IS THE DEBT INTOLERANCE APPROACH RIGHT? EMPIRICAL EVIDENCE FROM PANEL DATA ANALYSIS

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Abstract

The main task of this article is to assess the recent external debt dynamics in middle-income economies and try to understand how this debt has evolved over time. Then, we intend to shed light on the main hypothesis associated with the well-known "debt intolerance" approach. According to this approach the propensity to default of some developing countries is frequently associated with their history of default and inflation. Our empirical findings suggest that the *way* developing economies borrow, that is, the debt denomination is still far more important to explain the debt dynamics than the domestic weakness in accepting default and fiscal avoidance.
Key-Words: External Debt; Developing Countries; Debt Intolerance; Sustainability Assessment.
JEL Classifications: F34; F37; F41; C23.

Resumo

O principal objetivo deste trabalho é analisar a recente dinâmica da divida externa em economias de renda per capita média e tentar entender como essa dívida tem evoluído no tempo. Nossa principal hipótese a ser testa diz respeito ao enunciado da abordagem conhecida como "debt intolerance" (Reinhart, Rogoff e Savastano, 2002). De acordo com esta abordagem a propensão ao *default* de algumas economias em desenvolvimento é frequentemente associada com suas histórias de *default* e inflação. Nossos resultados empíricos sugerem que o *modo* como tais economias tomam emprestado parece ser mais importante para explicar a dinâmica da dívida externa de tais economias do que propriamente seus possíveis frágeis sistemas financeiros e tendência em aceitar políticas fiscais mais frouxas.
Palavras-Chave: Dívida externa, economias em desenvolvimento, debt intolerance, sustentabilidade de dívida.
Classificação JEL: F34; F37; F41; C23.

ÁREA 6: ECONOMIA INTERANCIONAL - ANPEC 2006

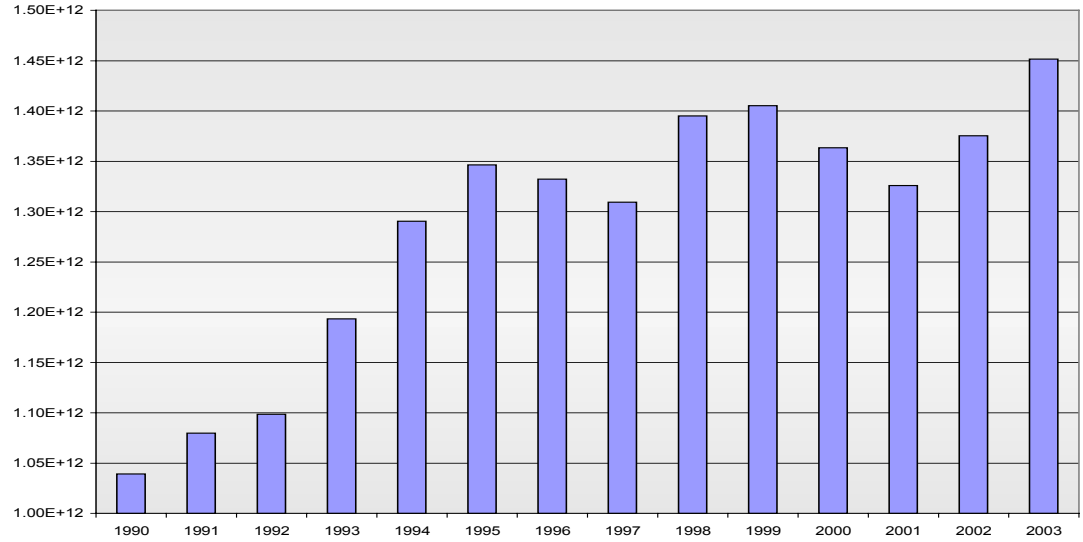
1. INTRODUCTION

Even though programs of debt restructuring took place in the late 1980s and in the early 1990s, the total external debt has increased in most developing regions. Figure 1 shows the sizeable increase of the public and publicly guaranteed debt in all developing economies around the world. From 1990 to 2003, the total external debt (public and publicly guaranteed) increased by 40%, while low income countries experienced an increase of 47% and middle income countries debt increased by 25%. Key debt indicators can be very contradictory and for many developing economies, mainly for middle income economies, one may find relieving situations. Actually, these debt indicators can show decreases in the external debt scaled to exports, and the reason is close associated with increasing exports led by domestic currency devaluation. As currency crises took place a few years ago one could barely predict some real effect of exchange rate competitiveness on exports to some time ahead. Concerns are addressed about both the rising in the total amount and the way the debt has raised in the last decades.

According to Reinhart, Rogoff and Savastano (2003), default became a rule rather than an exception in countries with weak financial intermediation and high tax avoidance. In a very different perspective, Eichengreen, Hausmann and Panizza (2003) associate the problem of the external debt in developing countries with the "global imbalance" or more properly speaking emerging market economies suffer from the original sin, because they are incapable of borrowing abroad in their own currency, even domestically in long-term interest rate.

The paper is organized as follows. Section two summarizes why some countries borrow so much, according to the standpoint of the "debt intolerance" hypothesis. The third section presents a model to analyze sustainability models in a critical condition of external indebtedness. Econometrical evidence will be summed up in the fourth section.

Figure 1 - Developing Countries: Public and Publicly Guaranteed Debt (1990-2003) – US$



Source: World Bank (2004)

Throughout the paper the analysis is conducted towards supporting the ideas that external debt dynamics in developing countries remains the same well-known theoretical derivation associated with its profile. This argument is rather associated with the "original sin" than with the "debt intolerance" approach. Even though the sustainability assessments provided by International Monetary Fund (IMF) are worthy, they need to take into account specific attributes of the debt dynamics.

2. WHY SOME COUNTRIES BORROW SO MUCH?

According to Reinhart, Rogoff and Savastano (2003), the concept of "debt intolerance" manifests itself under the extreme circumstances many emerging market economies experience in terms of debt level that would seem manageable by advanced country standards. They argue that "safe" external debt-to-GNP thresholds for debt intolerant countries are low and that these thresholds depend on the history of default and inflation. The key finding is that the debt intolerance showed by some countries can be explained by a very small number of variables related to their repayments and inflation history[1].

Why does the market repeatedly lend to debt-intolerant countries to a point where the credit risk becomes significant, if serial default is such a pervasive phenomenon? "Part of the reason may have to do with the pro-cyclical nature of the capital market, which has repeatedly lent vast sums to emerging market economies in boom periods (which are often associated with low returns in the industrial countries) only to retrench when adverse shocks occur, producing painful 'sudden stops'". (Reinhart, Rogoff and Savastano, 2003:7). But, the other part of their answer is associated with the shortsightedness and complacence of both domestic governments and multilateral institutions. In other words, during periods of international liquidity "governments have often been too short-sighted (or too corrupt) to internalize the significant risks that over borrowing produces over the longer term" and "the multilateral institutions have been too complacent (or have had too little leverage) when loans were pouring in" (Reinhart, Rogoff and Savastano, 2003:7).

According to the "debt intolerance" approach some countries always borrow more than they should and will then suffer domestic fiscal imbalance; as a consequence, if a "sudden stop" occurs, they will default. And they do this because they do not protect their domestic financial system[2].

In order to make practical the debt intolerance measurement, Reinhart, Rogoff and Savastano (2003) focused on the indicator of sovereign debt called "Institutional Investor's Country Credit Ratings" (henceforth IIR) prepared by the *Institutional Investor*[3]. However, according to figure 2, it is hard to pinpoint the relationship between the key indicator of external debt (PVD_GNI[4]) and IIR. The correlation coefficient[5] between PVD_GNI and IIR is 0.017. But, the correlation between PVD_XGS and IIR is negative and relatively high (-0.23), which definitely does not make sense. That is, it is not expected that low debt indicator is associated with high probability of default on government debt obligation. Consequently, it indicates that it is not easy to define debtor's club and external debt intolerance regions through only those two variables. Conversely, figure 3 shows the other way the investors can analyze the country's sovereign debt focusing on external vulnerability and it is

reasonable to think about the positive relationship between high debt and strong external imbalances.

According to the "debt intolerance" approach, the inflation history is used to predict default. But, the inflation of the last eight years (from 1995 to 2002) is not associated with the IIR. At first glance, there is a very practical reason to believe that there is some relationship between inflation and sovereign risk. Certainly, countries suffering unrelieved inflation show frequently high interest rates and then they become more domestically indebted. Conversely, there is another reason to believe that this has been a phenomenon, at least since 1990s, with low likelihood to be related to increases in the external debt. Figure 4 shows the inflation across regions, and they were reduced to low levels even in developing countries where inflation is more difficult to be controlled.

Figure 2 – Cross-Plot between External Debt and IIR for Developing Economies (Average 2000-2002)

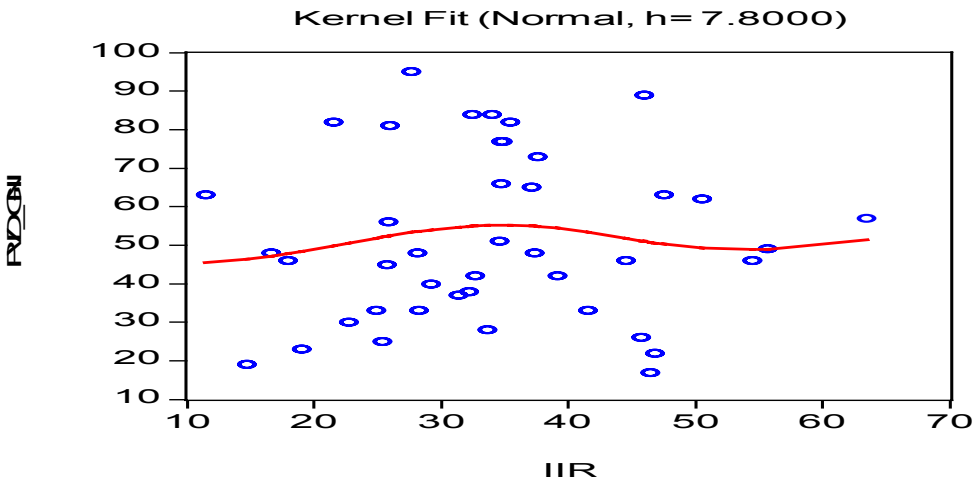
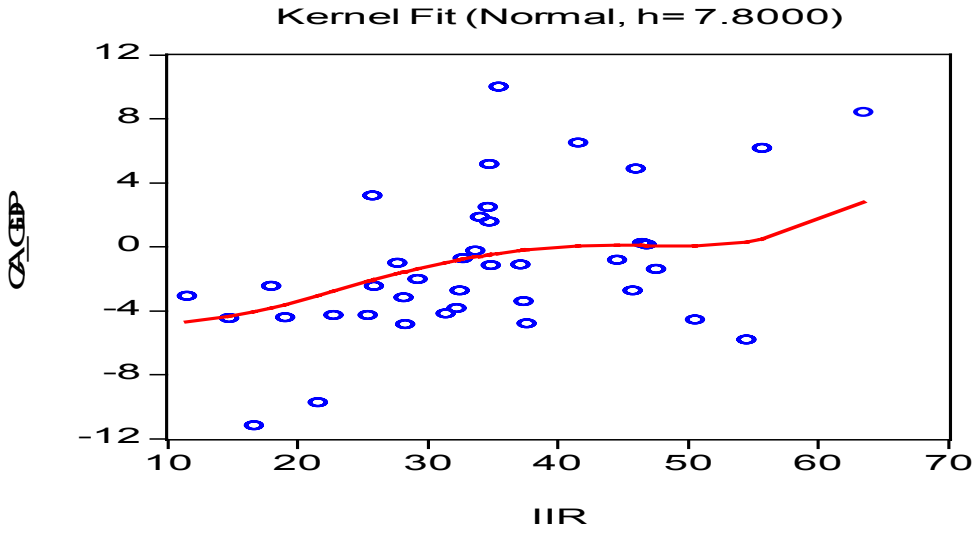
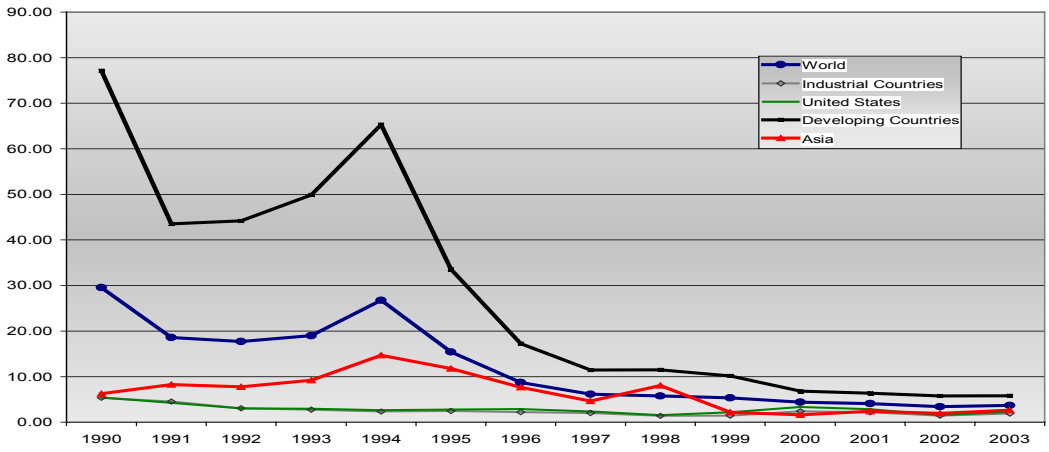


Figure 3 – Cross-Plot between Current Account and IIR for Developing Economies (Average 2000-2002)



Source: World Bank (2005) and Institutional Investors (2005).

Figure 4: Inflation by Regions - % Annual of CPI (1992-2002)



Source: World Bank (2005)

But, why do countries without history of default attempt to avoid default for such a long period of time? The authors' answer of the "debt intolerance" approach is associated with the interest that countries have in protecting their banking and financing system. It means that weak financial intermediation in many serial defaulters is associated with low penalty for defaulting. So, "The lower costs of financial intermediation disruption that these countries face may induce them to default at lower thresholds, further weakening their financial systems and perpetuating the cycle"(p. 13)[6].

Additionally, do debt-intolerant countries really borrow too much? According to those authors, at least from 1980s and 1990s, evidence shows that external borrowing was often driven by shortsighted governments that were willing to take significant risks to raise consumption temporarily, rather than to foster high-return investment projects. "The fact that the gains from borrowing come quickly, whereas the increased risks of default is borne only in the future, tilts shortsighted governments towards excessive debt"(p. 13).

Summing up, some countries borrow *more* than they *should*, and they borrow *more* because they are unable to find an alternative domestic source to support their imbalance. They also can live borrowing and defaulting as a way of life without focusing attention on protecting their weak banking and financial system. The external debt dynamics over time, specially indexed to foreign currency and international interest rates, is only the expression of the way they can borrow more; international investors lend more during exuberant financial cycles and earn higher returns than they would earn in developed economies.

Reinhart, Rogoff and Savastano (2003) are probably right when they emphasize the fact that default is a cyclical phenomenon and most likely serial defaulters are more prone to default during "sudden stops" in capital flows than the non-defaulters. The perception of the international investors is an important variable and can be expressed in ratings and credit risk measurements. It is also important that the history of inflation matters to build foreign investors' perceptions.

But, what can be said about the role played by other factors such as the degree of dollarization and the maturity structure of the debt? Do these factors help to build the perception of foreign investors? That is, not only the degree of the external debt, but also its profile can be important to grade countries according to credit risk measurements. Is it fair to relate a country's debt profile to domestic institutional weakness? In other words, why do some countries borrow the *way* they borrow?

3. DEBT SUSTAINABILITY ANALYSIS

Now it is important to understand the situation that emerging market economies can experience when they are considered debt-intolerant countries and analyze the way they can deal with their debt in order to avoid default.

According to the standard debt sustainability analysis:

(1) $D(t+1) = [1 + r(t)]D(t) - TB(t)$

where $D(t)$ is the country's external debt at time t, TB is its trade balance, and r is the interest paid by the country on its external debt. In steady-state one can express the following relationship:

(2) $TB/Y = (r - g)(D/Y)$

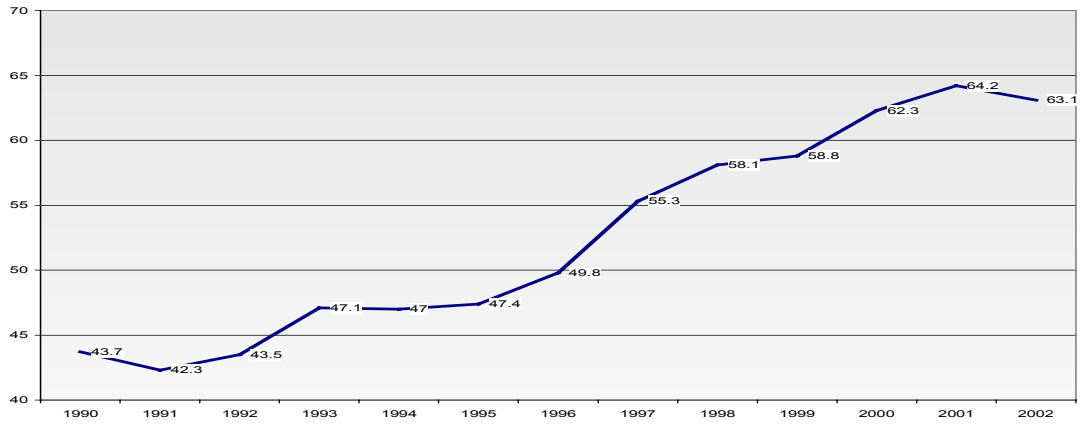
where TB/Y is the steady-state ratio of the trade balance to output needed to stabilize the external debt ratio at D/Y.

To be closer to the recent movement of the external debt, three different changes in the expression 1 can be proposed. First of all, the current account instead of trade balance; second, as the majority of external debts in developing countries are U.S. Dollars denominated, the debt denomination is incorporated in the model. Hence, not only the interest rate matters, but also the U.S. Dollar variability is taken into account in the expression; and, finally, the model weighs the participation of the U.S. Dollar-denominated external debt. Then, the equation 1 can be expressed as:

(1a) $D(t+1) = [1 + r(t).e(t)](w_{USD})D(t) - CA(t)$

where e is the U.S. exchange rate in terms of an international basket of currencies; w_{USD} is the weight of the U.S. Dollar-Denominated external debt in the total debt, and CA is the Current Account. Figure 5 shows the important role played by this component of the external debt when, in the early 1990s, the U.S. Dollar-denominated debt averaged 40% of the total external debt in developing economies and in 2002 represented more than 60%.

Figure 5: Developing Countries: Currency Composition of the Long-Term External Debt (1990-2002). % US Dollar-Denominated Debt



Source: World Bank (2005).

After simple manipulation, the steady-state expression 2 can be written as following:

(2a) $CA/Y = [(r + e - g)(1 + w)](D/Y)$

Taking into account the exogenous shocks, such as confidence, political and terms-of-trade shocks, $\zeta(t)$, (2a) can be expressed as a stochastic process as following[7]:

(2b) $CA/Y = [(r + e - g)(1 + w)](D/Y) + \zeta(t)$

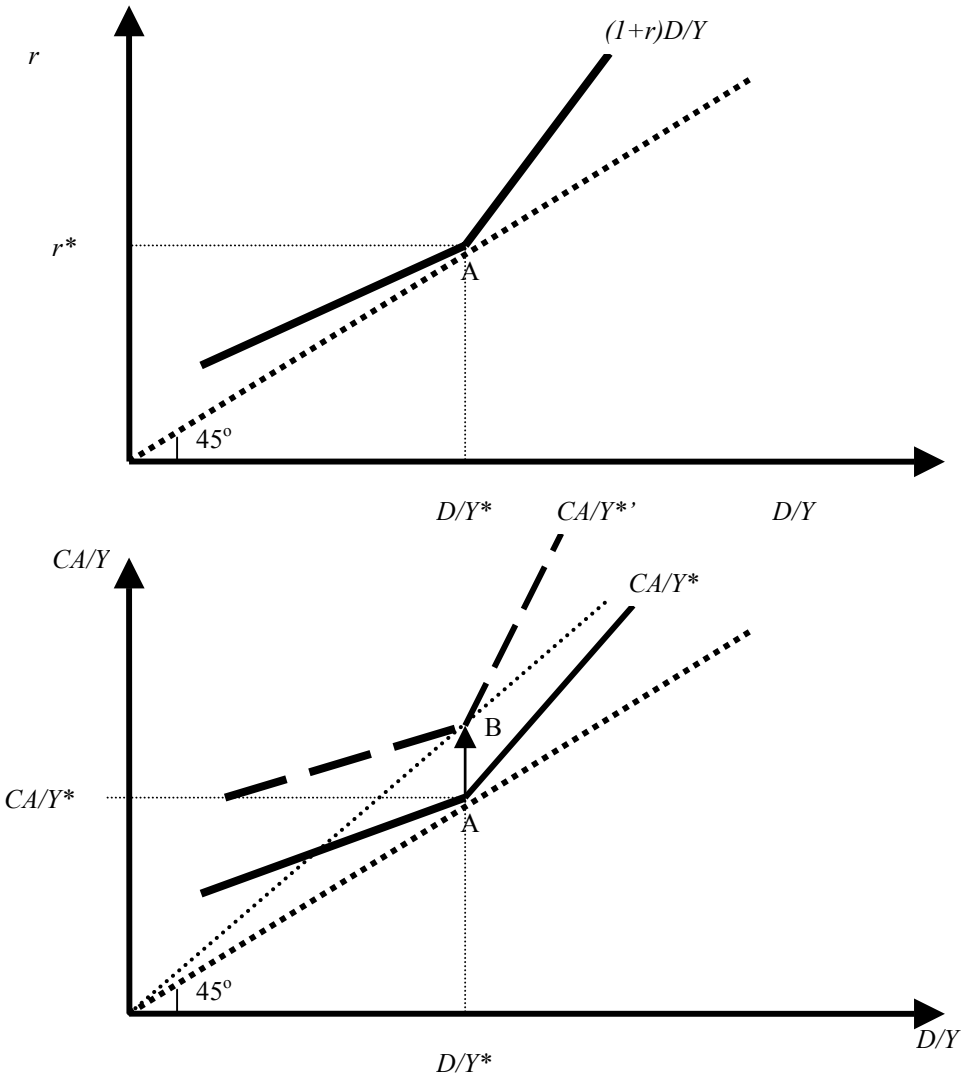
Figure 6 illustrates both situations for the "standard approach" of the external debt sustainability analysis and the other one added with the problem of foreign currency denomination of the external debt. According to expression 2 some countries can manage their external debt by implementing sustainable current account surplus (relative to GDP), as shown in the initial equilibrium A. But, once the interest rate is an endogenous variable (the higher the external debt, scaled to GDP or to exports, the higher the interest rate for future debt renegotiations)[8], the model states that after the equilibrium A, the higher the debt-to-GDP (or debt-to-exports) is, the higher the interest rate for futures payments will be.

The consequence is straightforward: the country must present very high current account surplus related to GDP. However, even if the country can increase its current account to GDP, it will not be insulated from more increases in its external debt, once most of its external debt can be foreign-currency denominated. In this context, there are many mechanisms to be revealed. First, if a country has *elasticity* to increase the current account[9], maybe because of either trade performance associated with depreciation in the domestic currency, or because the external income has increased faster than the domestic income. Second, and consequently, the international currency denominated external debt would have increased.

This especially dramatic dynamics of the external debt might take place only because the country's initial level of debt (scaled by GDP or exports) may already have exceeded, or be close to exceeding the *D/Y** level. Needless to say, non-anticipated external shocks in the foreign exchange rate and international interest rate, besides the

shocks in term-of-trade and domestic inflation, cause changes in the steady-state equilibrium, from *CA/Y** to *CA/Y*'*, as shown in figure 5. On the CA/Y*' curve, with the same initial value of the external debt (D/Y*), the country must have a higher current account surplus, and, it is very likely to move on a steep curve and it therefore has to obtain a much higher current account surplus over time. However, some countries, mainly developing ones, seek more revenue from inelastic sources and they, therefore, borrow more abroad in foreign currency. During periods of exuberating capital flight they can probably finance their external imbalance, but when "sudden stop" takes place they default.

Figure 6 - External Debt Dynamics for Debt-Intolerant Countries



Finally, it is important to consider the rapid growth of the domestic government debt in the 1990s. It is fair to say, according to the experience in Brazil, Argentina and Turkey, that the domestic government debts are denominated either to foreign currencies or to some short-term interest rates. "These trends suggest that domestic debt intolerance can manifest itself in a manner similar to external debt intolerance." (Reinhart, Rogoff and Savastano, 2003: 50).

Discussing the effects of debt intolerance for debt sustainability analysis, it is necessary to recognize that the interest rate paid on debt is an endogenous variable, which depends on the debt-to-output (or debt-to-exports) ratio. The interest rate on debt to private creditors can increase with the debt level. Additionally, sustainability analyses need to take into account that the initial level of debt may already have exceeded.

According to this standard debt sustainability model, emerging market economies can experience difficulties in overcoming external imbalances and therefore they default. However, they default not exactly because of their history of default and inflation, even the inflationary process remains a great concern. They default because of the *way* they borrow. In a prospective analysis even if they borrow *less* they can default; even if they present commitment to keep the inflation at low levels, they can default; and, finally, even if they defend low exchange rate volatility[10], default can be their destiny.

4. ECONOMETRICAL FINDINGS: A PANEL MODEL

We first estimate the equation as follow:

$$Y_{it} = \alpha_i + \beta_0 Y_{it-1} + \beta_1 X_{it} + \beta_1 Z_{it} + \varepsilon_{it} \qquad (3)$$

where: Y_{it} is the external debt measured by PPGD (Public and Publicly Guaranteed Debt), sometimes in absolute values, or in terms of growth rates, or related to GDP[11]; X_{it} is the vector of explanatory variables that might express size and development level of the monetary and financial sector[12], such as domestic credit, market capitalization, besides inflation, monetary policy (five-year moving average of the inflation), ratio monetary base to GDP and consequently the credibility of monetary policy[13]; Z_{it} is the vector of explanatory variables that can express the debt profile, such as the maturity structure[14], the average interest rate[15] and the currency-denomination[16] of the debt, as well as variables to control the external vulnerability problems and foreign liquidity, such as current account deficit (or relative to GDP), foreign exchange reserves to imports, real exchange rate misalignment and exchange rate regimes[17] and external debt interest payments to exports. Most variables in the data set (see table 1) were obtained from World Bank's databases (*World Economic Indicators* and *Global Development Finance* On line)[18].

The functional form (3) is a dynamic model. As known, when T is small and the model is dynamic (i.e. includes a lagged dependent variable), the estimation bias can be substantial (see Nickell, 1981). Methods to cope with such dynamic panel data models are particularly the GMM-type estimators of Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) and also the Anderson and Hsiao (1992) estimators. Modeling dynamics typically involves including a lagged value of the dependent variable as an explanatory variable. Fixed effects (FE) and random effects (RE) modelsare biased in this case[19]. A common choice of instrument is Y_{t-2} used as an instrumental variable for ΔY_{t-1} as suggested by instrument variable estimation (Anderson and Hsiao, 1981).

However, in Blundell and Bond (1998), in dynamic panel data models where the autoregressive parameter is moderately large and the number of time series observations is moderately small, exactly as our dataset, the widely used linear generalized method of moments (GMM) estimator obtained from first differencing has been found to have large finite sample bias and poor precision in simulation studies. Lagged levels of the series provide weak instruments for first differences in this case. (see Blundell and Bond, 1998, p. 115).

Arellano, Bond, and Bover developed one and two step general methods of moments (GMM) estimators for panel data analysis. GMM is usually robust to deviations of the underlying data generation process to violations of heteroskedasticity and normality, insofar as they are asymptotically normal but they are not always the most efficient estimators. When estimating dynamic models for our equation (see table 2) we are therefore concerned with the transformations that allow the use of lagged endogenous variable as instruments in the transformed equation. In this case, we procedure a two-step GMM estimation, when one-lagged real our dependent variables is treated as endogenous variable and two-lagged the dependent variables e as additional instrument variable[20].

Table 2 shows the empirical results. We run several variants of the expression 3. First of all, there is strong evidence cross-country, for the period 1990-2002, that high GDP is positively correlated with high external debt; second, even statistically non significant, high growth rates in external debt are related with lowers growth rates in GDP; third, there is no evidence proving any sort of reasonable relation between growth of the external debt and either inflation or the size of the monetary and financial system[21].

It very important to highlight that it was run the same equations using different measurements that express same reasonable idea of monetary policy credibility: the inflation measured by CPI and the variance of inflation measured by five-year moving average and were reported only the best results in terms of t-test statistics and/or coefficient signal. We also preceded exclusion and restrictions tests to evaluate restrict model against an irrestrict one, according to F-statistic. Variance of inflation was tested because some countries can mantain the high interest rate longer with the intention to build credibility because they recently had undergone hyper-inflation episodes.

Fourth, high current account deficit to GDP is statistically related to changes in the external debt, which suggests that there is some evidence in favor of the external vulnerability as an important sign of highly indebtedness countries. Taking the debt to GDP, it was run other set of equations. Once more, inflation (or variance of inflation) and the size of the monetary system were not statistically significant at all, what means that countries that have experienced high inflation are not the same with high external debt; additionally, the size of the monetary system is not statistically significant, even the negative sign can convey the idea that the country with large monetary system is less indebted.

It was tested if severely indebted countries have experienced pegged exchange regimes and there is no empirical evidence in favor of this idea. It means that the choice of the pegged exchange rate regimes and the subsequent collapse in the developing economies did not help to predict the external debt dynamics, even though it can be narrowly associated with domestic federal debt and default of this debt. Finally, considering the variables that can express the debt profile (maturity structure, interest rate and currency-denomination), it is absolutely fair to say that all those explanatory variables are statistically significant to explain the external debt dynamics during the 1990s in the developing countries.

Consequently, it is fair to remark that[22]:

1. If the debt intolerance approach were right, would be able to see some significant and negative estimated parameters for the inflation, variance of inflation, domestic credit (or scaled by GDP), market capitalization (or scaled by GDP), or interactions of these variables such as the Monetary and Financial System. We know that debt intolerance cannot be reduced to this analysis, but it supports the ideas that debt intolerant countries operate under weak monetary and financial system and under inflation, and that their governments have no concerns about probability to default.
2. It was not reported any evidence regarding tax systems and most importantly, the debt intolerance approach can be correct about the fact that countries where tax system avoidance is high tend to have greater difficulty to pay the debt. However, if the profile of the external debt is so important, according to the empirical findings, even the government would face the relatively elastic tax sources to honor debt payments, it would not be enough once the developing countries' debts face high foreign currency volatility and higher international interest rate to pay debts than their domestic interest rate.
3. So, even with tremendous effort from domestic authorities of the developing countries in order to improve output growth, to build credible monetary policy and/or to strengthen the tax system, the external debt dynamics ingrains in the foreign-currency denomination and in the concentration of small quantities of currencies associated with short-tem maturity structures and, therefore, it may cause by themselves and no longer default.
4. Even if we have not directly tested the main original sin hypothesis, that explains *why* some countries cannot borrow abroad in domestic currency, even domestically for short term, we presented a lot of empirical inquiries concerned with the *way* the developing countries borrow abroad and how important this is for the debt dynamics. It seems that the some countries default because of the *way* they borrow and according to the original sin arguments the way they borrow is strongly associated with the global imbalance and causes, therefore, currency mismatches. In other worlds, the original sin hypothesis can be considered the alternative to the null hypothesis (debt intolerance).
5. Finally, Reinhart, Rogoff and Savastano (2003) are apparently right when they argue that there are some critical shortcomings in the standard sustainability exercises and the recognition of other factor, such as the degree of dollarization, short-term interest rates and the maturity structure of a country's debt, are actually different manifestations of the same underlying institutional weaknesses. But, if the authors are concerned about the *domestic institutions*

this research moved far more towards *international institutions*, that is, monetary international institutions that lend to developing countries.

5. FINAL REMARKS

The empirical evidence presented in this work is comprehensive and straightforward in order to show reservations about the hypothesis supported by Reinhart, Rogoff and Savastano (2003). The inflation (or variance of inflation) and the size of the monetary-financial system barely explain the sovereign debt dynamics since 1990. There is no evidence in favor of the idea that debt intolerant countries are not concerns about their financial system and they are not the same living with high inflation rates, even though developing countries show higher inflation rates than developed ones.

The external debt dynamics preserve the traditional foundations ingrained in the profile in terms of maturity structure (predominantly short-term debts), interest rates paid to its obligations (most of them are higher than the domestic interest rates) and, last but not least, the foreign-currency denominated debt, and as well-known the US dollar can reach more the 80% of the total debt. From this last feature derivates the idea that the external debt can not be controllable only by domestic governments. That means directly that even under extraordinary economic growth rates and credible monetary and fiscal policies, developing economies can not avoid US dollar volatility. More than symptoms of the history of default and inflation, the *way* the developing economies borrow abroad is remarkable. They definitely suffer from original sin since they have inability to borrow in their own currencies.

Table 1 - Variables, Descriptions and Sources

Name of the Variable	Description	Source
PPGD	Public and Publicly Guaranteed Debt, US$	Global Development Finance
GDP	Gross Domestic Product, constant, 1995, US$	World Economic Indicators
GDPgrowth	Growth rate of Gross Domestic Product (constant, 1995, US$)	World Economic Indicators
INFLATION	Growth rate of Consumer Index Price (1995 = 100)	World Economic Indicators
VAR INFL	Variance of Inflation measured by the moving average of the Inflation	World Economic Indicators
DOMESTIC CREDIT	Domestic Credit Provided by Banking Sector (US Dollar Total or % of GDP).	World Economic Indicators
MONEY	Money and Quasi Money (US Dollar Total or as % of GDP)	World Economic Indicators
MONETARY SYSTEM	Monetary System measured by multiplication of Domestic Credit and Money and Quasi Money (US Dollar Total or as % of GDP)	World Economic Indicators
FINANCIALSYSTEM	Size and development of the financial system measured by market capitalization (also known as market value) that is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year.	Standard & Poor's, Emerging Stock Markets Fact book and supplemental S&P data.
MON & FINANCIAL SYSTEM	Measured by the common factor between the variables monetary system and financial system.	World Bank and Standard & Poor's, Emerging Stock Markets Fact book and supplemental S&P data.
CURRENT ACCOUNT	Current Account Balance, current, US$	World Economic Indicators
RES_IMPORTS	Total Reserves in Months of Imports	World Economic Indicators
EXCHANGE RATE REGIMES	Measures of exchange rate regimes (*De Facto* Exchange Rate Regimes Classification – 1990-2001)	Bubula and Ókter-Robert (2002)
REER	Real and Effective Exchange Rate Index (1995 = 100)	World Economic Indicators
INTEREST RATE	Average Interest Rate (Annual %)	Global Development Finance
MATURITY	Average Maturity (Years)	Global Development Finance
DENOMINATION	Currency Composition of Long Term Debt (U.S. Dollars %)	Global Development Finance

Table 2: Empirical Results (1990-2002)[1/] - Combined GMM – Blundell and Bond (1998) Estimates

Dependent Variable[2/]	**PPGD**	**PPGDgrowth**				
PPGD_1	0.45 (6.08)					
PPGDgrowth_1		0.54 (3.45)	0.51 (2.98)	0.48 (3.01)	0.44 (2.67)	0.45 (2.89)
GDP	0.054 (5.54)					
GDPgrowth		-0.0001 (-1.38)				
INFLATION			0.252 (0.517)		0.285 (0.582)	0.290 (0.602)
MON & FINANCIAL SYSTEM[3/]				-0.4081 (-1.13)	-0.4178 (-1.15)	-0.4603 (-1.30)
CURRENT ACCOUNT TO GDP						0.262 (2.42)
N[3/]	702	686	694	689	685	665
No. of Parameters	58	58	58	58	59	60
Wald (joint)[5/]	30.67[0.000]	1.910[0.167]	0.267[0.605]	1.272[0.259]	1.767[0.413]	441.9[0.000]
AR (1) Test[6/]	2.206[0.027]	1.113[0.452]	1.007[0.314]	0.704[0.481]	0.697[0.485]	0.201[0.840]
Dependent Variable[2/]	**PPGD_GDP**					
PPGD_GDP_1	0.32 (2.43)	0.28 (2.33)	0.31 (2.08)	0.34 (2.22)	0.33 (2.09)	0.31 (1.98)
INFLATION	0.0006 (0.672)					0.0006 (0.750)
DOMESTIC CREDIT		-0.0004 (-0.344)				
MONEY			-0.001 (-0.525)			
MON & FINANCIAL SYSTEM				0.0004 (-0.035)		-0.0001 (-0.163)
CURRENT ACCOUNT DEFICIT					0.0007 (1.16)	
N[4/]	689	693	683	682	676	676
No. of Parameters	58	58	58	58	58	59
Wald (joint)[5/]	0.451[0.502]	0.118[0.731]	0.275[0.600]	0.0012[0.972]	1.339[0.24]	0.6011[0.740]
AR (1) Test[6/]	-0.958[0.338]	-0.9522[0.341]	-0.951[0.341]	-0.954[0.340]	-0.95[0.32]	-0.959[0.337]
Dependent Variable[2/]	**PPGD_GDP**					
PPGD_PDG_1	0.38 (2.33)	0.41 (2.81)	0.34 (2.78)	0.41 (2.77)	0.44 (2.90)	0.42 (3.01)
INFLATION			0.0004 (0.614)		0.0002 (0.385)	0.003 (0.547)
MONEY						0.001 (0.976)
MON & FINANCIAL SYSTEM			0.0009 (1.32)			
RESERVES	0.0028 (1.05)		0.002 (0.913)			
CURRENT ACCOUNT			-0.002 (-1.60)			
EXCHANGE RATE REGIME		0.0003 (0.544)				
INTEREST RATE				0.0126 (2.63)	0.127 (2.79)	0.013 (2.91)
MATURITY				0.0015 (1.03)	0.0023 (1.78)	0.0021 (1.91)
DENOMINATION				0.0016 (2.10)	0.0013 (2.23)	0.001 (1.99)
N[4/]	618	451	587	681	668	656
No. of Parameters	54	38	56	59	59	60
Wald (joint)[5/]	1.097[0.295]	0.295[0.586]	3.808 [0.433]	10.35[0.016]	11.59[0.09]	12.58[0.014]
AR (1) Test[6/]	3.316[0.001]	-0.977[0.338]	3.525 [0.000]	3.920[0.000]	3.536[0.00]	3.481[0.000]

Notes:

[2/] All estimations were run by using robust standard error. T-test statistics in parentheses.

[3/] We reported only Monetary and Financial System, instead of reporting Monetary System and/or Financial System because it was our better results.

[4/] Unbalanced panel with 57 individuals, longest time series with 13 and shortest time series with 8 (1990-2002).

[5/] Wald (joint) $X^2(2)$.

[6/] AR(1) test N(0,1).

REFERENCES

Anderson, T. W. and C. Hsiao (1981). "Estimation of dynamic models with error components". *Journal of American Statistical Association*. 76. (pp. 598-606)

Arellano, M. and S. R. Bover (1995). Another look at the instrumental-variable estimation of error-components models. *Journal of Econometrics*, 68. (pp. 29-52).

Arellano, M. and S. R. Bond (1991). "Some tests of specification for panel data: monte carlo evidence and an application to employment equations, *Review of Economic Studies*, 58, pp. 277-297.

Blundell, Richard and Stephen Bond (1998). "Initial conditions and moment restrictions in dynamic panel data models". *Journal of Econometrics*, 87. (pp.115-143)

Bubula, A. and Ötker-Rober, I. (2002). "The evolution of exchange rate regimes since 1990: evidence from De Facto policies". *IMF Working Paper 02/155*. Washington: International Monetary Fund.

Calvo, G. and Reinhart, C. (2002). "Fear of floating". *Quarterly Journal of Economics*. Vol. 113(3).

Chamon, M. and Hausmann, R. (2002). *Why do countries borrow the way they borrow?* Harvard: Harvard University. November 2002.

Chamon, M. (2001). *Why cannot developing countries borrow from abroad in their currency?* (unpublished manuscript). Harvard University.

Corsetti, G. and Mackowiak, B. (2002). *Nominal debt and currency crises*. (unpublished manuscript). Yale University: Yale.

Eichengreen, B, Hausmann, R. and Panizza, U. (2003). *Original Sin: the pain, the mystery.* University of California, Berkeley. August 2003. (unpublished manuscript)

Eichengreen, B, Hausmann, R. and Panizza, U. (2003b). *Currency mismatches, debt intolerance and original sin: why they are not the same and why it matters*. University of California, Berkeley. October 2003. (unpublished manuscript)

Eichengreen, B, Hausmann, R. (2003). *Original Sin: the road of redemption.* University of California, Berkeley. August 2003. (unpublished manuscript)

Eichengreen, B. and Hausmann, R. (1999). *Exchange rate and financial fragility*. NBER Working Paper 7418. November 1999.

Finkel, S. (1995). *Causal Analysis with Panel Data*. Sage Publications: London.

Flandreau, M. and Sussman, N. (2003). 'Old sins". In B. Eichengreen and R. Hausmann (eds.). *Debt denomination and Financial Instability in Emerging Market Economies.* University of Chicago Press: Chicago (forthcoming).

Frankel, J. and Wei, Shang-Jei. *Managing macroeconomic crises; policy lessons.* (Draft Chapter for Managing volatility and crises: a practitioner's guide). March 2004. (unpublished manuscript).

Hausmann, R. and Panizza, U. (2003). "On the determinants of Original Sin: an empirical investigation". *Journal of International Money and Finance.* 22 (2003). 957-990.

Hausmann, R. (2003). "Good credit ratios, bad credit ratings: the role of debt denomination". G. Kopis (ed.). *Rules-based fiscal policy in emerging markets: background, analysis and prospects*. Macmillan: London. (Forthcoming).

Hsiao, C. (1999). *Analysis of Panel Data*. Cambridge: UP. (Econometric Society Monographs, n. 11).

IMF (2002). *Assessing sustainability*. IMF: Washington, D.C. May 2002.

IMF (2003). *Sustainability assessments: review of application and methodological refinements*. IMF: Washington, D.C. June 2003.

Jeanne, O. (2002). *Why do emerging economies borrow in foreign currency?* IMF: Washington, D.C. November 2002. (unpublished manuscript).

Reinhart, C., Rogoff, K. and Savastano, M. (2003). *Debt Intolerance*. NBER Working Paper 9908. Cambridge, MA: NBER. August 2003.

Reinhart, C., Rogoff, K. (2004). *Serial default and the "paradox" of rich to poor capital flows*. NBER Working Paper 10296. Cambridge, MA: NBER. February 2004.

Reinhart, C. (2002). *Default, currency crises and sovereign credit ratings*. NBER Working Paper 8738. Cambridge, MA: NBER. January 2002.

Wooldridge, J. (2002). *Econometrics Analysis of Cross Section and Panel Data*. The MIT Press: MIT, U.S.A.

Wooldridge, J. (2000). *Introductory Econometrics: a modern approach*. The South-Western College Publishing: U.S.A.

World Bank (2005). *Global Development Finance: harnessing cyclical for development*. Washington, D.C: World Bank.

World Bank (2005). *World Economic Indicators*. (On Line). Washington, D.C: World Bank.

Footnotes:

[1] From historical perspective, default can become a way of life, and, from 1824 to 2001, countries like Brazil and Argentina were either in default or undergoing restructuring a quarter of the time, Venezuela and Colombia almost 40 percent of the time, and Mexico for almost half of all the years since its independence.

[2] The authors of the "original sin" approach (Eichengreen, Hausmann and Panizza, 2003) question that the debt-intolerance approach suggests that default on external debt may weaken a country's tax system by encouraging capital flight and tax avoidance. However, they report no regressions relating these facts.

[3] The Institutional Investor Rating (IIR) is compiled twice a year and is based on information provided by economists and sovereign risk analysts at leading global banks and securities firms. The ratings grade each country on a scale from 0 to 100, with a rating of 100 given to those countries perceived as having the lowest change of defaulting on their government debt obligations.

[4] PVD_GNI is the Prevent Value of Debt Service to GNI and PVD_XGS is the Present Value of Debt Service to Exports.

[5] We calculated Pearson's correlation coefficient and in this case the value of the correlation does not depend on the specific measurement units used.

[6] The mechanism also takes into account the tax system in a capital flight context. Countries where tax avoidance is high tend to have greater difficulty to fulfill debt payments, "forcing governments to seek more revenue from relatively inelastic tax sources, in turn exaggerating flight and avoidance. Default amplifies and ingrains this cycle" (p. 13).

[7] As previously discussed, Reinhart, Rogoff and Savastano (2003) measure the "debt intolerance" focusing on two indicators: the sovereign debt rating, reported by Institutional Investors, and the external debt-to-GNP ratio (or alternatively, the external debt-to-exports ratio). "Other factors", such as dollarization, indexation and maturity of the country's debt are different aspects of the same underlying institutional weaknesses. Therefore, the sustainability assessment could not be worth.

[8] "Because the interest rate on debt to private creditors can rise very sharply with the level of debt, a trajectory that may seem marginally sustainable according to standard calculations may in fact be much more problematic when debt intolerance is taken into account". Reinhart, Rogoff and Savastano (2003: 41),

[9] However, developing countries are, generally, treated as small economies that cannot alter the international market.

[10] According to Calvo and Reinhart (2002), the exchange rate volatility might be lower than the interest rate volatility because emerging market economies can suffer from the "fear of floating".

[11] It is very important to highlight that in order to avoid the dependence problem between explanatory and dependent variables, when the total external debt (herein Public and Publicly Guaranteed Debt) is related to GDP, the explanatory variables are used in their absolute values, such as Domestic Credit, Money M2 and Quasi-Money, Current Account, as well as combinations using these variables were calculated from their absolute values.

[12] According to Reinhart, Rogoff and Savastano (2003:13) "weak financial intermediation in many serial defaulters lowers their penalty to default". Then, domestic credit provided by banking system and/or market capitalization can actually offer us a proxy of financial intermediation in domestic monetary and financial systems.

[13] It is expected that low inflation and tight monetary policy is symptom of credible central banks.

[14] Average maturity represents the average maturity for all new public and publicly guaranteed loans contracted during the year. To obtain the average, the maturity for all public and publicly guaranteed loans has been weighted by the amounts of the loans. Public debt is an external obligation of a public debtor, including the national government, a political subdivision (or an agency of either), and autonomous public bodies. Publicly guaranteed debt is an external obligation of a private debtor that is guaranteed for repayment by a public entity. (Global Development Finance: World Bank, 2004).

[15] Interest rate represents the average interest rate on all new public and publicly guaranteed loans contracted during the year. To obtain the average, the interest rates for all public and publicly guaranteed loans have been weighted by the amounts of the loans. (Global Development Finance: World Bank, 2004).

[16] The percentage of external long-term debt contracted in U.S. dollars for the low- and middle-income countries. Long-term external debt is defined as debt that has an original or extended maturity of more than one year and that is owed to nonresidents and repayable in foreign currency, goods, or services. (Global Development Finance: World Bank, 2004).

[17] It was used *De Facto* Exchange Rate Regimes classification provided by Bulbula & Ókter-Rube (2002). According to this classification a country can be ranked from 1 (Another currency as legal tender) to 13 (independently floating). As the dataset ends in 2001, estimations with the variable exchange rate regimes used data from 1990 to 2001.

[18] Annex 2 shows box-plot of the main variables used in our estimations.

[19] FE transformation subtracts each unit's average value from each observation and, consequently, each transformed value of the lagged dependent variable for that unit involves all the error terms associated with that unit, and so is contemporaneously correlated with the transformed error. Things are even worse for RE because a unit's random intercept appears directly as an element of the composite error term as a determinant of the lagged value of the dependent variable.

[20] It is important to highlight that unit root tests were run, but not reported for convenience. They are available upon request.

[21] Three different data were collected in order to catch on the size and the development level (financial intermediation) of the monetary-financial systems across countries. On one hand, concerning with the monetary system, there are the variables: the domestic credit (or scaled to GDP) and the M2 to GDP (or only M2); on the other hand, to take into account the financial system level there is the market capitalization (or scaled to GDP) provided by Standard and Poor's. Afterwards, the mixed variable "Monetary and Financial System" was calculated by multiplying domestic credit with market capitalization. The author believes that the variable M2 to GDP (or only M2) can also be used as the proxy of monetary policy, but we would rather use only Inflation (or variance of inflation) because monetary market equilibrium can be fairly expressed by the inflation.

[22] The more difficult issue with these estimations is in considering the problem of causality mainly when involving variables such as debt, maturity structure, denomination and interest rate. There is a natural tendency to believe that high interest rate (low maturity or foreign-currency-denominated debt) paid as debt obligations is caused by the debt amount and, at the same time, high interest rates (low maturity or foreign-currency-denominated debt) cause enlargement in the debt. This discussion became popular in several economies that default their domestic debt or had presented high default probability, such as Brazil and Argentina. Some authors could prove that each hit in the interest rate in order to smooth the capital inflows caused enlargement in domestic debt and hence stressed the investors to ask for a higher interest rate to keep domestic t-bills in their portfolios. At first glance, the simple way to test the potential bi-directional causality is to run the equations by OLS taking all variables as endogenous and using lagged variables as regressors. This could allow us to test whether, after by controlling for past y, past x helps to forecast y_t, which is widely known as Granger causality. However, Finkel (1995) indicated the limits of OLS regression and because of the problem of "reciprocal causation" it would be highly recommended to use "instrumental variables" or Two Stage Least Squares analysis, even panel designs are a powerful means of estimating reciprocal causal effects. Others problems come up while we are deciding about the "instrumental variables" (Wooldridge, 2002). But, most importantly, even dynamic panel designs are concerned *only* with taking into account the lagged *dependent* variable, but our problem when we are talking about causality is not definitely addressed to estimate autocorrelation model (see Hsiao, 1995:chapter 4).