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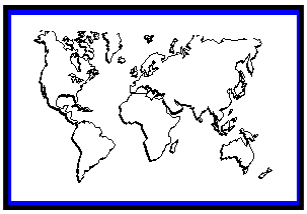

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DOLLARIZATION AND THE RELATIONSHIP BETWEEN EMBI AND FUNDAMENTALS LATIN AMERICAN COUNTRIES*

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Abstract

This paper presents empirical evidence on the interrelationship that exists between the evolution of the Emerging Markets Bonds Index (EMBI) and some macroeconomic variables in seven Latin American countries; two of them (Ecuador and Panama), full dollarized. We make use of a Cointegrated Vector framework to analyze the short run effects from 2001 to 2009. The results suggest that EMBI is more stable in dollarized countries and that its evolution influences economic activity in non-dollarized economies; suggesting that investors confidence might be higher in dollarized countries where real and financial economic evolution are less tied than in non-dollarized ones.

JEL Classification Codes: C32, E44, F30.

Keywords: Dollarization, emerging markets, Latin American countries, Cointegrated VAR, EMBI, exchange rate regime.

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1. Introduction

The global financial and economic crisis of 2008-2009 had a much smaller impact on emerging Latin American markets than on their US and European counterparts. While Latin American countries have continued to grow and do not present major macroeconomic imbalances, the advanced economies still do not present solid recovery (Figures 1 and 2 jointly with Tables 1 and 2, in Annex 1, show the evolution of GDP growth and of the government-debt-to-GDP ratio in the two groups of countries). The marginal exposure of banks in emerging markets to US subprime assets and their governments' expansive monetary and fiscal policies to stimulate aggregate demand might explain these differences (see Aizenman *et al.*, 2013). However, some authors have analyzed whether exchange rate regimes have played a part[1].

This paper has two main objectives. The first is to empirically investigate the role of fundamentals in the reduced vulnerability to shocks observed in the bond markets of seven Latin American countries, and how this reduced vulnerability has in turn affected macroeconomic fundamentals. The second is to determine whether there are any differences between countries that can be attributed to their exchange rate regime. Specifically, we aim to compare countries with and without a fully-dollarized economy. To this end, we empirically assess the relationship between key economic factors such as the external debt-to-exports ratio and inflation, and the Emerging Markets Bonds Index (EMBI)[2] during the sample period 2001-2009. In the second stage of the study, we aim to establish whether there are relevant differences in the two groups of countries (dollarized and non-dollarized economies).

A review of the empirical literature shows that our first question has usually been approached through an analysis of the main determinants of country risk premium[3]. For instance, Edwards (1986) uses data on yields of 167 bonds floated by 13 Least Developed Countries (LDC) between 1976 and 1980 to analyse the factors that determine the country

[1]The results are not conclusive, though. Whilst Krugman (2013) shows how Eurozone members have had more trouble managing their debts than countries outside it, Rose (2013) suggests that the exchange rate regime does not matter.

[2]The JP Morgan Emerging Markets Bonds Index Global tracks total returns for traded external debt instruments in emerging markets. The EMBI Global includes US dollar-denominated Brady bonds, loans, and Eurobonds with an outstanding face value of at least $500 million. Daily historical index levels have been reported since December 31, 1993. See JP Morgan (1999) for more details.

[3]Country risk refers to the likelihood that a sovereign state (borrower) may be unable and/or unwilling to meet its obligations towards foreign lenders and/or investors (Krayenbuehl, 1985).

risk premium. He presents evidence that bond spreads depend positively on the countries' level of indebtedness and negatively on the level of investment they undertake. He also analyses the behaviour of country risk premium during a debt crisis period. Based on monthly spreads of Mexican bonds in the secondary market, he demonstrates the positive (negative) relationship between the external debt-to-exports ratio (international reserves-to-imports ratio) and the country risk premium. Nogués and Grandes (2001), focusing on monthly data for Argentina between 1994 and 1998 and estimating its econometric model by OLS, conclude that endogenous factors such as the external debt-to-exports ratio, the fiscal deficit, growth expectations, contagion effects or political noise are the determinants of Argentina's country risk. Rozada and Yeyati (2008), however, estimating panel error-correction models of emerging spreads on high-yield corporate bonds in developed markets and international rates (US Treasury bills) and using high frequency (monthly, weekly and daily) data from 33 emerging economies, find that global (exogenous) factors explain over 50 per cent of the long run volatility of emerging market spreads.

To sum up, the country risk premium has generally been proxied in the literature by sovereign spreads. Specifically, the spread of JP Morgan's EMBI Global index over US Treasuries bills in Latin America countries is the most important reference for prospective investors in this area.

The research so far on the determinants of country risk can be classified in three groups[4]. First, certain authors have found a significant correlation between macroeconomic-political variables and the risk premium (Hoti and McAller, 2004; Baldacci *et al.* 2008; Aizenman *et al.*, 2013). Authors in the second group have emphasized the effect of exogenous factors (global factors, contagion effects, capital flows or "investor's sentiment") on risk premium (Eichengreen and Mody, 1998; Kamin and von Kleist, 1999; Schuknecht *et al.*, 2009, 2010). Finally, authors in the third group relate country risk and the exchange rate regime. They consider that investors want to know two major components of country risk premium: the *currency premium,* which can be measured as the yield spread between non-dollar-denominated and US dollar-denominated sovereign debt of the same borrowing country, and the *credit premium,* measured as the yield spread between the dollar-denominated sovereign debt of the emerging country and US Treasury bills. There is a certain consensus

[4]The literature on country risk is essentially four decades old. The two pioneering articles were published by Frank and Cline (1971) and Feder and Just (1977). Since then, authors have attempted to establish the determinants and the econometric criteria to estimate, evaluate, and forecast country risk in different economies.

inside the third group of authors that dollarization and hard pegs would substantially reduce the country risk of emerging countries (Domowitz *et. al.*, 1998; Rubinstein, 1999; Schmukler, 2002).

The aim of this paper is to contribute to this branch of the literature by examining the impact of macroeconomic fundamentals on risk premium and vice versa, since movements in government bond yields may have significant macroeconomic consequences. A rise in sovereign yields tends to be accompanied by a widespread increase in long-term interest rates in the rest of the economy, affecting both investment and consumption decisions. On the fiscal side, higher government bond yields imply higher debt-servicing costs and can significantly raise funding costs. This could also lead to an increase in rollover risk, as debt might have to be refinanced at unusually high cost or, in extreme cases, cannot be rolled over at all. Large increases in government funding costs can thus cause real economic losses, in addition to the purely financial effects of higher interest rates (see Caceres *et al.*, 2010).

For this reason, in this paper we will apply a cointegrated Vector Autorregressive (CVAR) approach[5] including proxies of macroeconomic behaviour (captured by endogenous variables) in each country and the evolution of its EMBI. Specifically, we focus on seven Latin American countries – two of them dollarized economies – in order to analyse the impact of dollarization on country risk premium (proxied by the evolution of the EMBI).

The literature on the determinants of EMBI in specific Latin American countries is still scarce. We have just found one paper (mainly dissertations or unpublished papers) for each country: Fracasso (2007), a good reference for Brazil (he shows that foreign investors' appetite for risk impacts substantially on EMBI spreads)[6]; Nogués and Grandes (2001) for Argentina, who highlight that devaluation risk elimination may not have a statistically significant impact on country risk (other macroeconomic variables such as the external debt-to-exports ratio and growth expectations present a higher impact); Vargas *et al.* (2012), for Colombia, who present evidence that improvement of fiscal variables reduces the

[5]Other authors have also applied Vector Autoregressive models. Favero (2013) used a Global VAR to capture time-varying interdependence between financial variables by modeling each country's spread as a function of global spreads. In that article, the spreads of the Eurozone co-move due to fiscal fundamentals, global market appetite for risk and expected exchange rate devaluations. Jang and Kim (2009) used a VAR model to examine the aggregate determinants of credit spreads and the influence of monetary policy shocks on their dynamics in Korea.

[6]In financial jargon, the investors' degree of risk aversion is usually called "investor appetite for risk".

sovereign risk premium; Herrera *et al.* (2013) for Mexico, who find long-run relationships between domestic macroeconomic variables and the Mexican EMBI; Lindao Jurado *et al.* (2009) for Ecuador who conclude that debt and the inflation are the most important factors for explaining its country risk; Délano and Selaive (2005), who examine Chilean's EMBI behaviour and conclude that approximately 25% of the variability of the sovereign spread is due to global factors, and finally the IMF (2010) which emphasizes that achieving investment grade lowers Panamanian debt spreads by over 140 basis points.

The rest of the paper is organized as follows. Section 2 discusses the theoretical framework while Section 3 outlines the data and the econometric model used in the empirical analysis. Section 4 reports the main empirical results, comparing dollarized and non-dollarized countries. Finally, Section 5 presents the main conclusions.

2. Country risk and EMBI determinants

2.1. The equilibrium condition for a risk-neutral lender

Following Edwards (1986), in an emerging or developing country that cannot affect the world interest rate, the cost of external funds is formed by two concepts: (1) the risk-free world interest rate (i*) and (2) a country risk premium (s) related to the probability of default perceived by the lender (p). In the case of a one-period loan, where in case of default the lender loses both the principal and the interest, the equilibrium condition for a risk-neutral lender is:

$$(1-p)[1+i^*+s] = (1+i^*) \quad (1)$$

From here, the country risk premium is:

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

where $k= 1+i^*$.

Since the probability of default depends positively on the debt-to-GDP ratio, as the seminal article by Eaton and Gersowitz (1989) demonstrated, the country then faces an upwards-sloping supply curve for foreign funds. As the probability of default approaches one, the country risk premium approaches infinity and a credit ceiling will be reached. The

country in question will have difficulties gaining access to the world's credit market. If the variables that comprise the probability of default perceived by lenders were known, the countries might be able to improve them in order to reduce it to zero.

According to Edwards (1986), p has the following logistic function:

$$p = (\exp \sum \beta_i X_i)/(1+\exp \sum \beta_i X_i) \quad (3)$$

where X_i are the determinants of the sovereign risk premium and β_i are the corresponding coefficients. Combining (2) and (3), taking logarithms and adding a random disturbance ε, the equation to be estimated is:

$$\log s = \log k + \sum \beta_i X_i + \varepsilon \quad (4)$$

The signs of this equation change slightly if the model is described in terms of returns. Transforming equation (1), we obtain:

$$(1-p)[1+r^*-s] = (1+r^*) \quad (5)$$

where r* is the risk-free world return and s represents, this time, the reduction in terms of return on the bond investment, and $k^*=1+r^*$. Our equation (4) then only changes the signs:

$$\log s = \log k^* + \sum \beta_i X_i + \varepsilon \quad (6)$$

Moving terms, we obtain the emerging country return depending on the same determinants of country risk:

$$\log s - \log k^* = \sum \beta_i X_i + \varepsilon \quad (7)$$

2.2. Determinants of each country return index

Both theoretical and empirical studies have highlighted a large number of variables that may affect the evolution of government debt returns in emerging countries[7]. We can split these variables into three groups: economic-financial, socio-political, and global factors.

[7]See Hoti and McAller (2004) and Maltritz and Molchanov (2013), which present a summary of the explanatory variables and econometric models used in previously published empirical articles.

Whereas economic and financial risk factors encompass the major components of country risk, such as a sudden deterioration in the country's terms of trade, the gross domestic product rate of growth, the current account-to-GDP ratio, and so on, political and social risk factors emerge from the political instability generated in a country by wars, revolutions changing the current government, terrorist attacks and other internal or external conflicts[8]. Social events include civil unrest due to ideological or religious differences, or to unequal income distribution (Hoti and McAleer, 2004). The political risk is usually captured by dummy variables. Finally, global factors are shocks that arise from changes in the conditions of international financial markets. They, basically, include the "contagion effect", a significant increase in cross-market linkages after a shock to one country according to Forbes and Rigobon's (2002) definition of contagion[9], as well as variables that capture the market sentiment[10].

Table 3 in Annex 2 details some of the variables used in the empirical literature by a wide range of authors to explain the determinants of government debt returns in emerging countries, whilst Table 4 describes the variables used in our model.

3. Data and empirical approach

3.1. Data and variables

The sample comprises seven Latin American countries: Argentina, Brazil, Colombia, Chile, Ecuador, Mexico and Panama from 2001:01 to 2009:12. These countries were selected on the basis of data availability and in view of the fact that they are categorized as emerging countries by the IMF (2012). As mentioned, Table 4 in Annex 2 provides the description of the variables along with the data sources. The finishing date is chosen in order to avoid the influence of the start of the huge global economic and financial crisis on emerging economies. We honestly think that it is better to omit data corresponding to 2010 from the study because the crisis deserves independent analysis, since from that date all the countries examined implemented specific adjustment policies.

[8]Shanmugam (1990) introduces external conflicts as part of the political determinants due to the spillover effects. For instance, if the borrowing country is situated geographically close to a country which is at war, it is likely that the country risk of the borrower country will be higher than if its neighbor were at peace. Investors from the peaceful country may identify the inflow of refugees from the country in conflict as a problem. However, commercial relations or agreements that might be damaged or interrupted are more important facts for investors and/or lenders.

[9]There is considerable ambiguity in the literature concerning the precise definition of contagion (see Gómez-Puig and Sosvilla-Rivero, 2014). Concretely, Pericoli and Sbracia (2003) note five definitions, whilst The World Bank summarizes the following three layers of definitions: http://go.worldbank.org/JIBDRK3YC0

[10] Market or investor sentiment is an expectation about future returns and investment risks that is not justified by facts.

We included four endogenous variables in our econometric model. The EMBI (with its monthly average calculated from daily data, in order to eliminate its heteroscedasticity and because the rest of variables are available at this frequency), along with variables that are only reported monthly, such as the Economic Activity Index (eai). This variable was used to measure the growth perspective in the case of Argentina, Colombia and Ecuador, while the growth perspective was proxied by the Industrial Activity Index (iai) in Mexico, the Industrial Index (ii) in Brazil, the Industrial Production Index (ipi) in Chile and, finally, the revenues from taxes to cross the Canal in the case of Panama. In Panama we used this variable because all the other sectors of its economy depend on Canal activities, as do other markets such as the labour market. The other monthly variables are the inflation rate (inf), which was has been calculated from the Consumer Price Index in all the countries, except in Ecuador where it was directly recorded, and the external debt-to-exports ratio (debt_x), which captures the current account solvency of emerging countries.

The purpose of this empirical exercise is to determine the effect of some important fundamentals on the evolution of the EMBI in Latin America countries, and to assess how far the behaviour of the EMBI also affects fundamentals. This is why, as we explained above, the cointegrated VAR is the appropriate econometric approach since all variables in the model are assumed to be endogenous. The impact of global risk factors will be captured through the inclusion of dummies.

3.2. Econometric approach: Identification of the short run structure in the Cointegrated VAR (CVAR)

Consider the Cointegrated VAR model in the so-called reduced form representation:

$$\Delta x_t = \Gamma_1 \Delta x_{t-1} + \alpha\beta' x_{t-1} + \Phi D_t + \varepsilon_t, \qquad \varepsilon_t \sim IN(0, \Omega) \qquad (8)$$

The cointegration relationships ($\beta' x_{t-1}$) are identified as r long run simultaneous relationships between p1 variables (the dimension of x_{t-1}) which enter in the relationships with the same index. In order to identify the long run structure ($\alpha\beta' x_{t-1}$) we have to impose restrictions on each of the cointegrating relations. R_i denotes a $p1 \times m_i$ restriction matrix and H_i a $p1 \times s_i$ design matrix. Thus, there are m_i restrictions and s_i parameters to be

estimated in the *i*th relation. $H_i = R_{i\perp}$. The cointegrating relations are assumed to satisfy the restrictions $\beta^c = \{H_1\varphi_1,..., H_r\varphi_r\}$ where φ_i are $s_i x\ 1$ matrices of unrestricted coefficients. Pre-multiplying (8) with a non singular $p \times p$ matrix A_0, we obtain the so-called structural form representation:

$$A_0\Delta x_t = A_1\Delta x_{t-1} + a\beta' x_{t-1} + A_0\Phi D_t + v_t, \qquad v_t \sim IN_p(0, \Sigma) \qquad (9)$$

where $A_1=A_0\Gamma_1$, $a=A_0\alpha$, $v_t=A_0\varepsilon_t$

The short run equations consist of p equations between p current variables, Δx_t, p(k-1) lagged variables (Δx_{t-i} i=1….,k-1), and r lagged equilibrium errors, $(\beta^c)' x_{t-1}$. Identification of the r long run relationships requires at least r-1 restrictions on each relationship, while identification of the simultaneous short run structure of the p equations requires at least p-1 restrictions on each equation.

Keeping the properly identified cointegrating relationships fixed at their estimated values, i.e. by treating $(\beta^c)' x_{t-1}$ as predetermined stationary regressors, as in the case of Δx_{t-i}, it is easier to identify the simultaneous short run structure. We identify the long run relationships first, and then the short run adjustment parameters.

The unrestricted short run reduced form model is identified exactly by the p-1 zero restrictions on each row of A_0=I. Further zero restrictions on Γ_1, α and Φ are over-identifying. Thus, the process of identification consists firstly in individually testing whether all lagged variables, the long run structure, and dummy variables are statistically significant in the system. The next step is to remove the non-significant variables from the system, so that the generally identified model only contains significant coefficients. The significant coefficients will identify the short run adjustment parameters and the long run relationships that affect the dependent variables of our simultaneous equations system which is estimated by maximum likelihood[11].

[11]This section relies heavily on Juselius (2006).

4. Empirical Results

4.1. Econometric steps

First, we estimated an unrestricted VAR for each country with the following structure: X_t=[EMBI, eai, inf, debt_x]. Previously, all the variables were transformed into logarithms except inflation; recall from section 3.1 that the variable capturing the growth expectations (eai) changes depending on the country in question.

Second, we carried out the residual analysis shown properly in Table 5 in Annex 3; only by including dummies with which we were able to obtain residuals that were uncorrelated, normal and without heteroscedasticity (ARCH effects)[12]. To obtain normality it was necessary to include different permanent dummies which take the value 1 for the reference date and zero otherwise. Here we detail the dummies included for each country:

Argentina: The dummy dum0111p (2001:11) takes into account the significant fall in the Global EMBI due to the currency crisis sparked by Argentina's abandoning of the currency board, following public debt default[13]. Dum0202p and dum0204p variables capture the consequences of devaluation that generated inflation pressures (CEPAL, 2002). The dum0504p was included to normalize debt_x residuals since at that date external debt experienced a sharp decrease when Argentina launched a debt exchange in 2005[14]. Brazil: dum0211p is included to normalize the debt_x residuals. After the 1999 devaluation on the public debt denominated in US dollars, Brazil's debt increased substantially, reaching 50% of total public debt at the end of 2002[15]. Colombia: The objective of dum0405p is to normalize the EMBI residuals; three dummies dum0901p, dum0904p and dum0907p represent the impact of the 2008-2009 global crisis on Colombia's economic activity (CEPAL, 2009). Chile: dum0405p which normalizes the EMBI residuals and the dum0901p which normalizes the economic activity variable (ipi) are incorporated in the analysis. Mexico: dum0405p is introduced in order to eliminate the outliers of EMBI residuals. Ecuador: Five permanent dummies need to be included. One of them,

[12]The first and second steps were performed using the software CATS.
[13]In April 1991 the Convertibility Plan was launched, which pegged the peso 1-to-1 to the US dollar. This plan was replaced with a dual exchange rate regime based on an official exchange rate of 1.4 pesos per dollar for public sector and tradable transactions, while other transactions were conducted at market rates. By June 2002 the exchange rate reached 4 pesos per dollar (see Kaminsky *et al*., 2009 and Mourelle, 2010).
[14]See Hornbeck (2013).
[15]See Giambiagi and Ronci (2004).

dum0906p, is explained in detail in Marí Del Cristo and Gómez Puig (2013)[16]. To these variables we add dum0811p to jointly explain the debt_x and the EMBI evolution. The rest of dummies are dum0109p and dum0301p which are needed to normalize inflation residuals[17]. Panama: The dum0401p normalizes residuals of inflation. Prices decreased in the first quarter of 2004, but the trend reverted afterward due to the rise in oil prices and other import products (CEPAL, 2004).

The dum0810p (along with dum0811p only for Ecuador) is common to all the endogenous variables since it is related to the start of the world financial crisis (the US financial institution Lehman Brothers collapsed in September 2008 and affected the EMBI evolution of all emerging countries included in this study). Dummies such as dum0405p and dum0901p might explain contagion effects between Chile, Colombia and Mexico[18]. Dum0405p captures the incidence of global factors such as a fall in international interest rates, which we can proxy using the US Treasury 10-year yield[19] (Fig. 3 in Annex 1 shows that Treasury bonds yields went down in 2004:05). Following Eichengreen and Mody (1998), we assume that the relationship between the US Treasury bond rates and emerging bond prices is explained in terms of demand[20]. On the demand side, when Treasury bonds rates go up (their prices go down), there will be a tendency among investors to substitute emerging bonds by US Treasury bonds, and so the EMBI price falls. Finally, dummy dum0901p represents the vulnerability of Colombia and Chile with respect to the other countries included in the sample during the global economic crisis of 2008-2009.

Third, we determined the rank of cointegration; Table 6 in Annex 3 shows the results of Johansen's (1996) test, which concludes that all the countries reflect the presence of just one cointegrated vector; so the rank of their long run matrix is equal to 1 (except Panama's, which is r=2).

[16]In June 2009 the Correa government defaulted on $3.2 billion of foreign public debt, and then completed a buyback of 91 per cent of the defaulted bonds (Sandoval, 2009).

[17] Inflation only achieved a stable level in Ecuador after the first quarter of 2003 (see Marí del Cristo and Gómez-Puig, 2013)

[18]Several articles have presented empirical evidence of contagion effects within these countries. For instance, based on the estimation of a multivariate regression model, Mathur *et al.* (2002) conclude that there were spillover contagion effects from the Mexican market to the Chilean market during the 1994 peso crisis. Moreover, Kaminsky and Schmukler (2001) study whether capital controls affect the link between domestic and foreign stock market prices and interest rates, and find that equity prices are more internationally linked than interest rates.

[19]McGuire and Schrijvers (2003) find high correlations of common factors with S&P500, US Treasury yield curve and oil prices.

[20]On the supply side, when Treasury bond rates go up, the increased debt servicing cost decreases the supply of US external debt. This in turn increases the price of emerging bonds averaged by the EMBI.

Fourth, we test and impose over-identifying restrictions on the long run structure (beta vectors) in order to have only significant coefficients. Table 7 in Annex 3 shows the tests of exclusion for the seven countries, and Table 8 in the same Annex displays the final cointegration relationships for each of the countries. These long run relationships will be added as another predetermined variable into the simultaneous equation system and, along with dummies and lagged differenced variables, we will test whether their coefficients are significant or not.

Finally as a fifth step, we test the CVAR model as a simultaneous equation system. Its results are summarized in Tables 9a to 9g in Annex 4. We present the significance of the t-values for the different coefficients in order to highlight the differences between the countries[21] – specifically, between dollarized and non-dollarized countries.

4.2. Interpretation of the results

As mentioned, the results of the parameter estimations that describe the short run effects over variables are presented in Tables 9a to 9g in Annex 4. Specifically, Tables 9a to 9e correspond to non-dollarized countries and Tables 9f and 9g to the dollarized ones (Ecuador and Panama). In these tables, the presence of t-values makes it easy to distinguish between significant and non-significant coefficients across the seven emerging countries in the sample.

The case of Argentina is illustrated in Table 9a. It is shown that EMBI_arg is influenced by its own shocks and by the dummies dum0810p and dum0111p, meaning that global factors are more important than fundamentals in explaining EMBI movements. The economic activity is only affected by the EMBI lagged one period in the short run. Inflation is affected not only by its own shocks, in the short run, but in the long run as well. Finally, the variable Ldebt_x is affected by EMBI_arg, suggesting that EMBI_arg is a good indicator for investors making decisions about their sovereign bond investments. Besides, dum0504p is significant when explaining Argentina's solvency. Furthermore, there are three events in which the movements were stronger than at other dates, as dum0204p, dum0202p and dum0504p show. Similarly, in the Brazilian case, shown in Table 9b, the EMBI_br follows the same path as EMBI_arg: global factors captured by dummy variables dum0810p and dum0211p are more important for these two large countries than

[21]This econometric work was carried out with the software Ox Metrics.

fundamentals – or at least the fundamentals included in this study. The economic activity is affected by the EMBI lagged one period, its own shocks, inflation and a long run relationship of economic cycles. Inflation has short run impacts from its own shocks and economic activity, and it also adjusts to that long run relationship. Besides, both EMBI and economic cycle (the latter proxied by the industrial index variable DLii) lagged one period affect the debt of the next period. Moreover, debt is adjusting to a long run relationship lagged two periods. Table 9c describes the results for Colombia. The EMBI_co is affected not only by global factors, captured by dum0810p and dum0405p, but also by the fundamental variable DLIMACO_1.The variable capturing the economic movements is affected by almost all the predetermined variables: DLEMBI_co, DLIMACO, and DLdebt_x, in the short run, and by a long run relationship based on the EMBI_co path. The dummy dum0810p also exerts an impact over inflation and, finally, the solvency of Colombia (proxied by the external debt-to-exports ratio) is only affected by its own shocks. Estimations for Chile are shown in Table 9d. The EMBI_ch adjusts to the long run relationship -this involves the country's payment capacity (Ldebt_x), the EMBI_ch and inflation variables- and, as in the other emerging countries global factors represent a large part of its changes. Chile's inflation co-moves along with activity, EMBI_ch and its own shocks. Finally, the significant coefficients of EMBI_ch, debt_x and inflation should be highlighted as variables which affect the country's debt in the short run. Table 9e displays the results for Mexico, another important, large, emerging country. The results suggest that the EMBI_mx variable is affected by inflation and global factors (dum0810p and dum0405p) during the sample period. Both fundamental and financial factors (the economic cycle, debt, inflation and EMBI_mx) have an impact on activity (DLiai). It is noticeable that in the Mexican case, inflation is affected by all the variables in the short run whilst the Debt_x variable is influenced by EMBI_mx_3 in the short run and by inflation in the long run.

In the case of Ecuador (Table 9f), the first dollarized country in this empirical investigation, the results show that not only the global factors (dum0810p, dum0812p), but also the level of debt_x affect the evolution of the EMBI. Indeed, there is a bi-directional dependence between debt_x and EMBI, as the significant coefficient of EMBI_ec in the DLdebt_x equation shows. We also find that both economic activity and inflation are not affected by fundamentals except their own shocks, and economic activity in the case of inflation. Finally, the second dollarized country in this comparison of seven Latin American

countries is Panama, whose results are presented in Table 9g. EMBI_pa adjusts equally to its first long run relationship and, as in the other emerging countries, is affected by global factors (dum0810p). The revenues from taxes to cross the Canal, which proxy the economic activity cycles, are affected by inflation and by the first cointegrated vector whilst inflation adjusts to the second long run relationship and DLdebt_x_1 and EMBI_pa are the variables whose shocks have an impact on it. Lastly, Panama's debt_x relationship adjusts to the second cointegrated vector, and is affected by inflation in the short run.

Table 10 in Annex 4 presents the comparative analysis of the seven emerging countries. Looking across the columns in Tables 9a to 9g in Annex 4, the following conclusions can be drawn: (1) The Emerging Bond Market Index (EMBI) is generally affected by global factors (proxied by dum0810p which captures the beginning of the financial crisis) and their own shocks, since all the countries in the sample, except Colombia, have a significant lagged DLEMBI coefficient in their EMBI equations. Debt_x does not seem to be relevant for explaining the EMBI behaviour, unless a country has defaulted on its debt obligations (as Ecuador did); (2) Economic activity is affected by the EMBI in all countries but dollarized ones; which represents the first important finding of this study, suggesting that in non-dollarized countries, debt-servicing costs may have an important impact on the evolution of the economy; (3) In most cases, inflation follows a long run relationship. In our opinion, this is the second important finding of this research, since it means that a country does not need to be dollarized to reach stable inflation levels. Inflation targeting might be behind the non-dollarized countries' results; (4) In general, investors look at the evolution of the EMBI to make their next decisions regarding sovereign bond debt investment. Colombia and Panama are the exceptions; (5) In general, the EMBI does not follow a long run relationship (with the exception of Chile and Panama), whilst Debt_x does, except for Argentina, Colombia, and Ecuador; (6) Finally, it seems that contagion effects are present in only three countries: Colombia, Chile, and Mexico. These inter-relationships are captured by dum0405p and dum0901p variables. The former affects the EMBI in the three countries, whilst the latter affects the economic activity in just the first two countries.

5. Conclusions

The empirical literature has followed the interesting and recent economic trends taking place in various parts of the world that are still dealing with the effects of the global crisis of 2008-2009. Surprisingly, the emerging countries have performed much better than their US and European counterparts in both financial and macroeconomic sectors. One of the key questions, then, is whether the relationships between fundamentals and financial variables play a role in reducing vulnerability to external shocks.

This paper had two main objectives: first, to empirically investigate the role of fundamentals in the reduced vulnerability to shocks of emerging countries' bond markets, and then in turn to assess the effect of this reduced vulnerability on macroeconomic fundamentals; and second, to determine whether there are any differences between countries depending on their exchange rate regime.

Concretely, using monthly data from seven Latin American countries for the 2001-2009 period, we conclude that the EMBI, the general reference of country risk for investors in emerging countries, has basically been determined by global factors: specifically, the impact of the outbreak of the recent financial crisis. Debt is a less important determinant, unless the country in question has defaulted on its obligations. However, the evolution of the EMBI does influence investors in taking decisions regarding their next debt investments. As for contagion effects, they have not affected all the countries, in fact, they have affected only three of them, Colombia, Chile and Mexico which is consistent with the results presented by Mathur *et al.* (2002) and Kaminsky and Schmukler (2001), among others.

Finally, the two main findings of this paper are: (i) economic activity is affected by the EMBI in all the countries except the dollarized ones; and (ii) inflation follows a long run relationship for most of the sample (the exceptions being Colombia and Chile), showing that a country does not need to be dollarized to achieve a stable inflation level.

Our results suggest that in Latin America countries the pricing of risk (EMBI) depends mostly on global factors. Nevertheless, its evolution affects foreign lenders' prospective debt investments, as well as domestic economic activity, except in dollarized countries. These results may suggest the following conclusions. First, dollarization may ensure that currency mismatches will not occur during domestic economic crises; thus, the EMBI is

more stable and these countries' access to debt markets is easier due to their lower vulnerability to EMBI shocks. Second, dollarized countries are not as dependent on international reserves (they use the US dollar both to develop their economies and to pay their debts), as their non-dollarized counterparts which need international reserves to pay their debts but use national currencies to develop their economies. This comparative analysis between two dollarized and five non-dollarized countries suggests that dollarization may isolate the evolution of the broadest emerging market debt benchmark, the EMBI. Therefore, these economies may in a way be isolated from investors' sentiments and more exposed to fundamentals. Besides, our results also suggest that in the long run, non-dollarized countries with inflation targeting policies achieve similar levels of inflation to those obtained by their dollarized counterparts. This result is consistent with those presented by other authors [see, for instance, Bernanke and Mishkin (1997) and Bernanke (1999)]. The novelty is to reach this conclusion by means of the cointegrated VAR approach which identifies long-run relationships, including a stationary inflation variable in non-dollarized countries.

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Annex 1: Latin American and developed countries evolution (2001-2010).

<u>Latin American countries' evolution</u>.

Fig. 1. Total Central Government Debt-to-GDP ratio (%).

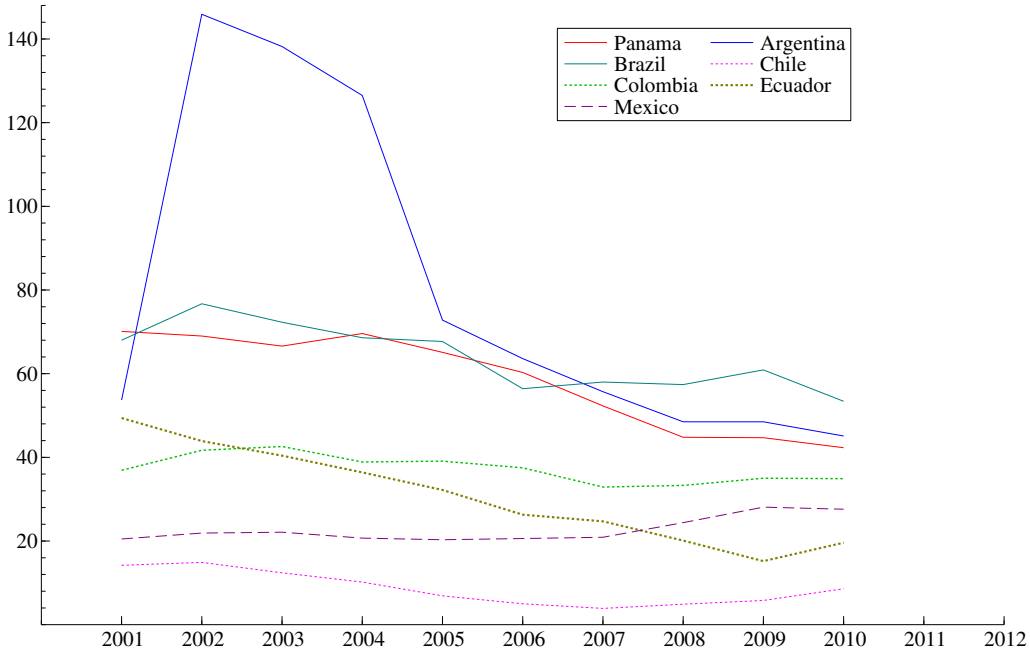


Table 1. Annual GDP rate of growth.

Year	Argentina	Brazil	Colombia	Chile	Mexico	Ecuador	Panama
2001	-4.45	1.31	1.71	3.35	-0.03	3.97	0.00
2002	-10.84	2.65	2.48	2.19	0.77	4.11	2.40
2003	8.76	1.15	3.91	3.92	1.39	2.82	4.68
2004	9.03	5.71	5.34	6.03	4.21	8.24	7.46
2005	9.18	3.15	4.71	5.60	3.07	5.32	6.94
2006	8.51	3.95	6.68	4.58	4.97	4.33	8.44
2007	8.65	6.09	6.90	4.53	3.22	2.07	12.57
2008	6.71	5.17	3.59	3.67	1.37	6.33	10.10
2009	0.86	-0.33	1.61	-0.99	-4.74	0.63	3.86
2010	9.16	7.53	3.97	5.73	5.20	3.59	7.44
2011	8.86	2.73	6.67	5.89	3.83	7.75	10.82
2012	1.88	1.02	4.20	5.50	3.94	5.11	10.93

Evolution of the US and European countries.

Fig. 2. Total Central Government Debt-to-GDP ratio (%).

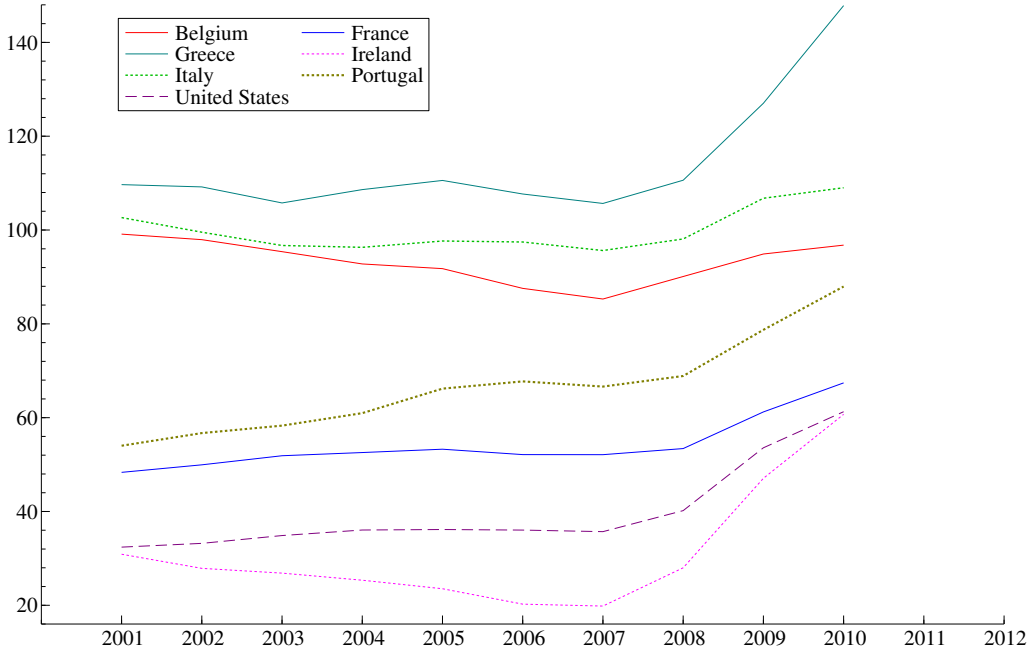
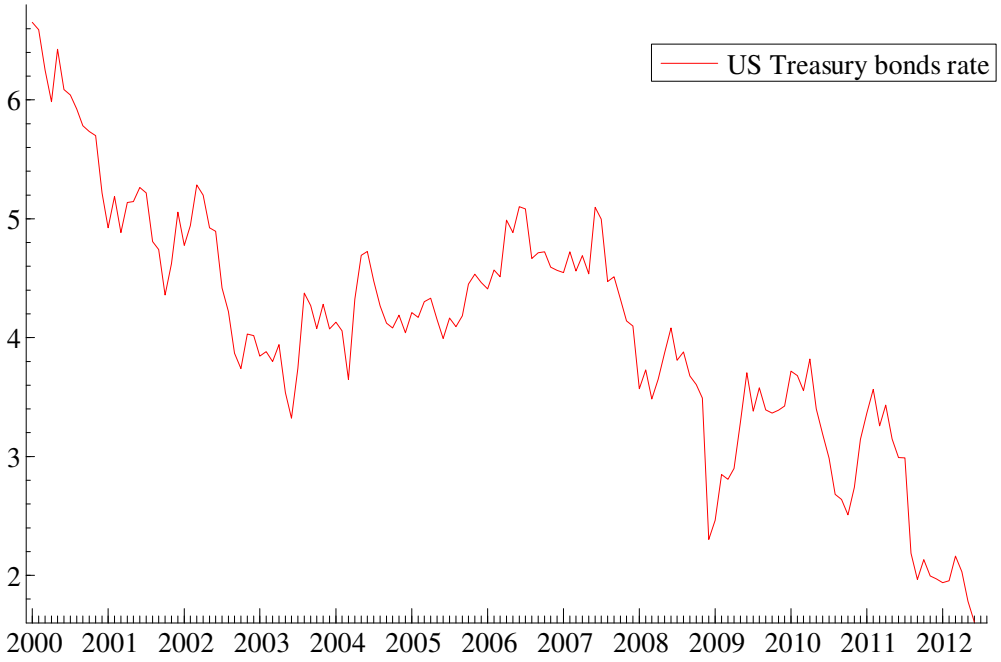


Table 2. Annual GDP rate of growth.

Year	Belgium	France	Greece	Ireland	Italy	Portugal	United States
2001	0.80	1.83	4.19	4.98	1.86	1.97	0.94
2002	1.35	0.92	3.43	5.41	0.45	0.76	1.77
2003	0.80	0.89	5.94	3.72	-0.04	-0.91	2.79
2004	3.27	2.54	4.36	4.19	1.73	1.56	3.79
2005	1.75	1.82	2.28	6.08	0.93	0.77	3.35
2006	2.66	2.46	5.50	5.50	2.19	1.44	2.66
2007	2.88	2.28	3.53	4.97	1.68	2.36	1.78
2008	0.98	-0.08	-0.21	-2.16	-1.15	-0.01	-0.29
2009	-2.80	-3.14	-3.13	-6.38	-5.49	-2.90	-2.80
2010	2.32	1.72	-4.94	-1.06	1.72	1.93	2.50
2011	1.76	2.02	-7.10	2.16	0.47	-1.25	1.84
2012	-0.13	0.01	-6.37	0.15	-2.53	-3.22	2.77

Fig 3. US Treasury 10 year bond rate evolution (Monthly data 2001-2009)



Annex 2: Determinants of sovereign returns in emerging countries.

Table 3. Variables used in the literature on sovereign returns' analysis in emerging countries.

Economic and financial variables	
Variable	**Description/Authors**
Debt-to-GDP ratio	The most important variable, since in most theoretical models of foreign borrowing it is included as an important triggering factor to borrowers to default (Eaton and Gersovitz, 1981; Edwards, 1986, 1986). It has also been included in empirical studies (Aizenman *et al.*, 2013; Eichengreen and Mody, 1998).
International reserves to GNP or GDP	Measures the solvency held by a country. (See Edwards, 1986; Aizenman *et al.*, 2013; and Rowland and Torres, 2004, to name a few).
Investment-to-GNP/GDP ratio; GDP per capita growth; Industrial production.	These variables capture the country's prospects for future growth. There are other variables used in the literature, though, such as the growth rate measured by the difference between the logs of GDP in time t and t-1. (See Nogués and Grandes, 2001; Edwards 1986 or Aizenman *et al.*, 2013)
Current account-to-GNP/GDP ratio	Solvency variables. (See Edwards, 1986; Nogués and Grandes, 2001; or Aizenman *et al.*, 2013).
External debt service- to-exports ratio; External debt-to- GDP ratio; External debt-to- exports.	These variables capture the intertemporal liquidity situation of a country. (Edwards, 1986; Nogués and Grandes, 2001; Aizenman *et al.*, 2013 and Rowland and Torres, 2004).
Imports-to- GNP ratio; Trade openness (Exports plus Imports) % of GDP; Terms of trade	These variables gauge the importance of trade. (See Edwards, 1986; Aizenman *et al.*, 2013; or Balacci *et al.*, 2008)
Index of real effective exchange rate	See Edwards, 1986; or Rozada and Yeyati, 2008.
Fiscal balance- to- GDP ratio.	This variable measures the country's fiscal sustainability. (See Nogués and Grandes, 2001; Rozada and Yeyati, 2008; or Baldacci *et al.* 2008).
Inflation rate	See Baldacci *et al.*, 2008; or Aizenman *et al.*, 2013.

Social and political variables	
Variable	**Description/Authors**
Political noise	Nogués and Grandes (2001) focused on Argentina and tested the political noise associated with the resignation of the Minister Cavallo through a dummy variable that took the value 1 in the period of uncertainty that led to his resignation.

Global factors	
Variable	**Description/Authors**
External financial shocks	Nogués and Grandes (2001) capture them using the rate of the 30-year US Treasury bonds, whilst Rozada and Yeyati (2008) use the 10-year US Treasury rate.
Contagion effects	They can be captured either by dummies or by variables such as other countries' returns. For instance, Nogues and Grandes (2001) included the JP Morgan Price index of Mexican bonds to measure its relationship with the country risk of Argentina. They expected that the historical similarities (in terms of economic policy and response to external shocks) between Mexico and Argentina would result in a similar behaviour of their governments' returns, beyond fundamental-based reasons.
Market sentiment	Diaz Weigel and Gemmill (2006) analyse a sample of emerging countries using variables such as US and regional stock returns or oil prices as proxies of global factors and market sentiment.

Table 4. Variables used in our comparative study.

Variable	Observations	Source
LEMBI_country	Monthly average has been calculated from daily reported JP Morgan EMBI.	Datastream
LEAI, LIAI, LII, LIPI, LREV (These variables represent growth expectations. The variable used depends on data availability in each country).	LEAI: Economic activity index in Argentina, Colombia and Ecuador. LIAI: Industrial activity index in Mexico. LII: Industrial Index in Brazil. LIPI: Industrial production index in Chile. LREV: Revenues from taxes levied in the Panama Canal.	Argentina: Statistical National Institute (www.indec.mecon.ar) Brazil: Brazilian Statistical and Geographical Institute (www.ibge.gov.br) Colombia: Central Bank of Colombia Republic (www.banrep.gov.co) Chile: National Statistical Institute (www.ine.cl) Ecuador: Central Bank (www.bce.ec) Mexico: National Statistical and Geographical Institute (www. Inegi.org.mx) Panama: National Contraloria (www.contraloria.gob.pa)
INF	Inflation statistics in the case of Ecuador, but in the rest of the countries the difference in the Consumer Prices Index is used	Ecuador: Central Bank Rest of countries: CEPAL.
LDEBT_X	External debt-to-exports ratio	Economic Commission of the Latin American and Caribbean countries (CEPAL)

Annex 3. Preliminary tests.

Table. 5. Residual Analysis

Argentina

Tests for Autocorrelation

LM(1): ChiSqr(16) = 14.977 [0.526]
LM(2): ChiSqr(16) = 15.357 [0.499]

Test for ARCH:

LM(1): ChiSqr(100) = 107.723 [0.281]
LM(2): ChiSqr(200) = 214.580 [0.228]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_M_ARG	-0.000	0.052	-0.566	3.742	0.099	-0.170
DLEAI	0.000	0.014	-0.070	2.927	0.033	-0.034
DINF	-0.000	0.211	0.300	3.808	0.698	-0.560
DLDEBT_X	0.000	0.064	0.103	4.942	0.190	-0.244

	ARCH(2)	Normality	R-Squared
DLEMBI_M_ARG	3.732 [0.155]	5.806 [0.055]	0.697
DLEAI	0.252 [0.881]	0.204 [0.903]	0.945
DINF	12.131 [0.002]	4.875 [0.087]	0.852
DLDEBT_X	1.473 [0.479]	17.219 [0.000]	0.416

Brazil

Tests for Autocorrelation

LM(1): ChiSqr(16) = 12.508 [0.708]
LM(2): ChiSqr(16) = 21.238 [0.170]

Test for ARCH:

LM(1): ChiSqr(100) = 117.024 [0.117]
LM(2): ChiSqr(200) = 230.838 [0.067]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_M_BRA	0.000	0.039	-0.665	4.135	0.088	-0.115
DLII	-0.000	0.051	-0.034	2.850	0.128	-0.139
DINF	0.000	0.144	0.168	3.523	0.384	-0.417
DLDEBT_X	0.000	0.101	-0.100	3.359	0.268	-0.273

	ARCH(3)	Normality	R-Squared
DLEMBI_M_BRA	6.537 [0.088]	7.799 [0.020]	0.353
DLII	0.337 [0.953]	0.048 [0.976]	0.417
DINF	1.399 [0.706]	2.892 [0.236]	0.516
DLDEBT_X	5.180 [0.159]	1.851 [0.396]	0.336

Colombia

Tests for Autocorrelation
LM(1): ChiSqr(16) = 17.635 [0.346]
LM(2): ChiSqr(16) = 18.685 [0.285]

Test for ARCH:
LM(1): ChiSqr(100) = 116.696 [0.122]
LM(2): ChiSqr(200) = 228.552 [0.081]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_CO	-0.000	0.023	-0.510	3.737	0.061	-0.070
DLDEBT_X	0.000	0.078	0.123	3.412	0.203	-0.202
DLIMACO	0.000	0.125	0.045	4.314	0.415	-0.379
DINF	-0.000	0.156	0.250	3.082	0.456	-0.400

	ARCH(2)	**Normality**	**R-Squared**
DLEMBI_CO	2.497 [0.287]	5.191 [0.075]	0.501
DLDEBT_X	1.316 [0.518]	2.178 [0.337]	0.553
DLIMACO	1.075 [0.584]	9.972 [0.007]	0.887
DINF	0.783 [0.676]	1.328 [0.515]	0.661

Chile

Tests for Autocorrelation
LM(1): ChiSqr(16) = 31.760 [0.011]
LM(2): ChiSqr(16) = 9.406 [0.896]

Test for ARCH:
LM(1): ChiSqr(100) = 113.875 [0.162]
LM(2): ChiSqr(200) = 182.715 [0.804]

Univariate Statistics

	Mean	**Std.Dev**	**Skewness**	**Kurtosis**	**Maximum**	**Minimum**
DLEMBI_CH	0.000	0.018	-0.148	3.244	0.049	-0.057
DLIPI	0.000	0.027	-0.131	2.921	0.057	-0.073
DINF	-0.000	0.264	0.202	3.485	0.768	-0.673
DLDEBT_X	-0.000	0.087	0.014	2.597	0.201	-0.210

	ARCH(3)	**Normality**	**R-Squared**
DLEMBI_CH	6.776 [0.079]	1.367 [0.505]	0.632
DLIPI	1.186 [0.756]	0.389 [0.823]	0.858
DINF	0.208 [0.976]	2.704 [0.259]	0.609
DLDEBT_X	0.848 [0.838]	0.252 [0.882]	0.608

Mexico

Tests for Autocorrelation

LM(1): ChiSqr(16) = 24.217 [0.085]
LM(2): ChiSqr(16) = 26.980 [0.042]

Test for ARCH:

LM(1): ChiSqr(100) = 135.255 [0.011]
LM(2): ChiSqr(200) = 218.177 [0.180]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_MX	-0.000	0.014	-0.375	3.625	0.038	-0.043
DIAI	-0.000	2.028	0.162	3.174	5.854	-5.179
DINF	0.000	0.193	-0.336	2.706	0.390	-0.540
DLDEBT_X	0.000	0.070	0.320	3.567	0.235	-0.146

	ARCH(4)	Normality	R-Squared
DLEMBI_MX	8.903 [0.064]	3.879 [0.144]	0.654
DIAI	16.944 [0.002]	1.125 [0.570]	0.547
DINF	11.197 [0.024]	2.921 [0.232]	0.558
DLDEBT_X	7.688 [0.104]	3.403 [0.182]	0.409

Ecuador

Tests for Autocorrelation

LM(1): ChiSqr(16) = 13.456 [0.639]
LM(2): ChiSqr(16) = 12.525 [0.707]

Test for ARCH:

LM(1): ChiSqr(100) = 77.364 [0.955]
LM(2): ChiSqr(200) = 178.660 [0.859]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_M_EC	-0.000	0.046	-0.858	4.242	0.097	-0.164
DLEAI	0.000	0.063	0.002	2.843	0.166	-0.144
DINF	0.000	0.003	0.051	2.838	0.007	-0.006
DLDEBT_X	0.000	0.073	0.330	3.110	0.225	-0.175

	ARCH(2)	Normality	R-Squared
DLEMBI_M_EC	9.820 [0.007]	12.068 [0.002]	0.741
DLEAI	1.248 [0.536]	0.021 [0.990]	0.663
DINF	2.059 [0.357]	0.065 [0.968]	0.775
DLDEBT_X	4.122 [0.127]	2.100 [0.350]	0.469

Panama

Tests for Autocorrelation

LM(1): ChiSqr(16) = 33.712 [0.006]
LM(2): ChiSqr(16) = 12.591 [0.702]

Test for ARCH:

LM(1): ChiSqr(100) = 133.607 [0.014]
LM(2): ChiSqr(200) = 262.105 [0.002]

Univariate Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Maximum	Minimum
DLEMBI_M_PANA	0.000	0.017	-0.444	3.452	0.031	-0.058
DLREV_C	-0.000	0.036	-0.143	3.307	0.091	-0.104
DINF	-0.000	0.349	0.006	2.946	0.832	-0.954
DLDEBT_X	0.000	0.131	-0.358	3.283	0.285	-0.410

	ARCH(2)	Normality	R-Squared
DLEMBI_M_PANA	1.942 [0.379]	3.805 [0.149]	0.614
DLREV_C	0.118 [0.943]	1.647 [0.439]	0.745
DINF	3.593 [0.166]	0.162 [0.922]	0.634
DLDEBT_X	0.335 [0.846]	2.609 [0.271]	0.617

Table 6. Johansen tests

Argentina

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.506	108.329	101.441	47.707	0.000	0.000
3	1	0.218	34.375	32.146	29.804	0.013	0.026
2	2	0.076	8.605	7.860	15.408	0.410	0.488
1	3	0.003	0.313	0.270	3.841	0.576	0.603

Brazil

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.347	78.969	72.529	47.707	0.000	0.000
3	1	0.204	34.590	32.763	29.804	0.012	0.021
2	2	0.099	10.869	10.378	15.408	0.223	0.257
1	3	0.000	0.018	0.017	3.841	0.894	0.896

Colombia

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.451	108.706	104.035	47.707	0.000	0.000
3	1	0.254	45.788	39.445	29.804	0.000	0.002
2	2	0.122	15.088	12.985	15.408	0.056	0.116
1	3	0.014	1.481	1.323	3.841	0.224	0.250

Chile

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.271	52.125	49.204	47.707	0.017	0.035
3	1	0.131	19.239	18.217	29.804	0.487	0.560
2	2	0.037	4.696	4.139	15.408	0.837	0.886
1	3	0.007	0.741	0.549	3.841	0.389	0.459

Mexico

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.375	74.024	67.332	47.707	0.000	0.000
3	1	0.141	25.549	23.741	29.804	0.147	0.219
2	2	0.089	9.849	8.448	15.408	0.298	0.426
1	3	0.003	0.303	0.283	3.841	0.582	0.595

Ecuador

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.289	66.145	61.757	47.707	0.000	0.001
3	1	0.195	29.970	28.117	29.804	0.048	0.078
2	2	0.064	6.956	6.563	15.408	0.589	0.634
1	3	0.000	0.001	0.001	3.841	0.970	0.972

Panama

p-r	r	Eig.Value	Trace	Trace*	Frac95	P-Value	P-Value*
4	0	0.323	83.576	79.508	47.707	0.000	0.000
3	1	0.235	42.641	40.886	29.804	0.001	0.001
2	2	0.128	14.546	13.868	15.408	0.068	0.086
1	3	0.001	0.104	0.099	3.841	0.747	0.754

Table 7. Exclusion tests

Argentina

r	DGF	5% C.V.	LEMBI_M_ARG	LEAI	INF	LDEBT_X
1	1	3.841	0.177	0.160	46.649	0.148
			[0.674]	[0.689]	[0.000]	[0.701]
2	2	5.991	15.169	1.422	61.128	3.340
			[0.001]	[0.491]	[0.000]	[0.188]
3	3	7.815	21.412	8.798	64.226	11.312
			[0.000]	[0.032]	[0.000]	[0.010]

Brazil

r	DGF	5% C.V.	LEMBI_M_BRA	LII	INF	LDEBT_X	TREND
1	1	3.841	1.682	8.402	9.067	2.262	1.309
			[0.195]	[0.004]	[0.003]	[0.133]	[0.253]
2	2	5.991	4.477	21.536	23.366	5.754	4.234
			[0.107]	[0.000]	[0.000]	[0.056]	[0.120]
3	3	7.815	12.327	32.972	34.786	15.161	5.681
			[0.006]	[0.000]	[0.000]	[0.002]	[0.128]

Colombia

r	DGF	5% C.V.	LEMBI_ CO	LIMACO	INF	LDEBT_X
1	1	3.841	6.244	11.050	2.505	3.386
			[0.012]	[0.001]	[0.113]	[0.066]
2	2	5.991	6.793	18.160	17.016	3.791
			[0.033]	[0.000]	[0.000]	[0.150]
3	3	7.815	18.919	30.095	29.017	15.027
			[0.000]	[0.000]	[0.000]	[0.002]

Chile

r	DGF	5% C.V.	LEMBI_CH	LIPI	INF	LDEBT_X
1	1	3.841	3.280	10.785	12.279	4.749
			[0.070]	[0.001]	[0.000]	[0.029]
2	2	5.991	5.856	16.712	18.250	8.666
			[0.053]	[0.000]	[0.000]	[0.013]
3	3	7.815	8.233	19.840	21.572	12.050
			[0.041]	[0.000]	[0.000]	[0.007]

Mexico

r	DGF	5% C.V.	LEMBI_MX	IAI	INF	LDEBT_X
1	1	3.841	0.002	0.015	32.296	0.726
			[0.961]	[0.904]	[0.000]	[0.394]
2	2	5.991	1.885	0.048	38.251	4.239
			[0.390]	[0.976]	[0.000]	[0.120]
3	3	7.815	9.470	8.479	47.469	13.480
			[0.024]	[0.037]	[0.000]	[0.004]

Ecuador

r	DGF	5% C.V.	LEMBI_M_EC	LEAI	INF	LDEBT_X
1	1	3.841	1.391	0.019	32.046	0.176
			[0.238]	[0.891]	[0.000]	[0.675]
2	2	5.991	1.429	10.899	40.450	9.598
			[0.490]	[0.004]	[0.000]	[0.008]
3	3	7.815	10.337	20.355	47.864	15.872
			[0.016]	[0.000]	[0.000]	[0.001]

Panama

r	DGF	5% C.V.	LEMBI_M_PANA	LREV_C	INF	LDEBT_X
1	1	3.841	1.318	2.971	11.776	10.982
			[0.251]	[0.085]	[0.001]	[0.001]
2	2	5.991	11.760	13.278	20.549	15.019
			[0.003]	[0.001]	[0.000]	[0.001]
3	3	7.815	25.313	25.599	34.818	29.224
			[0.000]	[0.000]	[0.000]	[0.000]

Note: LR-test, Chi-Square(r), P-values in brackets.

Table 8. Long run relationships

Country	CI(1)	CI(2)
Argentina	Inf	
Brazil	Lii - 0.18221*Inf + 0.1918*LDebt_X	
Colombia	LEmbi_co – 1.0232*LIMACO – 2.4449*Inf	
Chile	LEmbi_ch + 0.07898*LDebt_X – 0.2549*Inf	
Mexico	Inf	
Ecuador	Inf	
Panama	-0.79176*Lrev_c +LEmbi_pana	0.61532*Inf +LDebt_X – 0.44483*LRev_c

Annex 4. Econometric Results

Table 9a. Argentina

Variable \ Equation	DLEmbi_arg	DLeai	Dinf	DLDebt_X
DLEmbi_arg_1	**0.4745**	**0.055**	0.0650	**-0.2536**
	(0.0729)	**(0.0178)**	(0.2797)	**(0.084)**
	[6.51]	**[3.11]**	[0.233]	**[-3.02]**
DLeai_1	0.2267	-0.0911	1.5977	0.386
	(0.4613)	(0.1127)	(1.769)	(0.5317)
	[0.492]	[-0.809]	[0.903]	[0.727]
Dinf_1	-0.00607	-0.0024	**-0.1776**	0.0097
	(0.0142)	(0.0034)	**(0.054)**	(0.0164)
	[-0.426]	[-0.697]	**[-3.35]**	[0.593]
DLDebt_X_1	0.1185	0.0264	-0.3997	-0.1450
	(0.0876)	(0.0207)	(0.3251)	(0.097)
	[1.40]	[1.28]	[-1.23]	[-1.48]
CI(1)_1*	0.00036	0.00144	**-0.3642**	-0.0088
	(0.0111)	(0.00272)	**(0.0427)**	(0.0128)
	[0.0329]	[0.531]	**[-8.53]**	[-0.69]
Dum0111p	**-0.2780**	-0.0154	-0.1857	-0.0372
	(0.0689)	(0.01683)	(0.2643)	(0.079)
	[-4.03]	[-0.917]	[-0.703]	[-0.469]
Dum0202p	0.0959	0.0027	**1.2090**	-0.0299
	(0.07146)	(0.0174)	**(0.2740)**	(0.082)
	[1.34]	[0.155]	**[4.41]**	[-0.364]
Dum0204p	-0.0425	0.022	**3.9607**	0.0106
	(0.0707)	(0.01728)	**(0.2713)**	(0.081)
	[-0.602]	[1.30]	**[14.6]**	[0.13]
Dum0504p	-0.1002	0.0100	-0.5195	**-0.409**
	(0.0694)	(0.0169)	(0.2663)	**(0.080)**
	[-1.44]	[0.595]	[-1.95]	**[-5.12]**
Dum0810p	**-0.4681**	0.0077	0.0541	0.073
	(0.0688)	(0.01682)	(0.2641)	(0.079)
	[-6.80]	[0.459]	[0.205]	[0.92]

Notes: Std-Error are in parenthesis and t-values in brackets. *Argentina: CI(1)= Inf.

Table 9b. Brazil

Variable \ Equation	DLEmbi_br	DLii	Dinf	DLDebt_X
DLEmbi_br_1	**0.2413**	**-0.3561**	-0.3595	**0.6114**
	(0.0973)	**(0.1324)**	(0.3639)	**(0.2551)**
	[2.48]	**[-2.69]**	[-0.988]	**[2.40]**
DLEmbi_br_2	-0.0300	0.1743	-0.4834	0.1667
	(0.0999)	(0.1359)	(0.3735)	(0.2618)
	[-0.301]	[1.28]	[-1.29]	[0.637]
DLii_1	0.0568	**-0.1524**	**-0.4626**	**-0.2911**
	(0.0564)	**(0.0768)**	**(0.2112)**	**(0.148)**
	[1.01]	**[-1.98]**	**[-2.19]**	**[-1.97]**
DLii_2	0.0645	**0.4152**	-0.3957	**-0.9867**
	(0.0904)	**(0.1230)**	(0.3381)	**(0.2371)**
	[0.714]	**[3.37]**	[-1.17]	**[-4.16]**
Dinf_1	-0.0102	-0.0114	**-0.3567**	-0.0522
	(0.0226)	(0.0308)	**(0.0848)**	(0.0594)
	[-0.451]	[-0.372]	**[-4.21]**	[-0.879]
Dinf_2	0.0392	**-0.0917**	-0.1435	0.0879
	(0.0209)	**(0.0284)**	(0.0781)	(0.0548)
	[1.88]	**[-3.23]**	[-1.84]	[1.60]
DLDebt_X_1	0.0054	-0.0691	0.0793	**-0.3450**
	(0.0403)	(0.0592)	(0.1509)	**(0.1058)**
	[0.136]	[-1.26]	[0.526]	**[-3.26]**
DLDebt_X_2	0.0655	0.0508	0.0320	**-0.2745**
	(0.0447)	(0.0608)	(0.1671)	**(0.1171)**
	[1.47]	[0.837]	[0.192]	**[-2.34]**
CI (1)_1*	-0.0007	**-0.2942**	**0.3610**	0.1442
	(0.0440)	**(0.0598)**	**(0.1646)**	(0.1154)
	[-0.0172]	**[-4.91]**	**[2.19]**	[1.25]
CI (1)_2*	-0.0605	-0.1305	**0.7434**	**0.4920**
	(0.0516)	(0.0702)	**(0.1930)**	**(0.1353)**
	[-1.17]	[-1.86]	**[3.85]**	**[3.64]**
Dum0211p	**0.1891**	-0.0553	**1.1154**	**0.2762**
	(0.0456)	(0.0620)	**(0.1705)**	**(0.1196)**
	[4.15]	[-0.893]	**[6.54]**	**[2.31]**
Dum0810p	**-0.1312**	0.0228	0.0279	0.0769
	(0.0436)	(0.0593)	(0.1630)	(0.1143)
	[-3.01]	[0.385]	[0.171]	[0.674]

Notes: Std-Errors are in parenthesis and t-values in brackets.*Brazil: CI(1)= Lii - 0.18221*Inf + 0.1918*LDebt_X.

Table 9c. Colombia

Variable \ Equation	DLEmbi_co	DLIMACO	Dinf	DLDebt_X
DLEmbi_co_1	0.1520	**1.1126**	-1.15585	-0.4547
	(0.095)	**(0.5134)**	(0.7058)	(0.3327)
	[1.60]	**[2.17]**	[-1.64]	[-1.37]
DLIMACO_1	**-0.01669**	**-0.5392**	0.037718	-0.02614
	(0.008016)	**(0.0433)**	(0.05953)	(0.02806)
	[-2.08]	**[-12.5]**	[0.634]	[-0.932]
Dinf_1	0.01621	0.1390	-0.184651	-0.03471
	(0.01507)	(0.06141)	(0.1119)	(0.0527)
	[1.08]	[1.71]	[-1.65]	[-0.658]
DLDebt_X_1	0.01487	**-0.3494**	-0.097537	**-0.4635**
	(0.02810)	**(0.1518)**	(0.2087)	**(0.09839)**
	[0.501]	**[-2.30]**	[-0.467]	**[-4.71]**
CI(1)_1*	-0.00061	**0.1247**	0.03288	-0.005683
	(0.00306)	**(0.01655)**	(0.02275)	(0.01072)
	[-0.202]	**[7.54]**	[1.45]	[-0.53]
Dum0405p	**-0.1057**	0.02470	0.16086	0.00572
	(0.02889)	(0.1561)	(0.2145)	(0.1011)
	[-3.66]	[0.158]	[0.75]	[0.0566]
Dum0810p	**-0.1548**	**-0.3675**	**0.5895**	0.028015
	(0.03011)	**(0.1626)**	**(0.2236)**	(0.1054)
	[-5.14]	**[-2.26]**	**[2.64]**	[0.266]
Dum0901p	-0.00769	**-0.8094**	-0.1852	0.1348
	(0.030)	**(0.1631)**	(0.2243)	(0.1057)
	[-0.255]	**[-4.96]**	[-0.826]	[1.28]
Dum0904p	0.02359	**-1.4419**	-0.02224	0.1485
	(0.02929)	**(0.1582)**	(0.2175)	(0.1025)
	[0.805]	**[-9.11]**	[-0.102]	[1.45]
Dum0907p	-0.01486	**-2.3418**	0.15916	0.00464
	(0.03016)	**(0.1629)**	(0.2240)	(0.1056)
	[-0.493]	**[-14.4]**	[0.711]	[0.0440]

Notes: Std-Errors are in parentheses and t-values in brackets. *Colombia: CI (1)= LEMBI_co – 1.0232*LIMACO – 2.4449*Inf.

Table 9d. Chile

Variable \ Equation	DLEmbi_ch	DLipi	Dinf	DLDebt_X
DLEmbi_ch_1	**0.1718**	**0.1621**	-0.02261	**-0.550403**
	(0.05825)	**(0.0870)**	(0.8816)	**(0.277)**
	[2.94]	**[1.86]****	[-0.025]	**[-1.98]**
DLEmbi_ch_2	**-0.2627**	-0.077	**3.3522**	-0.5122
	(0.08576)	(0.1282)	**(1.29)**	(0.4687)
	[-3.06]	[-0.607]	**[2.58]**	[-1.25]
DLipi_1	-0.04337	**-0.3102**	-0.8168	0.0184
	(0.06714)	**(0.1004)**	(1.016)	(0.3199)
	[-0.646]	**[-3.09]**	[-0.804]	[0.0578]
DLipi_2	0.0069	-0.02408	**-2.6025**	-0.153
	(0.0639)	(0.09564)	**(0.9682)**	(0.3049)
	[0.108]	[-0.252]	**[-2.69]**	[-0.505]
Dinf_1	0.01954	0.01473	-0.2675	**-0.1225**
	(0.022)	(0.0168)	(0.17)	**(0.05354)**
	[1.74]	[0.877]	[1.57]	**[-2.29]**
Dinf_2	-0.001122	0.00672	**-0.3613**	**-0.0704**
	(0.0068)	(0.01017)	**(0.1030)**	**(0.03242)**
	[-0.165]	[0.661]	**[-3.51]**	**[-2.17]**
DLDebt_X_1	-0.0137	-0.02618	-0.1056	**-0.6269**
	(0.02486)	(0.037)	(0.3762)	**(0.1185)**
	[-0.552]	[-0.704]	[-0.281]	**[-5.29]**
DLDebt_X_2	-0.0063	0.03496	-0.1842	**-0.3492**
	(0.02455)	(0.0367)	(0.3715)	**(0.1170)**
	[-0.259]	[0.953]	[-0.496]	**[-2.99]**
CI(1)_1*	**0.07855**	0.07911	0.0655	-0.300
	(0.02832)	(0.0423)	(0.4286)	(0.1349)
	[2.77]	[1.87]	[0.153]	[-2.23]
CI(1)_2*	**-0.0864**	-0.07724	0.02834	**0.2684**
	(0.028)	(0.04188)	(0.4239)	**(0.1335)**
	[-3.09]	[-1.84]	[0.0669]	**[2.01]**
Dum0405p	**-0.0995**	-0.0123	0.0668	-0.0393
	(0.02329)	(0.0348)	(0.3524)	(0.111)
	[-4.27]	[-0.355]	[0.190]	[-0.354]
Dum0810p	**-0.1611**	-0.01164	0.0174	0.1631
	(0.02449)	(0.0366)	(0.3706)	(0.1167)
	[-6.58]	[-0.318]	[0.0470]	[1.40]
Dum0901p	-0.0058	**-0.2303**	-0.5219	0.1623
	(0.02581)	**(0.0385)**	(0.3906)	(0.1230)
	[-0.225]	**[-5.97]**	[-1.34]	[1.32]

Notes: Std-Errors are in parentheses and t-values in brackets. *Chile: C(1)= LEMBI_ch + 0.07898*LDebt_X – 0.2549*Inf . **When non-significant dummies were excluded this coefficient becomes significant.

Table 9e . Mexico

Variable \ Equation	DLEmbi_mx	Dliai	Dinf	DLDebt_X
DLEmbi_mx_1	0.114	0.9876	**-3.08177**	-0.5085
	(0.0761)	(11.25)	**(1.051)**	(0.3904)
	[1.51]	[0.087]	**[-2.93]**	[-1.30]
DLEmbi_mx_2	**-0.4156**	10.13	0.8405	-0.4222
	(0.072)	(10.68)	(0.9981)	(0.3708)
	[-5.75]	[0.949]	[0.842]	[-1.14]
DLEmbi_mx_3	0.044	**29.466**	-0.821	**-1.5534**
	(0.078)	**(11.58)**	(1.082)	**(0.4019)**
	[0.573]	**[2.54]**	[-0.759]	**[-3.86]**
DLiai_1	-0.0004	**-0.800**	**0.02131**	0.0046
	(0.0007)	**(0.1038)**	**(0.0096)**	(0.0036)
	[-0.671]	**[-7.71]**	**[2.20]**	[1.28]
DLiai_2	0.0004	**-0.5716**	0.02077	0.002755
	(0.0008)	**(0.1212)**	(0.01132)	(0.0042)
	[0.595]	**[-4.72]**	[1.84]	[0.655]
DLiai_3	0.0001	**-0.3033**	0.0079	-0.001739
	(0.0007)	**(0.1043)**	(0.0097)	(0.0036)
	[0.24]	**[-2.91]**	[0.811]	[-0.481]
Dinf_1	-0.0059	**1.3309**	**-0.170217**	-0.0244
	(0.0038)	**(0.576)**	**(0.053)**	(0.020)
	[-1.52]	**[2.31]**	**[-3.16]**	[-1.22]
Dinf_2	**0.0092**	-0.5244	0.0037	-0.0099
	(0.0041)	(0.6138)	(0.057)	(0.021)
	[2.22]	[-0.854]	[0.066]	[-0.468]
Dinf_3	0.00178	0.4255	**0.2831**	0.0252
	(0.0071)	(1.057)	**(0.098)**	(0.036)
	[0.249]	[0.403]	**[2.87]**	[0.688]
DLDebt_X_1	-0.008	-4.969	0.266	**-0.2910**
	(0.020)	(3.044)	(0.2844)	**(0.1056)**
	[-0.388]	[-1.63]	[0.938]	**[-2.76]**
DLDebt_X_2	0.0114	**-6.9052**	**1.30024**	0.03249
	(0.021)	**(3.202)**	**(0.2991)**	(0.111)
	[0.526]	**[-2.16]**	**[4.35]**	[0.292]
DLDebt_X_3	0.02932	**-11.0014**	0.0677	0.134
	(0.021)	**(3.202)**	(0.2991)	(0.111)
	[1.35]	**[-3.44]**	[0.227]	[1.21]
CI(1)_1*	-0.0007	1.2099	**-0.4262**	0.0206
	(0.004)	(0.6641)	**(0.06204)**	(0.023)
	[-0.175]	[1.82]	**[-6.87]**	[0.895]
CI(1)_2*	0.0051	-0.121	**-0.2560**	**0.04502**
	(0.0036)	(0.543)	**(0.050)**	**(0.018)**
	[1.40]	[-0.223]	**[-5.05]**	**[2.39]**
CI(1)_3*	-0.0040	0.4043	**-0.2598**	0.055
	(0.0054)	(0.8094)	**(0.075)**	(0.028)
	[-0.741]	[0.498]	**[-3.44]**	[1.96]
Dum0405p	**-0.06056**	-2.34	-0.199	-0.0531
	(0.0166)	(2.46)	(0.2298)	(0.085)
	[-3.64]	[-0.955]	[-0.868]	[-0.623]
Dum0810p	**-0.1394**	-0.577	0.07348	-0.0255
	(0.016)	(2.407)	(0.2249)	(0.083)
	[-8.56]	[-0.24]	[0.327]	[-0.305]

Notes: Std-Errors are in parentheses and t-values in brackets. *Mexico: C(1) = Inf.

Table 9f. Ecuador

Variable \ Equation	DLEmbi_ec	DLeai	Dinf	DLDebt_X
DLEmbi_ec_1	**0.2528**	-0.086	-0.0027	**-0.2698**
	(0.072)	(0.1061)	(0.0039)	**(0.1149)**
	[3.50]	[-0.819]	[-0.700]	**[-2.35]**
DLeai_1	-0.031	**-0.6107**	**-0.0080**	0.0937
	(0.0604)	**(0.088)**	**(0.0033)**	(0.096)
	[-0.527]	**[-6.88]**	**[-2.42]**	[0.0976]
Dinf_1	1.0619	-0.1161	**-0.1312**	-1.504
	(1.017)	(1.493)	**(0.055)**	(1.616)
	[1.04]	[-0.077]	**[-2.35]**	[-0.931]
DLDebt_X_1	**0.125**	-0.0820	0.0009	**-0.2481**
	(0.0613)	(0.089)	(0.0033)	**(0.097)**
	[2.04]	[-0.911]	[0.273]	**[-2.55]**
CI(1)_1*	-0.6925	0.0627	**-0.4235**	-0.7155
	(1.073)	(1.575)	**(0.059)**	(1.705)
	[-0.645]	[0.0399]	**[-7.17]**	[-0.42]
Dum0109p	**0.0125**	0.0596	**0.013**	-0.089
	(0.0569)	(0.083)	**(0.0031)**	(0.09)
	[0.221]	[0.714]	**[4.22]**	[-0.987]
Dum0301p	0.083	0.0077	**0.017**	0.0109
	(0.056)	(0.083)	**(0.0031)**	(0.09)
	[1.46]	[0.0931]	**[5.43]**	[0.121]
Dum0810p	**-0.4618**	-0.1432	-0.0047	**0.200**
	(0.058)	(0.0854)	(0.0032)	**(0.092)**
	[-7.93]	[-1.68]	[-1.49]	**[2.16]**
Dum0811p	**-0.4984**	-0.0083	-0.0071	**0.0721**
	(0.065)	(0.096)	(0.0035)	**(0.1039)**
	[-7.62]	[-0.08]	[-1.97]	**[0.69]**
Dum0906p	**0.1389**	-0.0377	-0.0007	**-0.410**
	(0.056)	(0.082)	(0.0031)	**(0.089)**
	[2.46]	[-0.455]	[-0.257]	**[-4.92]**

Note: Std-Errors are in parentheses and t-values in brackets. *Ecuador: CI(1)= Inf_1.

Table 9g. Panama

Variable \ Equation	DLEmbi_pa	DLrev_c	Dinf	DLDebt_X
DLEmbi_pa_1	**0.2995**	0.04671	**3.8661**	-0.4881
	(0.074)	(0.1630)	**(1.595)**	(0.6171)
	[4.00]	[0.287]	**[2.42]**	[-0.791]
DLrev_c_1	-0.0387	-0.1722	0.7122	0.1170
	(0.0456)	(0.0992)	(0.9714)	(0.3757)
	[-0.849]	[-1.74]	[0.733]	[0.311]
Dinf_1	-0.0058	**-0.0228**	**-0.2284**	**0.0769**
	(0.0043)	**(0.0095)**	**(0.093)**	**(0.036)**
	[-1.33]	**[-2.40]**	**[-2.45]**	**[2.14]**
DLDebt_X_1	-0.00147	0.0337	**0.6640**	-0.0085
	(0.01302)	(0.02832)	**(0.2772)**	(0.1072)
	[-0.113]	[1.19]	**[2.40]**	[-0.919]
CI(1)_1*	**-0.0988**	**0.1816**	-0.0633	-0.1927
	(0.028)	**(0.0612)**	(0.5992)	(0.2318)
	[-3.51]	**[2.97]**	[-0.106]	[-0.832]
CI(2)_1*	0.0067	0.00694	**-0.9952**	**-0.2118**
	(0.0092)	(0.0200)	**(0.1964)**	**(0.0759)**
	[0.737]	[0.346]	**[-5.07]**	**[-2.79]**
Dum0401p	0.02503	-0.00535	**-1.9271**	**0.3987**
	(0.02011)	(0.0437)	**(0.4283)**	**(0.1656)**
	[1.25]	[-0.122]	**[-4.50]**	**[2.41]**
Dum0810p	**-0.1819**	0.0221	-0.4506	0.1666
	(0.0202)	(0.044)	(0.4310)	(0.1667)
	[-8.99]	[0.0502]	[-1.05]	[1.00]

Note: Std-Errors are in parentheses and t-values in brackets. *Panama: CI(1)= -0.79176*Lrev_c +LEmbi_pana and CI(2)=0.61532*Inf +LDebt_X – 0.44483*LRev_c

Table 10. Comparative analysis taking only the significant coefficients into account

Variable	Argentina	Brazil	Colombia	Chile	Mexico	Ecuador	Panama
Dependent variable: DLEMBI_specific_country							
DLEMBI	X	X		X	X	X	X
DLEAI			X				
DINF					X		
DLDEBT_X						X	
DUM0810	X	X	X	X	X	X	X
DUM0405			X	X	X		
CI()				X			X (CI(1))
Dependent variable: DLEAI*							
DLEMBI	X	X	X	X(**)	X		
DLEAI		X	X	X	X	X	
DINF		X			X		X
DDEBT_X			X		X		
DUM0810			X				
DUM0901			X	X			
CI()			X				X(CI(1))
Dependent variable: DINF							X
DLEMBI				X	X		X
DLEAI		X		X	X	X	
DINF	X	X		X	X	X	X
DLDEBT_X					X		X
DUM0810			X				
CI()	X	X			X	X	X (CI(2))
Dependent variable: DLDEBT_X							
DLEMBI	X	X		X	X	X	
DLEAI		X					
DINF				X			X
DLDEBT_X		X	X	X	X	X	
DUM0810						X	
CI()		X		X	X		X (CI(2))

Note: The results shown are the ones obtained when non-significant dummies were eliminated. CI(): Specifies only the variables included in each long run relationship, which are described in Table 8. *This variable changes depending on the country (see Table 4). **When non-significant dummies were excluded this coefficient becomes significant.