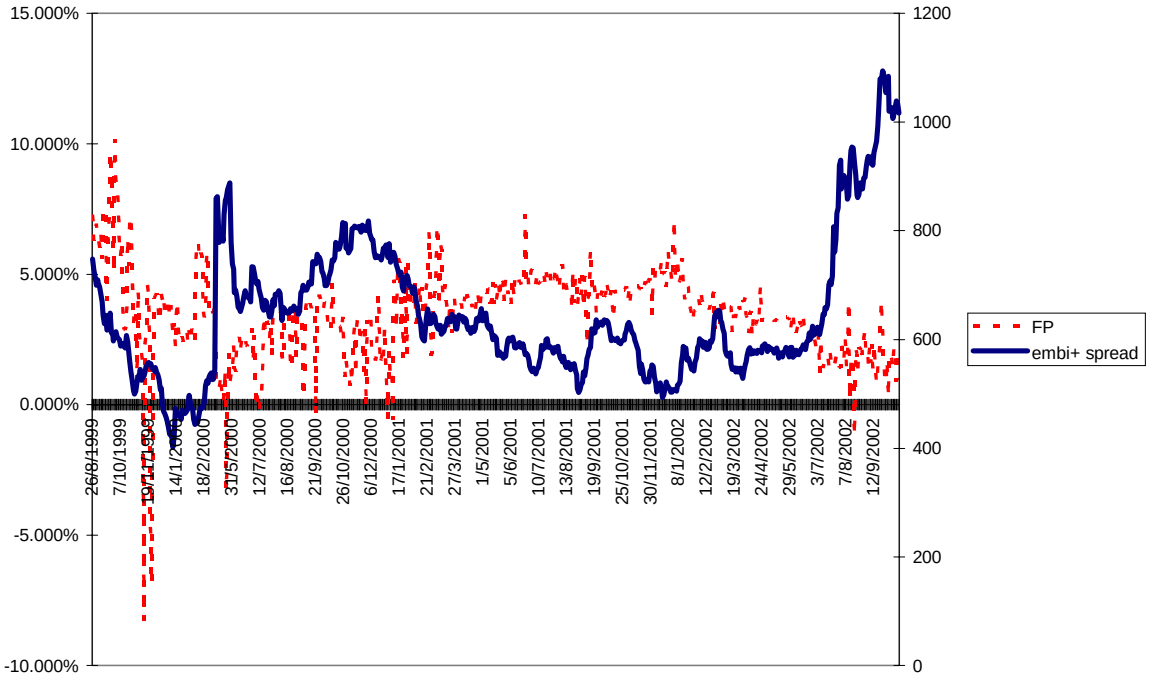
Chile: Embi global vs. FP



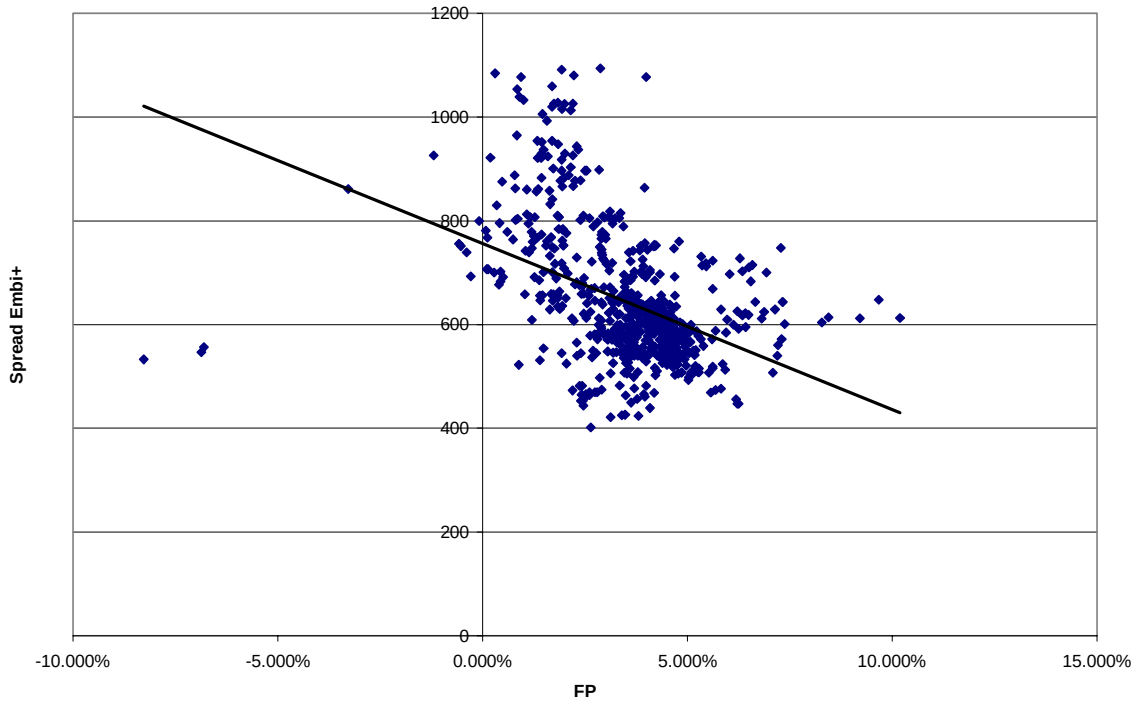
Canadá: CID vs. FP



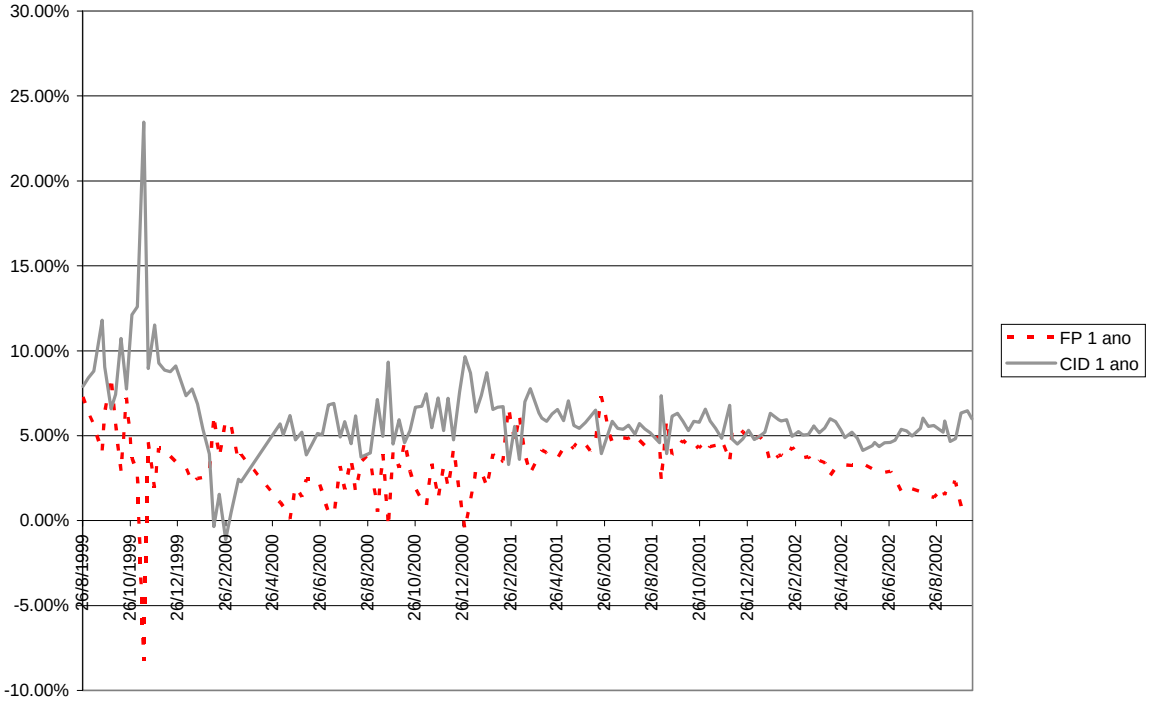
Colombia: Embi+ Spread vs. FP



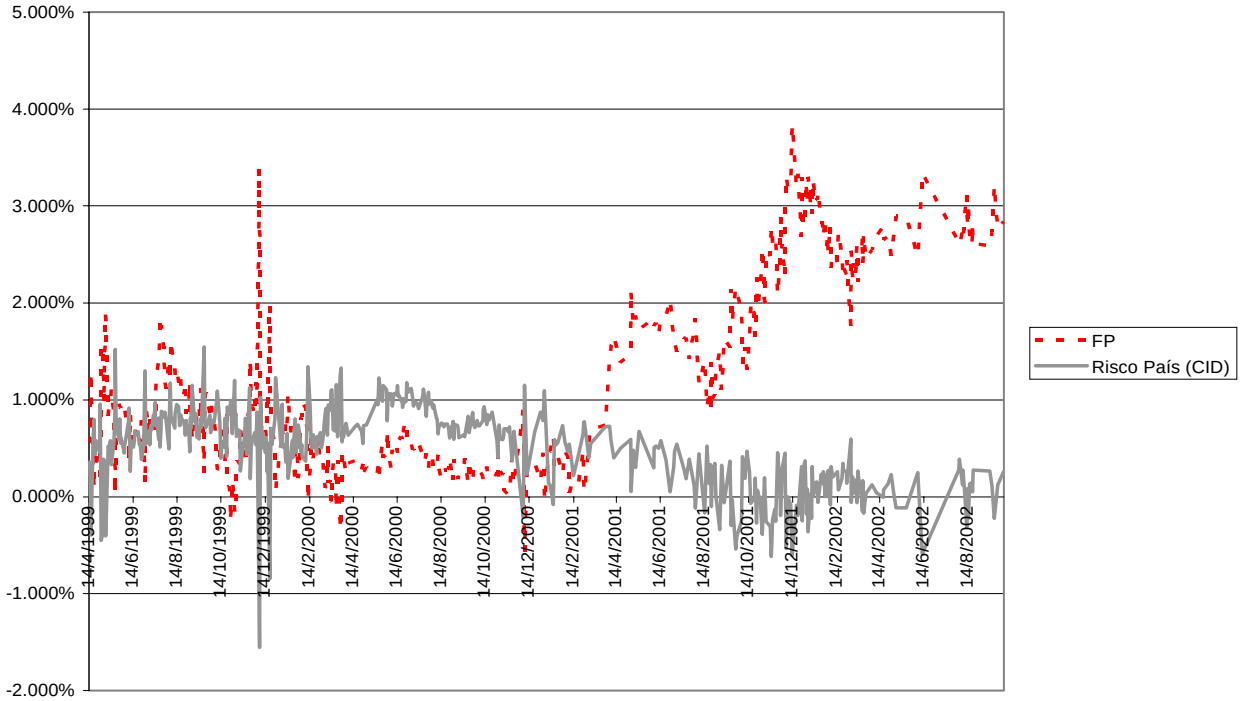
Colômbia: Embi+ e FP



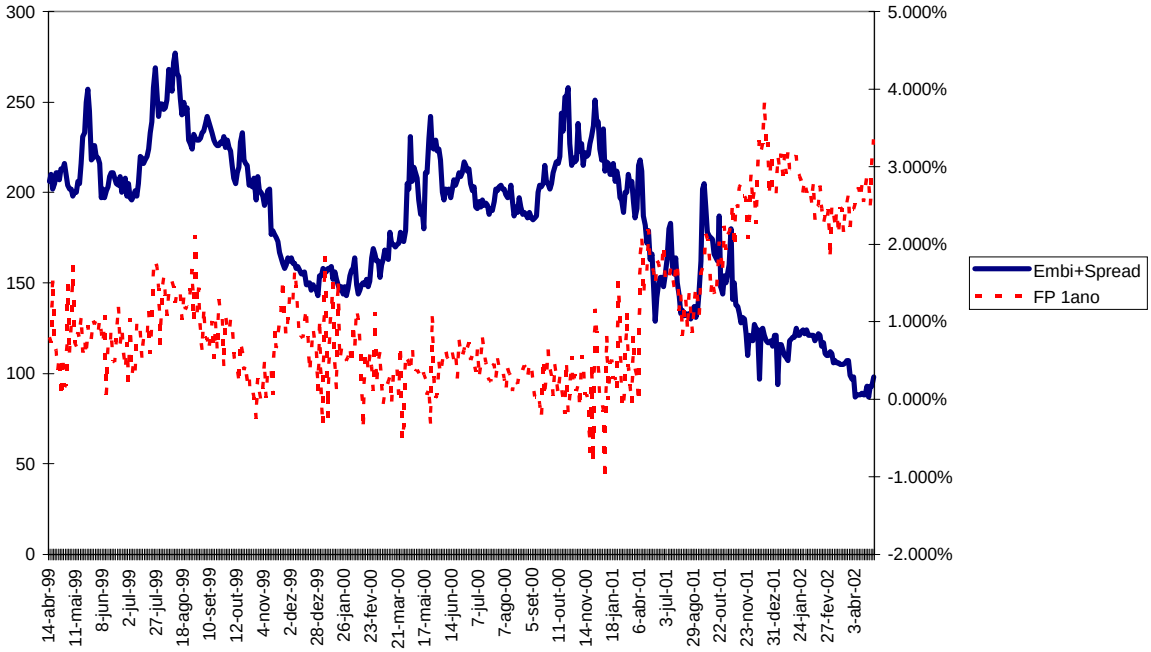
Colombia: CID vs. FP



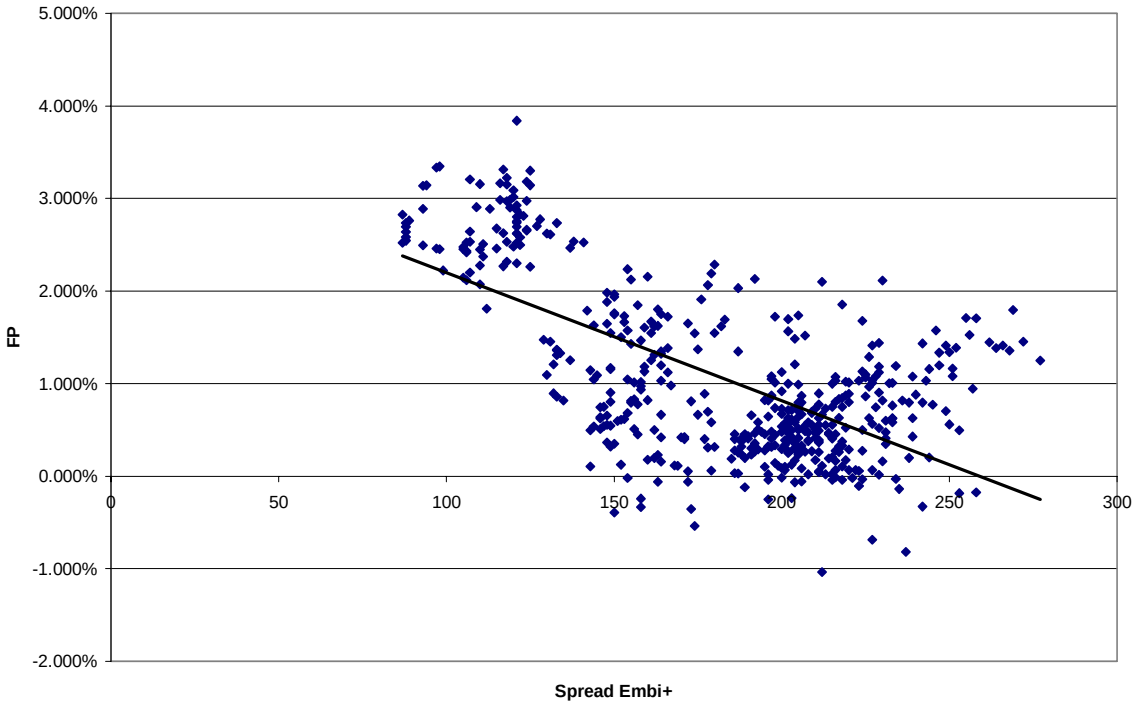
Coréia do Sul: CID e FP



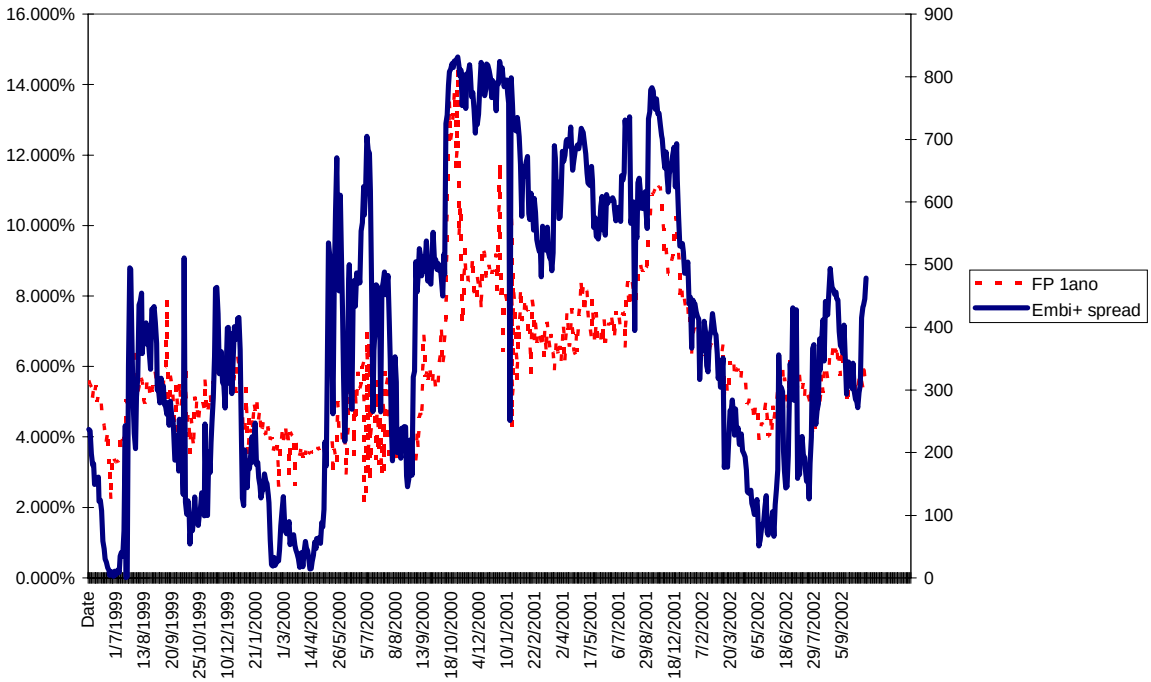
Coréia do Sul: Embi+ Spread vs. FP



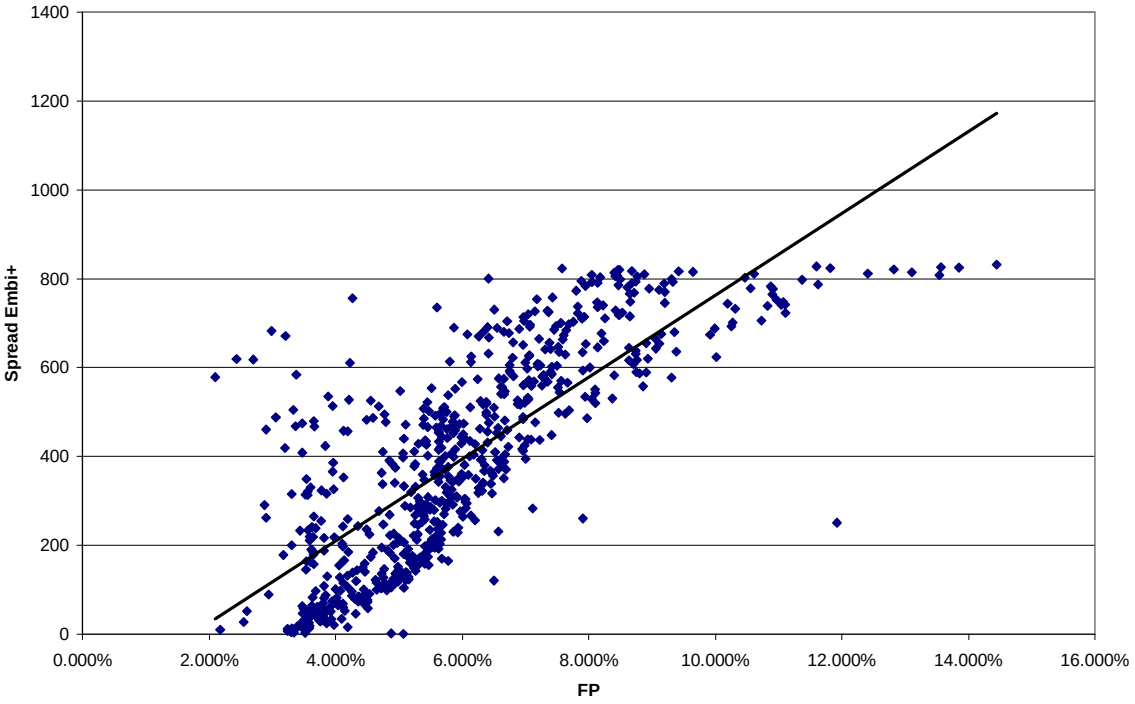
Coréia do Sul: Embi+ vs. FP



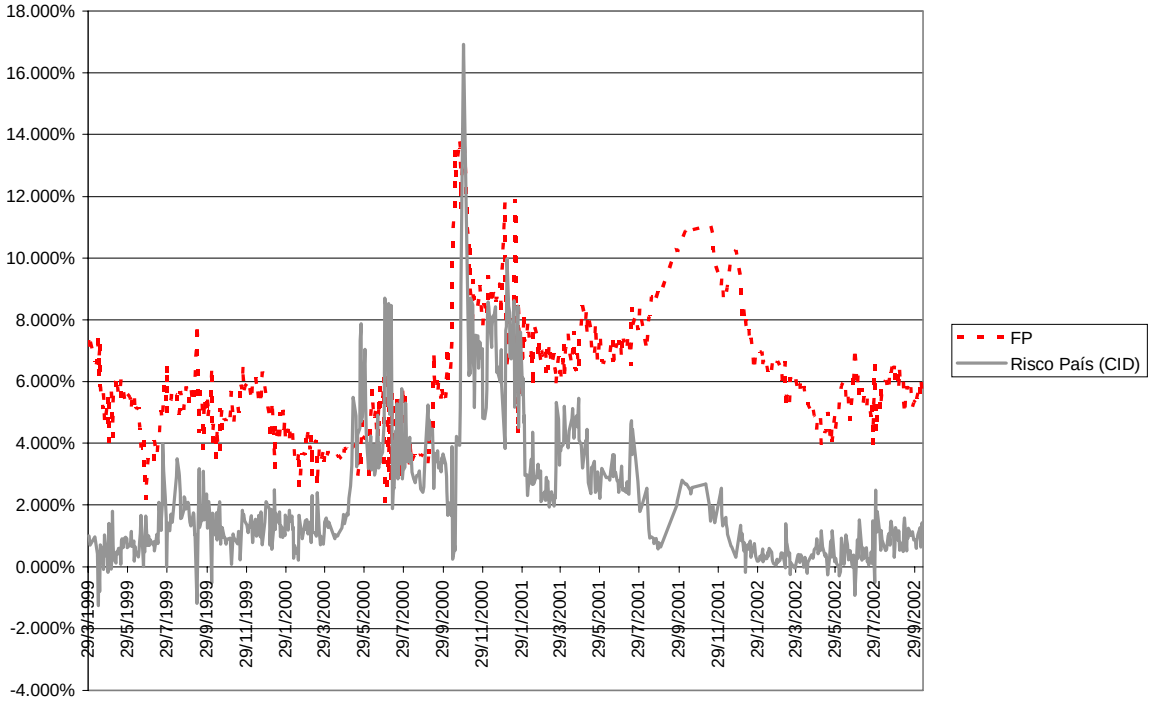
Filipinas: Embi+ spread vs. FP



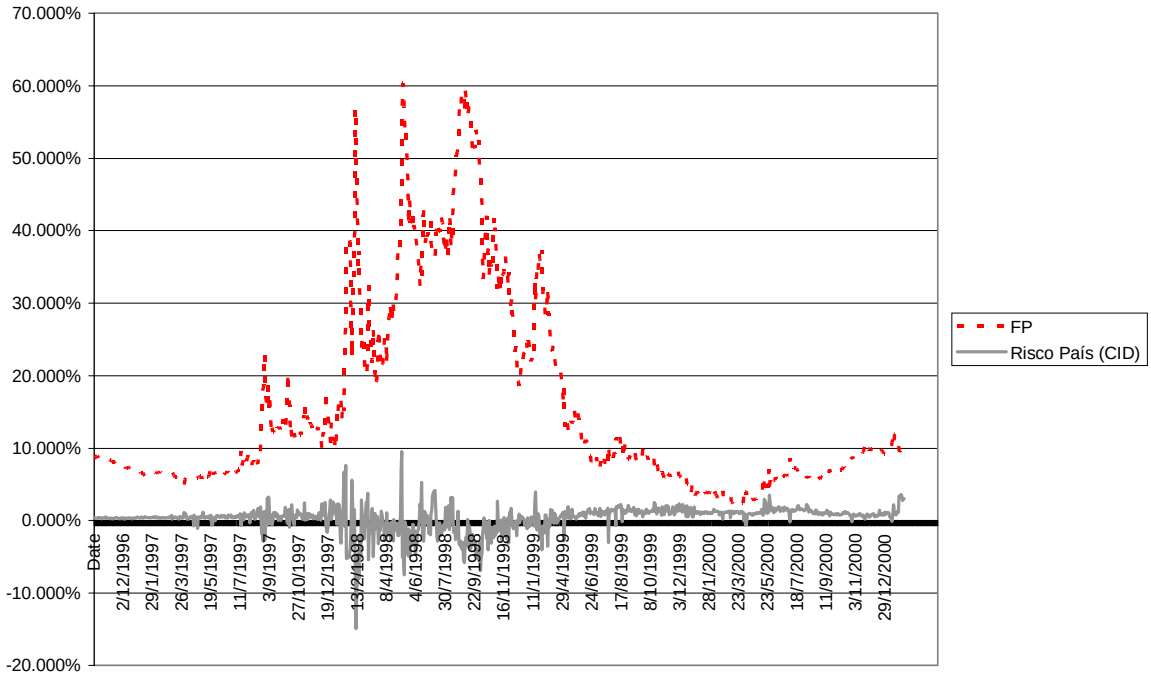
Filipinas Embi+ vs. FP



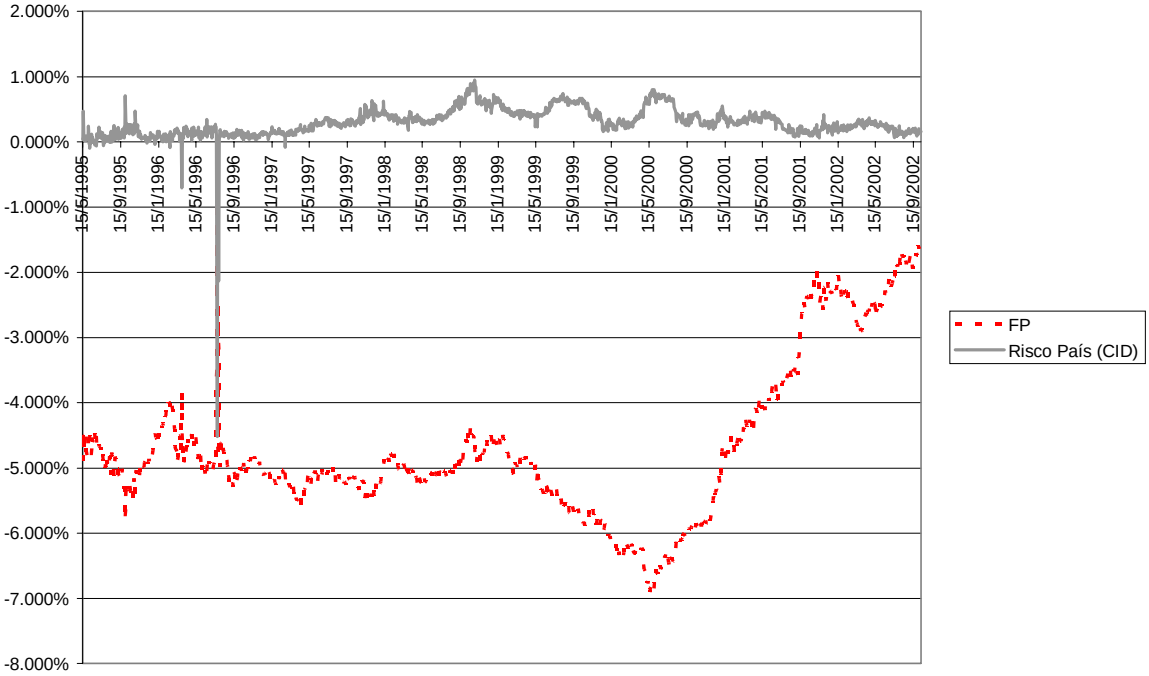
Filipinas: CID vs. FP



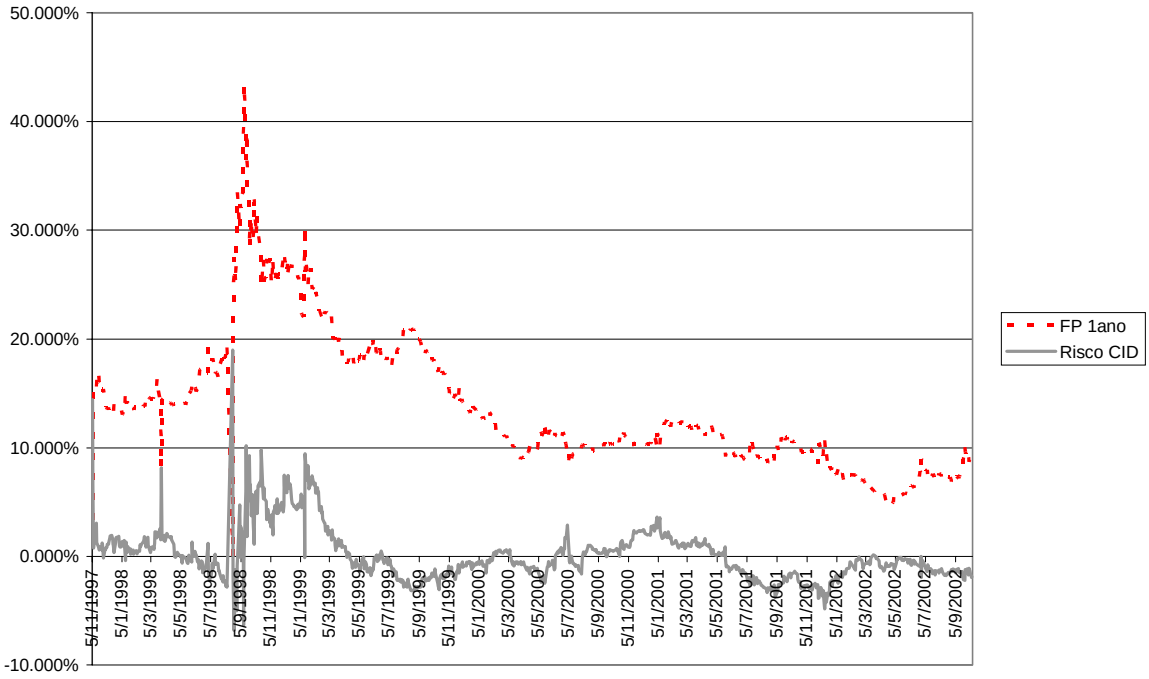
Indonésia: CID vs. FP



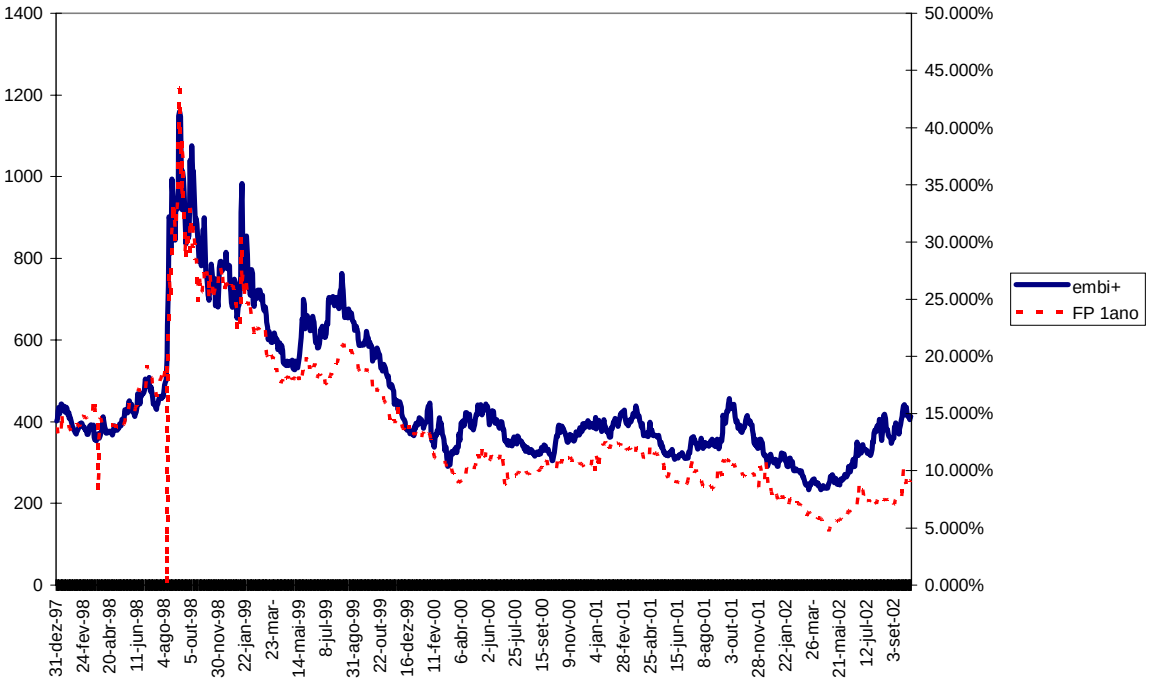
Japão: CID vs. FP



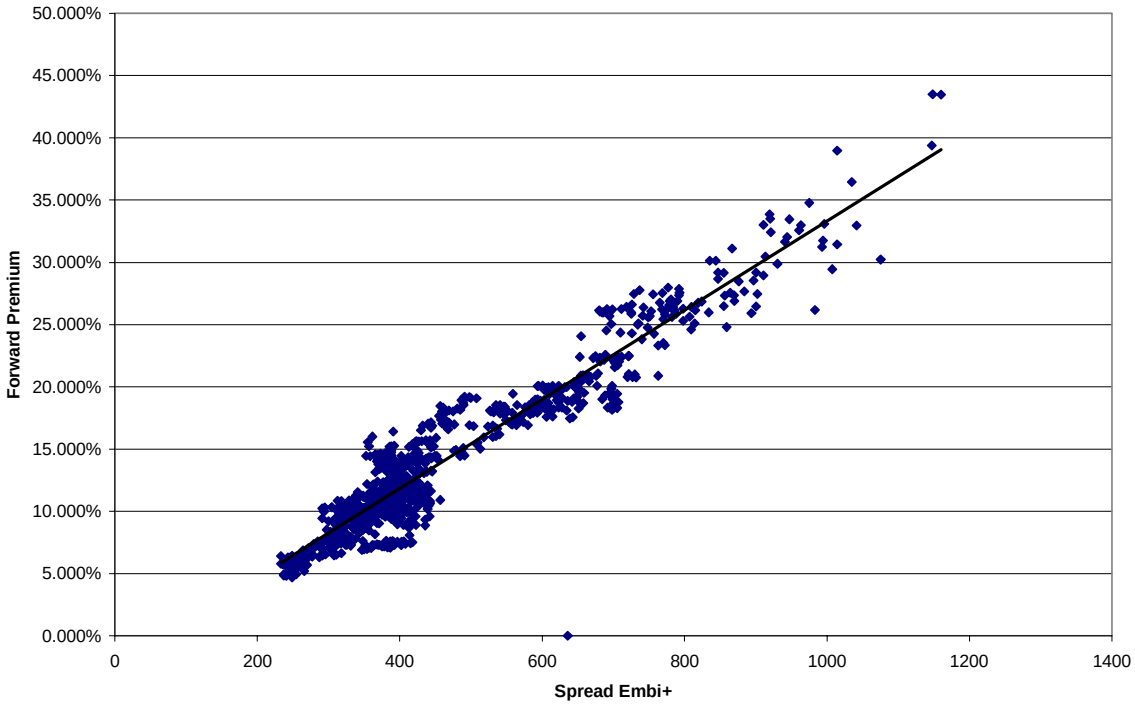
México: CID vs. FP



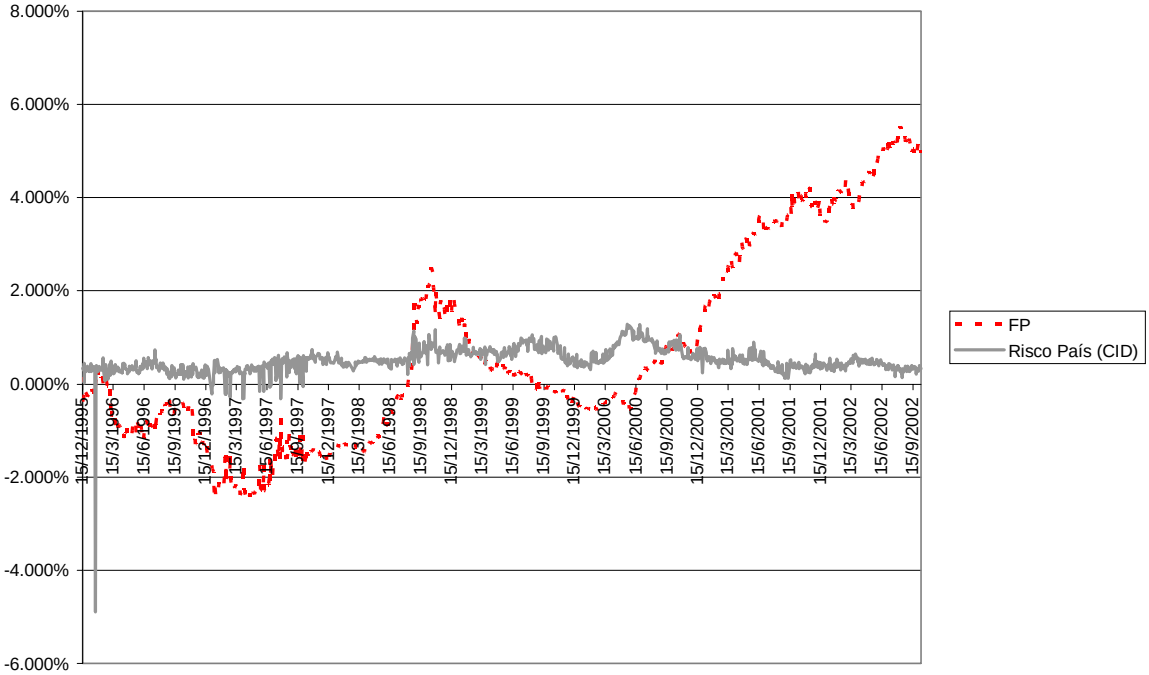
México: Embi+ spread vs. FP



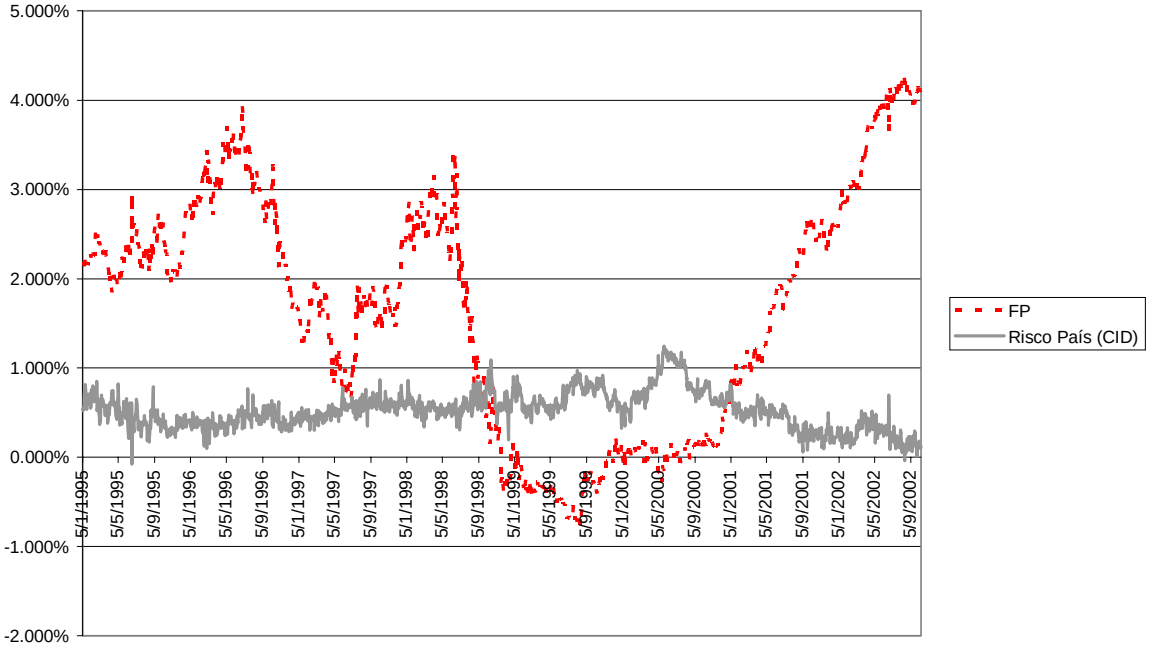
México: Spread Embi + vs. FP



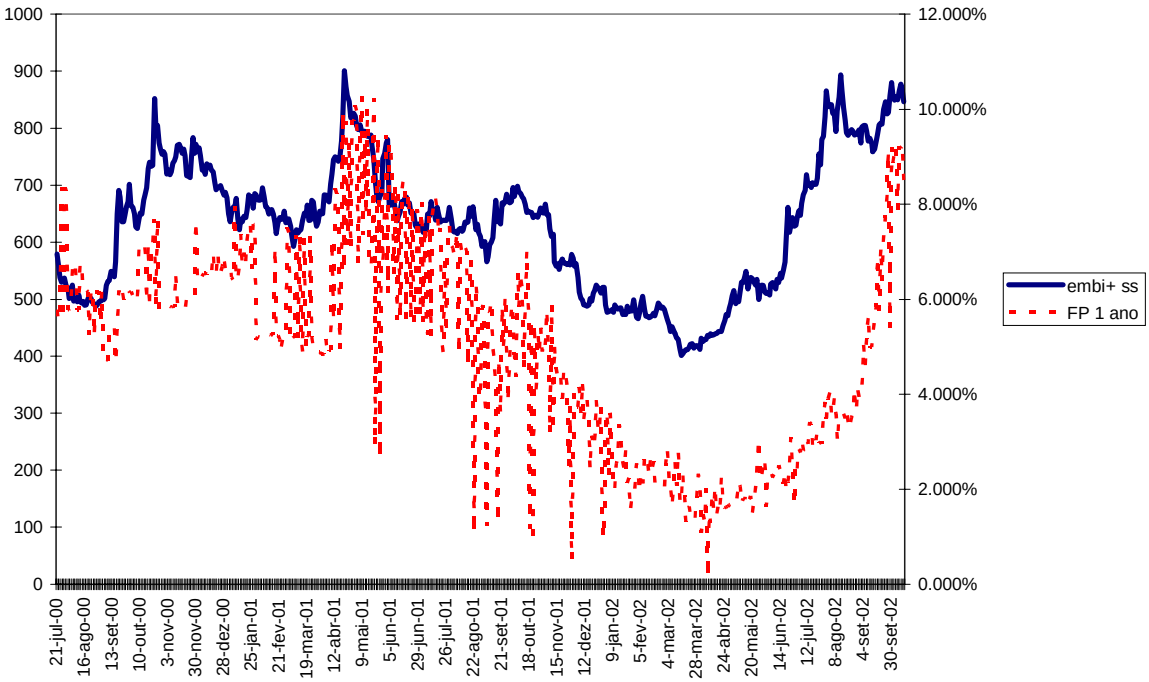
Noruega: CID vs. FP



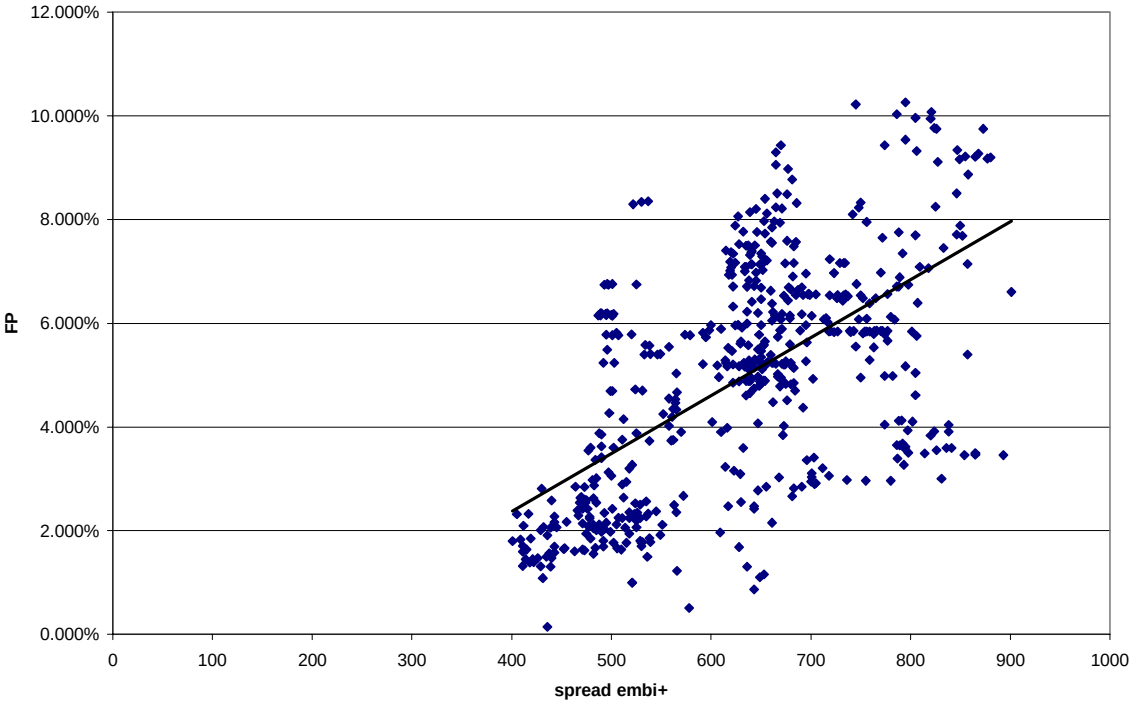
Nova Zelandia: CID vs. FP



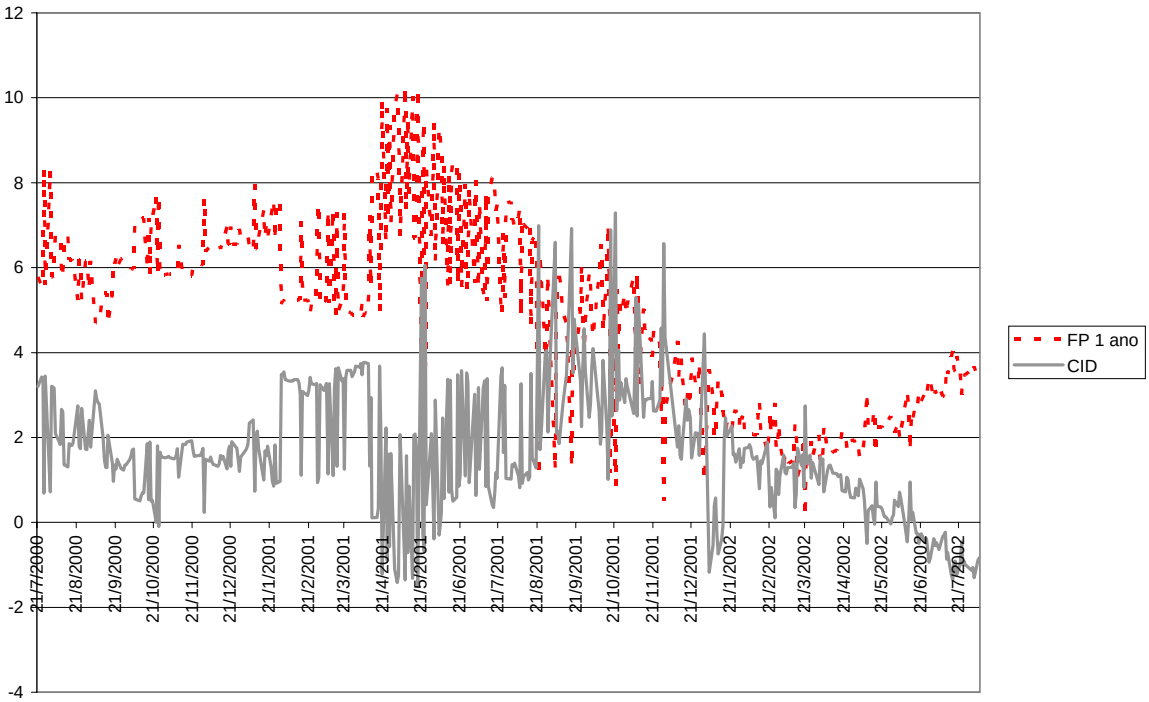
Peru: Embi+ spread vs. FP



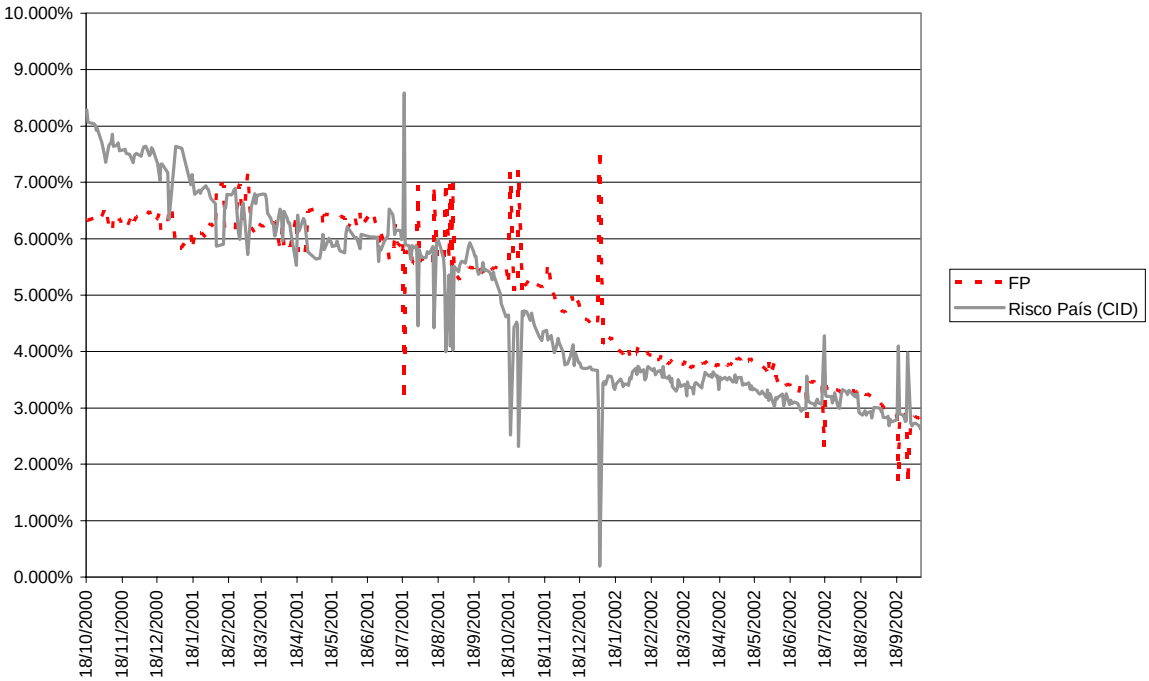
Peru: Embi+ vs. FP



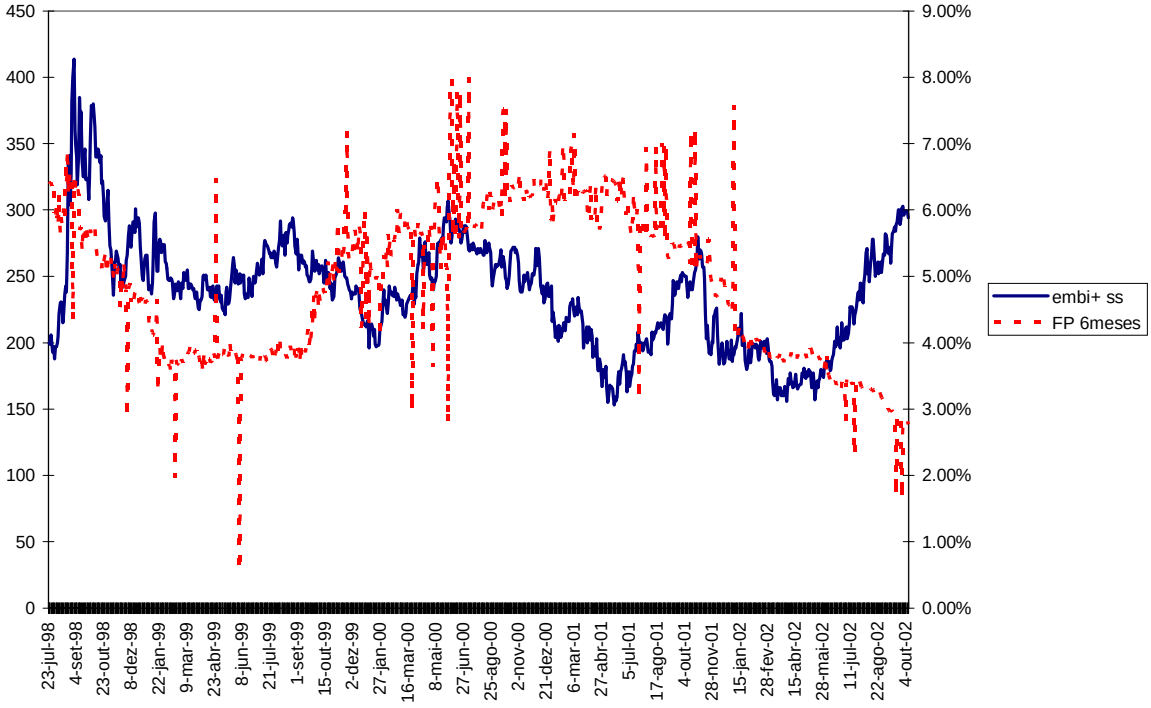
Peru: CID vs. Fp



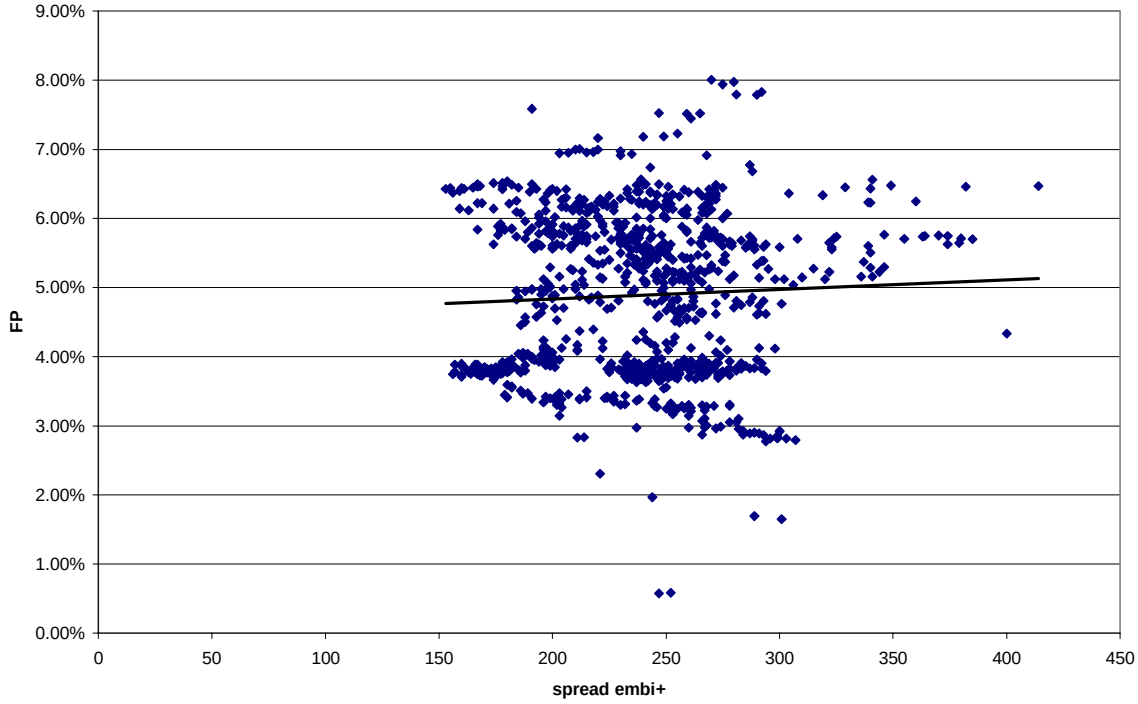
Polonia: CID vs. FP



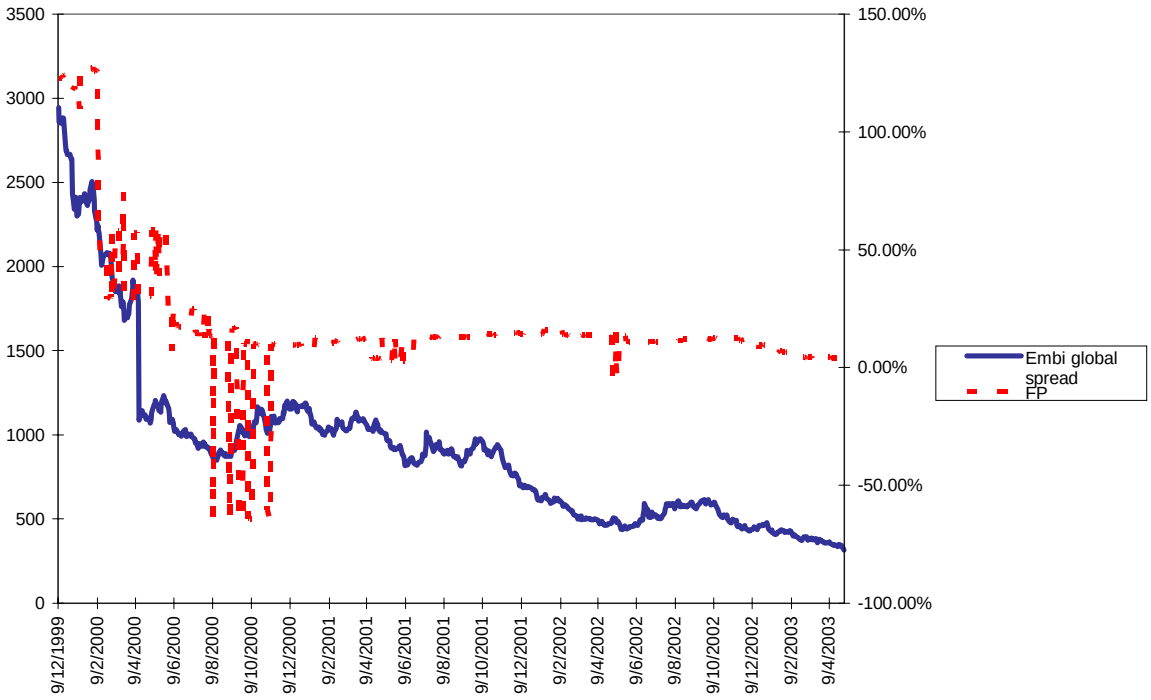
Polônia: Embi+ vs. FP



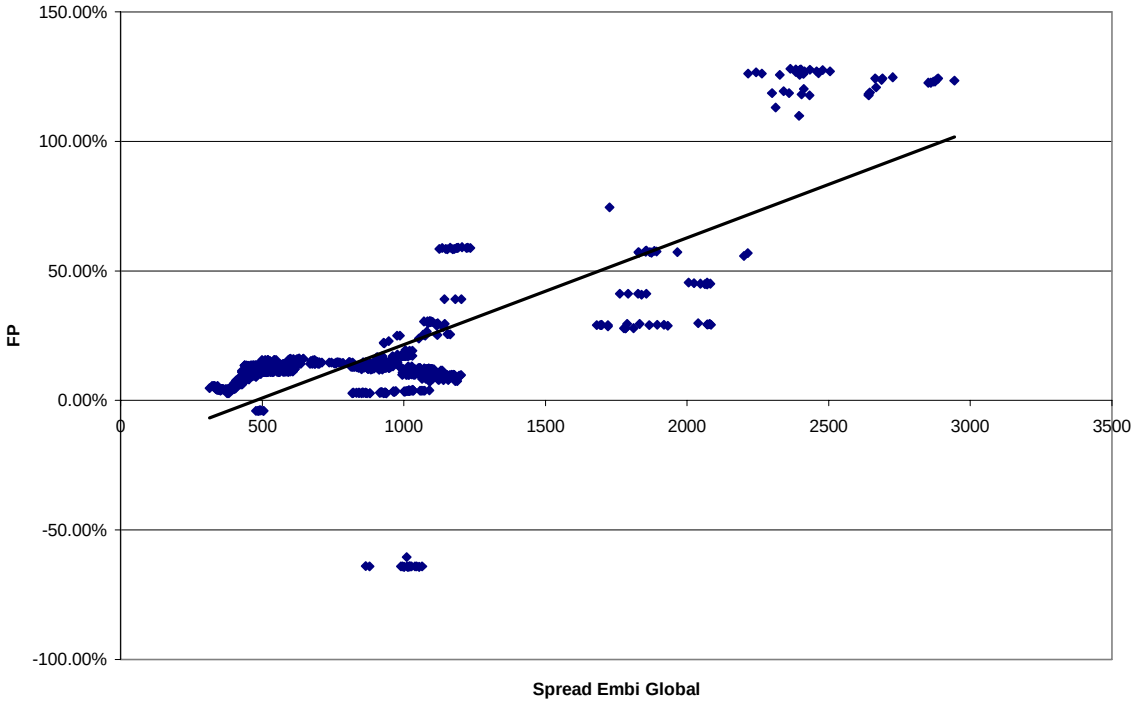
Polônia: Embi+ vs. FP



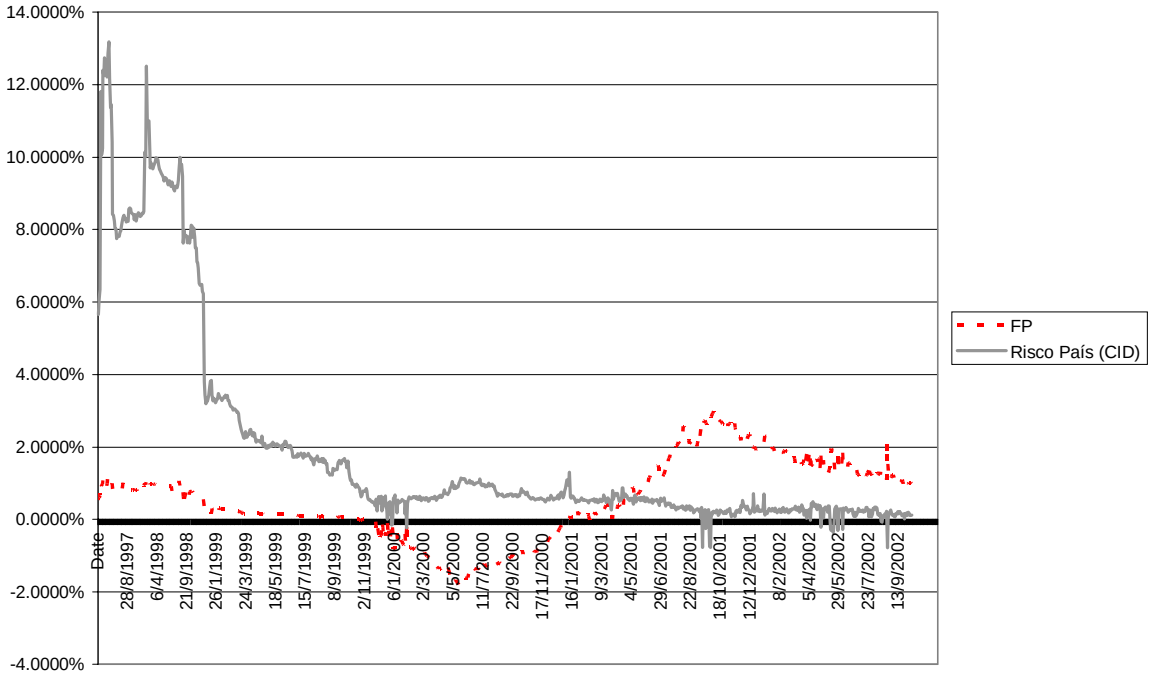
Rússia: Embi Global vs. FP



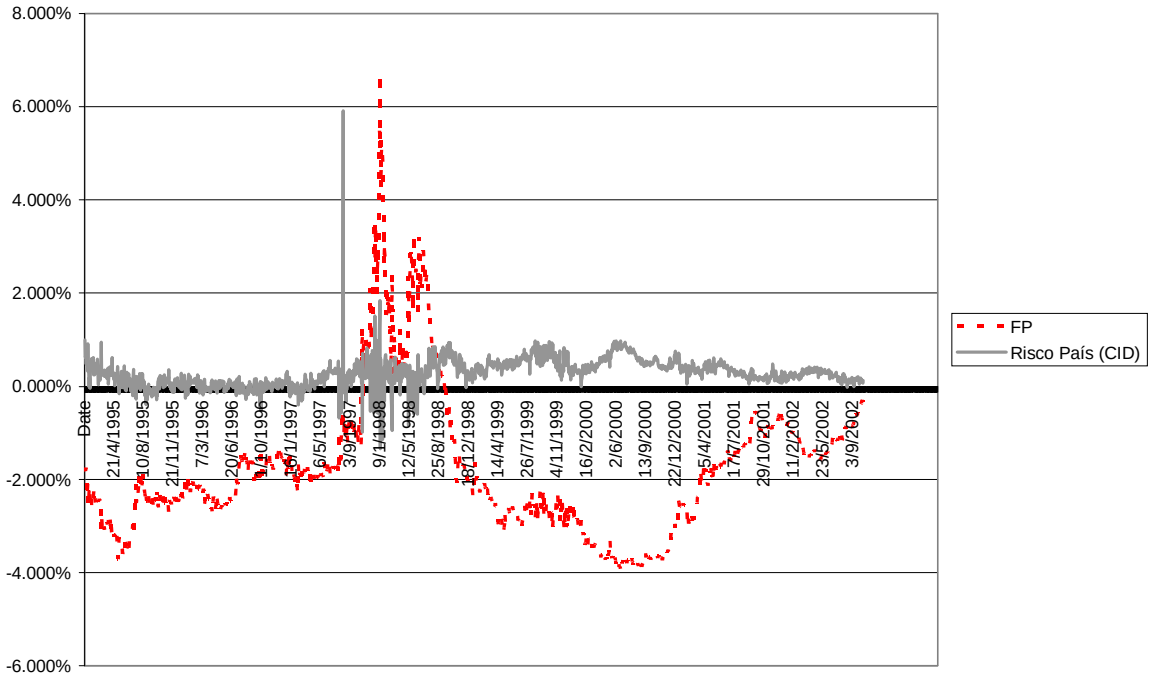
Russia: Embi Global vs. FP



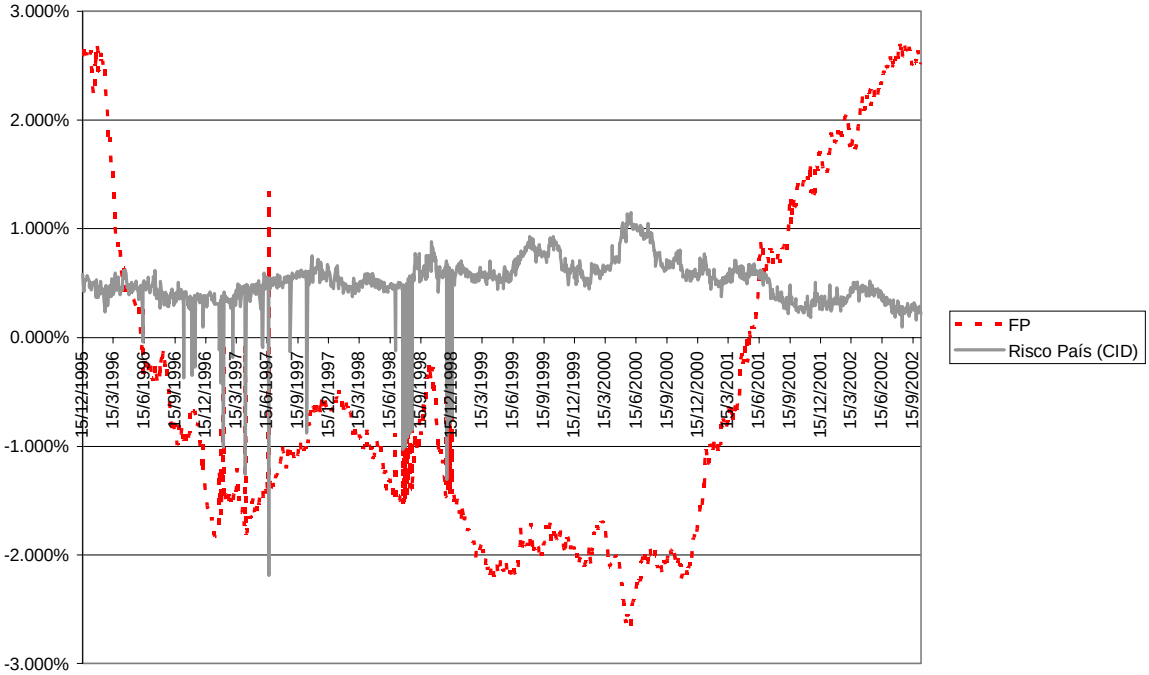
Rep. Tcheca: CID vs. FP



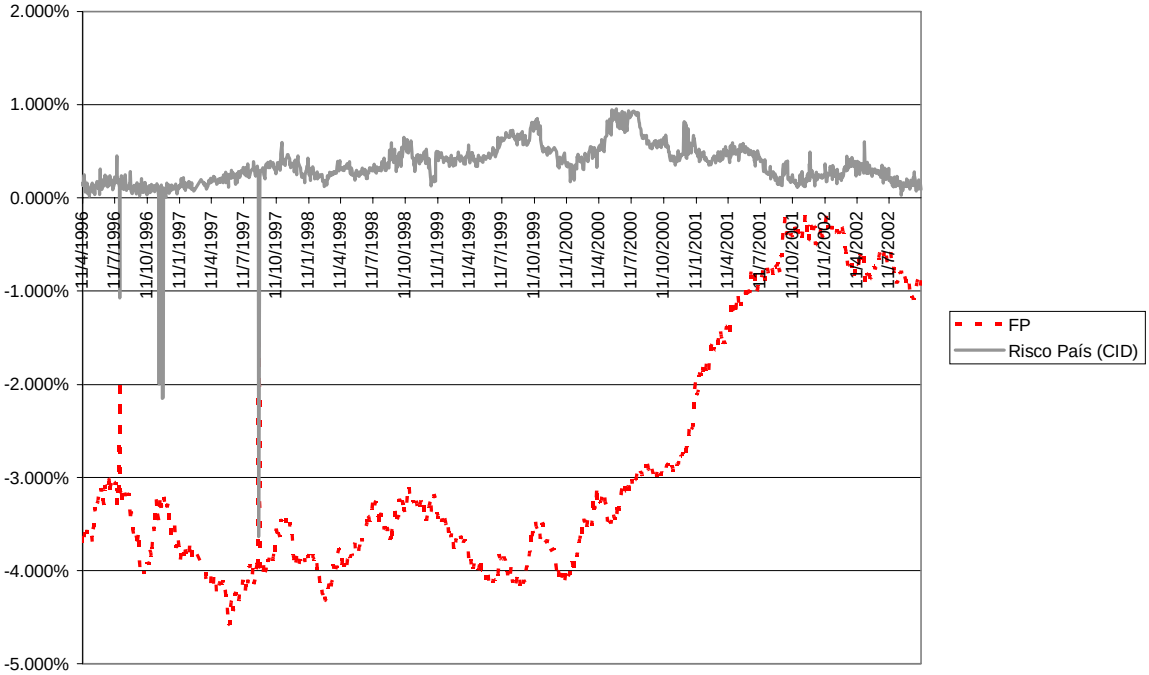
Singapura: CID vs. FP



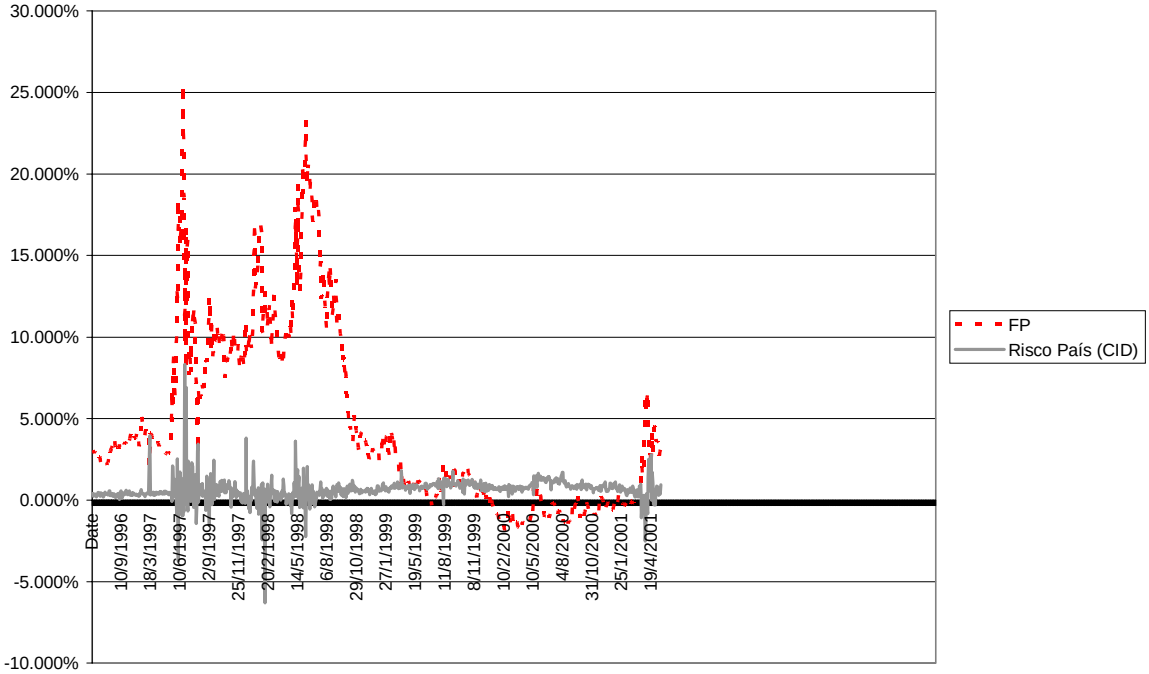
Suécia: CID vs. FP



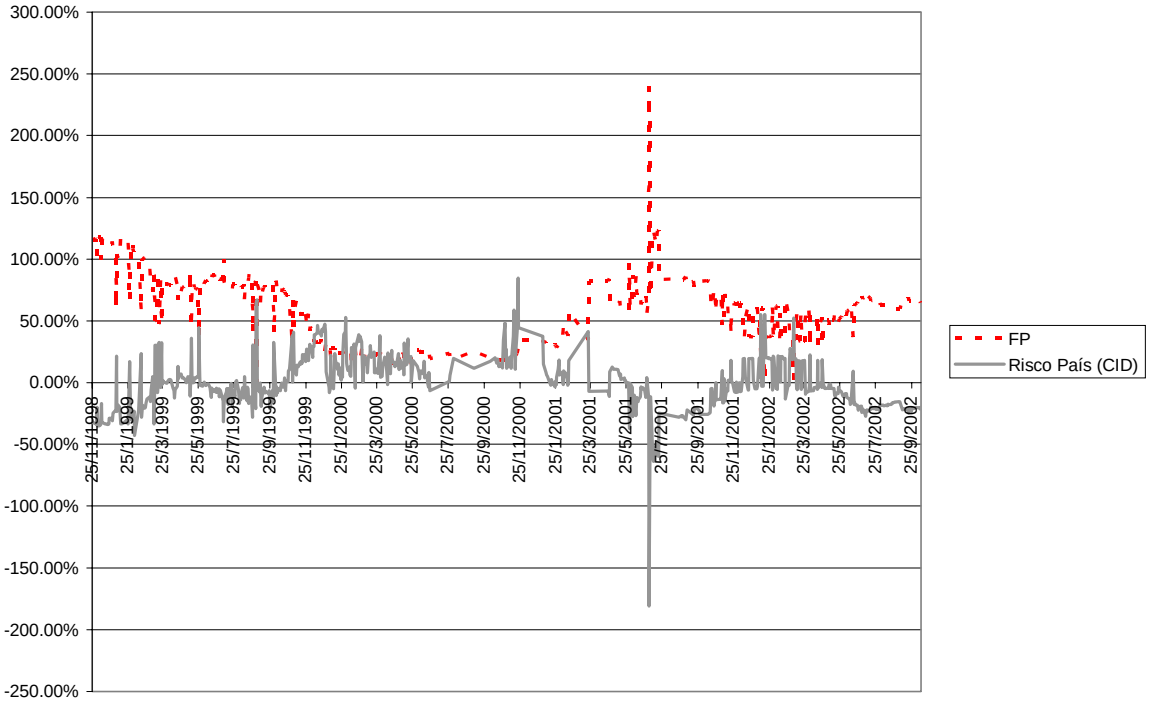
Suíça: CID vs. FP



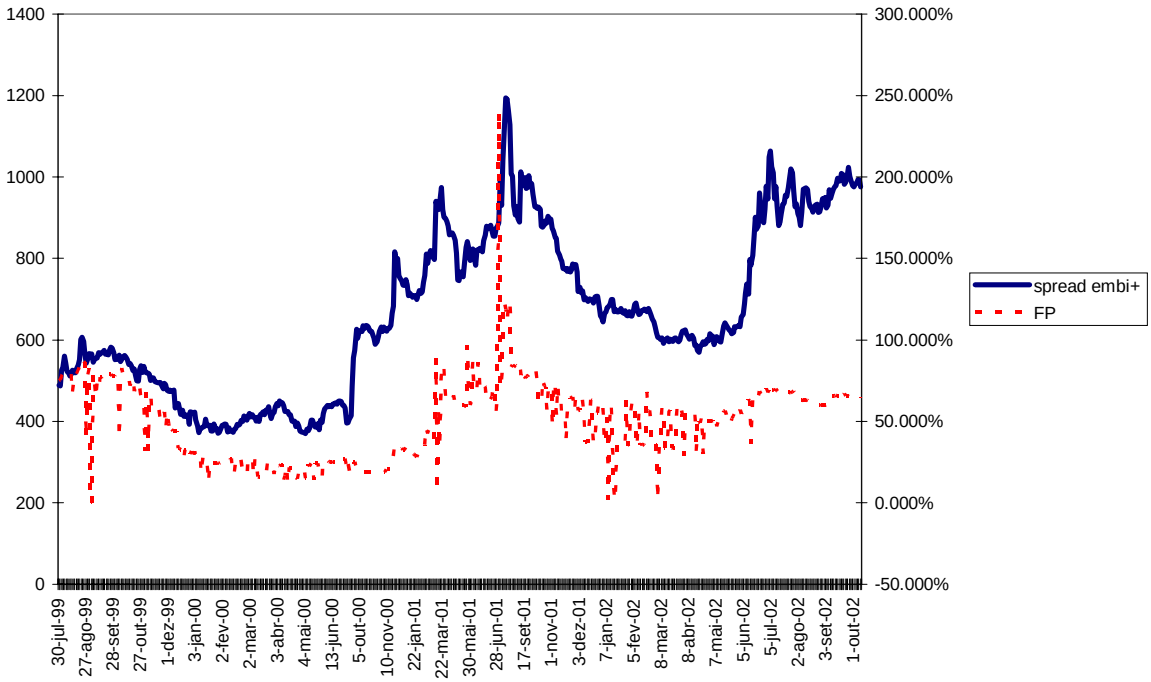
Tailândia: CID vs. FP



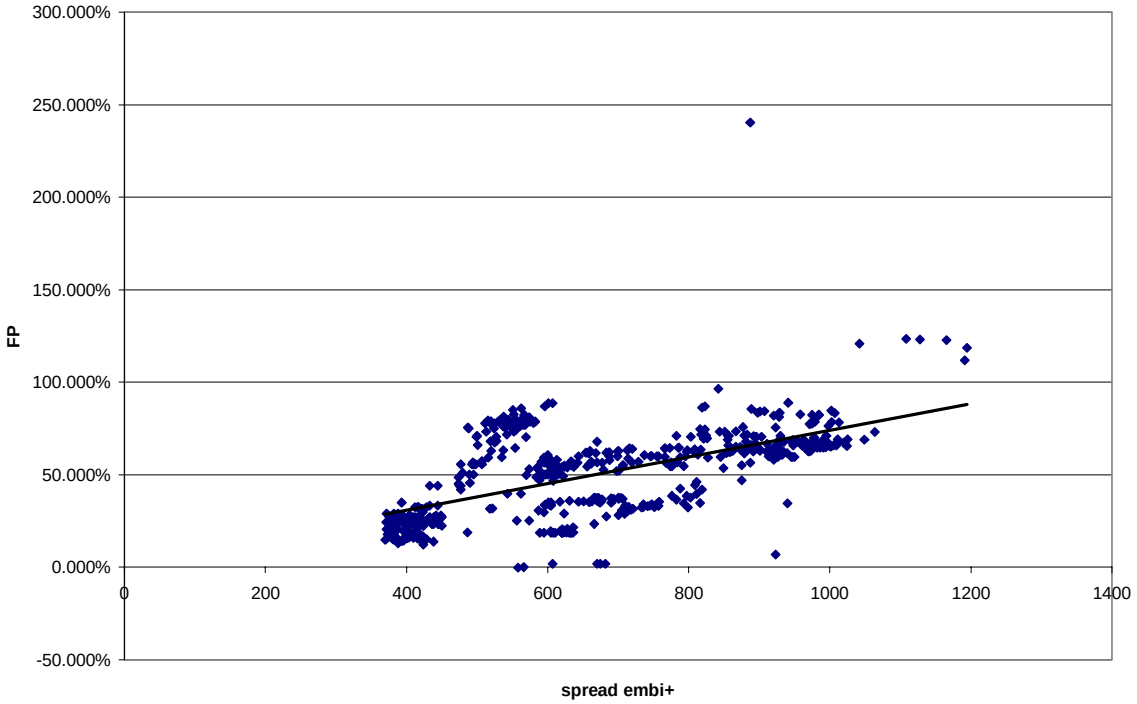
Turquia: FP vs. CID



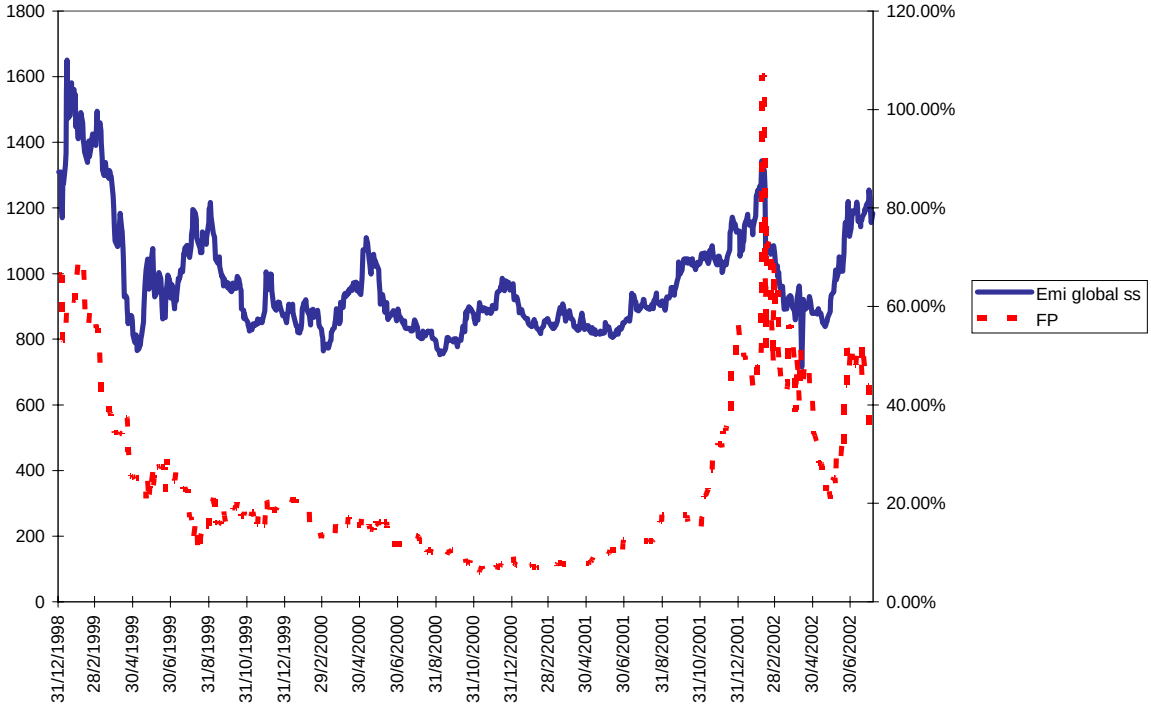
Turquia: Embi+ Spread vs. FP



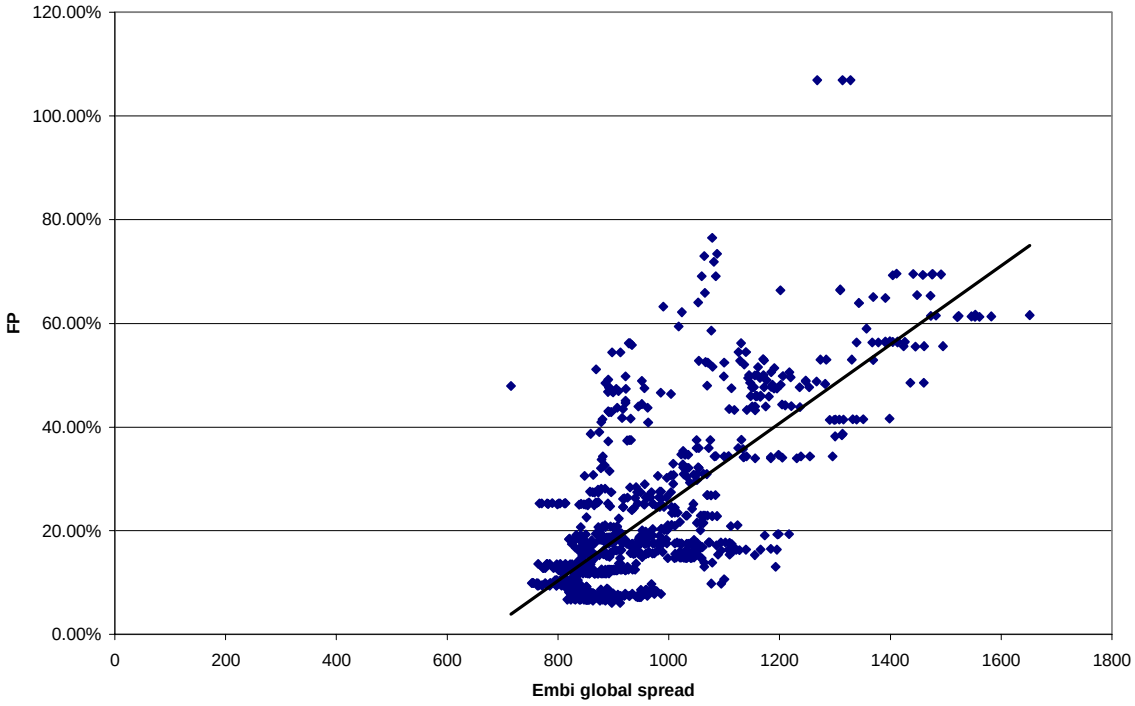
Turquia: embi+ vs. FP



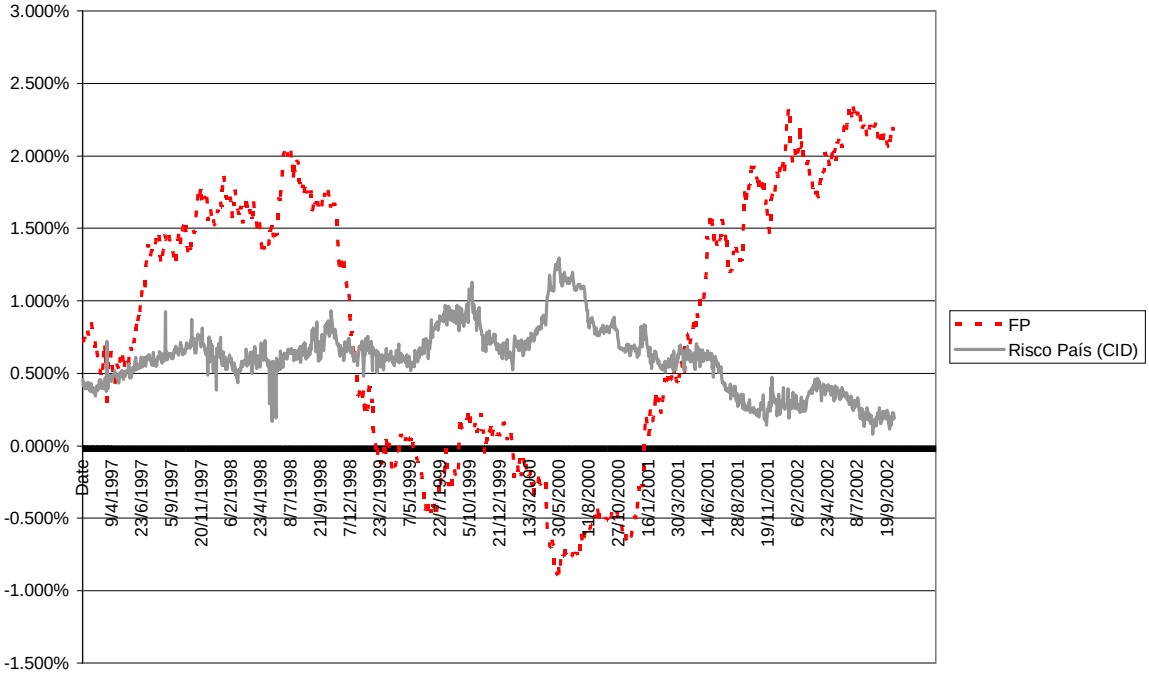
Venezuela: Embi global vs. FP



Venezuela: Embi global vs. FP



Ingalterra: CID vs. FP



Apendix 2
Data Sources

Deffinition and Data Sources (except debt)

Variable	*Source:*
Exports of goods and services (% of GDP)	WDI - World Bank
Imports of goods and services (% of GDP)	WDI - World Bank
Current account balance (% of GDP)	WDI - World Bank
Simple Mean tarif	WDI - World Bank
Balance of Payments: Overall Balance	IFS - FMI
Gross international reserves (includes gold, current US$)	WDI - World Bank
External debt, total (DOD, current US$)	WDI - World Bank
Gross domestic savings (% of GDP)	WDI - World Bank
Government External Debt (% PIB)	Different each country (see next)
Government Internal Debt (% PIB)	Different each country (see next)
Overall budget balance, including grants (% of GDP)	WDI - Bco Mundial
Domestic credit to private sector (% of GDP)	WDI - Bco Mundial
Market capitalization of listed companies (% of GDP)	WDI - Bco Mundial

Debt Data Sources

	Internal Debt	External Debt
Argentina	Ministerio de Economia y Producción	Ministerio de Economia y Producción
Australia	OECD	RBA - Reserve Bank of Australia
Brazil	BCB - Banco Central do Brasil	BCB - Banco Central do Brasil
Canada	OECD	SDSS IMF
Chile	Ministério da fazenda do chile (Deuda del Gobierno Central)	Ministério da fazenda do chile (Deuda del Gobierno Central)
Colombia	Banco de la República - Colômbia	Banco de la República - Colômbia
Czech Rep.	IFS - IMF	IFS - IMF
Indonesia	World Bank	World Bank
Japan	OECD	Ministry of Finance - Japan
Mexico	Secretaria de Hacienda - Mexico	Secretaria de Hacienda - Mexico
New Zealand	OECD	Reserve Bank of New Zealand
Norway	SDSS IMF	SDSS IMF
Peru	Banco Central de Reserva del Perú	Ministerio de Economia y Finanzas
Phillipines	Department of Economic Research - Bangko Sentral ng Pilipinas	Department of Economic Research - Bangko Sentral ng Pilipinas
Poland	IFS - IMF	IFS - IMF
Russia	Ministry of Finance	Ministry of Finance
Singapore	Singapore Department of Statistics	Singapore Department of Statistics
South Africa	IFS - IMF	IFS - IMF
South Korea	Ministry of Finance - Korea	Bank of Korea
Sweden	Statistiska centralbyrán	Statistiska centralbyrán
Switzerland	-	-
Thailand	IFS - IMF	IFS - IMF
Turkey	Central Bank of the Republic of Turkey	Central Bank of the Republic of Turkey
UK	OECD	-
Venezuela	The Ministry of Finance	The Ministry of Finance

Apendix 3
Models Estimated by Logit

Logit Univariate Models

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)
number of observations: 25

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
constant	-2.160793	2.348164	3.552126	-2.111728	-1.266669	0.965385	-0.725782	-3.580993
p-value	*0.0046*	*0.2662*	*0.0044*	*0.0357*	*0.0356*	*0.4412*	*0.106*	*0.008*
External Debt-Reserves (%GDP)	0.135654	-	-	-	-	-	-	-
p-value	*0.0017*	-	-	-	-	-	-	-
Savings (% GDP)	-	-0.134729	-	-	-	-	-	-
p-value	-	*0.1503*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-	-0.097562	-	-	-	-	-
p-value	-	-	*0.0042*	-	-	-	-	-
Total Debt (% PIB)	-	-	-	0.033109	-	-	-	-
p-value	-	-	-	*0.0957*	-	-	-	-
Overall Budget Balance (% PIB)	-	-	-	-	-0.264436	-	-	-
p-value	-	-	-	-	*0.1344*	-	-	-
Exports+Imports (% GDP)	-	-	-	-	-	-0.029134	-	-
p-value	-	-	-	-	-	*0.1743*	-	-
Current Account Balance (% GDP)	-	-	-	-	-	-	-0.051487	-
p-value	-	-	-	-	-	-	*0.5657*	-
Mean Tariff Import	-	-	-	-	-	-	-	0.309957
p-value	-	-	-	-	-	-	-	*0.0151*
Akaike criteria	0.775315	1.294333	0.692440	1.265239	1.292358	1.286851	1.397905	1.086001
Schwartz criteria	0.872825	1.391843	0.78995	1.363411	1.389868	1.384361	1.495415	1.183511
McFadden's R2	0.509216	0.09524	0.575318	0.13704	0.096815	0.101208	0.012629	0.261409

Logit Multivariate Models

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)
number of observations: 25

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
constant	-0.29891	3.11242	3.035505	1.569321	-72.70211	-2.702484	2.968288
p-value	*0.9165*	*0.0551*	*0.0403*	*0.5816*	*0.2901*	*0.0076*	*0.029*
External Debt-Reserves (%GDP)	0.140624	0.195701	0.177600	-	1.345747	0.135626	-
p-value	*0.0028*	*0.0619*	*0.0048*	-	*0.3155*	*0.002*	-
Savings (% GDP)	-0.088809	-	-	-	-	-	-
p-value	*0.514*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-0.182631	-0.198081	-0.084538	-	-	-0.093249
p-value	-	*0.0621*	*0.0051*	*0.0236*	-	-	*0.0074*
Total Debt (% PIB)	-	-0.014965	-	-	-	-	-
p-value	-	*0.8187*	-	-	-	-	-
Overall Budget Balance (% PIB)	-	-	-	-	-	-0.228297	-0.166813
p-value	-	-	-	-	-	*0.3149*	*0.4281*
Exports+Imports (% GDP)	-	-	-	-	-	-	-
p-value	-	-	-	-	-	-	-
Current Account Balance (% GDP)	-	-	-	-	-	-	-
p-value	-	-	-	-	-	-	-
Mean Tariff Import	-	-	-	0.146367	4.051938	-	-
p-value	-	-	-	*0.4656*	*0.256*	-	-
Akaike criteria	0.843989	0.626204	0.521801	0.760067	0.368104	0.827496	0.756605
Schwartz criteria	0.990254	0.822546	0.668066	0.906332	0.514369	0.973761	0.902870
McFadden's R2	0.51825	0.769942	0.775232	0.585187	0.897823	0.531405	0.587949

Apendix 4
Robusteness Test: Estimations without Chile, South Africa, Poland and Turkey

Probit Univariate Models (without Chile, South Africa, Turkey and Poland)

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)

number of observations: 25

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
constant	-1.151751	1.618288	3.036547	-1.091054	-0.609576	0.6029	-0.385748	-2.229661
p-value	*0.0109*	*0.2271*	*0.0012*	*0.0578*	*0.0878*	*0.422*	*0.2016*	*0.0044*
External Debt-Reserves (%GDP)	0.072365	-	-	-	-	-	-	-
p-value	*0.0031*	-	-	-	-	-	-	-
Savings (% GDP)	-	-0.086172	-	-	-	-	-	-
p-value	-	*0.1293*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-	-0.074743	-	-	-	-	-
p-value	-	-	*0.002*	-	-	-	-	-
Total Debt (% PIB)	-	-	-	0.017048	-	-	-	-
p-value	-	-	-	*0.1316*	-	-	-	-
Overall Budget Balance (% PIB)	-	-	-	-	-0.125648	-	-	-
p-value	-	-	-	-	*0.2927*	-	-	-
Exports+Imports (% GDP)	-	-	-	-	-	-0.016788	-	-
p-value	-	-	-	-	-	*0.1572*	-	-
Current Account Balance (% GDP)	-	-	-	-	-	-	-0.04387	-
p-value	-	-	-	-	-	-	*0.4455*	-
Mean Tariff Import	-	-	-	-	-	-	-	0.200122
p-value	-	-	-	-	-	-	-	*0.0058*
Akaike criteria	0.867008	1.31045	0.576131	1.340696	1.395415	1.311764	1.429974	1.016411
Schwartz criteria	0.966486	1.409928	0.675609	1.44027	1.494893	1.411242	1.529452	1.115889
McFadden's R2	0.468565	0.120229	0.697057	0.119081	0.053486	0.119196	0.026339	0.351205

Probit Multivariate Models (without Chile, South Africa, Turkey and Poland)

Dependent Variable: Cousin Risks (1=Presenting, 0=Not presenting)

number of observations: 25

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
constant	-0.034984	-	-	1.994721	-24.73149	-1.424146	3.1874
p-value	*0.9837*	-	-	*0.4333*	*0.6398*	*0.0182*	*0.0049*
External Debt-Reserves (%GDP)	0.074569	0.049607	0.090826	-	0.438813	0.073729	-
p-value	*0.0073*	*0.3546*	*0.0048*	-	*0.6722*	*0.0038*	-
Savings (% GDP)	-0.050806	-	-	-	-	-	-
p-value	*0.5147*	-	-	-	-	-	-
Domestic Credit to Private Sector (% GDP)	-	-0.096117	-0.046627	-0.064054	-	-	-0.07595
p-value	-	*0.2044*	*0.025*	*0.0544*	-	-	*0.0026*
Total Debt (% PIB)	-	0.041448	-	-	-	-	-
p-value	-	*0.4116*	-	-	-	-	-
Overall Budget Balance (% PIB)	-	-	-	-	-	-0.121446	0.039171
p-value	-	-	-	-	-	*0.3963*	*0.7857*
Exports+Imports (% GDP)	-	-	-	-	-	-	-
p-value	-	-	-	-	-	-	-
Current Account Balance (% GDP)	-	-	-	-	-	-	-
p-value	-	-	-	-	-	-	-
Mean Tariff Import	-	-	-	0.062691	1.450852	-	-
p-value	-	-	-	*0.6722*	*0.594*	-	-
Akaike criteria	0.947466	0.657161	0.546120	0.66808	0.434935	0.937615	0.670014
Schwartz criteria	1.096683	0.806521	0.645598	0.817298	0.584153	1.086832	0.819232
McFadden's R2	0.480175	-	-	0.699641	0.882783	0.487914	0.698121

Apendix 5
Internal debt indexed to exchange rate in Brazil

Brazil has a significant part of its internal debt indexed to exchange rate, as can be seen in the graph below. So the Brazilian external debt data used in this paper was calculated as the effective external debt plus internal debt indexed to exchange rate. This was done because we were interested in exchange rate mismatch.