

**Debt Sustainability:
How to Assess Whether a Country is Insolvent**

by

Nouriel Roubini

**Stern School of Business
New York University
December 20, 2001**

SUMMARY

- The intertemporal solvency constraints imposes excessively mild restrictions on the paths of trade balances, current account balance, primary fiscal balances, foreign debt and public debt that are consistent with a country or a government being solvent.
- A more restrictive, practical, solvency criterion suggests that the debt to GDP ratio (or the ratio of debt to some other measure of the capacity to pay such as exports or government revenue) should not increase forever.
- Thus, the “resource (trade balance) gap” or “primary fiscal gap” represent the amount of trade balance (or primary fiscal balance) adjustment required to stabilize the debt ratio and ensure solvency.
- While usually “permanent” values of this gaps are used, it may be more sensible to use “current” values of these gaps to assess sustainability.
- Such gaps do not provide a direct measure of which stock of debt (divided by an appropriate scale variable) is sustainable. But if the initial debt ratio is too high, such primary/trade adjustment may not be feasible or can occur only at too a severe cost in terms of the long-run growth capacity of a country (debt overhang). In these cases debt reduction/relief/writedown may be appropriate. Thus, both “gaps” and debt ratios need to be used in assessing debt sustainability.
- There is some debate on which debt ratio (relative to GDP, exports, government revenues) is the most appropriate measure of insolvency. Different debt ratios may provide different signals on whether debt is sustainable or not. There are pros and cons to the use of each indicator but most of them are useful in some dimension.
- The implicit tax on domestic investment deriving from a high burden of existing debt may create a “debt overhang” so large that incentives to invest, and thus build capital and output to repay debt in the future, are severely reduced. In these cases, debt is unsustainable and debt reduction is certainly warranted.
- While it may be hard to precisely assess insolvency versus illiquidity, a systematic analysis of indicators, debt ratios, resource “gap” analysis and an analysis of the medium term sustainability of the debt profile can provide a sensible assessment of whether solvency at stake. By such criteria Ecuador, for example, appeared as insolvent in 1999. Argentina is likely to be also considered as insolvent today.
- An exogenous increase in sovereign spreads may trigger a perverse debt dynamics in which, if the country tries to service its debt in full at current high spreads, debt ratios grow even if the country/government is following policies that are sound. One may end up in situations of “self-fulfilling solvency traps”. These traps may occur both in cases of illiquidity and in cases of insolvency. Thus, one should consider and assess this issue in assessing debt sustainability and the need for a debt workout.

1. SOLVENCY AND ILLIQUIDITY

To decide whether a country may need debt reduction or not requires assessing whether a country suffers of a “solvency” problem or a “liquidity” problem. In the former case, debt reduction may be necessary to achieve a sustainable medium term path for the external liabilities of a country. In the latter case debt reduction may not be necessary; instead, debt rescheduling/restructuring may be sufficient to provide a sustainable medium-term profile for the debt of the country.¹

In general, there is no simple rule that can help us determine when foreign debt accumulation is sustainable or not, i.e. whether a country suffers of a solvency or liquidity problem. However, there are a number of criteria that ought to be used in assessing the sustainability of the foreign debt of a country. Here, we will discuss various indicators that can be used to assess whether a particular foreign debt accumulation and current account deficits are sustainable or not.

Solvency criterion from the intertemporal budget constraint

The analytical literature on current account and foreign debt sustainability provides a useful starting point. A theoretical criterion for foreign debt and current account sustainability is not particularly stringent because the intertemporal budget constraint of a country imposes only very mild restrictions on the evolution of a country's current account and foreign debt. As long as the discounted value of the country foreign debt is non-zero in the infinite limit, the country is solvent; this means only that the country cannot increase its foreign debt faster than the real interest rate on this debt. Subject to this constraint, any path of the current account such that the infinite sum of all current accounts is equal to the initial foreign debt of the country is consistent with solvency. A country could run very large

¹ In between there are difficult cases such as Ukraine or Pakistan (as opposed to Ecuador or Russia) where the country may not be formally insolvent but has large lumpy debt servicing coming due and has lost market access. In those cases, a debt restructuring that treats the coupon on the bond but does not reduce the principal/face value of the claim may work. But note that there is no conceptual difference between treating coupons or principal; they are all cash flow stream and imply some NPV reduction of the value of the initial claims. I.e. even in Pakistan and Ukraine you had debt reduction.

current account deficits for a long time and remain solvent as long as there are surpluses at some time in the future. The solvency constraint also implies that the stock of foreign debt of the country can increase without limit as long as it does not increase faster than the real interest rate. If the real interest rate is greater than the rate of growth of an economy, solvency is consistent even with a foreign debt to GDP ratio that grows continuously over time.

The intertemporal solvency criterion does however impose some limits on the behavior of trade balances. Such solvency constraint implies that the discounted value of trade balances should be at least equal to the initial foreign debt of the country; if a country is initially running a trade deficits and has a stock of foreign debt, it needs to run trade surpluses over time to remain solvent.

Similar conceptual difficulties in determining solvency emerge when one considers whether a country's government, rather than the country as a whole, is solvent, i.e. whether the (domestic and foreign) public debt of a government is sustainable or not. This is important because, in practice, a large fraction of the foreign debt of a country may be government debt and debt reduction will often, in practice, take the form of a reduction of the debt of a government. Again the theoretical criteria for government solvency are quite loose. Specifically, as long as the discounted value of the government debt is non-zero in the infinite limit, the public sector is solvent; this means only that the government cannot increase its debt faster than the real interest rate on this debt. Subject to this constraint, any path of the fiscal (cum interest) surpluses/deficits such that the infinite sum of all fiscal balances is equal to the initial debt of the government is consistent with public sector solvency. The stock of public debt could increase without limit as long as it does not increase faster than the real interest rate. Again, the intertemporal solvency constraint does impose some limits on the behavior of the non-interest fiscal balance (i.e. the primary fiscal balance). The solvency constraint requires that the discounted value of primary balances should be at least equal to the initial public debt; if a government is initially running primary deficits and has a stock of initial debt, it needs to run primary surpluses over time to remain solvent.²

² An appropriate measure of debt would be net debt (i.e. debt net of any assets that the government or the country holds) where gross liabilities should include possible implicit

The solvency constraint is too loose a criterion to assess sustainability

Obviously, these criteria for fiscal and external debt solvency are way too loose. Take the fiscal solvency criterion. A country could run very large primary deficits for a very long time if it could credibly commit to run primary surpluses in the long run to satisfy the condition that the discounted value of primary balances is at least equal to the initial public debt. But this is not realistic for three reasons:

1. A government cannot credibly commit to such a path.
2. Such adjustment would be highly costly and inefficient given distortionary taxation. I.e. if a country has to raise distortionary taxes in the long run to run primary balances that compensate for short run primary deficits, the marginal and average tax rate may be very large and distort economic choices (labor, saving behavior) in ways that hurt long run growth; it does not make sense to have marginal tax rates of 70% in the long run to compensate for low marginal tax rates of 10% in the short run.
3. If the long run adjustment required to run primary surpluses falls on government spending, rather than taxes, it may again be unfeasible, inefficient and unfair to cut government spending and provision of public services by draconian levels in the long run to allow large spending in the short run.

The same argument holds for foreign debt; it may not be realistic and feasible to run large trade surpluses in the long run to finance persistent excessive trade deficits in the short run. The exchange rate and domestic income adjustment to contract imports and expand exports (or increase savings and cut investment) may be excessive and inefficient if a country runs a trade deficit for too long; and market may not allow a country to borrow for that long.

Resource gap or primary balance gap as a sustainability criterion: adjustment necessary to stabilize the debt ratio

liabilities of the sovereign (deriving for example from guarantees of deposits of insolvent banks and implicit liabilities deriving from the operation of social security systems).

Given the looseness of the theoretical criteria for solvency and sustainability and the inefficiency or feasibility to run primary deficits or trade deficits for a long time in expectation of adjustment in an uncertain vague future it may be more reasonable to consider more practical criteria for sustainability. In fact, a dynamics of the current account that leads to an increase without bounds of the foreign debt to GDP ratio can be seen as being effectively unsustainable: the financial markets will eventually get concerned about the country's ability and willingness to repay its debt and will limit its borrowing leading to a foreign debt crisis. Same things for the case of domestic debt.

Therefore, *a non-increasing foreign debt to GDP ratio* is seen as a practical sufficient condition for sustainability: a country is likely to remain solvent as long as the ratio is not growing. This criterion is related to the "resource balance gap". In a country where the debt to GDP ratio is growing, the gap is the difference between the current trade balance and the trade surplus required to stabilize the debt to GDP ratio. Such a required trade surplus will be larger the bigger are the debt to GDP ratio and the differential between the real interest rate and the growth rate of the economy.³

³ Note also that movements of the real exchange rate and terms of trade shock importantly affect the debt dynamics. Specifically, a real depreciation of the currency leads to an increase in the foreign debt to GDP ratio (as it increases the real value of foreign currency denominated liabilities of a country) and will worsen the debt sustainability of a country: i.e. a larger trade surplus will be required to stabilize the debt to GDP ratio when a real depreciation increases the debt to GDP ratio. Similarly, a negative terms of trade shock (a fall in the relative price of the exports of a country) will also lead to an increase in the debt to GDP ratio (as it reduces the real income of the country) and will thus require a larger trade surplus adjustment to avoid an unsustainable increase in the debt to GDP ratio. Note, however, that while a real depreciation increases the stock for debt (relative to GDP), it may also improve the external balance (especially if the traded sector is large relative to GDP) and does help to improve sustainability.

A similar practical criterion can be used to assess the sustainability of public debt: public debt can be viewed as sustainable as long as the public debt to GDP ratio is non-increasing. In a country where the public debt to GDP ratio is growing, the fiscal “primary gap” is the difference between the fiscal primary balance and the primary balance required to stabilize the debt to GDP ratio. Such required primary surplus will be larger the bigger are the public debt to GDP ratio and the differential between the real interest rate and the growth rate of the economy.⁴

Pros and cons of “permanent” versus “current” values of the primary/resource gap

It is often argued that, in considering the resource gap or primary fiscal gap, one should look not at current levels of real interest rates and GDP growth rates and current (cyclically unadjusted) values of trade and primary balances but rather at the medium/long-run levels of real interest rates and growth and structural values of trade balances and primary balances, i.e. stabilization of the debt to GDP ratio should be considered in a medium term perspective, not a short term one. In other terms, one should look at the “permanent” rather than “current” primary gaps and resource/trade balance gap.

There are arguments in favor and against using permanent rather than current gaps. In normal circumstances where insolvency is not at stake it may make sense to look at the permanent gap; if growth is low or negative for a year or so and real interest rates are temporarily high for some reason while a recession is leading to a transitory primary deficit or a temporary trade balance improvement, it does make sense to look at the permanent values, rather than current/cyclical values of these variables.

But in situations where structural factors (such as a persistently weak fiscal position, or an overvalued currency) are leading growth to be low or negative (in the absence of a policy/currency regime change), are leading real interest rates to be very high because the country is deemed to be borderline insolvent and leading primary deficits to be high because

⁴ Real depreciations and terms of trade shock impact this public debt sustainability in ways that are similar to those of the foreign debt of the country as a whole.

of structural impediments to growth or trade balances improved because of structurally depressed imports (with growth being structurally low or negative), it makes more sense to look at the “current” gap rather than the “permanent” one as the permanent one cannot be achieved without a major change in regime (be it the currency regime or the stock of debt of the sovereign). This is important for the case of Argentina that has had over three years of negative growth and where real interest rates are extremely high given the market belief that the country is insolvent.

“Gap” analysis does not provide a direct measure of whether the debt ratio is unsustainable

While the “practical criterion” for foreign and public debt sustainability (a measure of the primary gap and the trade balance gaps) provides as useful benchmark (i.e. debt is not sustainable if its ratio to GDP is growing over time without bounds), it does not directly provide a tool to assess whether a certain stock of debt is sustainable or not. As long as the debt ratio (to GDP) is stabilized over the medium term, it is considered as sustainable regardless of its level; i.e. a debt to GDP ratio of 150% is as sustainable as a debt to GDP ratio of 50%. While the practical criterion provides a normative rule (how much a trade surplus or primary surplus is required to close the resource or primary gap), such debt stabilization goal may not be realistically achievable if the initial level of the debt is too high; in that case, the country/government may not be able to close the resource/primary gap over time and debt reduction may be required. In other terms, the initial debt to GDP ratio may be so high that, given the expected long-run values of real interest rates and growth rates, the trade surplus or primary surplus required to achieve debt ratio stabilization may not be economically and/or politically sustainable. For example, foreign debt may be so high and the interest rate on it so large that the country may be unable to have a trade surplus large enough to service such debt in a way that stabilized the debt ratio. Achieving the required trade surplus may imply a draconian cut in domestic private consumption or government consumption (public services) or private investment that may not be economically/politically feasible. Similarly, achieving the required primary surplus that stabilizes the public debt ratio may imply a draconian cut in government spending or increase in public revenues that may not be economically/politically feasible.

Another way to consider the same problem is to note that a country may be able to achieve (via a draconian policy effort to squeeze resources for debt service) a medium-term stabilization of the debt ratio. However, if the initial debt ratio is too high, the achievement of such a goal may be so costly (in terms of the future growth rate of the economy and the effort required to service the debt) that the country should be allowed to get some debt relief so as to allow it to sustain investment and long-term satisfactory growth (i.e. milking a denourished cow to the extreme may leave the poor animal comatose for the long haul). Again, in this case it makes sense to provide some degree of debt relief (debt reduction) to allow the country to emerge from the burden of an unsustainable debt.

Difficulties in deciding what is draconian, i.e. “politically”/“socially” feasible or not should not be underestimated but, as discussed below, there are ways to make such an assessment. Comparison of current growth rates, interest rates and primary/trade imbalances with their historical averages may provide a sense of what is realistically feasible.

The discussion above suggests that, in assessing sustainability, one should look at both the primary/resource gaps and the debt ratios (appropriately scaled).

2. DEBT OVERHANG

In this regard, it is worth noting that the cut in private investment necessary to achieve trade surpluses large enough to stabilize the foreign debt ratio may also have perverse effects on the external debt dynamics. While in the short-run, a fall in investment improves the trade balance and thus helps to close the resource gap, in the medium term a country can service its foreign debt only if the country growth rate is large enough. However, lower investment rates (as a share of GDP) implies lower future capital stock, lower output levels and growth rates. Thus, a fall in private investment will have perverse effects on debt sustainability in the medium-run. It is this perverse effect that led a number of authors to suggest that a country may suffer of a “debt overhang”: the foreign debt may be so large that the incentives to do reforms and increase investment may be reduced. As most of the increase in output deriving from further investment will go to service the external debt of the country, the high foreign debt may reduce the incentive to invest and lead to self-fulfilling solvency over time. Under these conditions of debt overhang, debt reduction may be

necessary to restore the solvency of the country and provide incentives to increase investment over time. Because of high debt, some countries may be trapped in a debt-overhang trap. This trap is a case where the debt burden inhibits economic activity so much that even creditors would benefit from a debt writedown; see Sachs (1989) and Krugman (1988). A debt-overhang effect may suggest that one should provide this relief sooner rather than later: delayed relief may exacerbate the real effects of the crisis. Thus, if there is a debt overhang, only debt relief will lead to a resumption of economic growth. Krugman (1998) even suggested the existence of a “debt Laffer curve”, i.e. after a certain point the face value of the foreign debt may be so high that reductions in its face value (debt writedown) may actually lead to an increase in the market value of the residual debt. This is the case when the negative implicit-tax incentive effect on domestic investment (and domestic reform effort) dominates the behavior of the debtor. When the debt is in the perverse region of the debt Laffer-curve, both creditors and debtors benefit from a debt writedown, i.e. debt reduction is Pareto-improving. But even if the debt level is not in the perverse region (in which case debt reduction is not Pareto-improving as it benefits the debtor at some cost for the creditors), debt reduction may be warranted if an excessive burden of foreign debt implies a level of investment and activity that trap a country in a low growth rate equilibrium for the long haul.

While there is some debate on whether such a debt-overhang effect was at work in the 1980s crisis (i.e. whether debt was in the downward region of the debt Laffer-curve in the countries in crisis in the 1980s; see Corden and Dooley (1989) versus Cline (1995), we should consider whether this is a serious problem in a number of emerging market currently in crisis. If debt-overhang is found to be a serious issue, the G-7 and the IMF should provide a leadership role in nudging private creditors towards a debt relief scheme. In the 1980s crisis, such official leadership was crucial in leading to the implementation of debt reduction schemes when the G-7 abandoned the Baker Plan and push instead for the Brady Plan. One cannot wait for the market to take care of this; a strong role of official institutions in creditor countries would be needed to nudge private creditors to consider debt reduction.

3. SOME INDICATORS TO ASSESS INSOLVENCY VERSUS ILLIQUIDITY

The discussion above suggests that it may not be easy to distinguish in practice between insolvency and illiquidity. Also, debt sustainability and solvency are inherently dynamic concepts. A country that may look today as insolvent may not be so at some future date. For example, a country exporting primary commodities (such as oil) may appear insolvent when the price of such commodities is depressed but may be solvent if commodity price will increase again on a sustained long-term basis. Similarly, economic reforms and fiscal reforms in a previous “basket case” country may lead to higher long-run economic growth and restore solvency of the country and its public sector. Given the uncertainty about future external and domestic shocks, about the possibility of growth enhancing policy changes and about political and institutional changes that may or may not occur, it may be hard to assess whether a country is insolvent. But one can use a series of criteria to make such an assessment.

Use of traditional indicators of sustainability

One approach is to rely on traditional indicators of external and domestic debt sustainability. For what concerns external debt, various authors and suggested alternative criteria such as external debt to GDP, external debt to exports, debt service to GDP, debt service to exports. For the public debt, indicators such as public debt to GDP, public debt to government revenues, debt service to GDP, debt service to government revenues have been proposed. Market prices of the value of the external debt of a country also provide a measure of market perception of the likelihood that a country may not pay in time and in full its external liabilities.

Each one of these indicators has some benefits and drawbacks that have been extensively discussed in the literature. In practice, assessing solvency is an “art” that requires considering a very broad range of indicators, factors, forecasts about likely future policy events and shocks in a country.

Use of average historical data to assess whether a certain debt path is sustainable and whether “gaps” can be closed.

In practice, a careful analysis of a country and its medium terms prospects may lead to a reasonable assessment that the country may be insolvent under sensible scenarios. In making this assessment, one can consider previous average historical values of key variables (such as GDP growth rates, trade and current account balance balances, fiscal deficits, interest rates, non-debt creating capital inflows such as FDI) to project how much resources will be likely available to service the interest payments on the debt (under the assumption that the principal will be rolled over) and whether the primary/trade gaps can be closed under reasonable assumptions about the values of the relevant variables. Then one can compare the expected resources likely to be available to service interest payments with actual interest payments coming due in the medium term. If there is a significant shortfall of resources relative to payments due, this suggests that the problem is not just one of liquidity (as the exercise assumes that principal payments are rolled over) but rather one of solvency. Similarly, if average historical values of trade balances, primary fiscal balances, growth, real interest rates suggests that eliminating the primary or trade gaps may not be feasible even under realistic scenarios about such macro variables, then the debt has to be deemed as unsustainable.

Note that assuming that the principal value of the debt may be rolled over may not be warranted in assessing sustainability. For one thing, if debt is high market access may be lost and unlikely to be regained. For another, cash flows are cash flow regardless of whether they are coupon payments or amortization of principal. Short-run debt servicing profiles may be very different depending on whether the debt is short-term, long-term, zero-coupon, amortizing or bullet. What matters for solvency is not the actual current debt servicing profile (that can always be modified by debt reprofiling) but rather the overall burden of a stock of debt that needs to be serviced over time.

Using the market value of the debt as a measure of debt sustainability

Reprofiling of debt can reduce debt servicing in the short run at the cost of a severe increase in debt servicing cost in the medium term (as in the case of Argentina's financial engineering in 2001). Thus, an assessment of sustainability requires an assessment of whether the debt burden is sustainable. One way to do that would be to look at the discounted value of the debt, i.e. the discounted value of the expected debt servicing cash flows (both

coupons and amortization of principal). The issue is then which discount factor to use to price those cash flows. If one uses current market rates/spreads, one obtains the current value of the debt. But if the country is likely to be insolvent and default, the use of such market rates would give the current low value of the debt. In some sense, this is, if the market correctly prices the risk of default, the correct market assessment of the value of the debt of the country and thus a measure of the amount of debt reduction necessary to achieve debt sustainability. But one cannot rule out mispricing due to situations of panic where the spreads spike beyond what is warranted by fundamentals or situations in which the debtors may try to talk down the market value of the debt to achieve a better deal in the debt restructuring process. But, at a first approximation, if the market value of the debt is very different from the value of the prospective cash flows payments discounted by a risk-neutral discount rate, a debt reduction may be warranted.

An application to Ecuador in 1999

Take, for example, a country such as Ecuador in 1999. According to the above criteria, the medium term sustainability of the debt of the country was highly unlikely and the country looked like it was insolvent.⁵ Note that:

- a. over 40% of the public budget was being used to service the debt of the country.
- b. the country had been buffeted over and over again by a series of negative shocks to the price of the commodities it was exporting.
- c. the banking crisis that enveloped the country in 1999 implied a further sharp increase in the implicit public sector liabilities associated with the need to need to rescue the banking system; such fiscal cost of a banking system bailout were estimated to be 15-20% of GDP.
- d. The debt to GDP ratio, the debt to export ratio and the debt to government revenue ratio were all extremely high (above 100% of GDP the first one), much higher than the average for emerging markets and close or above HIPC ratios.

⁵ The assessment of the likely insolvency of Ecuador was shared by some private sector participants. See, for example, the July 1999 report by JP Morgan on Ecuador that came to the conclusion that, under any reasonable scenario, the country was insolvent.

- e. Based on historical averages of growth, real interest rates, primary balances and trade balances, the amount of primary adjustment and trade balance adjustment necessary to stabilize the debt ratios was not feasible without a reduction in the stock of government and external debt of the country.⁶
- f. the degree of debt relief that the country obtained in the early 1990s via the Brady plan was very modest and did not significantly reduce the debt burden of the country. Debt indicators thus did not improve much and, instead, worsened, over time.

The overall consideration of a broad range of economic indicator thus suggested that the country was insolvent, rather than being illiquid. Thus, the external debt of the country was unsustainable and a debt reduction was warranted to restore the medium term sustainability of the debt profile of the country.

Which debt ratio is most appropriate in assessing sustainability?

There are many alternative indicators of fiscal and external debt sustainability that can be used to assess insolvency. Three of the most commonly used are the debt to GDP ratio, the debt to export ratio and the debt to government revenues ratio. Figuring out which one is the most appropriate one is crucial to assess sustainability. For example, based on the criterion of the external debt to GDP ratio, Argentina does not look very different from the average of other emerging markets and Latin American countries as it has a ratio of about 50%. While, based on the debt to export ratio, Argentina is way out of line with a ratio above 400% and much larger than that of most emerging markets. So, Argentina looks insolvent based on the debt to export ratio and solvent based on the debt to GDP ratio.⁷

⁶ JP Morgan reached a similar conclusion in its analysis of Ecuador (July 1999 report).

⁷ One caveat on the debt to GDP ratio: if the currency is overvalued/misaligned and a real depreciation is necessary to restore growth, the current debt to GDP ratio is misleading. For, example with a 30% overvaluation, a current 50% of GDP ratio would become closer to 67% of GDP after the real depreciation has occurred. This has relevance for the case of Argentina.

Thus, which is the most appropriate measure? Some argue that the debt to export ratio is more relevant as a country needs to rely on hard currency receipts to service its external debt and export are the sources of this revenue. But conceptually what matters for sustainability of external debt is the ability to generate trade surpluses (the difference between exports and imports) rather than just exports as a way to avoid an explosive path for the external debt. The debt to export ratio also penalizes countries that, given their size or structural characteristics, have a low export to GDP ratio.

To clarify this point take the following example. Suppose you have two countries, A and B that are identical. Their GDP is 100 each, their external debt is 50 each, their exports are 20 each (with 10 of it exported to each other and the rest exported to the rest of the world). Then the debt to GDP ratio is 50% for each and the debt to export ratio is 250% each. Assume that, at this ratios, both countries are solvent. Now take the two countries and merge them. Total GDP will be 200, total debt will be 100 and total exports will be 20 (as exports among each other is now inter-regional rather than international trade). Then the combined A+B economy has a debt to GDP ratio that is still 50% but now the debt to export ratio is 500%, a figure that is clearly unsustainable and would suggest default. So, using the debt to export criterion, the same two economies look solvent if they are a separate country and insolvent if they are joined in one country. This suggests that the debt to export ratio may be a faulty measure of solvency; larger countries with greater intra-regional, rather than international trade, would look insolvent while smaller countries with similar fundamental would look solvent just because their export to GDP ratio is higher. Thus, the debt to GDP ratio may be a better measure of solvency.

But the debt to export ratio should not be disregarded altogether in spite of some of its shortcomings. In the example above, the export to GDP ratio is lower for a larger country with greater amount of inter-regional, rather than international trade. But a small open economy, like Argentina, is usually more open than a larger economy; thus, low export to GDP ratio may reflect currency overvaluation, high degrees of trade protection and other policy restrictions to openness rather than structural factors that explain lower openness. Thus, an economy that should be more open than it is and has a large debt to export ratio may find it harder to service its external debt. For example, if export ratios are low, even a large real depreciation may not improve exports and the trade balance enough to reduce a resource

(trade balance) gap necessary to prevent insolvency. So, the degree of openness (export to GDP ratio) does affect the country ability to service its debt.

A related discussion is relevant for deciding on whether the debt to GDP or the debt to government revenues is more relevant to assess sustainability. If most of the external debt of the country represents the liabilities of the sovereign (or if we are looking at the issue of domestic debt and possible insolvency of the sovereign with respect to this debt), it makes more sense to scale the debt to some fiscal variable rather than GDP. In fact, if a country is structurally unable to raise revenues out of GDP to finance its spending and service its debt (i.e. government revenues are a small share of GDP), GDP is not an appropriate scale variable and government revenues are a better one. In this respect, one could again argue that government revenues are not the appropriate scale variable as what matters for solvency and debt dynamics is not the absolute value of revenues but rather the ability to achieve primary surpluses (revenues minus non-interest spending). While this point is correct, it is easier to achieve a certain amount of primary adjustment when revenues are large as a share of GDP than when they are a small share of GDP. For example, a 2% of GDP primary adjustment (be it on the revenue side or the spending side) should be easier to implement when revenues/spending are closer to 30% of GDP than when they are only 10% of GDP; in the former case, a 2% primary adjustment is a 20% adjustment of revenues/spending while in the latter case is only a 6.6% adjustment of revenues/spending. Thus, looking at the debt to revenue ratio may be relevant.

The analysis above suggest that the three indicators of debt sustainability discussed above (and there are other ones one could look at too) have all some pros and cons and they may all be useful in making an assessment of whether a country is insolvent.

Debt ratios for Argentina

Based on these three criteria, Argentina does not look as insolvent based on the debt to GDP ratio (50%) with the caveat that the necessary real depreciation of the peso may make this ratio much higher very fast (closer to 70%); Argentina looks like insolvent based on the

debt to export ratio (over 400% and getting close to 500%); and it also looks close to insolvency based on the debt to government revenue ratio (that is in the 200-230% range).⁸

4. INTEREST RATE ON THE DEBT, DEBT DYNAMICS AND SOLVENCY

In assessing solvency, one should also carefully consider the potentially perverse effects that the interest rate on the country or government debt may impart on the debt dynamics of a country/government. If foreign/public debt is very high, the market will price the probability that the debt may not be serviced in full and in time. In this case, the level of interest rates and interest spreads on the debt will reflect the possibility that “partial default” (defined as a situation where debts are not promptly serviced in full) may occur. Such a risk of default implies that the risk-adjusted interest rate on the debt will be higher than under no-default risk and higher interest rate will trigger a more rapid accumulation over time of a given stock of debt (given the constancy of other economic factors). Such an increase in spread may trigger a perverse debt dynamics in which, if the country tries to service its debt in full at current high spreads, debt ratios grow even if the country/government is following policies that are sound. One may also end up in situations of “self-fulfilling solvency traps”. For example, suppose that investors exogenously and arbitrarily increase their assessment of the probability of default on a sovereign debtor that would otherwise have a lower objective default probability. Then, the sovereign spread will accordingly increase to reflect that higher subjective probability. In that case, in equilibrium the borrower may be forced to default according to the higher probability even if such an increase in default probability was not

⁸ Note that this ratios are close to those used to assess a country eligibility for HIPC debt relief (150% for debt to exports and 250% for debt to fiscal revenues). The main caveat is that HIPC criteria are based on the net present value of debt rather than its face value. However, it is a tricky issue to decide how to measure the NPV of debt for a country that is near insolvent; if one uses current market rates and spreads (rather than risk-free rates) one would get a low NPV of debt; but that is not an appropriate measure of the true burden of debt if all of it has to be serviced in full. It may be better to measure the NPV of debt using risk-free market rates. By that criteria, Argentina’s debt ratios look close or above HIPC ones.

justified in the first place. If the borrower does not default, the ex-post real cost of borrowing may become prohibitively high. So, you can get multiple equilibria in which any subjective probability of default is self-justified even if not justified by underlying fundamentals: the higher probability leads to higher sovereign spread and this in turn forces the borrower to default to justify having committed to such high ex-ante premia.

Such perverse dynamics becomes a serious issues for countries that are in a crisis and being borderline between being insolvent and illiquid. As there is broad uncertainty about whether there is insolvency (and some investors may also be risk averse), markets will react to any increase in the objective probability of default by increasing the spreads on the country/government debt and thus worsening the debt dynamics of the country/government. An otherwise solvent agent may thus be thrown in an insolvency region if real interest rates on the debt become too high.

Moreover, while it is socially efficient to be in a world in which countries have strong incentives to pay in full their obligations, sovereign spreads reflect the objective probability of default for countries that may be insolvent. Thus, in equilibrium default will on average occur from time to time (for countries/governments that are effectively insolvent) in such a manner that the net of default return to the investors will be on average close/equal to the return to a safe asset (say US Treasuries). In equilibrium it does not make sense to have higher sovereign spreads and then expect that every debtor will pays in full in all circumstances and for every bond. If it did so, the ex-post systematic real cost of borrowing will be extremely high and markets would be mispricing the assets. I.e. if there is a default premium, the asset has to default accordingly in a probabilistic sense. For example, if Russia had paid in full the GKO's at a 70% nominal return, the real borrowing costs would have been prohibitive.⁹ The above argument does imply that every country borrowing above the riskless rate should default in proportion to its sovereign spread. One should not favor the idea that countries should default on a regular basis: if obtaining debt relief is too easy, there is a risk of creating incentives for countries not to pay, i.e. debtor moral hazard. What it is

⁹ If spreads are that high it is clear that payment in full will not occur; you are likely to be forced to default to avoid an unsustainable debt dynamics. Investors that bet on 80% returns , as in Russia in 1988, should not have expected to be paid in full.

suggested here is, instead, that sovereign spreads on foreign currency borrowing reflect the probability that the investment will not be paid in full. If markets are pricing risk correctly, a high spread implies a high risk of default and, in equilibrium, defaults will occur from time to time. Some countries/governments that borrowed ex-ante at high spreads will be able, given the developments in their economies and realization of shocks, to service in full their liabilities; other countries/government will be subject to such negative developments and shocks that insolvency will result and some debt reduction will occur either via a negotiated deal or through outright partial default.

The above discussion is relevant for the assessment of sustainability in several ways.

First, it suggest that a country that is solvent may be trapped in a self-fulfilling debt trap where, if it is expected to default, spreads would increase so much that it may be forced to default. But, if these are pure or semi pure liquidity cases (such as Mexico in 1994 or Korea in 1997) there are other ways to address such problems that do not involve debt writedown or use of a SDRM; specifically, official exceptional financing may be warranted or debt could and should be rolled over (if collective action problems can be solved) outside a SDRM.

Second, even if a country is deemed to be insolvent, it may still be the case that spreads increase, because of investors panic and market dynamics, beyond what is justified by the fundamental insolvency. Then, if the debt of the country is restructured, reducing the coupons on the restructured instruments to a lower level does not really represent a debt haircut (NPV reduction) as the component of the high spread that represents only the “bad equilibrium” element of the movement in market price/spread has to be treated to make the unsustainable “self-fulfilling” high debt spread sustainable. For example, in spite of Argentina’s spreads being high now because of actual default risk and true insolvency and inability to pay, there may be a self-fulfilling element to the very high and volatile current spreads. Thus, reducing coupons on restructured instruments (for the component that is purely self-fulfilling high spread) does not involve any NPV loss for creditors; if coupons are reduced to sustainable levels, market spread will fall in such a way that the market value of the claims will be maintained or even improved.