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An Ability-to-Pay Approach to Foreign Debt Burden

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Abstract

In this paper has been proposed a solvency-sustainability concept based on a "modified" ability to pay criterion, that avoid the looseness of the traditional solvency condition. Specifically, we have taken into explicit consideration the presence of liquidity constraints and/or of precautionary motives to save, that constraint the saving capacity of the economy, because the saving profile is, to some extent, forced to follow the current income time evolution. As a result, poor countries with more fragile financial markets, and more exposed to the world business cycle (uncertainty) may fail to met debt discipline objectives on a pure ability to pay basis. We have derived a precise theoretical formulation of this intuition, conditioned on specific debt disciplines, that have been employed to evaluate the observed external debt position of several groups of countries. Our conclusion is that, the presence of relevant liquidity constraints can really make the difference between sustainability and non sustainability of a given stock of foreign debt

Keywords:external debt, ability to pay, liquidity constraints, sustainability.

1 Introduction

Theoretical effort aimed at deriving "early warning signals" is a crucial issue as far as the empirical assessments about external debt solvency and current account sustainability are considered. Traditionally, the notion of solvency refers to the economy's present value budget constraint. According to this intertemporal approach a country is solvent as long as the present value of its future trade balances does not exceeds its current level of external indebtedness. This solvency criterion implies that, the stock of foreign debt can grow without limits as long as it does not increase faster than the real interest rate. As stressed by several scholars[1], this solvency criterion is too loose to serve any practical purpose. Indeed, virtually any path of future trade surpluses may support the sustainability of the observed stock of external debt. As pointed out by many authors, the weakness of the above notion of solvency depends on the fact that the intertemporal budget constraint approach evaluates the current level of indebtedness on an *ability to pay* basis only, and ignores *willingness to pay* issues, that may constitute the relevant binding constraint on debt repayments[2]. Under this perspective, independently of any ability to pay or liquidity considerations, debtors may optimally choose to default in their debt contracts, if the expected payoff from repudiation exceeds the payoff of preserving the credit relationship. This leads to a stricter notion of sustainability, as it can include several social, political and institutional factors relevant for the evaluation of a country's default risk: education and health system, law and order, bureaucracy quality, corruption, political stability, risk of revolution and so on[3].

Despite the criticism to the traditional notion of solvency, in the present paper, we reconsider the ability to pay criterion in the light of a very simple question: "why do under-developed countries suffer from a greater debt vulnerability than developed countries?" and "why rich countries can sustain persistent current account deficits, while negative trade balances in poor countries are likely to be considered as early warning signals?". In a willingness to pay perspective the answer is that, contrary to poor countries, richer economies operate in a more stable institutional environment and

[1] See for example Milesi-Ferretti and Razin (1996a) and Cashin and McDermott (1998).
[2] For criticism to the "ability to pay " approach see Fafchamps (1996), Calvo (1996) and Rogoff (1992).
[3] Since the contribution of Eaton and Gersovitz (1981), a large variety of papers have adopted a willingness to pay perspective to explain the observed episodes of external crises Eaton, Gersovitz, and

within a more integrated international network of economic and political relationships. This reduces the default risk and the incentive to debt repudiation. To introduce our argument, we first notice that the relevance of any willingness to pay consideration depends on the implicit assumption that the ability to pay requirements are met. However, the usual ability to pay criterion relies on a solvency condition that constraints in the limit the economy to not run a Ponzi game debt rescheduling. To serve any practical purpose, therefore, the traditional notion of solvency should be restricted to a shorter time horizon. The idea of the paper is precisely based on a period-per-period ability to pay. The key question is of the type: "given the current level of debt and trade balance, would the country been able to generate the additional saving required to stabilize debt next period?". We think that, the answer can substantially differ considering rich and poor countries. Indeed, the saving capacity of a country depends fundamentally on the degree of development of the financial markets and on the efficiency of the labor market. The presence of liquidity constraints can determine a relevant fraction of population that save according to their current income levels, thus not incorporating any intertemporal consumption smoothing approach. Inefficient labor markets can increase uncertainty about future income levels, that may induce precautionary motives to saving. In poor and developing countries these market institutions are characterized by a degree of evolution considerably lower than developed and industrialized economies. Moreover, in very poor economies, a relevant fraction of population may suffer within a subsistence or even an under-subsistence level, which makes the propensity to save equals to zero. These considerations point out that the private sector capacity to generate additional saving in less developed countries may be seriously prevented by the presence of relevant liquidity constraints and/or precautionary motives to save. On the other side, low levels of domestic saving accompanied by high profitability of internal investment projects seem a "natural" starting-point condition of low and low-middle income countries trying for a successful process of economic development. Therefore, external debt is the endogenous outcome of economies starting a process of convergence to higher stages of development. Indeed, the presence of liquidity constraints and/or of precautionary motives to save can

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Stiglitz, (1986), Eichengreen and Lindert (eds.) (1989), Milesi-Ferretti and Razin (1996a,b),

determine a relevant fraction of individuals, whose consumption behaviour does not incorporate the intertemporal solvency condition. In other words, if consumption depends on current income, then this static decision rule completely fails to consider the current debt level in terms of higher saving in some future time. As a result, the fact that the time evolution of consumption (and hence of saving) cannot be entirely consistent with the debt dynamics, makes these countries' external debt management more problematic.

Our argument offers the following intuition for the vulnerability of the external indebtedness in developing and poor countries: the low private sector capacity to generate saving in excess of investment, due to the presence of a relevant fraction of population that plan their consumption expenditure on a static basis according to their current income levels. To obtain testable predictions, in the next section we work out the theoretical formulation of our ability to pay concept. The idea is simple. We incorporate in the dynamic budget constraint a simple behavioural consumption rule, according to which a given fraction of total consumption does not obey the Permanent Income Hypothesis, but follows closely the current income profile. We consider two debt disciplines. The first aims at stabilizing the stock of debt, the second the stock of debt per unit of output. Conditioning on a specific debt discipline, we proceed in two directions. First we derive the theoretical growth rate able to generate the trade balance surplus, required to met the given debt discipline between two consecutive periods. Within this context, we show that the theoretical growth rate is strictly increasing in the fraction of total consumption that follow the “keynesian” rule. Second, we propose an alternative exercise, where we derive the stock of debt in the current period, that enables the country to met a given debt discipline in the next period. Substituting this theoretical value in the intertemporal budget constraint, we obtain the limit value of debt, i.e. the maximum stock of debt/GDP that the country can sustain in the long run. In section 3 and 4 we propose two empirical applications. The first simulation exercise considers several groups of countries and compares the observed debt figures between 1970 and 2003, with the theoretical debt ceilings. Our findings show considerable variability across areas. For example, the South and East Asia average debt figures appears

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Thomas(1996), Corsetti, Pesenti and Rubini (1998,b) and Arellano and Mendoza (2002).

absolutely safe according to our ability to pay criterion, while Sub Sahara Africa debt figures appear decidedly unsustainable in the middle-long run. The second simulation exercise evaluates the actual growth performance of a selected HIPC African countries compared to the simulated time series of growth rates. The simulation shows that, despite the debt relief program, several countries haven't be able to reach safer debt levels yet. Section 5 resumes and concludes.

2 Theoretical formulation of the Ability-to-pay Criterion

Over the past two decades the permanent income hypothesis due to Friedman (1957) has been challenged by a large body of literature, which stresses the importance of current income in explaining the observed pattern of aggregate consumption (Hall and Mishkin; 1982, Flavin; 1985, Hayashi; 1985, Jappelli and Pagano; 1989, Campbell and Mankiw; 1991). The excess sensitivity of consumption to transitory movements of income has been considered evidence of capital market imperfections. The presence of relevant liquidity constraints prevents rational consumers from optimally smooth their consumption path. As a result, observed consumption track "too close" the pattern of disposable income. Foe example, Jappelli and Pagano (1989), considering a small sample of developed countries, do conclude that, among the factors that can invalidate the permanent income assumption, the excess sensitivity of consumption mainly reflects credit market imperfections.

However, it should be remarked that other factors, departing from the traditional Hall (1978) set-up, can account for the excess sensitivity evidence. In particular, the assumption that consumers behave according to the rational expectation hypothesis cannot be taken for granted, especially when low and less developed countries are considered. Actually, the rational formation of expectations requires both information and processing ability. Particularly in developing and low income countries the access to information (media, newspapers, internet, …) may be precluded to a relevant share of population. Moreover, in poor countries many people may lack the basic knowledge and human capital required to the purpose of having a sensible view of what is going to happen in the future.

In the present context, we employ a standard model due to (Jappelli and Pagano; 1989) and (Campbell and Mankiw; 1992) among others. In its simplest formulation it considers total consumption as a weighted average between consumers who behave according to the Permanet Income Hypothesis (PIH) and consumers who follow their current income. Given (1 - λ) the fraction of consumers obeying the PHI, the assumed consumption function is:

$$C_t = \lambda Y_t + (1-\lambda) YP_t$$

where *C* is aggregate consumption, *Y* disposable income and *YP* the permanent income. Assuming a certainty perspective, *YP* is constant. Therefore, the change of current consumption between periods is simply given by:

$$\Delta C_t = \lambda \Delta Y_t \qquad [1]$$

Following the interpretation of the cited literature, lambda represents the fraction of total consumers, that cannot obey the PIH. This may reflect the presence of liquidity constraints, i.e. the impossibility to borrow at the prevailing market conditions, and the tendency of individuals to predict the evolution of the market conditions according to the adaptive expectation rule. In the present context the importance of λ relates to the existing evidence, which reports significantly lower estimates of lambda for high income countries, compared to less developed economies. For example, Vaidyanathan (1993) finds that the λ parameter range from 0.8 and higher for the African economies, and drops to 0.4 for the OECD countries.

Our model strategy consists of including the decision rule described by equation [1] in the definition of debt burden, and then conditioning the resulting debt-sustainable trade balance policy on specific values of λ.

Let the economy's dynamic budget constraint for period *t* given by:

$$B_t - B_{t-1} = -CA_t = -Y_t + C_t + I_t + G_t + rB_{t-1} \qquad [2]$$

with B_t representing the stock of external debt at the end of t, CA_t the current account, Y_t, C_t, I_t, G_t, output, consumption, investment and public spending at time t respectively, and r the (constant) world rate of interest. An over-simplified version of our model can be derived assuming no uncertainty and holding constant I_t and G_t. Given [1], this allows to write the trade balance difference ΔTB_t between t and t-1 as:

$$\Delta TB_t = \Delta Y_t - \Delta C_t = (1 - \lambda)\Delta Y_t \qquad [3]$$

We consider now two different debt disciplines. The first refers to the feasibility of a policy aimed at maintaining a constant stock of debt over time. The second takes into consideration the less severe objective of stabilizing the ratio of debt over GDP.

We start analysing the first discipline. The trade balance surplus to be generated in period t as to keep a constant stock of debt is:

$$TB_t = rB_{t-1} \quad \rightarrow \quad \Delta B_t = B_t - B_{t-1} = 0 \qquad [4]$$

Given -$TB_{t-1}=B_{t-1} -(1+r)\ B_{t-2}$ and $TB_t=rB_{t-1}$, the trade balance between t and t-1 equals to:

$$\Delta TB_t = (1+r)\Delta B_{t-1} = -(1+r)CA_{t-1} \qquad [5]$$

which, with the behavioural assumption concerning consumption (equation [3]) reduces to:

$$(1-\lambda)\Delta Y_t = -(1+r)CA_{t-1} \qquad [6]$$

Dividing both sides of [6] by Y_{t-1} obtains:

$$(1-\lambda)\gamma_t = -(1+r)\mu_{t-1} \ ; \ \gamma_t \equiv \frac{\Delta Y_t}{Y_{t-1}} \ ; \ \mu_t \equiv \frac{CA_t}{Y_t} \qquad [7]$$

Equation [6] represents our testable relation under two different perspectives: in terms of "growth rate floor", and in terms of Debt/GDP ceiling. In the first sense we derive the output growth rate consistent with the objective of a stabilized debt, given the observed value of $\mu_{t-1}<0$:

$$\gamma_t = -\frac{1+r}{1-\lambda}\mu_{t-1} \qquad [8]$$

γ_t depends crucially on λ. The higher is λ the higher is the growth rate able to generate the required trade balance surplus for a constant level of B. Therefore, other things being equal, poor countries, which are characterized by values of λ around 0.8, must grow more than three time faster than rich countries to achieve the same goal of $\Delta B_t=0$. In other words, from the standpoint of international creditors, [8] answers the following question: "if the country were willing to hold constant the stock of debt given the observed current account deficit, what income growth rate would it have to be able to generate next period?"

Setting $\lambda=0$ we derive a growth rate floor, i.e. the lowest growth rate consistent with the $\Delta B_t=0$:

$$\gamma_t^* = -(1+r)\mu_{t-1} \qquad [9]$$

If the observed growth rate is lower than γ^*, than the country is entering a default situation, because it can't sustain the $\Delta B_t=0$ objective even if its development process would jump to a zero lambda value. Therefore, given our limit value of γ^*, we can set three different situations:

(i) the observed growth rate (g_t) is higher than γ_t. In this case the debt burden is perfectly sustainable.

(ii) $\gamma^* < g_t < \gamma_t$. The country is, in fact, unable to sustain a constant debt over time. Anyway, under the condition that lambda will decrease due to the effectiveness of its process of economic development, the goal might by affordable in the future.

(iii) $g_t < \gamma^*$. This represents a default situation.

To gain interpretation along the debt-ceiling perspective, consider again condition [4]. Reversing our previous reasoning [4] says that $B_t=TB_{t+1}/r$ is the stock of debt in t, that, given TB_{t+1}, enables to achieve the $\Delta B_{t+1}=0$ objective in $t+1$. Taking differences and applying [3] we get:

$$B_t = \frac{1-\lambda}{1+r}\Delta Y_{t+1} + B_{t-1} \qquad [10]$$

Condition [10] says that, if the country wishes to stabilize debt in $t+1$, then in t it can be generated additional debt in excess of B_{t-1}, depending on λ, r, and the output increase between $t+1$ and t (note that, if $\lambda=1$, then necessary condition for $\Delta B_{t+1}=0$ is that the stock of debt is stabilized the period before). Rewriting [10] in terms of debt per units of output we get the highest level of the debt/GDP (β), that the country can generate in any period T , in order to keep constant the stock of debt between $T+1$ and T, given the observed growth performance in T and $T+1$ and the actual debt/GDP ratio in period $t=0$:

$$\beta_T = \frac{(1-\lambda)}{1+r} g_{T+1} + \frac{1}{1+g_T}\beta_{T-1} \qquad ;\beta_{-1} = b_{t=0} \qquad [11]$$

which, solved recursively forward gives:

$$\beta_T = \frac{(1-\lambda)}{(1+r)}\left[g_{T+1} + \sum_{s=1}^{T} R_s g_{T+1-s} \right] + \frac{b_{t=0}}{1+g_0} R_T \; ; \qquad R_s = \left[\prod_{i=1}^{s} (1+g_{T+1-i}) \right]^{-1} \qquad [12]$$

Starting from any initial stock of debt per output units, the benchmark value of B/Y at time T consistent with the $\Delta B_{T+1}=0$ objective, depends negatively on λ and r and

positively on the next period growth rate and on the discounted sum of the entire sequence of current and past rates of output growth.

Assuming a positive constant rate of growth in the long run, β converges to its steady state value:

$$\beta^* = (1-\lambda)\frac{1+g}{1+r} \qquad [13]$$

Condition [13] shows the long run implication of condition [10] over the potential time evolution of B/Y. It says that, if the country, starting from any initial stock of debt brings about the debt discipline described by [10], then it will end up with a steady state debt/GDP ratio given by [13].

Conditioning on different values of λ, [13] offer a possible answer to one of the questions that opened our paper, namely why rich countries can sustain higher debt stocks than less developed countries. Assuming $g=r$, developed countries can sustain in the long run a debt stock amounting to the 60% of GDP (λ=0.4), whereas for poor economies it reduces to 20% of their national income (λ=0.8).

We now apply a similar procedure to the second debt discipline. To keep a constant level of *b* between *t* and *t-1* the trade balance must generate a surplus equal to the excess of interest payments over the growth rate:

$$TB_t = (r - g_t)B_{t-1} \qquad [14]$$

Then, given the consumption function in [1], the required trade balance variation between *t* and *t-1* gets:

$$(1-\lambda)\Delta Y_t = -(1+r)CA_{t-1} - g_t B_{t-1} \qquad [15]$$

We now proceed in a similar manner as before: we derive several possible scenarios conditioning equation [15] on extreme values for λ. The interpretation of results parallels the previously considered debt discipline. In terms of output growth rate floor we get:

$$\gamma_t = -(1+r)\frac{\mu_{t-1}}{1-\lambda+b_{t-1}} \qquad [16]$$

where, γ_t represents the output growth rate in t necessary to generate the additional private saving, if the country would be willing to keep constant the debt/GDP ratio between t and t-1.

From equation [16] we derive two benchmark values, when lambda is one and zero respectively:

$$(\lambda = 0) \qquad \gamma_t^* = -(1+r)\frac{\mu_{t-1}}{1+b_{t-1}} \qquad [17]$$

$$(\lambda = 1) \qquad \gamma_t^{'} = -(1+r)\frac{CA_{t-1}}{B_{t-1}} \qquad [18]$$

which allow to determine four possible situations with respect to the observed pattern of the growth rate:

(i) $g > \gamma'$. The country is absolutely safe, as it would be even if it would deteriorate to a unit value of lambda.

(ii) $g > \gamma$ The country's current growth performance is consistent with the objective of stabilizing the debt/GDP ratio.

(iii) $\gamma^* < g < \gamma$. The country is incurring a non-sustainable situation: the growth performance triggers an increasing b_t ratio.

(iv) $g < \gamma^*$. This describes a default situation: the country can't promise a stabilized ratio of debt over GDP.

Finally, we consider the above debt discipline under the "debt ceiling" perspective. Assume that at some t=0 the country would undertake the goal of stabilizing B/Y next period; at any $T>t$ the debt/GDP ratio consistent with a policy aimed at $\Delta b_{T+1}=0$ must obey the following condition:

$$\beta_T = \frac{(1-\lambda)}{(1+r-g_{T+1})} g_{T+1} + \frac{(1+r)}{(1+r-g_{T+1})(1+g_T)} \beta_{T-1} \;\; ; \quad \beta_{-1} = b_{t=0} \qquad [19]$$

which solved recursively gives:

$$\beta_T = \frac{1-\lambda}{1+r-g_{T+1}} \left[g_{T+1} \sum_{s=1}^{T} R_s g_{T+1-s} \right] + \frac{1+r}{1+g_0} R_T b_{t=0}$$

$$R_s = \left[\prod_{i=1}^{s} (1+r-g_{T+-i})(1+g_{T+1-i})(1+r)^{-i} \right]^{-1} \qquad [20]$$

The limit value β_T depends negatively on r and λ, and positively on the country's growth performance between *T+1* and *t=0*. Compared to [12] the discount factor applied to current and past output growth rates is lower, which implies a longer lasting memory of the past over the current debt sustainability situation.

Again, we derive the steady state value of β, conditioned on the debt discipline described by [15]:

$$\beta^* = (1-\lambda)\frac{1+g}{r-g} \qquad [21]$$

Independently from the relevance of the liquidity constraints (except for the λ=1 case), virtually any current level of debt per unit of output is consistent with the discipline of stabilizing the debt/GDP, provided that the country's growth rate is sufficiently close to the real interest rate.

Therefore, the asymptotic debt/GDP condition in [21] is too "large" to represent a meaningful benchmark reference to assess the sustainability of the observed debt path. The low practical applicability of the criterion in [21] reflects the looseness of the traditional notion of solvency, which relates to the economy's present value budget constraint. Under this criterion, the only requirement for intertemporal solvency is that the country cannot increase its external debt faster than the real interest rate. As a

consequence, with a interest rate greater than the growth rate the economy can run growing debt to GDP ratio, without violating solvency. It seems implausible that actual markets evaluate sustainability according to a pure solvency-ability-to-pay criterion, so we rely on the stricter criterion of the stabilization of the stock of debt, expressed in [13], to work out the empirical exercise.

3 Simulation I: the stock of external debt exercise

Our first exercise consists of employing the asymptotic level of debt/GDP derived from the first debt discipline (equation [12]), to evaluate the long run sustainability of the observed debt for several groups of countries. The countries considered are grouped according to the World Bank classification. They include: HIPC (Highly Indebted Poor Countries), Low Income, Low-Middle Income, Latin, Sub-Sahara, South Asia, Europe & Central Asia and East Asia. The data utilized are drawn from the World Bank *World Development Indicators* except for interest rate data, which has been taken from the IMF *International Finance Statistics*. Most of the lending, that industrialized countries have corresponded to developing economies consists of loans based on adjustable interest rates. This means that the interest rate would change as some key world interest rate changes. The interest rate commonly used is the LIBOR (London Interbank Offer Rate) adjusted with the average CPI inflation rate in industrial countries. We do not consider the spread over this reference rate, which relates to the specific country default risk perceived by the market. Therefore, the asymptotic stock of debt is obtained under the assumption that the country can borrow at the free risk market rate. This allows to compare observed and theoretical levels of debt/GDP, focusing only on the effect of the presence of liquidity constraints on the potential amount of private saving, that the county might generate.Simulation results appears in Table 1. Over three sub-sample periods (1970-1980, 1981-1993, 1994-2003), we report the average growth rate and the average of the observed (Debt/GDP) and simulated ($Debt/GDP^{*}$) debt per unit of output. This latter is calculated from [13], with g and r the average growth and the average real interest rate. For each set of countries lambda has been obtained as a weighted average of the estimates reported by Vaidyanathan (1993) and Censolo (1994, chapter 4). Starting from the seventies the historical evolution of the debt/GDP ratio shows a

similar pattern among the groups of countries considered (see Appendix 1). The debt/GDP is almost constant between 1970 and 1974. In 1973 the end of the Bretton Woods dollar-standard system coincided with the first two oil shocks in the 1970s. These events generated stagflation and high interest rates[4]. As a consequence, since 1974 the debt/GDP ratio started to grow. Further acceleration came from the early eighties oil shock. Except for the Low-Middle income countries, this trend has not reversed until the first 1992-1993, when the world interest rates started to decline, accompanied by the industrial world recovery from the early 1990's recession. However, despite these worldwide events are able to explain the time path of the debt/GDP ratio in less developed countries, they do not explain why some debtor countries suffered more than others the increased debt burden. Our empirical exercise offers a very simple and immediate view of the effect of specific country factors that can determine the degree of sustainability of the observed level of debt per unit of GDP. We recall the intuitive interpretation of [13]; β in [13] represents the maximum level of debt/GDP that a country can consistently run in the long term under the constraint that the private sector is potentially able to generate the required saving as to keep constant the level of debt per unit of output. Given that g and r are roughly equal, the ratio $(1+g)/(1+r)$ in [12] is close to one. Thus, the value of the asymptotic debt β crucially reflects the presence of liquidity constraints and/or precautionary saving motives, which are captured through the lambda parameter. The estimated average λ varies considerably across areas, ranging from 0.36 for the "East Asia" country group, to 0.88 for the "Low Income" area. This implies that the "East Asia" area can sustain in the long run level of debt/GDP up to 0.64 or, while the "Low Income" area displays a much greater vulnerability, as the highest level of debt/GDP the private saving is capable to sustain amount to 12 percent of output. Table 1 shows the simulation results.

[4] Several studies have tested the empirical relevance of the world interest rate shocks in explaining the current account deterioration experienced by developing countries. See, for example Kahn and Knight (1983), and Calderon *et al*. (2002).

i) Except for "Latin", for which the debt/GDP has dropped from an average 46% over the period 1981-1993 to a 38% over the last decade, all other areas have experienced a growing debt/GDP over time.

ii) The time evolution of debt/GDP differs substantially among areas; specifically, it seems that the shocks, that hurt the world economy in the seventies and early eighties, speeded up in the following decade the growth of the debt/GDP in "Low Income", Latin" and "Sub Sahara" (and probably "HIPC"), while debt/GDP in other areas didn't move away from the trend observed in the previous decade. Considering the first set of country-groups, the debt has increased from an average 20% in terms of GDP in the 1970's to a 50% in the following decade, while, "Low-Middle Income", "South Asia" and "East Asia" have experienced much more modest increases.

As far as the limit values of debt per unit of output are concerned (debt/GDP*) we remark the following:

Table 1

	HIPC (λ=0.84)				**Low Income (λ=0.88)**		
	growth	*Debt/GDP*	*Debt/GDP**		*growth*	*Debt/GDP*	*Debt/GDP**
70 - 80			0.1598405	*70 - 80*	0.00863	0.215762	0.121142
81 - 93	-0.010887	0.9404923	0.1524813	*81 - 93*	0.013683	0.528841	0.11701
94 - 03	0.012763	1.097074	0.1583588	*94 - 03*	0.024727	0.659756	0.120016
	Latin (λ=0.7)				**Low Middle Income (λ=0.75)**		
	growth	*Debt/GDP*	*Debt/GDP**		*growth*	*Debt/GDP*	*Debt/GDP**
70 - 80	0.029313	0.246324	0.308578	*70 - 80*	0.039156	0.107142	0.260005
81 - 93	-0.00725	0.461857	0.286546	*81 - 93*	0.007701	0.238638	0.242325
94 - 03	0.002313	0.381421	0.292529	*94 - 03*	0.022732	0.315225	0.2494
	Sub Sahara (λ=0.88)				**South Asia λ=(0.53)**		
	growth	*Debt/GDP*	*Debt/GDP**		*growth*	*Debt/GDP*	*Debt/GDP**
70 - 80	0.013076	0.166577	0.121634	*70 - 80*	0.007337	0.16381	0.472945
81 - 93	-0.01506	0.511098	0.113679	*81 - 93*	0.02737	0.266926	0.464491
94 - 03	0.00237	0.669344	0.117465	*94 - 03*	0.03223	0.281794	0.473164
	Europe Central Asia (λ=0.65)				**East Asia (λ=0.36)**		
	growth	*Debt/GDP*	*Debt/GDP**		*growth*	*Debt/GDP*	*Debt/GDP**
70 - 80			0.349651	*70 - 80*	0.044785	0.099703	0.669499
81 - 93	-0.06003	0.231029	0.330332	*81 - 93*	0.053304	0.286876	0.64862
94 - 03	0.007762	0.437081	0.345686	*94 - 03*	0.056025	0.327259	0.656598

i) Different growth performance and interest rate changes do not alter significantly the theoretical debt/GDP ratio, which, mainly reflects the magnitude of the lambda parameter.

ii) Consistently with the view of World Bank and IMF, the HIPC external debt situation appears unsustainable according to our ability-to-pay criterion. These countries have reached between 1994 and 2003 a level of debt, that exceeds the level of total output, in front of theoretical debt/GDP ceiling of 15%. The unsustainability is even more serious in the light of the fact that a lambda parameter in line with the average value characterizing industrial countries (λ=0.35) would not be sufficing to bring the observed 100% level of debt/GDP within the safe 65% threshold ($\beta \approx (1-\lambda)=0.65$).

iii) Low Income and Sub Sahara debt figures appear decidedly unsustainable in the middle-long term. Reducing the level of lambda requires structural economic, social and cultural changes, that follow a virtuous development process. This takes time. Therefore, in the medium-short run with a 65% level of debt/GDP, these groups of countries are not able (even if the will to) to stabilize the stock of the existing debt. This implies that, to decrease the stock of debt, the government has to reduce substantially its fiscal deficit, and/or the country has to incur in a drastic currency devaluation.

iv) Low-Middle Income and Latin exhibit levels of debt/GDP (31% and 38%) slightly above their respective limit values (24% and 29%). Following our interpretation, the current levels of debt/GDP are not entirely consistent with the potential saving capacity of the private sector. Therefore, to stabilize the stock of debt in the short run requires a flow of additional saving provided by the public sector. However, a slight improvement in the internal credit markets, associated to a more stable macroeconomic environment, aimed at reducing uncertainty, might help in reducing the presence of liquidity constraint and/or the precautionary motives to save. Under these conditions, a lower lambda value could make the external debt safe on an ability to pay basis.

v) Europe and Central Asia show a debt/GDP, that has considerably increased over the last decade, averaging 0.43 between 1994 and 2003. This level of current debt exceeds the safe level by ten percentage points. Many countries within this group have started in the early 1990's a transition toward a market economy. However, if the convergence to the well-being standard of the richest European countries was too fast, compared to the fundamental changes in the economic and social structure necessary to support a reliable development process (i.e. lambda does not decrease proportionally), then the speeding up of the debt/GDP ratio in the next years could very soon determine a troublesome debt situation.

vi) South Asia and East Asia are absolutely safe according to our ability to pay criterion. The private sector saving capacity is enhanced by low values of lambda (0.53 and 0,36 respectively). Therefore, the countries are effectively able to stabilize the stock of debt if they will. With specific reference to the East Asia region, the figures in Table [1] suggest that the financial crisis of 1997-1998 did not occurred because of a deterioration of the fundamentals related to the countries ability to pay, but rather to a panic wave, that fled over domestic and international investors (Radelet and Sachs (1998)) and /or to "moral hazard" problems that relates to the willingness to pay (Corsetti, Pesenti and Roubini (1998a, 1998b).

3 Simulation II: the current account sustainability

The second simulation exercise evaluates the actual growth performance of a selected group of countries compared to a simulated time series of growth rates, obtained under the constraint of a specific debt discipline. In section 2 we derived a theoretical growth rate, that answers the following question "given the objective to stabilize the stock of external debt (or alternatively the stock of debt per unit of output), what would the economy's growth rate to be, so that the private sector was able to generate the required additional saving?". Specifically, the answer refers to two distinct debt policy rules. The first constraints the simulated growth rate to be consistent with the strict objective of

stabilizing the stock of debt. The second conditions the debt discipline to keep constant the stock of debt per unit of output. We showed that, given the world interest rate, in both cases the needed growth performance reflect mainly the past current account evolution and the presence of liquidity constraints.

We apply the simulation procedure suggested in [8] and [16] to evaluate the growth performance of a selected group of HIPC countries. The ability to pay criterion implicit in [8] and [16] refers to the capacity of the private sector to generate additional saving. Differently from the previous empirical exercise, we calculate the theoretical growth rate given the actual current account per unit of GDP observed in the previous period, the current interest rate, and the lambda parameter. The interest rate employed is assumed as before the real LIBOR as a proxy of the world credit market conditions. The lambda parameter is the average for the HIPC's, λ=0.85. The countries taken into consideration are: Benin, Congo, Cote d'Ivoire, Ghana, Madagascar, Malawi, Rwanda and Sudan. In particular, given λ=0.85 and an average negative current account of about 5% of GDP, the implied growth rate consistent with a constant stock of debt exceeds 30%. Therefore, for the HIPC countries taken into examination the objective of stabilizing the external debt appears completely unattainable. Following the proposed notion of ability to pay, we might say that, given the observed pattern of the current account as a percentage of the GDP, the private sector is totally unable to generate the additional saving as to keep constant the stock of debt. This objective, therefore, relies on a drastic fiscal policy restriction. It should be stressed, however, that, given the high lambda value, a reduction in the fiscal deficit aimed at increasing the public saving could reduce the saving of the private sector, through a Keynesian mechanism, thus even deteriorating the sustainability of the observed debt according to our ability to pay criterion. These consideration defend and explain the HIPC initiative undertaken by the World Bank and IMF in the fall of 1996, in the sense that, there was nothing these countries could effectively do for a debt stabilization. Therefore we focus our attention on the weaker notion of sustainability in terms of a stabilized debt/GDP ratio, to evaluate the effects of the debt relief program enjoyed by the countries considered.

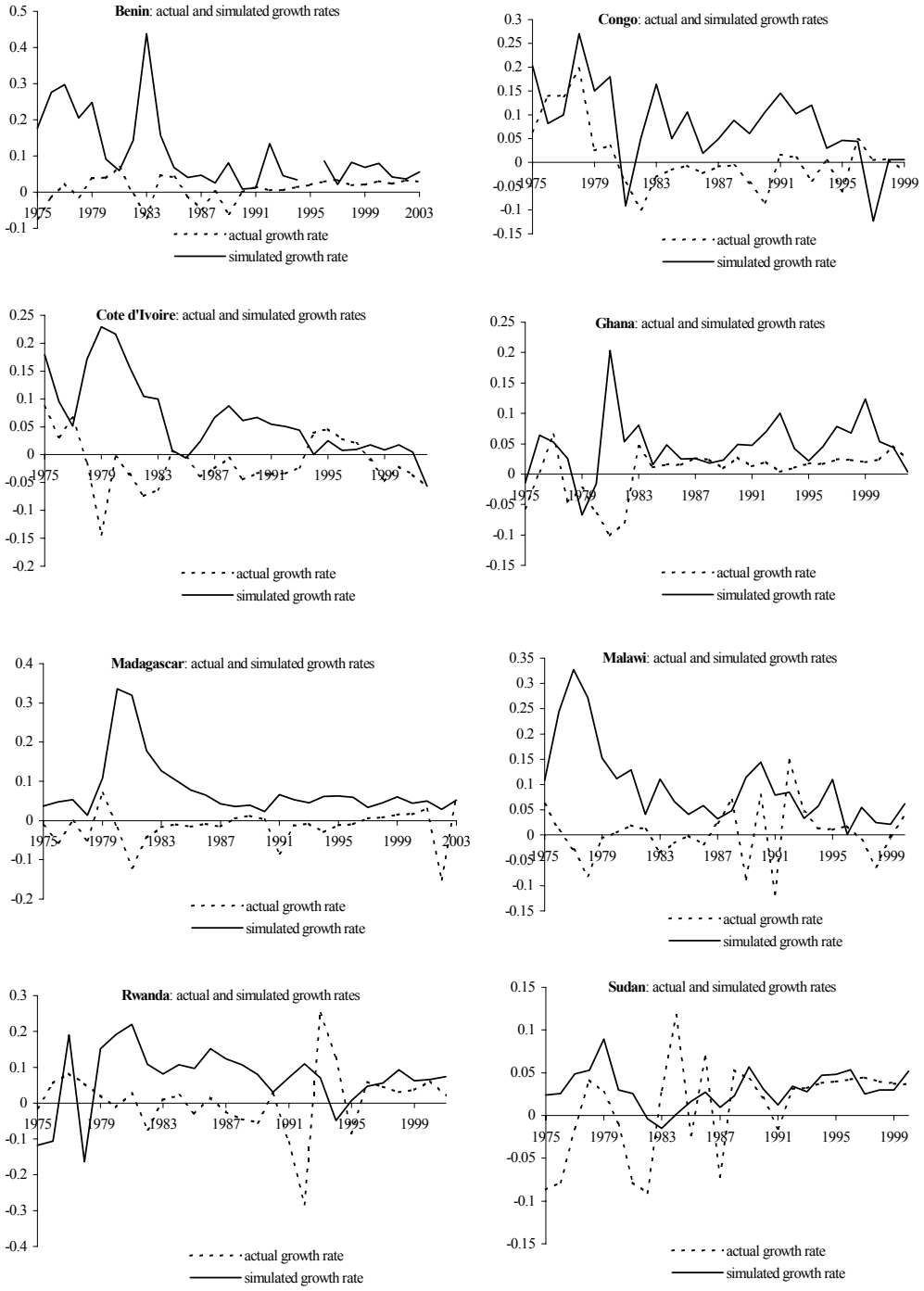


Figure 1

Figure 1 shows the actual growth rate (solid line) and the simulated growth rate (dotted line) computed according to [16], over the sample 1975-2003, for each of the considered countries. The general plot indicates an overall unsustainability of the current account position; i.e. on average the observed growth performance lies below the theoretical growth rate that should have been generated in order to keep constant the stock of debt per unit of. In particular, the simulated growth rate has been relevantly high for most countries in the seventies and early eighties, and to a lower extent in the

early 90's. This suggests that, the three consecutive oils shocks (1973, 1976, 1981) and the consequent world recessions, as well as the early nineties world slowdown have played a major role in determining the condition of the external sustainability. The second fact emerging from Picture 1 is that since the early eighties the distance between simulated and actual growth rate has reduced, with probably some effect due to the 1996 HIPC debt relief program. In this respect, the country performance seems to vary considerably. To see this we propose in Figure 2 the difference between actual and simulated growth rate and an interpolating regression line to highlight the time trend.

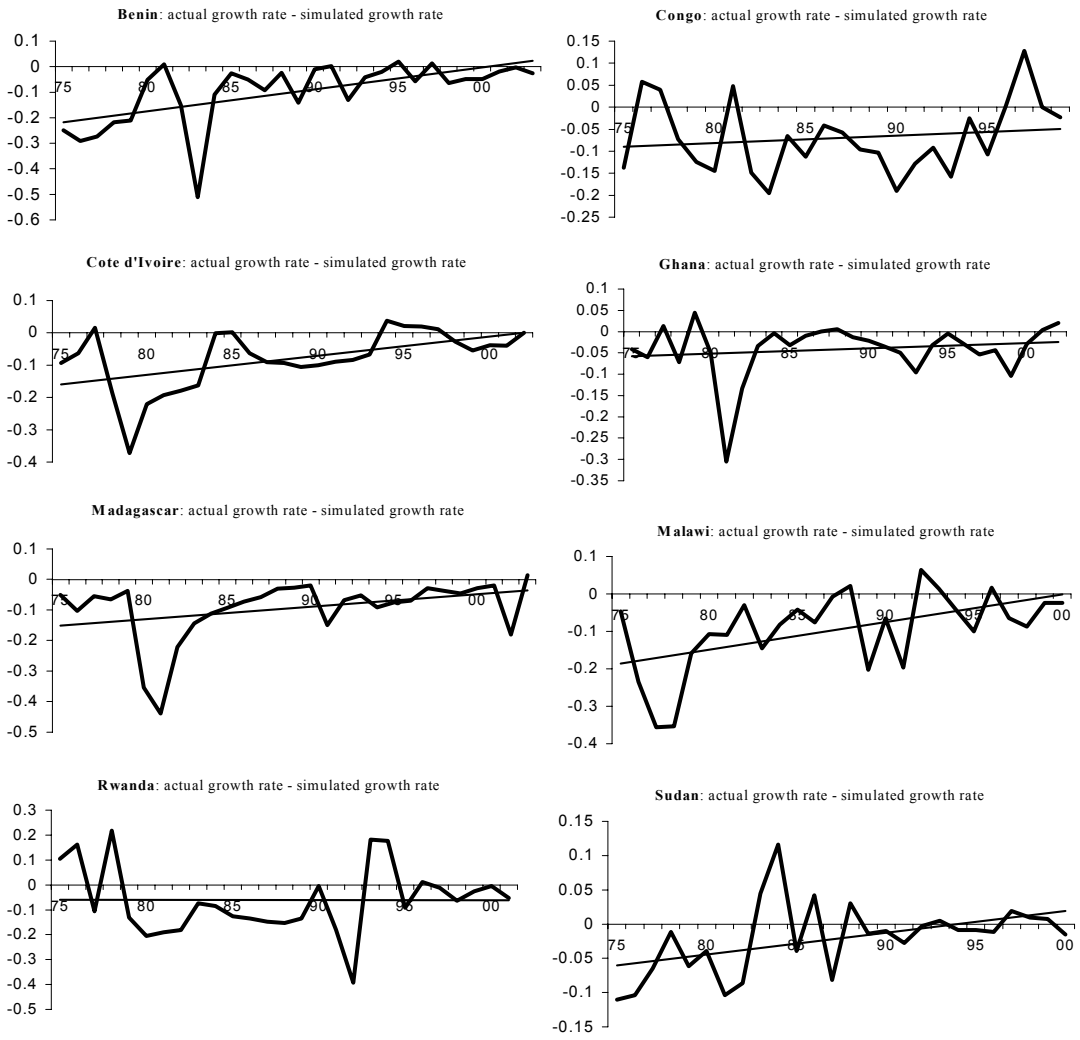


Figure 2

As it is clear, just three countries have reached a "safe" growth rate after the 1996: Congo, Malawi and, to a minor extent, Madagascar. Other countries, Benin, Cote

d'Ivoire and Sudan, show an increasing trend, that might lead to the reasonable expectation of a safer growth performance in the next future. Finally, observing the regression line, it is evident that countries such that Rwanda and Ghana, does not show any tendency to reverse the sign of the difference between actual and simulated growth rate. For this set of countries, the debt relief program doesn't seem to have exerted any positive effect on growth, at least in the sense of reducing the external debt burden In this respect, this evidence is consistent with the ambiguous results reported in several papers, that investigated the relationship between external debt position and internal growth[5].

Finally, we consider the simulation exercise from a slightly different perspective. We divided the sample period into two sub-samples: 1975-1995, and 1996-2003. For each sub-sample we report in the Table 2, the correlation between actual and theoretical growth rate. The idea is that, a positive correlation indicates that the actual growth rate reacts in the "right" direction, in order to achieve a stabilized debt/GDP ratio.

Table 2

Correlation between actual and simulated growth rates								
	Benin	**Congo**	**Cote d'Ivoire**	**Ghana**	**Madagascar**	**Malawi**	**Rwanda**	**Sudan**
75-95	-0.27	0.54	-0.24	-0.11	-0.36	-0.23	-0.11	0.18
96-03	-0.50	-0.20	0.59	-0.14	0.60	0.16	-0.21	0.07

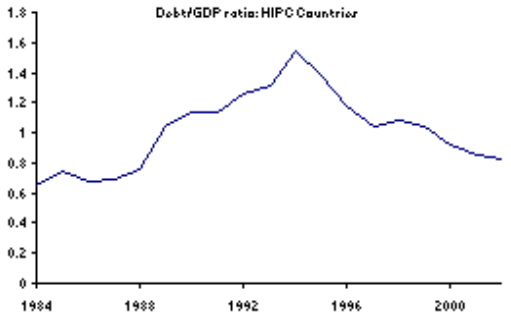
Under this respect, Cote d'Ivoire, Madagascar and Malawi show the best performance, indicating that, after joining the debt relief program, these countries have effectively improved their ability associate higher growth rates to current account deficits. This suggests that, the flow of imports has mainly concerned investments expenditures, enabling higher growth rates. Conversely, other countries, such that Benin, Ghana and Rwanda, show a negative correlation in the second sub-sample, which, in absolute value, exceeds the correlation values obtained for the first sub-sample period. For these countries, the observed dynamic of the growth rate following the HIPC program is not entirely consistent with the objective of a stabilized external debt.

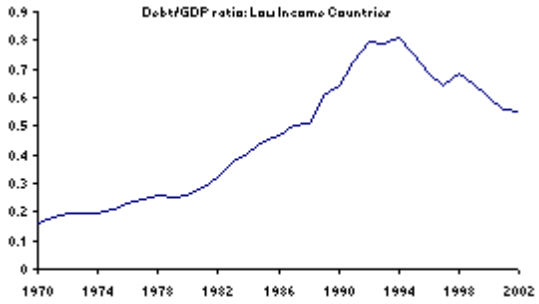
[5] Chowdhury (1994), considering a panel of asean countries, finds that the effect of external debt on GNP level is small. Bullow and Rogoff (1990) and Savvide (1992) claim that the external debt of developing countries is not a primary cause of economic slowdown. On the other side, Metwally and Tamaschke (1994) with a sample of african countries, and Levy and Chowdhury (1993), considering much broader country set, report that a rise in debt servicing negatively affects growth.

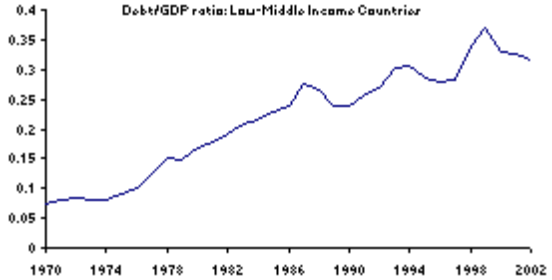
4 Conclusions

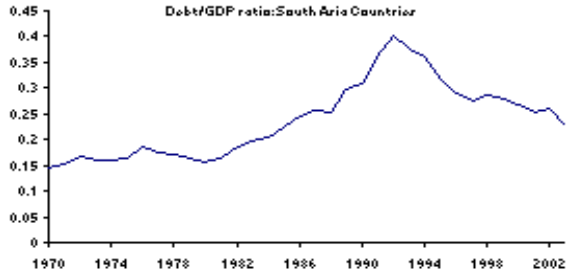
In this paper has been proposed a solvency-sustainability concept based on "modified" ability to pay criterion, that avoid the looseness of the traditional solvency condition. The key question to which our ability to pay notion give answer is the following: "given the current level of debt and trade balance, would the country be able to generate the additional saving required to stabilize debt next period?". The answer clearly depends on the saving function, that describe the behaviour of the private sector. Specifically, we have taken into explicit consideration the presence of liquidity constraints and/or of precautionary motives to save. These imperfections in the credit market (liquidity constraints) and in the labor market (labor income uncertainty, that induces precautionary saving) constraint the saving capacity of the economy, because the saving profile is, to some extent, forced to follow the current income time evolution. As a result, poor countries with more fragile financial markets, and more exposed to the world business cycle (uncertainty) may fail to met debt discipline objectives on a pure ability to pay basis. We have derived a precise theoretical formulation of this intuition, conditioned on specific debt disciplines, considering two different perspectives. The first refers to the theoretical growth rate consistent with a stabilized debt, the second derives the maximum debt level that a country can sustain in the long term. Both these approaches have been employed to evaluate the observed external debt position of several groups of countries. In this respect our conclusion is that, the presence of relevant liquidity constraints can really make the difference between sustainability and non sustainability of a given stock of foreign debt. For example, assuming that the fraction of total consumption that follows the "Keynesian" rule is around 80% in poor countries and 30% in rich countries, we get the prediction that, poor countries should grow four time faster than rich countries to sustain the same debt level, or that in the long run poor countries can end up with a maximum fraction stock of debt equals to the 20% of GDP, while rich countries can sustain up to a 70% debt/GDP ratio.

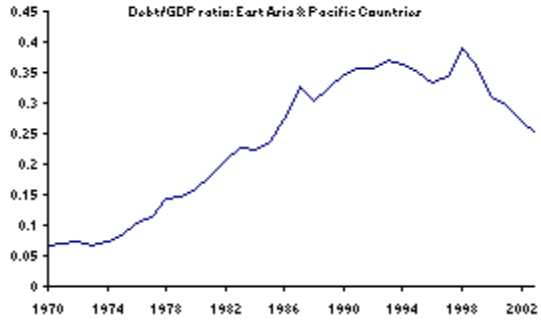
Appendix 1: External Debt/GDP ratios (Data source: World Bank: "World Development Indicators")











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