

Fiscal Sustainability and Fiscal Soundness*

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This paper tackles fiscal sustainability and fiscal soundness. In contrast to the existing literature, our analysis is in a general equilibrium framework. We obtain three results. First, we endogenize growth rate and interest rate, the two key rates for any study of fiscal sustainability; second, we illustrate that fiscal sustainability in general equilibrium should not be measured by a one-dimension indicator, e.g., debt-to-GDP ratio as in conventional studies, rather it is a line—a fiscal sustainability frontier—in two dimensions, namely, debt-to-GDP ratio and expenditure-to-GDP ratio; third, we obtain a novel and useful index of aggregate fiscal soundness.

Key Words: Fiscal sustainability; Sustainability frontier; Fiscal soundness.

JEL Classification Numbers: E62, E61, C61.

1. INTRODUCTION

While public debt is an important policy instrument that can be used by a government to better manage the economy, risk associated with high public debt has long been recognized by economists and policymakers in industrial and emerging market countries. For industrial countries, while debt ratios have generally declined in recent years, with the notable exception of Japan over the last decade and the U.S. in recent years, the need to strengthen fiscal positions and reduce public debt to accommodate the coming pressures of population aging has received considerable attention recently (see, among others, IMF, 2001). For emerging mar-

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ket economies, high public debt has often had more immediate and more painful consequences for economic performance, including resulting in debt crises and triggering banking and currency crises (Burnside et al., 2001 and Hemming et al., 2003). Standing in contrast to developments among the industrial countries, public debt in emerging market economies has risen sharply since the mid-1990s, with an average of about 70 percent of GDP in 2003. This increase in debt has more than reversed the decline that took place in the first half of the 1990s (IMF, 2003). A number of emerging market economies such as Argentina, Ecuador, Pakistan, Russia, Ukraine, and Uruguay, ended up with high profile and costly debt defaults or distressed debt restructuring.

These developments in emerging market economies have led many to wonder if these economies may once again be on the verge of serious public debt problems. In addition to this timely concern, two important fiscal issues stand up among the general policy and analytical concerns on fiscal policy by policymakers and economists. These issues are *fiscal sustainability*: is the fiscal path sustainable? and *fiscal soundness*: how much fiscal capacity is there to absorb shocks? The main objective of this paper are to tackle these two important issues.

It is a daunting task to examine whether a country's public debt is sustainable, because fiscal sustainability is inherently a question about the long term. For instance, is a debt to GDP ratio of 50 percent sustainable? What if the ratio hits 150 percent? While on average, a defaulter has a higher ratio of public debt to GDP and a higher debt-to-revenue ratio than a non-defaulter, the level of public debt at the time of default in emerging markets varies substantially, often it is quite low. For example, IMF (2003) reports that in 55 percent of the defaults recorded, public debt was below 60 percent of GDP in the year before the default, and in 35 percent of the cases the default occurred when public debt was below 40 percent of GDP. Nevertheless, not all emerging market economies have experienced debt crises even at a high debt ratio. A number of emerging market economies, e.g., India and Malaysia, have successfully managed to maintain relatively high public debt for a long period without a default, and Bulgaria has reduced its public debt ratio from close to 160 percent of GDP in the early 1990s to less than 60 percent of GDP in 2002 (IMF, 2003).

Traditional analysis to this question is usually partial equilibrium in nature, with both growth and interest rates exogenously given and with a focus on future primary surplus that is required to render the current debt-GDP ratio sustainable (see Balassone and Franco, 2000, and Chalk and Hemming, 2000 for literature survey). Fiscal sustainability is viewed from a one-dimension perspective, e.g., a debt-to-GDP ratio, such as the 60 percent rule defined in the Stability and Growth Pact (SGP) that was

adopted in the euro area before the adoption of the euro but substantially weakened recently.

In this paper, we tackle the issue of fiscal sustainability in a general equilibrium framework, in which both growth and interest rates are endogenously determined. In our endogenous growth model, the government is assumed to be benevolent and shares the same preferences as the representative agent. We illustrate that fiscal sustainability in general equilibrium should not be measured by a one-dimension indicator, e.g., debt-to-GDP ratio, rather it is a line — a *fiscal sustainability frontier* — in two dimensions, namely debt-to-GDP ratio and expenditure-to-GDP ratio. The facts that defaults occurred in various levels of debt-to-GDP ratios and high levels of debt do not necessarily lead to fiscal crisis and may be sustainable pose challenge to the one dimensional characterization of this issue, but they are consistent with our two-dimensional characterization.

The necessity of a general equilibrium analysis is obvious. Any change in fiscal policy, especially a change in the tax rate, is likely to have an impact on growth, and on the real rate of interest if the country is largely closed or is important in size relative to the world economy. Fiscal sustainability analysis should take this impact into account. Saint Paul (1995) extends the Blanchard model (1985) to endogenous growth with overlapping generations in which fiscal policy can be studied. His focus, however, was on the effect of public debt on the welfare of current and future generations. Another candidate general equilibrium model could be Turnovsky (1997), which distinguishes private and public capital as in Glomm and Ravikumar (1994), Devarajan, Xie, and Zou (1998). The model we use in this paper is adapted from Xie (1991) for its simplicity.

Another challenging task, related to the first one, is to assess a country's fiscal soundness. Countries and international organizations, including the IMF, have been developing numerous indicators and conducting stress testing, and hope to use exercises to gauge fiscal vulnerability. While these exercises are helpful, sometimes these indicators move in different and even opposite directions, and the assumptions behind the stress testing are arbitrary, thus making it difficult to get a general sense of fiscal vulnerability.

We obtain a novel characterization of fiscal vulnerability, which gives rise to a new and useful *aggregate fiscal soundness index* (or vulnerability index, the other side of the coin). This index, which depends on initial debt-to-GDP ratio, the expenditure path, and the deep parameters affecting the real interest rate and growth rate, gives a notion of how deeply a fiscal position is inside the fiscal sustainability set. A fiscal position deeply inside the fiscal sustainability set indicates a high shock absorptive capacity and hence lower vulnerability. If the fiscal position is on the boundary of the sustainability set, the shock absorptive capacity has been fully exhausted, and a small shock can lead to a fiscally unsustainable path.

It is interesting to compare our approach to the three existing approaches to assessing debt sustainability. The first approach examines whether a government's debt stock exceeds the present discounted value of its expected future primary surpluses, but it treats the discount rate – the difference between the real interest rate and real output growth – as exogenous, often proxied by the difference between the real LIBOR interest rate plus a country-specific spread and the average real GDP growth. In our approach, the discount rate is endogenously determined by preferences and technology parameters as well as the tax rate. The second approach is to look at the relationship between fiscal policy instruments and the objectives of fiscal policy, i.e., to estimate fiscal policy “reaction functions.” This reduced-form approach lacks theoretical foundation and is therefore subject to Lucas critique.

The third approach (Buiter, 1985, Blanchard, 1990, and Blanchard et al., 1990) is to view fiscal policy as sustainable if it delivers a ratio of public debt to GDP that is stable, arriving at the notion of “debt stabilizing primary balance.” But as in the first approach, the real growth rate and the real interest rate on government debt are exogenously given. Moreover, the definition of sustainability, a constant debt-to-GDP ratio, is arbitrary (see also Kopits, 2001). In our case, rather than focusing on primary surplus, we analyze fiscal sustainability in general equilibrium and characterize it as a two-dimensional frontier defined on the balanced growth path while recognizing the limitation of the government's power to tax and the fact that the tax policy would have an impact on interest rate and growth rate.

The various weaknesses of the above three approaches to assessing debt sustainability lead Aiyagari and McGrattan (1998) to a pessimistic conclusion that the existing theory provides little practical guidance on debt sustainability. It is our hope that this paper contributes in filling this gap. In addition, our contributions to fiscal soundness and optimal fiscal adjustment are new to the literature and fiscal policy debate.

Our results also have important policy implications on fiscal sustainability and fiscal soundness, and call for a broad and sustained package of reforms. Among these reforms, tax and expenditure reforms are of high priority. In discussing the fiscal sustainability, we also highlight the limitation of government's power to tax, i.e., the Laffer curve. The fact that effective tax rates in emerging market economies are generally low suggests that tax avoidance and weak tax administration are serious issues (Mendoza et al., 1994), and thereby a strong Laffer curve effect.

The rest of the paper is organized as follows. Section 2 presents an endogenous growth model with a benevolent government, and obtains novel aggregate measurement of fiscal soundness. Section 3 derives a fiscal sustainability frontier on a balanced growth path. The frontier depicts the combination of debt-to-GDP ratio and expenditure-to-GDP ratio that is

sustainable when the tax revenue is at the maximum. A numerical example is used to illustrate that the sustainability frontier can be very steep, namely, a small increase in the expenditure-to-GDP ratio requires a significant reduction in debt-to-GDP ratio for the combination to remain sustainable. Section 4 concludes and briefly discusses operational issues.

2. A SIMPLE ENDOGENOUS GROWTH MODEL

For simplicity, the model we use is adapted from Xie (1991), and along the line of the endogenous growth literature (Romer 1986, 1990). We consider an economy with a continuum of identical agents situated in the interval $[0, 1]$. The representative agent has the standard preferences:

$$\int_0^\infty \frac{c_t^{1-\sigma} - 1}{1-\sigma} e^{-\rho t} dt, \quad (1)$$

where c_t is the flow of consumption and ρ is the rate of time preference. $\sigma > 0$ is the inverse of the intertemporal rate of substitution.

There is a continuum of identical firms. The representative firm has a technology described by

$$y = Ak^\alpha k_a^{1-\alpha}, \quad (2)$$

where A is constant, k is the capital-labor ratio in this firm, and k_a is the average capital-labor ratio in the economy, which captures the notion of positive externality. In equilibrium, since all firms are identical, we must have $k_a = k$. Hence in the aggregate we arrive at the AK model: $y = Ak$. The productivity parameter A is assumed to satisfy (i) $\alpha A > \rho$ and (ii) $(1-\sigma)\alpha A < \rho$. The former guarantees positive long term growth at a competitive equilibrium and the latter ensures that the equilibrium is well-defined.

Given the externality, the optimal fiscal policy that could lead to the first best outcome would be to subsidize production (or capital accumulation) and let the subsidy be financed by a lump-sum tax. In this paper, however, we assume that lump-sum tax is not available and the government, in need of financing the provision of public goods, has to obtain revenue from output tax. Let us denote the output tax rate at time t by τ_t . This output tax would (i) hurt the incentive to produce and (ii) prompt tax avoidance. We assume that a higher tax leads to more sophisticated use of tax shelter and the tax leakage, L , takes the form:

$$L = \gamma \tau^{1+l} A k^\alpha k_a^{1-\alpha}, \quad l > 0 \text{ and } \gamma > 0, \quad (3)$$

where parameter γ captures the institutional quality: lower γ means higher institutional quality and thus less opportunity for tax avoidance.

The reason for introducing the tax leakage assumption in our model and thereby highlighting the limitation of government's power to tax is to make it operational in empirical applications. Afterall, tax avoidance is prevalent in the real world and fiscal sustainability assessment for any particular country needs to take the tax leakage seriously.

Let x_t be the ratio of public expenditure to GDP, which we assume to be exogenous in this paper. There have been models in which x_t is treated endogenously, for example, in Turnvosky and Brock 1980 and Chamley 1985. But Xie (1997) found that this class of models suffers from a technical problem which is not yet resolved.

Before we establish a proposition on optimal tax policy, let us simplify the notation by defining the effective tax rate, $\tilde{\tau}(\tau)$, where $\tilde{\tau}(\tau) = \tau - \gamma\tau^{1+l}$ when $\tau > 0$; and $\tilde{\tau}(\tau) = \tau$ when $\tau \leq 0$. Note that the function $\tilde{\tau}(\tau) = \tau - \gamma\tau^{1+l}$ is hump-shaped (in the spirit of the Laffer curve) and attains the maximum when

$$\tau^* = \left[\frac{1}{(1+l)\gamma} \right]^{1/l}. \quad (4)$$

The government's initial level of debt is denoted by D_0 . Its flow budget constraint can be written as:

$$\dot{D} = r_t D_t + x_t A k_t - A k_t \tilde{\tau}_t \quad (5)$$

where r_t is the real rate of interest and $A k_t \tilde{\tau}_t$ is the effective tax revenue taking into account the tax leakage.

LEMMA 1. *The private sector's response to the government fiscal policy can be characterized as follows:*

$$\dot{c} = \frac{\alpha A(1 - \tilde{\tau}_t) - \rho}{\sigma} c_t \quad (6)$$

$$\dot{k} = A k_t(1 - x_t) - c_t \quad (7)$$

with boundary conditions k_0 given and $\lim_{t \rightarrow \infty} c_t^{-\sigma} k_t e^{-\rho t} = 0$.

Proof. Standard and omitted. Note that in equilibrium we have $k_a(t) = k_t$ and the equilibrium real interest rate is $r_t = \alpha A(1 - \tilde{\tau}_t)$. ■

DEFINITION 2.1. Given an initial debt level, D_0 , an expenditure-to-GDP path $\{x_t\}_0^\infty$ is sustainable if there exists a path of effective tax rate $\{\tilde{\tau}_t\}_0^\infty$ such that:

$$D_0 \leq \int_0^\infty (\tilde{\tau}_t - x_t) A k_t e^{-\int_0^t \alpha A(1 - \tilde{\tau}_s) ds} dt \quad (8)$$

where the path $\{k_t\}_0^\infty$ is the solution to (6), (7) and the boundary conditions. The set of all sustainable expenditure-to-GDP paths is denoted by $S(D_0)$.

PROPOSITION 1. *For any sustainable expenditure-to-GDP path $\{x_t\}_0^\infty \in S(D_0)$, the optimal effective tax rate is a bang-bang solution: $\tilde{\tau}_t = \tilde{\tau}^* = \tau^* - \gamma(\tau^*)^{1+l}$ for period $[0, T)$ and $\tilde{\tau}_t = \frac{\alpha-1}{\alpha} < 0$ for $t \geq T$, where T is the smallest positive real number such that:*

$$D_0 = \int_0^T (\tilde{\tau}^* - x_t) Ak_t e^{-r^*t} dt - e^{(A-r^*)T} \int_T^\infty \left(x_t - \frac{\alpha-1}{\alpha}\right) Ak_t e^{-At} dt$$

where $r^* = \alpha A(1 - \tilde{\tau}^*)$. If no such T exists, $\tilde{\tau}_t = \tilde{\tau}^*$ for all t and

$$D_0 = \int_0^\infty (\tilde{\tau}^* - x_t) Ak_t e^{-r^*t} dt \tag{9}$$

Proof. For given $\{x_t\}_0^\infty \in S(D_0)$, the optimal path of effective tax rate solves the following problem:

$$\max \int_0^\infty \frac{c_t^{1-\sigma} - 1}{1-\sigma} e^{-\rho t} dt$$

subject to (6), (7), the boundary conditions and

$$\dot{D} = \alpha A(1 - \tilde{\tau}_t)D_t + x_t Ak_t - Ak_t \tilde{\tau}_t \tag{10}$$

$$\frac{\alpha-1}{\alpha} \leq \tilde{\tau}_t \leq \tilde{\tau}^* \tag{11}$$

Note that (6), (7) and (10) are all linear in $\tilde{\tau}_t$, thus this is a typical bang-bang control problem (Kamien and Schwartz, 1991, pp 202-208). The solution is as given in Proposition 1 with T determined as follows.

For $t \in [0, T)$:

$$\dot{c} = \frac{\alpha A(1 - \tilde{\tau}^*) - \rho}{\sigma} c_t \tag{12}$$

$$\dot{k} = Ak_t(1 - x_t) - c_t \tag{13}$$

$$\dot{D} = r^* D_t + x_t Ak_t - Ak_t \tilde{\tau}^* \tag{14}$$

where $r^* = \alpha A(1 - \tilde{\tau}^*)$. Namely, for the period $[0, T)$, the effective tax rate is at the maximum $\tilde{\tau}^*$ so that by the time T , the government builds up enough assets (D_T negative) which generates interest earnings subsequently to finance its expenditures as well as a subsidy to output production at the optimal rate ($\tilde{\tau} = (\alpha - 1)/\alpha < 0$) for the rest of the time. The amount of D_T needed is given by the debt dynamics from time T to infinity:

$$D_T = -e^{AT} \int_T^\infty \left(x_t - \frac{\alpha - 1}{\alpha} \right) Ak_t e^{-At} dt$$

The dynamics of D_t for $t \in [0, T]$ together with the continuity of D_t at $t = T$ require:

$$D_0 = \int_0^T (\tilde{\tau}^* - x_t) Ak_t e^{-r^*t} dt - e^{(A-r^*)T} \int_T^\infty \left(x_t - \frac{\alpha - 1}{\alpha} \right) Ak_t e^{-At} dt$$

If no such finite T exists, then $\tilde{\tau}_t = \tilde{\tau}^*$ for all t and the fact that $\{x_t\}_0^\infty \in S(D_0)$ implies that (9) has to hold:

$$D_0 = \int_0^\infty (\tilde{\tau}^* - x_t) Ak_t e^{-r^*t} dt \quad (15)$$

■

Several remarks are due. First, from Lemma 1, it is clear that if $\{x_t\}_0^\infty \in S$, the optimal tax rate follows the bang-bang structure given in Proposition 1 with T either finite or infinite. Although the bang-bang structure is model specific, it is worth noting that the same structure has appeared in contributions to the optimal taxation literature such as Chamley (1986), Jones, Manuelli, Rossi (1993), and Xie (1997).

Second, countries (in Asia and other regions) do run fiscal surplus for relatively long periods of time. Our results suggest that if a country does not face a tight expenditure constraint, it should accumulate enough assets to the optimal point such that the future returns on these assets can exactly pay off all the future expenditures as well as the optimal output subsidy to further boost economic growth.

Finally, we are ready to examine fiscal soundness, an important issue that country authorities as well as international agencies such as the IMF have been interested in assessing (see, e.g., Hemming et al 2003 and Manasse et al 2003). Fiscal soundness broadly measures a country's capacity to absorb fiscal shocks. Numerous indicators are developed and used in such kind of exercises, including the so-called stress testing. While these indicators are useful, they can move in all directions (and sometimes in opposite directions). While stress testing is also useful, the assumptions used for

the test are often arbitrary. It is thus desirable to have an aggregate index for fiscal soundness that assembles all the relevant information about the current fiscal situation in a general equilibrium fashion and points out the risk level after hitting by a shock or a series of shocks.

Indeed, Proposition 1 readily gives rise to an aggregate fiscal soundness index. More specifically, the endogenous variable T captures all the relevant information and thus can serve as a novel aggregate measurement for a country's fiscal soundness.

DEFINITION 2.2. Fiscal soundness, $\Omega \in [0, 1]$, as a country's shock absorptive capacity, can be captured in aggregation by

$$\Omega \equiv e^{-T}. \quad (16)$$

Obviously T is dependent on initial debt-to-GDP ratio, the expenditure path, and parameters affecting the real interest rate and growth rate. The smaller is T , the further inside the sustainability set, hence the higher shock absorptive capacity (the higher Ω). When $T = 0$, the maximum level of shock absorptive is achieved, and $\Omega = 1$. On the boundary of the sustainability set, $T = \infty$, and thus $\Omega = 0$, namely zero absorptive capacity. At this point, a small shock can push the economy toward a fiscally unsustainable path and calls for fiscal adjustment.

For a graphical exhibition of the fiscal sustainability set, it is helpful to examine properties of a balanced growth path (BGP). A sustainability frontier will emerge.

3. FISCAL SUSTAINABILITY

We now examine the condition for fiscal sustainability on a balanced growth path with $x_t = x$ for any t . The outcome is a sustainability frontier that depicts the combination of debt-to-GDP ratio and expenditure-to-GDP ratio that is sustainable when the effective tax rate $\tilde{\tau}$ is at $\tilde{\tau}^*$, namely when $\tau = \tau^* = \left[\frac{1}{(1+l)\gamma} \right]^{1/l}$. Let $d = D/y$ be the constant debt-to-GDP ratio. If (x, d) is sustainable, then we must have:

$$d \leq \frac{\tilde{\tau}^* - x}{r^* - g^*},$$

where $r^* = \alpha A(1 - \tilde{\tau}^*)$ and $g^* = (r^* - \rho)/\sigma$. The sustainable frontier is thus given by the equation:

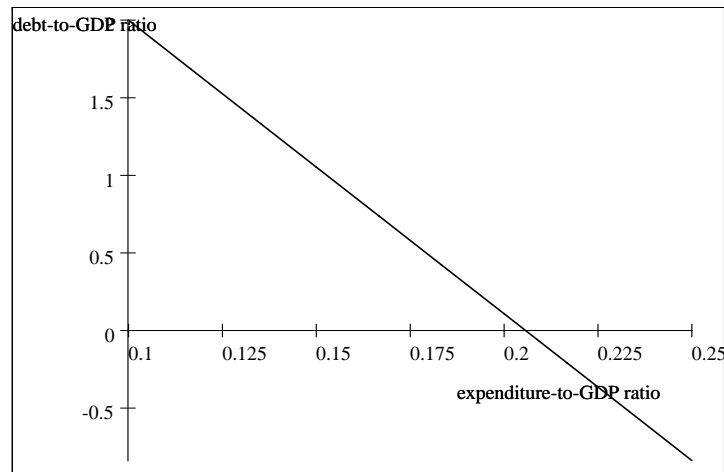
$$d = \frac{\tilde{\tau}^* - x}{r^* - g^*}.$$

Any combination of (x, d) lying to the southwest of the frontier is sustainable on a BGP. Any (x, d) lying to the northeast of the frontier is unsustainable on a BGP.

Let us get an idea of this sustainable frontier using an numerical example. Let $\rho = 0.02$, $A = 0.3$, $\alpha = .36$, $\gamma = 3.5$, $l = 2$, $\sigma = 1.8$. With these parameter values, $\tau^* = 0.3086$ and $\tilde{\tau}^* = \tau^* - \gamma(\tau^*)^{1+l} = .2057$. The resulting interest rate and growth rate on the BGP are: $r^* = 0.0858$ and $g^* = 0.0329$. The sustainable frontier is given by

$$d = 3.89 - 18.91 * x$$

FIG. 1. Sustainable Frontier on a BGP



This example shows that sustainable debt-to-GDP ratio is very sensitive to the expenditure-to-GDP ratio that a government intends to maintain. For instance, when the expenditure-to-GDP ratio is 17 percent, any debt-to-GDP ratio below 67.4 percent would be sustainable. When the expenditure-to-GDP ratio is 20 percent, the sustainable debt-to-GDP ratio drops to 10.9 percent.

This example suggests that without referring to the expenditure-to-GDP ratio, a single criterion on Debt-to-GDP ratio (for instance the 60 percent rule defined in the Stability and Growth Pact adopted in the euro area) is meaningless as a guide for debt sustainability. This view is confirmed by empirical evidence reported in the introduction, especially the finding that 55 percent of the defaults in emerging markets occurred when the public debt was below 60 percent of GDP, and 35 percent of the defaults occurred when the debt ratio was less than 40 percent of GDP.

Also, not all emerging market economies have experienced debt crises even at a high debt ratio. While Argentina ended up in a debt crisis when its public debt rose from 30 percent of GDP in the early 1990s to 150 percent of GDP at end-2002, Lebanon still hangs on when its debt increased from 50 percent of GDP to close to 180 percent of GDP over the same period. A number of emerging market economies, e.g., India and Malaysia, as well as developed economies, e.g., Belgium, have either successfully managed to maintain relatively high public debt for a long period without a default or successfully brought down its debt-to-GDP ratio significantly.

Third, the sharp difference in institutional quality between emerging market and industrial economies leads to sharp difference in debt sustainability (Reinhart, Rogoff and Savastano, 2003, and IMF, 2003). Revenue ratios in industrial countries, on average at 44 percent of GDP, are much higher than in emerging market economies, which are only about 27 percent of GDP. While many industrial countries have effective direct tax rates of 30 percent or more, the rates in emerging markets are often close to 10 percent. The institutional quality is captured in our model by the parameter γ (lower γ indicates higher institutional quality).

4. CONCLUSION

This paper tackles two important issues on fiscal policy that are of great concerns for policymakers and economists, namely, fiscal sustainability; and fiscal soundness. In contrast to the existing literature, our analysis is in a tractable general equilibrium framework, in which we obtain three results. First, we endogenize both growth rate and interest rate, the two key rates for any study of fiscal sustainability. Second, we illustrate that fiscal sustainability in general equilibrium should not be measured by a one-dimension indicator, rather the sustainable and unsustainable fiscal positions are separated by a “fiscal sustainability frontier,” which has two dimensions, namely, debt-to-GDP ratio and expenditure-to-GDP ratio. In other words, it makes no sense to ask the one-dimensional question “What is the sustainable debt-to-GDP ratio?”. Third, we construct a novel and useful index for aggregate fiscal soundness. In this concluding section, it is necessary to discuss about operational issues following our analysis.

In assessing fiscal sustainability, it is inappropriate to treat the interest rate and the growth rate as exogenous. Policymakers need to recognize that the two key rates are endogenously determined by preferences and technology parameters, and more importantly by the tax rate itself.

Our results suggest that the fiscal sustainability frontier could be rather steep and hence a country should pay a special attention to the second dimension, the expenditure to GDP ratio. The government should also be aware of the limitation of its power to tax. We recommend that a country

should first examine its institutional framework and obtain a reasonable estimate of the maximum effective tax rate achievable. This tax rate, together with estimates for the real interest rate and the growth rate for the long run, will yield the fiscal sustainability frontier.

When the fiscal position is inside the fiscal sustainability set, a country should try to achieve fiscal surplus and run down debt level, ideally to a point in which the returns on the accumulated assets can generate enough returns to pay off future expenditures. And from that point onward, a subsidy rather than tax should be used to internalize production externality and thereby boost economic growth. Some countries in Asia and in Nordic region have been trying to implement prudent policies to achieve fiscal surplus at about 2 percent of GDP over a business cycle.

So far, our model focuses on the role of economic factors in affecting fiscal sustainability and fiscal soundness. Political economy factors are largely absent in our model, although we do highlight the role of Laffer curve and the institutional factors for the shape of the curve. Adding political economy factors (see, among others, Alesina et al., 1998; Barro, 1979; von Hagen and Harden, 1995) would surely enrich our analysis, and should be a priority for future research.

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