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External Debt Sustainability Analysis¹

Introduction

14.1 The creation of debt is a natural consequence of economic activity. At any time, some economic entities have income in excess of their current consumption and investment requirements, while other entities are deficient in this regard. Through the creation of debt, both sets of entities are better able to realize their intertemporal consumption and output preferences, thus encouraging economic growth.

14.2 The creation of debt is premised on the assumption that the debtor will meet the requirements of the debt contract. But if the income of the debtor is insufficient or there is a lack of sufficient assets to call upon in the event of income proving insufficient, debt problems ensue. In such circumstances, or in the expectation of such circumstances, the benefits arising from international financial flows—for both creditors and debtors—may not be fully realized. Hence, the need at the country level for good risk-management procedures and the maintenance of external debt at sustainable levels.

14.3 The objective of external debt sustainability analysis (DSA) is to evaluate a country's capacity to finance its policy objectives and service the ensuing debt. DSAs are an integral part to the Fund's assessments of member countries' policies, both in the context of program monitoring and country surveillance. To this end, the Fund has developed two frameworks

for conducting public and external DSA, one focusing on low-income countries (LICs), the other focusing on market access countries (MACs) including both advanced and emerging market economies.

14.4 This chapter discusses the main concepts associated with external debt sustainability, including solvency and liquidity aspects, the basic steps involved in the preparation of external DSAs, and provides a brief overview of the frameworks used at the Fund to carry out DSAs.

Basic Concepts

14.5 Chapter 2 of the *Guide* discusses the definition of external debt as well as the accounting principles for the measurement of external debt. Accordingly, for the purpose of external DSAs, external debt refers to debt liabilities owed by residents of an economy (both the public and the private sector) to nonresidents. Foreign financial resources can be important to growing economies as they supplement domestic savings to finance investment. However, access to foreign finance could also lead to accumulation of unsustainable external debt, which is costly to a country and can disrupt the smooth functioning of international capital markets. External DSA aims to help policymakers to identify imbalances as they are building up.

14.6 A key component of external DSAs is to estimate the path of a country's external debt stock (position) over time. To compute the evolution of the debt, the starting values for the initial stock of public and private external debt, its maturity profile, and schedule of debt service payments are needed. A projection of future external borrowing and interest rates must be made. The projected path of the debt level is then compared with other indicators of a country's capacity to repay external debt over the medium to long term.

¹This chapter draws substantially on the following papers: *Stress Testing in the Debt Sustainability Framework (DSF) for Low-Income Countries*, François Painchaud and Tihomir (Tish) Stučka, World Bank 2011; *Modernizing the Framework for Fiscal Policy and Public Debt Sustainability Analysis*, IMF 2011; *Staff Guidance Note on the Application of the Joint Fund-Bank Debt Sustainability Framework for Low-Income Countries* (forthcoming), IMF 2013; *Staff Guidance Note on Debt Sustainability Analysis for Market Access Countries*, IMF 2008.

14.7 DSAs are usually done on a gross debt basis.² However, in countries with significant liquid assets (such as countries with substantial extra-budgetary funds), a DSA on a gross basis may overstate a country's debt distress. In these cases, the public debt component of external debt could take these assets into account.

Solvency

14.8 From a national perspective, solvency can be defined as the country's ability to discharge its external obligations on a continuing basis. It is relatively easy, but not very helpful, to define a country's theoretical ability to pay. In theory, assuming debt can be rolled over (renewed) at maturity, countries are solvent if the present value of net interest payments does not exceed the present value of other current account inflows (primarily export receipts) net of imports.³ In practice, countries stop servicing their debt long before this constraint is reached, at the point where servicing the debt is perceived to be too costly in terms of the country's economic and social objectives. Thus, the relevant constraint is generally the willingness to pay, rather than the theoretical ability to pay. To establish that a country is solvent and willing to pay is not easy.

Liquidity

14.9 Liquidity problems, i.e., when a shortage of liquidity affects the ability of an economy to discharge its immediate external obligations, generally, though not necessarily, give rise to concerns about insolvency. Liquidity problems can be triggered, e.g., by a sharp drop in export earnings, or an increase in interest rates (foreign and/or domestic),⁴ or a rise in the prices for imports, or a tightening in global liquidity conditions. The currency and interest rate composition of debt, the maturity structure of debt, and the

availability of assets to pay debts are all important determinants of the vulnerability of an economy to external liquidity crises; these are all considered in the next chapter.

How Is Debt Sustainability Assessed?

14.10 Debt sustainability is assessed on the basis of indicators of the debt stock or debt service relative to various measures of repayment capacity (typically GDP, exports, or government revenues). The basic equation is:

$$\text{Debt indicator} = \frac{\text{Indebtedness}}{\text{Repayment capacity}}$$

14.11 The various data series that can be used to populate the basic equation to calculate the various debt indicators are described below. Each of the indicators provides a different perspective on debt sustainability, suggesting that they should be used in combination.

Measures of Indebtedness (the Numerator)

14.12 Different measures of indebtedness are used to identify solvency and liquidity risks. Delineating liquidity and solvency risks can be a challenge, especially as liquidity problems can turn into solvency problems if not adequately addressed.

14.13 Indicators based on debt stocks (e.g., gross external debt position) are used to identify possible solvency problems. Debt stock indicators reflect the capacity of a country to generate resources to repay debt. In the case of LICs, the long maturity and grace periods of concessional debt make debt stock measure based on the present value (PV) of debt more appropriate as it captures the favorable terms of concessional loans by discounting the stream of future debt-service payments (see Appendix 3, Present Value). For MACs, the analysis is done on the basis of nominal values.

14.14 Indicators based on debt service (interest payments and amortization) are typically used to assess liquidity problems. They represent the share of a country's resources used to repay its debt (and therefore resources not used for other purposes). Debt-service ratios provide the best indication of the claim on resources and the associated risk of payment difficulties and distress. In the same vein, low and stable

²Timely and consistent data on net investment positions data are not always available. Moreover, even if individual entities in the economy have external assets, they may not correspond to the entities that have external liabilities. Furthermore, the liquidity aspect of sustainability, the risk of not being able to roll over existing debts, is likely to be related to gross financing needs.

³In considering imports, it is worth noting that these are endogenous and subject to potentially severe compression (reduction).

⁴Such as when domestic rates rise because of an economy's perceived deterioration in creditworthiness.

debt-service ratios are the clearest indication that debt is likely to be sustainable.⁵

Measures of Capacity to Repay (the Denominator)

14.15 Measures of capacity to repay include, among others, GDP, exports, and government revenues. Nominal GDP captures the amount of overall resources of the economy, while exports provide information on the capacity of an economy to generate foreign exchange. Finally, government revenues measure the government's ability to generate fiscal resources. In some specific cases, remittances⁶ may be added to GDP and exports to assess external debt sustainability.

14.16 The choice of the most relevant indicator of capacity to repay depends on the constraints that are more binding in an individual country. In general, it is useful to monitor external debt and debt service measures in relation to GDP, exports, and fiscal revenue.

Debt Burden Indicators

Stock-Based Indicators

14.17 The debt stock is measured by the nominal value of the debt or its present value. The most commonly used indicators are:

- *Debt-to-exports ratio*—Defined as the ratio of total outstanding debt at the end of the year to the economy's exports of goods and services for that year. An increasing debt-to-exports ratio over time, for a given interest rate, implies that total debt is growing faster than the economy's basic source of external income, indicating that the country may have problems meeting its debt obligations in the future.
- *Debt-to-GDP ratio*—Defined as the ratio of the total outstanding external debt at the end of the year to annual GDP for that year. By using GDP

as a denominator, the ratio may provide some indication of the potential to service external debt by switching resources from production of domestic goods to the production of exports. Indeed, a country might have a large debt-to-exports ratio but a low debt-to-GDP ratio if exportables comprise a very small proportion of GDP. This ratio, however, is vulnerable to the presence of over- or undervaluations of the real exchange rate, which could significantly distort the GDP denominator. Also, as with the debt-to-exports ratio, it is important to take account of the country's stage of development and the mix of concessional and nonconcessional debt (i.e., to consider the relevance of nominal or PV indicators).

- *Debt-to-fiscal revenue ratio*—Defined as the ratio of the total outstanding external debt at the end of the year to annual fiscal revenue. This ratio can be used as a measure of sustainability in those countries with a relatively open economy facing a heavy fiscal burden of external debt. In such circumstances, the government's ability to mobilize domestic revenue is relevant and will not be measured by the debt-to-exports or debt-to-GDP ratios.

Flow-Based Indicators

14.18 Debt service provides information on the resources that a country has to allocate to servicing its debts and the burden it may impose through crowding out other uses of financial resources. Comparing debt service to a country's repayment capacity yields the best indicator for analyzing whether a country is likely to face debt-servicing difficulties in the current period. Two main indicators are typically looked at:

- *Debt service-to-exports ratio*—Defined as the ratio of external debt-service payments (principal and interest) to exports of goods and services for any one year.⁷ It indicates how much of a country's export revenue will be used up in servicing

⁵In the case of LICs, debt service indicators may be less informative than for other economies because the repayment of concessional loans is usually back loaded. While long projection periods can mitigate this problem, the reliability of a projection tends to diminish with its length.

⁶Workers' remittances are current transfers made by employees to residents of another economy; in *BPM6* they are included as a supplementary item of personal transfers (*BPM6*, paragraphs 12.21–12.24).

⁷This ratio, in addition to the total debt-to-exports and the total debt-to-GNP (national output) ratios, is provided for individual countries in the World Bank's annual *International Debt Statistics* publication.

its debt and thus, how vulnerable the payment of debt-service obligations falling due in any one year is to an unexpected fall in export proceeds.⁸

- *Debt service-to-(government) revenues ratio*—Measures the burden of the external debt service in relation to the government’s revenues. It highlights the extent to which debt service hampers debtor countries in the use of their financial resources.

14.19 These debt burden indicators focus on the typical measures of repayment capacity (GDP, exports, and revenues). However, remittances can also affect the assessment of debt sustainability by improving a country’s capacity to repay its external debt. In countries where remittances are large and represent a reliable source of foreign exchange, the inclusion of remittance in GDP and exports becomes even more relevant.

14.20 While the indicators mentioned above are commonly used in assessing external debt sustainability, there are other indicators that help gauge debt vulnerabilities associated with the composition of debt, developments in the current account, market perceptions, international liquidity develop-

ments, as well as the country’s own record of servicing its debt. Some of these indicators are mentioned in Table 14.2.⁹

Basic Steps for Undertaking an External DSA

14.21 External debt sustainability is assessed by undertaking a forward-looking analysis of the evolution of debt burden indicators under baseline and stress test scenarios. In practice, this requires projecting the flows of income and expenditures, including those for servicing debt as well as exchange rate changes (given the currency denomination of the debt). Projections of the debt dynamics thus depend, in turn, on macroeconomic and financial market

Table 14.1 Common Debt Burden Indicators in Assessing External Debt Sustainability

Stock (nominal or PV)	Flow
Debt-to-GDP	Debt service-to-exports
Debt-to-exports	Debt service-to-revenues
Debt-to-revenues	

Table 14.2 Other Indicators for Vulnerability Analysis for the External Sector¹

Purpose	Indicators
External solvency indicators	Gross financing need
External liquidity indicators	Reserves in months of imports of goods and services
Indicators of stock imbalances (solvency risks)	Noninterest external current account deficit that stabilizes external debt-to-GDP
Indicators of flow imbalances (rollover risks)	- Gross official reserves-to-short-term external debt (at remaining maturity) ²
	- Extended reserve cover ³
	- Foreign currency deposits to foreign assets of the banking system

¹ For additional information on external and public indicators, see IMF 2008, *Staff Guidance Note on Debt Sustainability Analysis for Market Access Countries*.

² Defined as the ratio of the stock of international reserves available to the monetary authorities (reserve assets) to the short-term debt stock on a remaining maturity basis. This ratio indicates the extent to which the economy has the ability to meet all its scheduled amortizations to nonresidents for the coming year using its own international reserves. It provides a measure of how quickly a country would be forced to adjust if it were cut off from external borrowing, e.g., because of adverse developments in international capital markets. It could be a particularly useful indicator of reserve adequacy, especially for countries with significant, but not fully certain, access to international capital markets.

³ Reserve assets in percent of the current account deficit adjusted for net FDI inflows plus short-term debt on a remaining maturity basis (i.e., long-term external debt [original maturity] due in one year or less plus the stock of short-term external debt [original maturity]) at the end of the last period including foreign currency deposits in the banking system.

⁸ For further guidance on including remittances in the DSA for LICs, see the *Staff Guidance Note on the Application of the Joint Bank-Fund Debt Sustainability Framework for LIC* (IMF, 2013).

⁹ International financial crises have also underscored the importance of disseminating comprehensive information on countries’ international reserves and foreign currency liquidity on a timely basis (see paragraph 15.28 for more information on the Reserves Data Template).

developments, which are intrinsically uncertain and highly variable. While debt assessments can be presented in many ways, a typical DSA consists of three basic elements:

- *Baseline scenario*—This step implies the assessment of debt dynamics under the most likely path of key macroeconomic variables (e.g., GDP growth, net exports, foreign direct investment, and interest rates among others).
- *Stress/sensitivity tests*—The purpose of stress tests is to test the robustness of the baseline by assessing the evolution of debt burden indicators under different scenarios. Stress testing therefore scrutinizes the resilience of the baseline to shocks and reveals the country’s vulnerabilities. Taking into account country-specific characteristics in the design of stress tests is important to accurately capture the risks that a country is exposed to. The impact of stress testing is channeled in two ways: by changing the evolution of the measures of indebtedness and by changing the capacity to repay compared to the baseline scenario.
- *Interpretation of results*—This step involves a discussion of the main risks resulting from the assessment of debt dynamics under the baselines and stress tests. This includes a discussion of policy implications resulting from the projected debt dynamics and the adjustments needed to ensure sustainable debt dynamics, where relevant. This step should bear in mind country-specific circumstances and include an assessment of whether and how other factors (e.g., the evolution of domestic debt, contingent liabilities, or the financial sector) affect a country’s capacity to service future debt payments. The assessment of factors such as the currency and maturity structure of the outstanding debt position (see paragraph 15.16) may be necessary in order to cover the risks and vulnerabilities arising from external debt.

What Are the Main Drivers of Debt Dynamics?

14.22 As mentioned in the sections above, the evolution of external debt is embedded in the context of the overall macroeconomic framework. This involves the projection of key macroeconomic variables and deriving the implicit evolution of external debt.

14.23 The basic equation for the evolution of external debt takes into account a country’s sources of foreign exchange/inflows (exports of goods and services, net transfers, and net income¹⁰) and expenditures/outflows (imports of goods and services). The evolution of the external debt position also takes into account non-debt-creating sources of financing from the balance of payments (in particular the non-debt sources related to direct investment). Other factors (residual) contributing to the evolution of the external debt position include debt relief (exceptional financing), drawdown of foreign exchange reserves, and errors and omissions.¹¹

14.24 The evolution of the external debt position is determined by the following components: noninterest current account deficit, net foreign direct investment, endogenous debt dynamics, and a residual. The combined effect of the first three effects is labeled “identified net debt-creating flows” (Figure 14.1). The residual captures all factors that determine the projections of external debt but cannot be explained by the “identified net debt-creating flows.” The decomposition helps to identify whether the change in the debt burden indicators is largely driven by adjustment of the current account or is rather the result of the behaviors of interest rates, growth rates, and/or price and exchange rate movements.

14.25 The current account dynamics are important because, if deficits persist, the country’s external position may eventually become unsustainable (as reflected by a rising ratio of external debt to GDP). In other words, financing of continually large current account deficits through external debt will lead to an increasing debt burden, perhaps undermining solvency and leading to external vulnerability from a liquidity perspective, owing to the need to repay large amounts of debt.

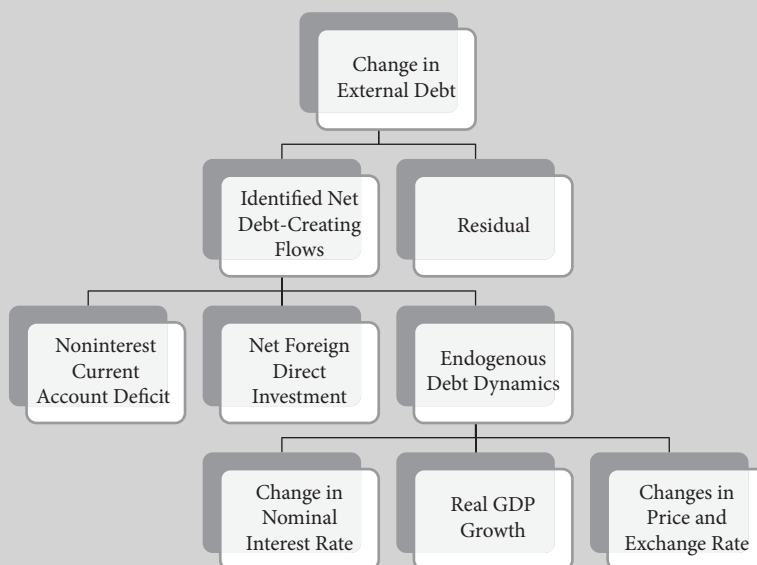
Assessing Debt Sustainability in the Context of Fund Program Monitoring and Country Surveillance

14.26 The IMF has developed a framework for conducting public and external DSAs as a tool to bet-

¹⁰Net income and net transfers are referred to as the balance on primary and secondary income, respectively, in *BPM6*.

¹¹For a detailed explanation of the equation of external debt dynamics, see Painchaud and Tihomir (2011), *Stress Testing in the Debt Sustainability Framework (DSF) for Low-Income Countries*.

Figure 14.1 Evolution of External Debt



ter detect, prevent, and resolve potential crises. The framework also helps assess the evolution of debt under alternative policy paths.

14.27 As mentioned in previous sections, DSA results should be assessed against relevant country-specific circumstances, including the particular features of a given country's debt as well as its policy track record and its policy space. With this in mind, two types of frameworks have been designed: those for MACs and those tailored for LICs.

DSA Framework for Market Access Countries

14.28 The IMF Board endorsed a standard framework for external and public debt sustainability for MACs in June 2002, with the goal of improving the consistency and discipline of DSAs.

14.29 The framework consists of a medium term (five years) baseline scenario, usually the set of macroeconomic projections that form the basis for understandings on a Fund-supported program or the articulation of the authorities' intended policies as discussed with the staff in a surveillance context. Together with a detailed presentation of the baseline scenarios, the framework also facilitates assessments of sensitivity of debt dynamics to a number of assumptions, essentially providing a tool to stress test the baseline.

14.30 In August 2011, the IMF Board approved a modernized framework for public DSA, which moved toward a risk-based approach, while maintaining some elements of standardization to ensure evenhandedness and cross-country comparability.¹² The external DSA part of the framework has not been changed.

DSA Framework for Low-Income Countries¹³

14.31 The World Bank and IMF jointly introduced a DSA framework for LICs in 2005. The conceptual framework underpinning the LIC DSA is essentially the same as that for the MAC DSA. However, its implementation involves different data and operational issues and reflects the prevalence of concessional financing from official creditors. For instance, it uses a 20-year projection horizon as opposed to the five-year period applicable in DSAs for MACs, reflecting the longer maturity of LICs debt. Also, debt indicators for LICs are expressed in present value terms because their debt is predominantly conces-

¹²For more detailed information, see *Modernizing the Framework for Fiscal Policy and Public Debt Sustainability*, IMF, 2011.

¹³More information can be found at the IMF Website: www.imf.org/external/np/exr/facts/jdsf.htm.

sional. Furthermore, LICs face a number of unique challenges, such as overcoming large infrastructure gaps, which raises questions on how best to capture the impact of public investment on growth and debt sustainability.

14.32 LIC DSAs are prepared jointly with the World Bank, and the framework is extended to include an explicit rating of the risk of external debt distress. LIC DSAs are published annually on the external Websites of the IMF and the World Bank.

14.33 The LIC DSA framework has been adopted as a tool to help policymakers strike a balance between achieving development objectives and maintaining debt sustainability. It guides the design of policies that help prevent the emergence, or reemergence, of debt distress in LICs. It is built on three pillars:

- A standardized forward-looking analysis of public sector and external debt and its vulnerability to shocks (baseline scenario, alternative scenarios, and standardized stress test scenarios are computed)
- A debt sustainability assessment, including an explicit rating of the risk of external debt distress
- Recommendations for a borrowing strategy that limits the risk of debt distress

14.34 There are important conceptual and methodological differences between the HIPC Initiative

debt relief assessment (HIPC DRA) and the LIC DSA. While both are driven by the objective of preventing excessive indebtedness, the HIPC DRA is a tool to calculate debt relief under the HIPC Initiative. The HIPC Initiative thresholds for the PV of debt-to-exports and the PV of debt-to-revenue ratios are uniform across countries; their denominators (exports and revenues) are derived on the basis of three-year backward-looking averages to limit the impact of transitory factors; and predetermined currency specific discount rates are used to calculate PVs within currencies, to avoid reliance on exchange rate projections. This analysis is described in more detail in Appendix 5. The LIC DSA is forward-looking, uses single-year denominators, incorporates exchange rate projections and a uniform discount rate, and applies policy-dependent indicative thresholds. The HIPC Initiative and Multilateral Debt Relief Initiative (MDRI, see Appendix 5) debt relief should be accounted for in the baseline or alternative scenario, depending on HIPC status. For instance, for post completion point countries, the LIC DSA should incorporate HIPC Initiative and MDRI relief in the baseline scenario; while for countries in the interim period, the baseline scenario should assume HIPC interim relief, and in an alternative scenario, irrevocable HIPC and MDRI relief should be assumed beyond the expected completion point date.