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Assessing fiscal sustainability in some selected countries

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Abstract

The aim of this article is to assess the sustainability of fiscal policy in 18 developing and emerging countries, using the recursive algorithm developed by Croce and Juan-Ramón (2003). In general, the results suggest that most countries were identified as presenting large unsustainable fiscal positions in the period considered, explained basically by primary fiscal deficits. Interestingly, results for Panama suggest no evidence that officially dollarized countries run more prudent fiscal policies than non-officially dollarized countries.

Keywords: Debt, deficit, fiscal sustainability.

JEL classification: E62, H62, H63

1 Introduction

In the last two decades, long-run sustainability has moved to centre stage in the analysis of fiscal policy. The idea of fiscal sustainability is intimately related to the dynamics of public debt and has regained relevance in the world due to the sovereign debt problems in European countries as a result of the global financial crisis. The economic literature provides us with a series of indicators for analyzing fiscal sustainability. One of the most used indicators is the public debt to gross domestic product (GDP) ratio. A fiscal policy is unsustainable if it causes

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the debt to GDP ratio to grow without limit. The concern here is that a debt that grew without limit would eventually become unmanageable, leading to some unpleasant consequences like default, high inflation, forced fiscal austerity or restrictive monetary and/or fiscal policies. Some authors find that emerging and developing countries have a lower tolerance for sovereign debt, with defaults at much lower levels of public debt to GDP (Reinhart, Savastano and Rogoff, 2003). Fiscal sustainability analysis has thus become a key element of macroeconomic analysis, particularly for emerging and developing countries.

The aim of this paper is to assess fiscal sustainability in some developing and emerging countries. To do that, the alternative approach proposed by Croce and Juan-Ramón (2003) is employed to measure the fiscal sustainability of each country. Croce and Juan-Ramón (2003), present a recursive algorithm derived from the law of motion of the debt to GDP ratio to analyse the sustainability of fiscal policy.

Quarterly data for a sample of the following 18 developing countries is presented: Argentina, Brazil, Chile, Colombia, Costa Rica, Czech Republic, the Dominican Republic, El Salvador, Honduras, Hungary, Indonesia, Malaysia, Mexico, Panama, Peru, Philippines, Thailand and Turkey. This selection of countries has been dictated by data availability. Fiscal policy was also a relevant criterion in terms of public debt, composition and variability of public expenditures in the sample. The inclusion of Panama allows an evaluation of whether official dollarization encourages prudent fiscal policies and lowers public debt.

The remainder of this paper is organised as follows: Section 2 provides a brief review of the literature discussing fiscal sustainability. Section 3 discusses the fiscal sustainability indicators. Section 4 describes the sets of data obtained and presents results. Finally, Section 5 presents the concluding remarks.

2 Fiscal Policy Sustainability: Literature Review

The idea of fiscal sustainability is intimately related with public debt dynamics. Rapid accumulation of debt (external and/or domestic) can lead to severe macroeconomic problems, impeding the control of the fiscal deficit itself. One concept of sustainability relates to solvency. A fiscal policy is sustainable if it leads to solvency, and solvency is defined as a situation in which the future paths of spending and revenue satisfy the inter-temporal budget constraint. In other words, solvency is the ability of the government to service its debt obligations in perpetuity without an explicit default (IMF, 2002; Croce and Juan-Ramón, 2003). Another concept of fiscal sustainability relates to the government's ability to maintain its current policies while remaining solvent (Burnside, 2004)[2]. The design of indicators on fiscal policy sustainability thus constitutes a key endeavour in economic analysis and is particularly relevant for emerging and developing countries. Numerous researchers have devoted considerable efforts in constructing appropriate indicators of fiscal policy sustainability (see Horne, 1991).

Early literature on fiscal sustainability is produced by Buiter (1985); Hamilton and Flavin (1986); Blanchard (1990) and Blanchard et al. (1990). Measures of fiscal sustainability are proposed by Buiter (1985), estimating that the annuity value of the discrepancy in the government's ex ante balance sheet or the permanent adjustment needed to maintain a constant ex ante share of public sector net worth to trend output. Hamilton and Flavin (1986)

[2] Government solvency is a necessary but not sufficient condition for fiscal policies to be sustainable because of the necessary assumptions concerning private savings and investment behaviour (Horne, 1991).

study issues of fiscal policy sustainability and empirical testing for government intertemporal budget constraints. Moreover, Blanchard (1990) attempts to assess whether the present value budget constraints could be met in an "ex ante" sense over the course of a specified planning period. Blanchard (1990) defines a sustainable fiscal policy as one which ensures that the government is intertemporally solvent. Similarly, Blanchard et al. (1990) define sustainable fiscal policy as a policy as such that the ratio of debt to Gross National Product (GNP) eventually converges back to its initial level. They suggest a set of indicators in the sustainability of fiscal policy, designed to assess the extent to which governments can maintain current tax and spending programmes without experiencing a continued increase in public debt. According to these authors, a good indicator of sustainability is one which sends clear and easily interpreted signals when current policy appears to be leading to a rapidly growing debt to GNP ratio[3].

While early literature on fiscal sustainability is mostly focused on industrial countries, more recent developments focus on fiscal sustainability in emerging markets and developing countries, incorporating elements of financial frictions (Calvo et al., 2003; Galindo and Izquierdo, 2003) and stochastic and recursive methods (Chalk and Hemming, 2000; Xu and Ghezzi, 2002; IMF, 2003; Barnhill and Kopits, 2004; Croce and Juan-Ramón, 2003; Hostland and Karam, 2005; Mendoza and Oviedo, 2006; Celasum et. al., 2007, and others)[4]. Calvo et al. (2003) argue that a sudden stop in capital flows is a key determinant of fiscal sustainability. A foreign or domestic shock triggers a sudden stop that can force abrupt adjustments in current account deficits that may require a large depreciation of the real exchange rate, and the latter can compromise the ability to service public debt and result in sharp declines in sustainable debt-output ratios[5]. Similarly, Galindo and Izquierdo (2003), based on work by Calvo et al. (2003), demonstrate that a large depreciation in the real exchange rate can lead to fiscal sustainability problems, particularly in relatively closed, highly indebted and heavily dollarized emerging markets. Hence, in the presence of large temporary fluctuations in the real exchange rate, a reading of the fiscal situation based on standard fiscal indicators may lead to a severely distorted assessment of fiscal sustainability. This suggests the need to develop alternative fiscal indicators. In that order, Talvi and Végh (2000) propose an indicator of fiscal sustainability based on a macro-adjusted deficit, which is defined as the level of primary deficit which would prevail under "normal" macroeconomic conditions[6].

On the other hand, Chalk and Hemming (2000) demonstrate that in the presence of non-renewable resources, sustainability would require equalising a country's net worth (including the value of non-renewable resources) to the present net value of primary non-resource deficits. This method highlights the fact that increasing resource exploitation to pay debt would not affect sustainability. Xu and Ghezzi (2002) model the flows in government budgets as stochastic processes in order to estimate default probabilities. They develop a method for pricing government debt and calculating fair yield spreads. Moreover, the IMF (2003) proposes a stochastic simulation approach that computes the probability density function of possible debt-output ratios. The IMF's stochastic simulation model is based on a non-structural time series analysis of the macroeconomic variables that drive the dynamics of public debt.

[3] For comprehensive surveys of fiscal sustainability, see Chalk and Hemming (2000); IMF (2002) and IMF (2003).

[4] Burnside (2004) and Díaz Alvarado et al. (2004) survey literature on fiscal sustainability with special focus on emerging market countries. Mora (2004) applies and analyses three methodologies to assess the fiscal sustainability of the central government's debt. Perotti (2007) presents a survey on fiscal policy in developing countries from the point of view of long-run growth. Tanner (2013) critically reviews recent work regarding the sustainability of public debt.

[5] The excessive liability of "dollarization" in the domestic banking sector is a key determinant of sudden stops.

[6] A drawback of this model is how to define normal conditions for developing countries.

Barnhill and Kopits (2004) use a stochastic approach based on the value-at-risk model to address the ways in which macroeconomic volatility and contingent liabilities affect fiscal sustainability. It is applied to the case of Ecuador and shows that the volatility of the sovereign spread is a major source of fiscal vulnerability and is more important than terms of trade shocks. In this sense, there are instances in which the behaviour of creditors is the determinant of sustainability.

Croce and Juan-Ramón (2003) develop a recursive model aimed at deriving a fiscal policy rule that is observable by external analysts and indicates whether a country is adopting a sustainable policy stance. They derive primary surplus and discount rate that would prevail when a country reaches its target debt to Gross Domestic Product (GDP) ratio and then construct a fiscal sustainability indicator allowing these variables to react to shocks that move the debt to GDP ratio out of its equilibrium value. Based on quarterly estimates of this algorithm in the 1990s, 12 developed and developing countries are ranked according to their degree of sustainability. For a number of countries, authors find evidence of causality between the fiscal policy stance and growth-adjusted real interest rates. They also explore how different types of public expenditures affect fiscal sustainability. Their results show that unsustainable countries experienced larger increases in certain categories of public spending as a percent of GDP (wages, subsidies, and other current transfers) than countries classified as sustainable.

Moreover, Hostland and Karam (2005) apply stochastic simulation methods to assess debt sustainability in emerging market economies and provide probability measures for projections of debt burden over the medium term horizon. They show that the vulnerability of external debt is sensitive to the determining of the exchange rate and to the pricing of traded goods. Mendoza and Oviedo (2006) apply stochastic simulation methods in a dynamic general equilibrium modelling framework where co-movement between macroeconomic variables is determined by an explicitly theoretical structure. These authors demonstrate how the stochastic behaviour of revenue flows affects the average ability of a government to borrow[7].

Celasum et. al. (2007) propose a probabilistic approach to public debt sustainability analysis using fan charts. These authors have developed a stochastic algorithm for generating and explicit risk analysis of debt dynamics, and applied it to five emerging market economies (Argentina, Brazil, Mexico, South Africa and Turkey). They show how the fan charts and sustainability indicators can be used to guide policy makers in making judgments about whether the present course of fiscal policy will, or will not, lead to a crisis down the road. The authors also introduce fiscal reaction functions, an important shortcut to modelling the dynamic properties of fiscal policymaking. Moreover, Frank and Ley (2009) modify several assumptions in the probabilistic approach to fiscal sustainability proposed by Celasum et. al. (2007). They allow for structural breaks in the data generation mechanism, through the application of Markov-Switching models. These methodological modifications have significant impacts on the results for specific country cases. Similarly, Budina and van Wijnbergen (2009) use a stochastic simulation (Monte Carlo) for the high volatility of key variable for Turkey, and develop a Value at Risk approach to fiscal sustainability analysis. The fiscal sustainability tool incorporates an endogenous debt feedback rule for the primary surplus, a fiscal policy reaction function. The results suggest that an important fiscal adjustment, with primary surpluses, is relevant to a decline in public debt (as a share of GDP). Moreover, Belhocine and Dell'Erba (2013) use a measure of debt sustainability (the difference between the debt stabilizing primary balance and the actual primary balance) in an otherwise standard spread regression model applied to a panel of 26 emerging market economies. These authors find that debt sustainability is a major determinant of spreads with an elasticity of about 25 basis points for each one percentage point departure of the primary balance from its debt stabilizing level.

[7] See Mendoza and Oviedo (2009) for a variant of the framework proposed by Mendoza and Oviedo (2006), and an application for Brazil, Colombia, Costa Rica and Mexico.

Their results suggest that policymakers in emerging economies should adopt prudent fiscal policies that keep public debt levels low in order to avoid a potentially damaging rise in their sovereign spreads.

On the other hand, the international financial crisis has again put the sustainability of public debt in the advanced economies agenda. Ghosh et. al. (2013) develop a new framework for assessing debt sustainability in advanced economies. They use a stochastic model of sovereign default in which risk-neutral investors lend to a government that displays "fiscal fatigue", whereby its ability to increase primary balance cannot keep pace with rising debt. Using data for 23 advanced economies over the period 1970-2007, they find evidence of a fiscal reaction function with theses features, and use it to compute "fiscal space", define as the difference between current debt ratios and the estimated debt limits. Similarly, Greenlaw, et. al (2013) examined sovereign debt dynamics, using panel data set on 20 advanced economies and case studies to Greece, Ireland, United States, and other European countries. The authors conclude that countries with debt above 80% of GDP and persistent current-account deficits are vulnerable to a rapid fiscal deterioration as a result of these tipping-point dynamics.

3 Methodology

In this section, the recursive algorithm developed by Croce and Juan-Ramón (2003) is reviewed in detail. The starting point is government intertemporal budget constraints. To facilitate the analysis, it is assumed that net privatisation proceeds, public revenue from the creation of money (seigniorage) and revaluations of assets and liabilities are equal to zero. The financing needs of the public sector are defined as:

$$PSBR_t = \left(D_t - D_{t-1}\right) = PD_t + i_t D_{t-1} \tag{1}$$

where D_t is the stock of total public debt (domestic and foreign), PD_t is the primary deficit and i_t is the nominal rate of interest payments. Equation (1) shows that the change in the stock of public debt (domestic and foreign) is induced by the public sector borrowing requirement (PSBR) at time t to finance the primary deficit and the interest payments on public debt. Multiplying both sides of equation (1) by -1, the following is obtained:

$$PS_t = i_t D_{t-1} - \left(D_t - D_{t-1}\right) \tag{2}$$

where $PS_t \equiv -PD_t$, that is PS_t is the primary surplus of the public sector. Equation (2) can be expressed as a fraction of the nominal Gross Domestic Product as:

$$d_t = \beta_t d_{t-1} - ps_t \tag{3}$$

in which d_t is public debt as a proportion of GDP (the law of motion in the debt to GDP ratio), ps_t is the ratio of the primary surplus to GDP, and $\beta_t = \frac{1+r_t}{1+g_t}$, r_t is the real interest rate and g_t denotes the rate of growth of real output[8]. Equation (3) states that, in the absence of

[8] $\beta^* > 1$ implies $r > \beta$, and indicates that in steady states there is an efficient capital overaccumulation (see Barro, 1976).

shocks and corrective policies, public debt as a proportion of GDP (d_t) increases over time in the presence of persistent primary fiscal deficits in joint with a real interest rate higher than the growth rate of real GDP[9].

Intertemporal budget constraints for the public sector can be constructed from equation (3). For simplicity, it is assumed that $\beta_{t+N} = \beta$ that is, the discount factor will be constant from time t to time $t+N$, and solving equation (3) forward recursively for N periods, we obtain:

$$d_t = \beta^{-1} ps_{t+1} + \beta^{-2} ps_{t+2} + \cdots + \beta^{-N} ps_{t+N} + \beta^{-N} d_{t+N} \tag{4}$$

This intertemporal budget constraint indicates that the initial stock of public debt should be equal to the discounted present value of the sequence of public primary surpluses from time t to time $t+N$. Using equation (4) the following definition can be stated: the public sector is said to be solvent if the planned trajectory of the primary deficit, from time t to time $t+N$, satisfies the intertemporal budget constraint (equation 4). The above definition implies that $d_{t+N} = 0$, that is, the public sector cannot be a net debtor in present value terms. This represents a strict condition for solvency, requiring the primary balance to become positive at some point. Alternatively, a less stringent condition for solvency can be derived by imposing weaker conditions on equation (4). We assume that $d_{t+N} = d^*$, where $0 < d^* < d_t$. Thus, the present value of expected primary surplus ratios will reduce the debt ratio below the current level. To construct an indicator of fiscal sustainability, Croce and Hugo Juan-Ramón (2003) suggest the equation (3) and two additional equations: target variables and the government reaction function. First of all target variables are defined as:

$$ps^* = \left(\beta^* - 1\right) d^* \tag{5}$$

where ps^* and β^* are, respectively, the primary surplus ratio and the discount factor that would prevail once convergence to the target debt ratio $\left(d^*\right)$, is achieved. Secondly, the government reaction function is defined by:

$$ps_t = ps^* + \lambda_t \left(d_{t-1} - d^*\right) \tag{6}$$

where the primary surplus ratio has two components: the primary surplus ratio associated with target debt ratio and the policy response to the gap between the observed debt ratio and the target debt ratio. The parameter λ_t indicates the intensity of the policy response at time t, given the debt ratio gap in the previous period. Equation (6) characterises a fiscal rule or a policy reaction function.

Combining equations (3), (5) and (6), the public debt as a proportion of GDP including the policy reaction parameter λ_t can be obtained:

$$d_t = \left(\beta_t - \lambda_t\right) d_{t-1} - \left(\beta^* - \lambda_t - 1\right) d^* \tag{7}$$

[9] For a detailed demonstration see appendix.

In order to derive a simple expression for the index of fiscal sustainability, it is assumed that the debt ratio at time $t-1$ is higher than the long-term objective for that ratio $\left(d_{t-1} > d^*\right)$. Hence equation (7) states that d_t would converge to d^*, if and only if $\left|\beta_t - \lambda_t\right| < 1$. Therefore, we can use $\left(\beta_t - \lambda_t\right)$ as an indicator of fiscal sustainability. An alternative expression for the Fiscal Sustainability Indicator (FSI) is accordingly:

$$FSI_t = \left(\beta_t - \lambda_t\right) = \left(\frac{1+r_t}{1+g_t} - \frac{ps_t - ps^*}{d_{t-1} - d^*}\right) \tag{8}$$

This expression states that a persistently higher spread between the observed real interest rate and the observed growth rate of real GDP would, other thing being equal, lead to higher public indebtedness (high parameter β_t)[10]. The second parameter $\left(\lambda_t\right)$, measures the ratio between the deviation of observed and target values of the primary surplus and public debt ratios. In addition, a fiscal position would be sustainable if $FSI_t < 1$. In contrast, if $FSI_t \geq 1$ then the fiscal position is unsustainable.

4 Data Description and Empirical Results

The empirical analysis of this paper is implemented using quarterly frequencies and covers the period from the first quarter of 1990 to the fourth quarter of 2004. Data was obtained from the World Bank's Global Development Finance (GDF), the IMF's Government Finance Statistics (GFS), the CD-ROM version of the IMF's International Financial Statistics (IFS), and the respective Ministry of Finance websites. As the Czech Republic was founded in 1993, earlier data for this country were not available. Similarly, the data for Panama were not available before 1997.

To construct a Fiscal Sustainability Indicator (FSI), following Croce and Juan-Ramón (2003), we use d^* equal to the lowest value reached by the debt ratio during the period under study. The value of β^* represents the median of the distribution of the observed values of β for the group of countries. Its value was set at 1.026. This implies that the expected value of the real interest rate is 2.6 percentage points higher than the real growth rate, in a steady state. Typically, the rate of interest tends to be higher than the rate of growth. In that case, a country that starts with any debt at all must hold its structural primary balance at a small surplus in order achieves sustainability. When countries rise their debt levels, they increase their exposure to higher interest rates. A rise in interest rates without an equal increase in the output growth rate will further undermine fiscal sustainability.

Table 1 shows the countries with problems of fiscal sustainability during 1990Q1-2004Q4. Countries for which the FSI was above the threshold of 1 at least 75% of the time were classified as having been fiscally unsustainable $\left(\beta - \lambda > 1\right)$ during the period considered. Also, Table 1 shows the frequency of β values being higher than β^*, and the frequency of λ assuming a negative value (implying primary deficit). In general, the selected countries in the

[10] For mature stable economies the expected value of β should be about 1, higher than 1 for economies with relative scarce capital and high financial intermediation costs, and much higher than 1 and more volatile in contexts of economic and political uncertainty.

sample present an unsustainable fiscal stance explained mostly by government fiscal deficits rather than spreads between the real interest rates and the growth rates. In the same way, Figure 1 shows debt to output ratios for each of the 18 developing countries, while Figure 2 presents the results of the FSI for each developing country, arranged alphabetically to facilitate the discussion. As shown in Figure 2, the higher FSI reflect fiscal unsustainability.

According to the FSI, Argentina shows an unsustainable fiscal position in 87% of the period studied, explained by continuous primary fiscal deficit $(\lambda < 1)$. Also, the public sector debt to GDP ratio grew from about 40% in early 1992 to about 125% in the last quarter of 2004 (see Figure 1). Similarly, Brazil shows an unsustainable fiscal stance in about 62% of the period considered (see Table 1). Inadequate primary fiscal balances and relatively high spreads between the real interest rate and the growth rate contribute to this unsustainability. The public debt to GDP ratio of Brazil decreased in the first half of the 1990s (from about 350% in 1993 to about 43% in 1995) and increased continuously, reaching about 85% towards the end of 2004. On the contrary, for Chile, the FSI fluctuated above the threshold of 1 from 1999 to 2003 (see Figure 2), explained mainly by primary fiscal deficit. Specifically, the results show the impact on the Chilean economy of the Brazilian crisis in January 1999 (Samba effect). However, the public debt to GDP ratio decreased from about 45% in 1990 to about 10% in 2004 (see Figure 1).

The FSI for Colombia, Costa Rica and the Czech Republic has consistently maintained an unsustainable fiscal position as a result of primary fiscal deficit and higher real interest rate-growth gap, respectively. The public debt to GDP ratio has increased in the three countries, especially since 1998. While in the Dominican Republic the FSI fluctuated above the threshold of 1 during the period 1990-1991, in 1994, in two quarters of 1996, during the period 1999-2000 and from the third quarter of 2002 to the first half of 2004. Consistent with this, the Dominican Republic showed primary fiscal deficit and a deep gap between real interest rates and growth rates in the same period. From 1990 to 2000, the debt to GDP ratio decreased (from approximately 80% to approximately 20%) to increase thereafter reaching about 30% in the last quarter of 2004 (see Figure 1). For El Salvador, Honduras and Hungary the FSI persistently presented an unsustainable fiscal stance, explained fundamentally by the primary government deficit. The public debt to GDP ratio decreased in Honduras, but increased in El Salvador and Hungary.

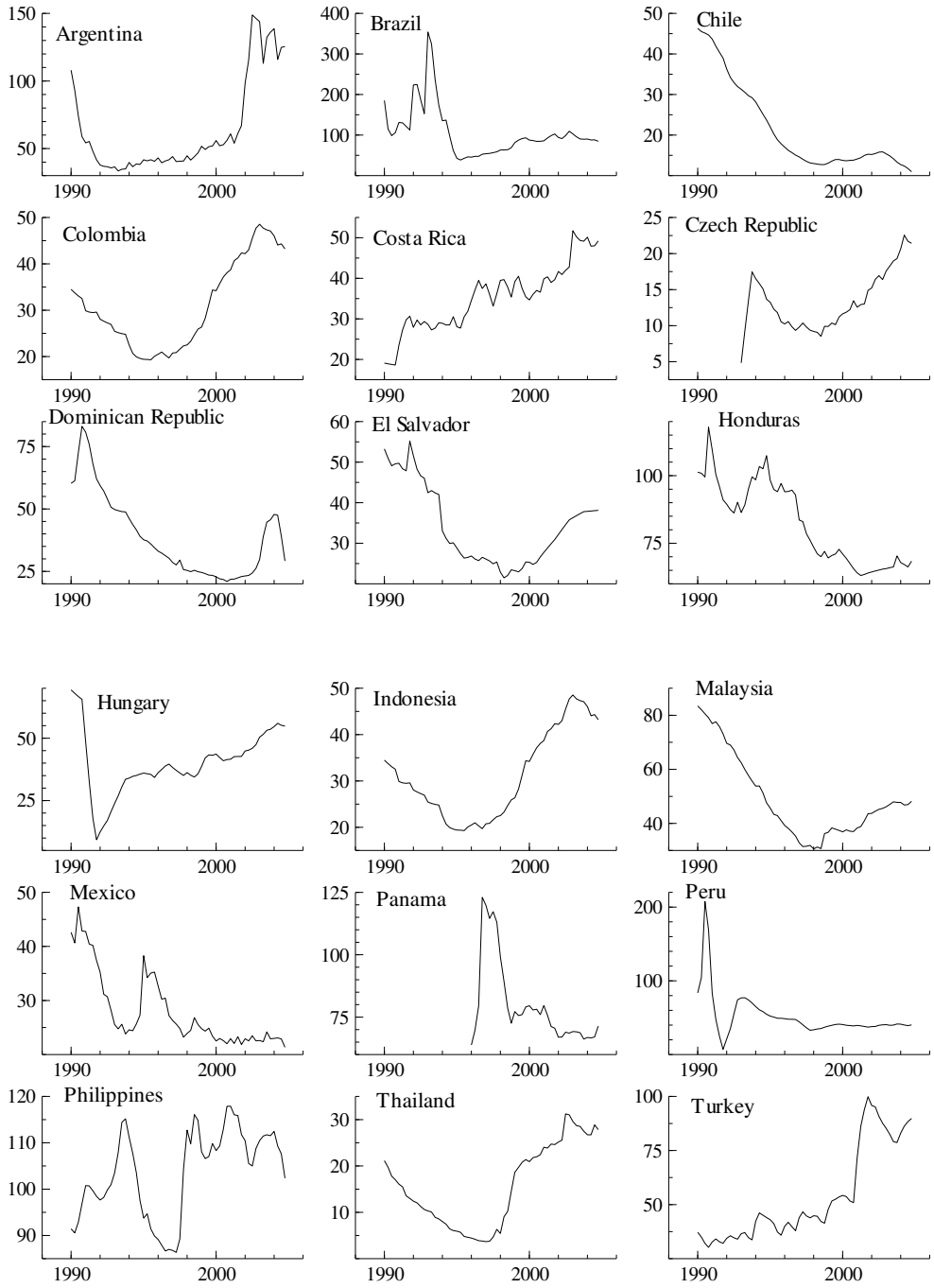
According to the FSI Indonesia shows a sustainable fiscal position during the final quarter of 1990 until the middle of 1991 and from 1993 to the second quarter of 1997. From the third quarter of 1997, the FSI jumped to an unsustainable area $(\beta - \lambda > 1)$ and remained in this area until early 2000, as a consequence of the October 1997 crisis. However, the FSI decreased thereafter, crossing into the sustainable area in the short period between 2000Q2-2001Q1. After this period, the FSI returned to an unsustainable area (see Figure 2). Between 1990 and 1996, the public debt to GDP ratio decreased (from about 35% to about 20%) but it increased abruptly from 1997 (about 45% in 2004). The results for Malaysia show a consistently sustainable fiscal balance in the period 1990-1997 (with two exceptions, the first two quarters of 1991), but the Fiscal Sustainability Indicator fluctuated intensively above the threshold of 1 from the second part of 1998 to 2004. The debt to GDP ratio decreased from 1990 (about 80%) to 1997 (about 30%), but shows a gradual increase from 1998.

Table 1: Analysis of Fiscal Sustainability Indicators

Country	Frequency		
	$\beta - \lambda > 1$	$\beta > \beta^*$	$\lambda < 0$
Argentina	87%	42%	95%
Brazil	62%	42%	60%
Chile	33%	3%	33%
Colombia	93%	37%	100%
Costa Rica	100%	2%	100%
Czech Republic	95%	20%	84%
Dominican Republic	40%	20%	40%
El Salvador	97%	3%	100%
Honduras	98%	13%	100%
Hungary	95%	30%	97%
Indonesia	50%	2%	60%
Malaysia	47%	7%	77%
Mexico	83%	18%	85%
Panama	84%	0%	97%
Peru	80%	42%	93%
Philippines	98%	10%	100%
Thailand	38%	13%	38%
Turkey	100%	50%	100%
All Countries	76%	20%	81%

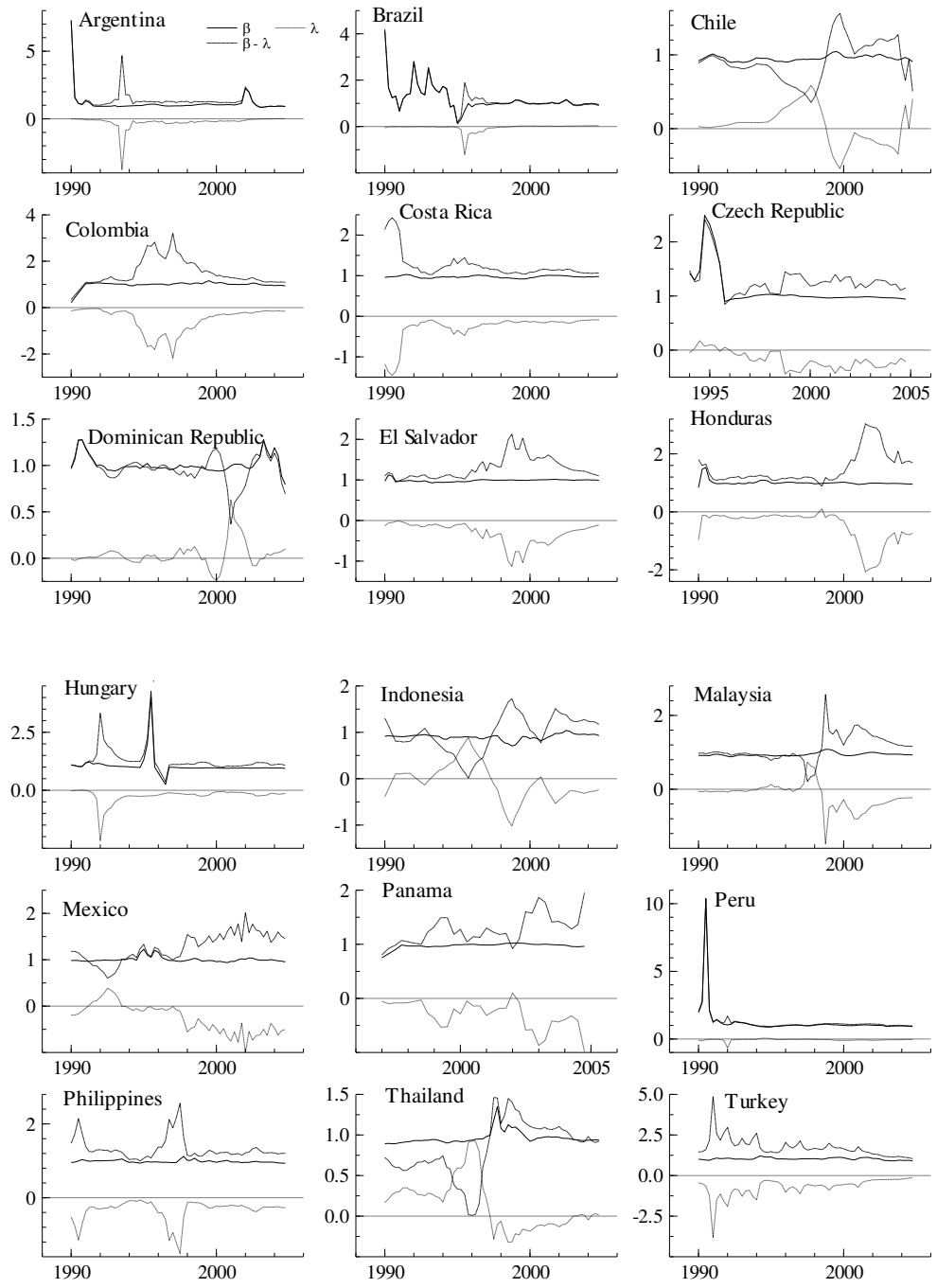
Source: Author's calculations.
Note: Number of quarters as a percentage of total quarters.

Figure 1: Debt to GDP



Source: Author's calculations.

Figure 2: Fiscal Sustainability Indicators



Source: Author's calculations.

The FSI for Mexico remained below 1 from 1991 to the first part of 1993, but from their third quarter of 1993 and the end of the 1994 crisis the Fiscal Sustainability Indicator moved into the unsustainable area and remained there until 2004. Mexico's public debt to GDP ratio decreased from 1990 (about 47%) to 1994 (about 25%) but increased to about 38% in 1995 and then decreased to about 21% in 2004. In most of the years under study, the FSI for

Panama presents an unsustainable fiscal position (84% of the time), and the public debt to GDP ratio has fluctuated to around 70%. On the other hand, the Fiscal Sustainability Indicator for Peru shows an unsustainable fiscal stance during the period 1990-1993 and from the last quarter of 1995 to the first quarter of 2004. The public debt to GDP ratio decreased from about 200% in 1990 to about 40% in 2004 (see Figure 1). For the Philippines, the FSI exhibits an unsustainable fiscal position during 98% of the period considered, defined principally by primary fiscal deficit, while the public debt to GDP grew from about 90% to about 102% between 1990 and 2004.

The FSI for Thailand indicated sustainability until the crisis in 1997, when it moved to above 1. This is basically explained by a primary fiscal deficit and high spreads between the real interest rate and the growth rate. In 2003, the FSI returned into the sustainable area. The public debt to GDP ratio decreased from about 21% in 1990 to about 3.8% in 1996. However, from 1997 it grew to about 27% in 2004. The results of the FSI for Turkey showed an unsustainable fiscal position overall in the period studied, and the debt to GDP ratio increased from about 30% to about 90% during 1990 and 2004.

In summary, Argentina, Colombia, Costa Rica, the Czech Republic, El Salvador, Honduras, Hungary, Mexico, Panama, Peru, the Philippines and Turkey present large unsustainable fiscal positions in most of the period studied, which is explained basically by primary fiscal deficits.

5 Concluding Remarks

In this paper a Fiscal Sustainability Indicator has been constructed for 18 developing and emerging countries and classified the countries for which the FSI was above the threshold of 1 at least 75% of the time as having been fiscally unsustainable. 12 countries were identified as presenting large unsustainable fiscal positions in most of the period studied, explained basically by primary fiscal deficits. Interestingly, Panama presents an unsustainable fiscal position in 84% of the time, and a high public debt to GDP ratio. These results suggest that there is no evidence that officially dollarized countries have run more prudent fiscal policies than non-officially dollarized developing countries. Panama has relied heavily on the IMF over the past 35 years or so, with 17 IMF programmes since 1973 (see Edwards, 2001).

For future research, it would be interesting to apply the same analysis to a larger sample of countries and to a higher frequency of data, such as monthly data, as well as the refinement of the FSI to include behavioural content that would take into account endogenous private savings and investment behaviour, thereby allowing extensions to externally financed public deficits. On the other hand, one must investigate whether those fiscal imbalances in selected emerging and developing countries reflect deeper structural shortcomings such as soft budget constraints and inefficient tax systems.

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Appendix

This section presents some simple algebraic expressions, which are in turn used to assess fiscal sustainability, based on the stochastic model developed by Croce and Hugo Juan-Ramón (2003). In addition to facilitating the analysis, the formulas also provide an intuitive understanding of what fiscal sustainability entails.

The government deficit for time t, which is assumed to be financed by net domestic and external indebtness, is descomposed into the primary deficit and interest payment.

$$D_t - D_{t-1} = G_t - T_t + i_t D_{t-1}$$

(a)

$$\Delta D = PD_t - IP_t$$

where D_t is the stock of public debt outstanding at the end of period $t-1$, G_t is the primary public expenditures, that is, public expenditures excluding interest payments the public debt, T_t is the public sector revenue, and i_t is the nominal interest rate on public debt. All variables are expressed in nominal terms. Equation (a) shows that the change in public debt will be equal to the difference between public expenditures (including interest payments) and public revenues.

The government budget constraint for period t in terms of domestic currency is given by:

$$PD_t + IP_t \equiv \left(D_t^D - D_{t-1}^D\right) + E_t\left(D_t^F - D_{t-1}^F\right) \qquad \text{(b)}$$

where PD_t is the primary deficit, IP_t are the interest payments, D_t^D is the domestic debt expressed in domestic currency, D_t^F is the external debt expressed in foreign currency and E_t is the average exchange rate, defined as domestic currency per unit of foreign currency between the end of period $t-1$ and the end of period t. The external debt can be expressed in domestic currency as $D_t^E \equiv E_t D_t^F$.

Denoting i_t^D and i_t^F as the average representative interest rates on the domestic and external debt at time t, respectively, interest payment can be expressed as:

$$IP_t \equiv i_t^D D_{t-1}^D + E_t i_t^F D_{t-1}^F \qquad \text{(c)}$$

Notice that equation (c) implicitly assumes that there is no interest accrued for period t on the debt acquired between the end of the time $t-1$ and the end of time t.

We can define primary surplus as $PS_t \equiv -PD_t$. Using this definition and equation (c), we can rearrange equation (b) as:

$$D_t^D + E_t D_t^F = \left(1+i_t^D\right)D_{t-1}^D + E\left(1+i_t^F\right)D_{t-1}^F - PS_t \qquad \text{(d)}$$

In order to express all variables in real terms, we divide both sides of equation (d) by nominal GDP at time $t(Y_t)$. The domestic debt, foreign debt (in domestic currency) and primary surplus, all expressed in real terms, may be defined as: $d_t^D \equiv \frac{D_t^D}{Y_t}, d_t^E \equiv \frac{D_t^E}{Y_t} \equiv \frac{E_t D_t^F}{Y_t}$ and $ps_t \equiv \frac{PS_t}{Y_t}$. Making use of these definitions, equation (d) becomes:

$$d_t^D + d_t^E = \left(1+i_t^D\right) d_{t-a}^D \left(\frac{Y_{t-1}}{Y_t}\right) + \left(1+i_t^F\right) d_{t-1}^E \left(\frac{E_t}{E_{t-1}}\right)\left(\frac{Y_{t-1}}{Y_t}\right) - ps_t \qquad \text{(e)}$$

One can express the change of the nominal gross domestic product in terms of the growth rate of the real gross domestic product (g) and the inflation rate (π) as $\frac{Y_t}{Y_{t-1}} \equiv (1+\pi)(1+g_t)$, and defining the rate of change of the average nominal exchange rate as $e_t \equiv \left(\frac{E_t}{E_{t-1}}\right) - 1$, we can then rewrite equation (e) as:

$$d_t^D + d_t^E = \frac{\left(1+i_t^D\right)}{(1+\pi_t)(1+g_t)} d_{t-1}^D + \frac{\left(1+i_t^F\right)(1+e_t)}{(1+\pi_t)(1+g_t)} d_{t-1}^E - ps_t \qquad \text{(f)}$$

By defining the real interest rates on the domestic and external debt expressed in domestic currency as $r_t^D \equiv \frac{\left(1+i_t^D\right)}{(1+\pi_t)} - 1$ and $r_t^E \equiv \frac{\left(1+i_t^F\right)(1+e_t)}{(1+\pi_t)} - 1$, respectively, we can write equation (f) more concisely as:

$$d_t^D + d_t^E = \frac{\left(1+r_t^D\right)}{(1+g_t)} d_{t-1}^D + \frac{\left(1+r_t^E\right)}{(1+g_t)} d_{t-1}^E - ps_t \qquad \text{(g)}$$

Defining the ratio of total debt expressed in domestic currency to the nominal GDP as $d_t \equiv d_t^D + d_t^E$ and multiplying the right hand side of equation (g) by $\frac{d_{t-1}}{d_t}$, we obtain:

$$d_t = \frac{\left(1+r_t^D\right)}{(1+g_t)} \left(\frac{d_{t-1}^D}{d_{t-1}}\right) d_{t-1} + \frac{\left(1+r_t^E\right)}{(1+g_t)} \left(\frac{d_{t-1}^E}{d_{t-1}}\right) d_{t-1} - ps_t \qquad \text{(h)}$$

Alternatively, we can rewrite equation (h) as:

$$d_t = \frac{(1+r_t)}{(1+g_t)} d_{t-1} - ps_t \qquad \text{(i)}$$

where the weighted real interest rate relevant to the total debt $\left(r_t\right)$ is defined as:

$$r_t \equiv r_t^D \frac{d_{t-1}^D}{d_{t-1}} + r_t^E \frac{d_{t-1}^E}{d_{t-1}}$$

Finally, we may define the spread between the weighted real interest rate relevant for the total debt and the rate of growth of the real domestic product at time t as $\beta_t \equiv \frac{\left(1+r_t\right)}{\left(1+g_t\right)}$. Then public debt as a proportion of GDP (in real terms) is given by:

$$d_t = \beta_t d_{t-1} - ps_t \qquad \text{(j)}$$

Equation (j) displays that, in absence of shocks and corrective policies, d_t will increase over time in the presence of persistent primary fiscal deficits jointly with a real interest rate higher than the growth rate of real GDP.