Part 3: Debt Sustainability Framework for Low-Income Countries

Unit 1: Structure, Learning Objectives and Overview

Video-Learning Objectives & Structure

Machiko Narita: Hi. Welcome to Part 3. My name is Machiko Narita. I am an economist in the Institute for Capacity Development at the IMF. I joined the IMF in 2011, and I have worked on country teams in an area department. I have also taught several courses on macro and fiscal topics in the Institute for Capacity Development. It is very nice to meet you, and I’m very excited to work with you. In this part of the course, I will lead you through the Debt Sustainability Framework for Low-Income Countries, which was jointly developed by the IMF and the World Bank. There are three learning objectives in Part 3 of the course. First, it is to learn what is the debt sustainability framework (DSF) for low-income countries (LICs)? We will discuss what are the specific features of the framework and how it is used in practice. Second, it is to learn how to use the LIC DSA template. The LIC DSA template is an Excel-based template, which is available at the IMF website. In this section of Part 3, we will analyze a model economy, which is called Developia, and by analyzing the Developian economy, we will learn what is the input, what is the output, of the DSA template and also discuss how to analyze the results from the template. We will extensively talk about factors for judgments, as well. Finally, we will study real country examples to learn about the DSAs in practice. The structure of Part 3 corresponds to these three learning objectives. Unit 1 and 2 cover what is the debt sustainability framework for low income countries, which is called the LIC DSF. In Unit 3-9, we will analyze the Developia economy and learn how to use the LIC DSA template. In Unit 10, we will study real country examples to learn about DSAs in practice. This part of the course is going to be very practical and hands-on. So at the end of this part, I hope you have some idea how to apply this analysis to your country. Thank you very much.

Video—What is the LIC DSF?

Machiko Narita: Hi, welcome. In this video, I will provide you with an overview of the Debt Sustainability Framework for Low-Income Countries, which we called the LIC DSF. The LIC DSF is an analytical framework to access debt vulnerabilities, which was jointly developed by the IMF and the World Bank. The LIC DSF covers all countries that are eligible to the concessional lending facilities at the Poverty Reduction and Growth Trust, which is PRGT facilities at the IMF and the concessional resources at the International Development Association, IDA. If there is substantial access to market financing in your economy, then you may want to choose whether to use the LIC DSF or the MAC DSA, which is another tool for market-access countries. The LIC DSF was first introduced in 2005, and it has been reviewed several times to make sure of its relevance and effectiveness. So far, almost 500 DSAs have been produced for 73 different low-income countries by the IMF and World Bank staff. Let me explain the structure of the LIC DSF. The LIC DSF consists of the External DSA and the Public DSA. The External DSA covers the public and publicly guaranteed external debt, which is PPG external debt,
and the private external debt. The Public DSA covers the PPG external debt and the public domestic debt. The external DSA plays an important role in the LIC DSF. It is because the PPG external debt has been the largest component of debt for many low-income countries. Therefore, in the LIC DSF, we analyze the PPG external debt with a special forecast and assess the external risk rating. In the LIC DSF, we also looked at the vulnerabilities in the public domestic debt and private external debt. Based on these analyses, we also assess the overall risk of debt distress. The LIC DSF takes into discount the characteristics of the low-income countries' economies. First, it is the concessionality of debt. The concessionality of debt is typically characterized by lower interest rates, grace periods, and long maturity periods. Second, the LIC DSF considers 20 years of projection horizon. It is to capture the long maturity of concessional loans and to capture the long-term investment returns. The LIC DSF also assesses the external risk ratings based on the analysis of the PPG external debt. This is because of the importance of PPG external debt in many low-income countries. There are mainly three types of users of the LIC DSF in practice. They are (1) the IMF and World Bank, (2) creditors, and (3) borrowers. By the IMF and World Bank, the LIC DSF is used in formulating their policy advice and used as input to policies at the IMF and World Bank. By creditors, the LIC DSF is used as guidance on lending and grant allocation decisions. By borrowers, the LIC DSF is used as an input in formulating their medium-term debt management strategy (MTDS). Let me explain how the DSAs are produced. The first step is to produce the projections and assumptions on the macroeconomic variables and debt in the macroeconomic framework. Then we will populate the projections and assumptions in the LIC DSF template. And we assess the risks based on the results generated by the template. Therefore, the DSA is only as good as the macroeconomic framework. If the projections and assumptions are good, then we can assess debt sustainability well. Good projections and assumptions are realistic, consistent with the policies of the country authorities, and consistent with each other. In the next video, we will talk a bit more about the relationship between the LIC DSF and the policies of the IMF and World Bank. Let's take a break here. Thank you.

Video-Intro

Machiko Narita: Hi. In this video, we invite Hajime Takizawa, who is a Senior Economist in the Debt Policy Division of the Strategy Policy and Review Department at the IMF. He will talk about the relationship of the LIC DSF to the IMF and World Bank policies.

Video-Relationship to IMF/WB Policies and Facilities

Hajime Takizawa: In this lecture, we are going to talk about LIC DSF's relationship to IMF-World Bank policies. LIC DSF plays an important role in IMF and World Bank's policies aimed at limiting debt accumulation. Results of LIC DSF are used to inform the IMF's debt-limits policy in Fund-supported program. LIC DSF also is an input to World Bank's IDA grant allocation and IDA's non-concessional borrowing policies. These policies and the role of LIC DSF will be discussed in subsequent slides. Let's first talk about the LIC DSF and debt limits policy (DLP) under Fund-supported programs. The objective of IMF's debt-limit policy is to ensure debt sustainability over the medium term, while allowing adequate external financing. In IMF-supported programs for low-income countries, a performance criterion that limits public and publicly guaranteed external borrowing is near universal, and is informed by the assessment of a country's risk of external debt distress in the LIC DSF. Concessional financing has historically been excluded from such limits. That is to say, only non-concessional financing is subject to the limits. The Fund's debt-limit policy was reformed in 2009, recognizing growing diversity of low-income countries, including that of available financing options. Flexibility was introduced in 2009 to allow for a menu of
options to provide a systematic framework for accessing non-concessional borrowing. Options available to a particular country are determined by debt vulnerabilities, as assessed in LIC DSA, and macroeconomic and public financial management capacity. Under the current policy, non-concessional borrowing is allowed if it does not exacerbate or create debt vulnerabilities. A comprehensive review of the debt-limits policy is ongoing. DSA will continue playing a key role in the reformed debt-limits policy. Once approved by the IMF’s Board, a new guidance note will be prepared. Now let's turn to our LIC DSA and World Bank IDA's grant allocation. IDA is designed to provide relief to the most indebted countries. Under IDA's grant-allocation framework, eligibility is determined by the assessment of a country's risk of external-debt distress, indicated by the external DSA. Countries at low risk of debt distress receive IDA loans on standard IDA credit terms. Countries at moderate risk of debt distress are eligible for 50% of their financing on the standard IDA credit terms, and the remaining 50% in the form of grants. Countries at high risk of debt distress, or assessed to be in debt distress, are eligible for full IDA grant financing. LIC DSF also plays a role in IDA's non-concessional borrowing policies. IDA's non-concessional borrowing policy was established in 2006, with a view to helping preserve benefits of debt relief and grants provided to low-income countries. The World Bank provides incentives for countries to seek concessional financing. LIC DSF is an important input to the determination of exempt and non-concessional borrowing ceilings and ex-post exceptions. For countries implementing Fund-supported programs, countries' specific ceilings for the non-concessional borrowing policy are based on the corresponding non-concessional borrowing ceilings in the Fund's program. For other countries, the Bank agrees to separate ceilings with its members. Where countries exceed agreed borrowing of non-concessional borrowing, the Bank may modify its IDA financing framework. When there is debt-sustainability concerns, non-observance can lead to reduction of IDA financing volume. Otherwise, non-observance can lead to hardened terms, including higher interest rate and shorter maturity. Now let's discuss when the LIC DSA is going to be produced. All LIC DSAs must be prepared jointly by IMF and World Bank staff. The DSA should be produced at least once every calendar year in the context of an IMF Board document, such as the one for Article IV consultation, a program review, a program request, or an IDA Board document. A new DSA also is required in specific situations. These include the following—first, a request for IMF financing that would involve exceptional access or bring total access to more than 80% of quota or involve a member with a high risk of debt distress or already in debt distress, or a combination of these. The 80% threshold would be lowered to 40%, once after the 14th general review of quota comes into effect. Second, any modification to a performance criterion, or request for waiver for non-compliance with a performance criterion related to the debt limit under IMF-supported program. And third, for countries that are subjected to IDA's non-concessional borrowing policy, a request for non-concessional borrowing going beyond levels assessed in the most recent DSA. Here is a quick summary of what we just discussed. LIC DSF is used as an input for setting and monitoring non-concessional borrowing limits under IMF's debt-limit policy and IDA's non-concessional borrowing policies. World Bank IDA's grant-allocation framework also reflects risk rating of external debt distress, as assessed in the LIC DSA.

Unit 2: The Concessionality of Debt

Video-Present Value of Debt

Machiko Narita: Welcome. In this unit, we are going to talk about how the concessionality of debt is considered in assessing debt
sustainability in the LIC DSF. First, in this video, we’re going to talk about the present value of debt, which is a useful notion in capturing the concessionality of debt. Let me start with a question. Do you think it is fair if I borrow $100 today and give you back exactly $100 one year later? The answer to this question is "no," because there are opportunity costs, such as interest earning potential. For example, if you have $100 and put it into your bank account, then one year later, you will earn the interest on the $100. The present value considers that opportunity cost of money. Present value is a future money amount that is discounted to reflect its current value. Let's think of it in an example. Consider $100 in Year t. Then the present value of $100 is $100, because it is about today. But think about one year later-- then the present value of $100 should be discounted by the discount factor. For example, if you consider 5% as a discount rate, this value is equal to $95.20. Think about that two years later-- $100 should be discounted twice, because it is about two years later. If you, again, use 5% as an interest rate, then it's going to be $90.70. This is the present value of the $100 in different time. Then what is the present value of debt? The present value of debt is the sum of all future debt service payments discounted to the present. By the way, the debt service payment is the sum of principal payment and interest payment. So this is the definitional equation. The present value of debt is the sum of all future debt service payments discounted to the present. By the way, the debt service payment is the sum of principal payment and interest payment. So this is the definitional equation. The present value of debt is the sum of all future payments discounted to the present. Let's think about the present value in an example. Consider a one year loan of $100 at an interest rate, i. At the end of year t, we borrow $100. One year later, at the end of year t plus 1, we have to pay back $100 as a principal payment. In addition, we have to pay the interest payment. It is interest rate times $100, which is the amount which we borrow. Then, do you remember what is the debt service payment? It is the sum of the principal payment and the interest payment. Then what is the present value of this debt service payment? We are thinking about one year later, so debt service payment discounted to the present. Since we are considering a one year loan, the present value of this loan is just this one, the present value of the debt service. Let's continue to think about this example. What is the nominal and present value of debt in this example? The nominal value of debt is $100, which is the face value of this debt. In other words, nominal value of debt is what you borrow at the beginning of the contract. What is the present value of debt? If you remember, it is the sum of principal payment plus interest payment discounted to the present. In other words, it is what you pay on the loan in the present value. So, we are comparing what we borrow and what we pay in the present value. Let's think about the relationship between the nominal and the present value of debt. Look at this equation from the example. If we rearrange this equation, then we can write it down as this expression. Then, if our interest rate is equal to the discount rate, then this term cancels out and it becomes $100, which is the nominal value of the loan. So if the interest rate is equal to the discount rate, what you borrow is exactly the same as what you pay in the present value. But if your interest rate is lower than the discount rate, then the present value becomes less than nominal value, $100. It means, in other words, there is some concession. On the other hand, if your interest rate is higher than the discount rate, then what you pay, or present value of debt, is larger than the nominal value of the loan, what you borrow. In practice there are some complexities, depending on your contract terms. But we can still say the similar thing. In general, if the interest rate is equal to the discount rate, then the present value is equal or close to its nominal value. And if the interest rate is smaller or lower than the discount rate, or there is some concession, the present value is typically smaller than the nominal value. And, likewise, if the interest rate is higher than the discount rate, present value is typically larger than the nominal value. Now the question is, what number are we going to use as a discount rate in the LIC DSF? For the LIC DSF, currently we use 5%. It is a single discount rate for all countries. It is determined by the Executive Boards in 2013, and the rate will remain unchanged until the next revision. OK. Let's take a break here, and please work on some quizzes to be more familiar with the present value of debt. Thank you very much.
Video-Present Value of Debt, Excel Exercise

Machiko Narita: Hi, how are you? In this video I will explain the spreadsheet provided for the calculation of the present value of debt. The name of the file is PV of debt. In the spreadsheet, you have a table for a two year loan of $100. The interest rate is set at 2%. And the discount rate is set at 5%. So what you have to do is, to fill out the yellow cells with some formula. So in this video I’m going to explain how to use this table using different numbers. So let’s set it as 4%. OK. At the end of the Year t we borrow $100. But in the following years, we make principal payment of $50. The interest payment is calculated as the amount of money we owe in the last 1 year, times the interest rate, which is 4%. So $100 times 4 percent is $4 in Year t + 1. t Similarly, in the t + 2 it is calculated as the amount we owed times the interest rate. The debt service payment is calculated-- is defined find as the sum of the principal payment and the interest payment. So it is $54 in Year t +1 and the same for Year t + 2. The question is how to calculate the present value of debt service? You can refer to the formula we discussed in the lecture video. The present value, to make this amount into the present value, we have to discount this value by the discount rate, which is the 5%. How about Year t + 2? Now we have to discount this number by the discount factor twice. So we have to discount the nominal value of debt service twice in Year t + 2 because it is about two years later. OK, so now we have to calculated the present value of debt service in each year. And this is the sum of these payments. Now, the final question is, what is the present value of debt? As we discussed in the lecture video, it is defined as the total sum of the debt service payment in the present value. So we can just refer to this number, which is the sum of all debt service payments on this loan. So the present value of debt, in this case is, $98.60. You do the same thing for 2%-- of interest rate at 2%-- for the assessment quizzes. OK, good luck. Thank you very much.

Video-Grant Element

Machiko Narita: Welcome back. In the previous video, we discussed that the present value of debt can differ from the nominal value of debt. Let me ask you a review question. Consider the case when the interest rate is lower than the discount rate. Is the present value of debt higher or lower than its nominal value? The answer to this question is lower. The PV of debt is lower than the nominal value of debt. What does it mean if the present value is lower than the nominal value? Recall that the nominal value of debt is what you borrow on the loan, and the present value of debt is what you pay on the loan. This is the definitional equation for the present value of debt, which is the sum of all future debt service payments discounted to the present. Again, what does it mean if the present value is lower than the nominal value? The answer is that your total future payment is cheaper than what you borrow in the present value. So lower present value reflects some concessionality in the debt. There are other factors that affect concessionality, which are maturity, grace period, and frequency of payments. Maturity is the number of years that are required to service the loan. The grace period is the period when no principal payment is required. Let's take an example. Consider a loan for 5 years. So at the end of the year t, we borrow some money for 5 years. So in this example, our maturity is 5 years. Look at the principal payment schedule. Then, you notice that the first 2 periods, we don't pay back. So how many grace periods do we have? It is 2 years. And what is the frequency of payments in this example? It is annual because we are paying in each period, each year. So it is annual. Now, consider the case where the interest rate is lower than the discount rate. Let's think about how the maturity, grace period, and payment frequency affect the concessionality in this situation. In this situation, when the interest rate is lower than the discount rate-- which reflects the market interest rates-- then it is advantageous to take a longer time to repay the loan. Therefore, in this situation, the longer the maturity is, the higher the concessionality is. The longer the grace period is, the higher the
concessionality is. And also, lower the payment frequency is, the higher the concessionality is. In this situation, everything lowers the present value of debt. In other words, it increases the concessionality of a loan. Grant element is a measure of the degree of concessionality of a loan. The grant element is defined as the difference between nominal value of debt, minus present value of debt, divided by the nominal value of debt. So is the difference between nominal value and present value in percentage of nominal value of debt. A loan is typically considered to be concessional if the grant element is equal to, or larger than 35%. In the LIC DSA, we have to make assumptions on how the country is going to borrow in the future. This is one of the output charts that summarizes the debt accumulation in the next 20 years. It has the grant element of the new borrowing in this country. This is an example from the published DSA for Bangladesh in 2013. In this case, the grant element for the future borrowing is around 15%. OK. Let’s take a break here, and please work on the exercises so that you can be more familiar with the grant element calculation. Thank you.

Video-Delay Burden Indicators

Machiko Narita: Hi. Welcome back. In this video, we’re going to talk about the debt burden indicators in the external DSA. There are five debt burden indicators in the external DSA but they are all about PPG external debt, which has been the largest component of debt in many low-income countries. There are two types of the indicators, which are the solvency indicators and the liquidity indicators. The solvency indicators are the ratio of the present value of PPG external debt to a resource base measure. And the liquidity indicators are the ratio of the debt service to a resource base measure. For the solvency indicators, we are looking at the present value of debt instead of the nominal value of debt. Do you remember why we want to look at the present value of debt instead of the nominal value of debt? Yes, it is because we want to consider the concessionality of debt in assessing debt sustainability. Here are the main output charts from the external DSA. These are the examples from the published DSA for Kenya. In the main output charts we have the summary chart of debt accumulation in the projection horizon, and the charts on the five debt burden indicators-- PV of debt-to-GDP ratio, PV of debt-to-exports ratio, PV of debt-to-revenue ratio, debt service-to-exports ratio, and debt service-to-revenue ratio. In each of the debt burden indicator charts, we also have a green dotted line, which are the indicative thresholds. The indicative thresholds are provided for each of the five debt burden indicators. And they are provided for each of the policy performance categories-- weak, medium and strong. In other words, indicative thresholds depend on the quality of the country’s policies and institutions. The question is how to measure the quality of policy and institutions. The LIC DSF uses the Country Policy and Institutional Assessment index, CPIA index, as a measure of the quality. The CPIA index consists of 16 indicators in the four areas, which are economic management, structural policies, policies for social inclusion and equity, and public sector management and institution. The CPIA index is annually compiled by the World Bank staff for all IDA eligible countries. Policy performance categories are determined based on the 3-year moving average of the CPIA index. Here is the criteria for each of the policy performance categories-- weak, medium and strong. For the debt burden indicators, you may want to incorporate remittances if they are large. The remittances are considered to be large if they are larger than 10% of GDP and 20% of exports. If these conditions are both satisfied, it is recommended to incorporate remittances. The LIC DSA template would automatically check these conditions and notify you when it is needed. When you incorporate remittances then you will look at the remittance-adjusted indicators for these three indicators. But the revenue indicators are the same. For these three indicators you will be looking at the remittance-adjusted indicative thresholds accordingly. OK let’s take a break. Thank you very much.
Unit 3: The LIC DSA Template

Video-Structure of the LIC Template

Machiko Narita: Hello, everyone. From this unit, we are going to work on the LIC DSA template and learn how it works. First, let me explain what is the LIC DSA template. LIC DSA template is an Excel file that produces charts and tables for external and public DSAs. It uses data for a country of your interest as an input. The template is publicly available from the IMF website. There are many worksheets in the template, or the Excel file, but they can be classified into three categories, which are (1) inputs, (2) outputs, and (3) background calculation sheets. Among the input sheets, the first two, the "Data-Input" sheet and "Inp_Out_Debt" sheet, are the most important ones, and you are going to be familiar with them. On the other hand, output sheets are the charts and tables for the DSAs. The background calculation sheets calculate everything for you. So normally you don't have to visit and see how it is done, but time to time, you may be curious how the results are generated or calculated. So sometimes you may want to visit. But in this course, we are going to focus on how we work on the input sheet, and how we interpret the results in the output sheets. OK, let's get started. So for this course, we are going to use the e-DSA version of the LIC DSA template, which is available on our course site. However, it is not that different from the actual template. It is the same as the actual template except for two things. First, it recognizes our imaginary country, Developia, as a country, although the actual template does not. Second, it has an additional data sheet called "Developia-Data," which contains data and projections for Developia. So in a way, we are in a situation that we receive data and projections from our macroforecasting team, and given that data and the projections, we conduct the DSA. OK.

Let's take a look at the template itself. If you open the Excel file, the LIC DSA template, then first, you may want to allow that macros work. So, there are many Excel macros in the LIC DSA template. So you go to Security Warning, here, around the top of the Excel file, and go to Options. You click on Options and enable macros. So, select Enable and click OK. The second thing you want to do is to select your working language. There are four languages available in this template—English, French, Portuguese, and Spanish. So as you see, if you click, for example, French, everything is in French. But there are certain things that are still in English, like the labels on the worksheets. So if you scroll down, there are tables that give you some translations. Anyway, for this course, we're going to use English, so let's select English. Now, let's take a look at the bottom of the Excel sheet. Next to the "Start" sheet, we have "Input-Instructions" sheet, "Developia-Data" sheet, and yellow input sheets. Let's go to the "Developia-Data" sheet. This is the sheet that I mentioned as an additional data sheet which is only available in the e-DSA course, the e-DSA version of the template. This sheet contains data and projections from the macro-framework for Developia. So these are the numbers, the historical numbers, and projections from the macroforecasting team that we are going to use as an input to the template later. In the next video we’re going to work on the input sheet. Thank you.

Video-Country Information

Machiko Narita: Welcome back. In this video, we start working on the input sheets. But before going into the details, I want to give you some big picture over the main input to the template. The main input to the template are mainly on the "Data-Input" sheet and "Inp_Out_Debt" sheet. These are the two main input sheets. The first thing you need to input in the "Data-Input" sheet is the debt-related country information, such as the status of IMF programs and IDA
operations. The second thing you need to populate on the "Data-Input" sheet are the historical data and projections for the main economic data series. On the other hand, the "Inp_Out_Debt" sheet focuses on the PPG external debt. Do you remember that the public and publicly guaranteed external debt was the largest component of the debt for many low-income countries. So that is the reason why the LIC DSA template collects more information on the evolution of PPG external debt, such as assumptions on new borrowing, like contract terms, and the schedule of debt service payments. Given this information, this sheet produces the projections of PPG external debt series. That's why it's called "Input" and "Output" of the PPG external "Debt" sheet. OK, let's look into the template. On the Excel file, there is a sheet which is called "Input-Instructions" sheet. Let's go to the "Input-Instructions" sheet. Then you're going to have step-by-step instructions for each of the input sheets. And if you click the blue button, Excel moves to the corresponding input sheet. So this is the navigator for the work on input. Also, you can print this page out and have it as your reference while you're working on the template. OK, let's go to that "Data-Input" sheet The first thing you need to populate is the country information, the debt-related country information. So let's take a closer look. The first thing is to select the country. If you click on the C4 cell, then you see the top, and there is a drop down list of the countries. This list contains all countries that are covered by the LIC DSA template (of the LIC DSF). So as I mentioned, this course version of the LIC DSA template contains Developia in the list. So it recognizes Developia as a country. If you select the country, then some information is automatically populated. So first let's move right here. Then this is the CPIA rating for Developia and the corresponding policy performance, which is "weak." And also, these are the threshold for debt burden indicators. So this is the status of the HIPC Initiative. As Developia already reached the "completion point" of the Initiative, it's shown as "CP." Developia didn't participate in the MDRI, so we populate it as "no." And currently Developia doesn't have an IMF program, so we say "no" here. So you type in here. So by the way, every cell which is in yellow means that it needs your input. So you need to populate them. And IDA operation-- there is IDA operation-- so you need to say "yes." And IDA status for Developia is "IDA only." The minimum concessionality requirements are usually 35%, unless other requirements are specified in some document for your country. But for Developia, let's use the standard minimum requirement, which is 35%. And as we discussed, the discount rate is uniformly set at 5%. And the projection horizon is 21 years. And we can select the scale of the data input which we are going to use. So if you select millions, everything will become millions. But for Developia, let's select billions. You see other yellows, so like "date staff report issued to the board", and "publication status." This is something specific to the Fund and IMF staff. And also this is the external debt distress rating. This is the result of the DSA. So these three places are the ones you need to populate after the analysis.

**Video - Data and Projections (Overview)**

Machiko Narita: Hi, welcome back. In the previous video, we worked on the country information in the template. Now in this video, we're going to move on to the debt section of the "Data-Input" sheet. And we will populate some of the series data and projections. Here is what we need to populate in the "Data-Input" sheet. We need to populate debt, BOP, fiscal accounts, GDP and exchange rate. For debt, we need to populate debt outstanding, interest payments, and principal payments. Principal payment is also called as amortization. I think everybody agrees that we need debt information in accessing debt sustainability. But do you see why we also need to populate BOP and fiscal accounts? It is because such data will give us some information about financing needs. In other words, they will provide us with the information as to why the debt is growing or shrinking. So they're going to be useful. OK, now let's go to the template. OK, now we are in the template, and we are on the "Data-Input" sheet, but in
the Data section. Now, the first thing that you want to do is to specify the first year of the projection. If you go to here, you find the yellow cell to specify the first year of projection. For Developia, we have historical data available until the end of 2013, so we're going to specify it as 2014, as the first year of projection. If you specify the number in here, then the labels of the table will be automatically adjusted. For example, if you change it to 2015, then the tables are changed. Let's specify it as 2014 for our exercise. Also, if you go to the end of the table, you find 2034 as the end year. So this table requires you to put the projections for 20 years. OK, here's the list of the things you need to populate. The first thing is the debt outstanding, and it consists of external debt outstanding and the public debt outstanding. For the external debt, we have PPG external debt and private external debt for different maturity. Typically, short-term debt refers to the debt with a maturity less than one year. By the way, you see the yellow cells in here? Yellow cells means that you're required to populate. So the next thing is the public domestic debt outstanding. We also need to populate for different maturity, and also, if you have series for the amount of domestic debt, which is denominated in foreign currency, you need to populate in here. After the debt outstanding, we need to populate the interest payments for each debt series and amortization. As we discussed, in addition to the debt series, we also need to populate the BOP data, such as the current account balance, exports, imports, transfers, and remittances. Also, you need to populate the net foreign direct investment, exceptional financing, and gross reserves--change in gross reserves. The exceptional financing refers to the debt relief or the accumulation or clearance of the arrears. The next thing is the fiscal accounts. So you need to populate revenues, expenditures. And if you have some information about the public assets, contingent liabilities, or other debt-creating or reducing flow, please populate in here. Also, please populate the debt relief and concessional loans, if they are available. Finally, you need to populate the nominal GDP in US dollars, real GDP, GDP deflator. And also, you need to populate the exchange rate, end of period, and period average exchange rate. OK, now let's take a break.

Unit 4: Data and Projections for the LIC Template

Video-Guidance on Debt Data

Machiko Narita: Hello, everyone. How are you today? In this unit, we're going to talk about some tips and guidance which are going to be useful in populating data inputs in the template. The first topic is about the guidance on the debt series. As we saw in the template, we have to populate many debt series. We have to populate external debt, domestic debt, public debt, and private debt. So there are many definitions we have to be clear about. And also, you may wonder whether we need to look at the gross debt or net debt. This video will provide some guidance on these questions. In principle, coverage of public sector debt should be as broad as possible. We want to cover the central government debt, regional and local governments, center bank, and public enterprises. But we also face the data availability, so it depends on the availability of the debt. Another thing you may want to consider is the consistency with the coverage of fiscal accounts. For example, if you present your fiscal tables for central government in the IMF Annual Consultation meetings, then we want to present the DSA for the central government as well, to be consistent. Generally, for the LIC DSA, external and domestic debt is defined based on the residency of the creditor. If the debt is owed to non-residents, then it's external debt. If it's owed to residents, then it's domestic debt. However, sometimes it's difficult to identify the
debt based on the residency of the creditor. For example, if the government debt are traded on the secondary market, is it difficult to keep track of the residency of the creditors. In those cases, you can use the domestically issued debt as a proxy for domestic debt, or you can also use the currency of denomination. It's OK to use any of the reasonable definitions, but it is very important that you disclose them in the DSA write-up. In LIC DSA, we examine the gross debt in assessing debt sustainability. Gross debt is defined as the total stock of outstanding liabilities. However, if the government has a significant amount of assets that can be used to service debt, then you may want to also look at the net debt as a complementary measure. Still you are examining the gross debt as a primary measure, but if the public assets are significant, then you also need to look at the net debt. OK, let's take a break here. And please work on the quizzes so that you can digest what we have discussed in this video. Thank you.

**Video-Debt Series**

Machiko Narita: Welcome back. In the previous video, we discussed some guidance on the debt series. In this video, we are going to review the information on the Developia case and populate the debt series to the template. For Developia, the coverage of the public sector is going to be Central Government. This is because of the availability of data. However, we have a consistent coverage for both public debt and the fiscal accounts, which is a good thing. For the External and Domestic debt definition, we use the residency of the creditor. Finally, we're going to look at the gross debt in assessing the debt sustainability. But we are not going to look at the net debt, because the government doesn't have a significant amount of public assets. OK. Now let's go to the template. Now we are on the template. Again, we are in the "Data-Input" sheet. So remember that yellow cells mean that you need to populate them. The first thing is the PPG external debt. Let me hide these columns so that you can see it more clearly. So for Developia, we have data and projections available from the "Developia-Data" sheet. So what we need to do is to find the PPG external debt outstanding from the "Developia-Data" sheet. Here it is. Now I want you to pay attention to the units and scale of this series. It is US dollars, millions. However, on the "Data-Input" sheet, you have US dollars, billions. So you need to convert it to the billions. So let's link this cell to the Developia data PPG external debt and divide it by 1,000 to make it in billions. Here it is. Now this cell is linked to the "Developia-Data." But sometimes you want to make sure if the link is correct or not. Here are some tips you can use. It is Control and left bracket. Go to the cell you want to make sure and press Control and left bracket at the same time. Then Excel moves to the cell that is linked. Let's do it again. Select the cell and press Control and left bracket. Then we can make sure that this is indeed coming from the PPG external debt outstanding in 2001. Now we are fine with this formula, so let's copy it to the other years. OK. Now we have populated them. By the way, notice that the yellow cell is ending in 2013. Do you remember why we don't have to populate the projections of debt outstanding of PPG debt? It is because the projections are produced by the next sheet, which is "Inp_Out_Debt" sheet. So in the next sheet, we are going to provide some assumptions to produce PPG external debt series. So this is the case for outstanding interest payments and amortization for PPG external debt. By the way, you can notice that many of the cells are already pre-populated. But you also notice that the interest payments and amortizations are left blank. They were left blank intentionally so that you can do it in the exercise. So please review what we did in this video, and make sure it works for you. Thank you very much.

**Video-Other Series**

Machiko Narita: Hi. Welcome back. In the previous video, we populated debt series in the template. In this video, we are going to move on to the other series, which are BOP series, fiscal accounts,
and GDP and exchange rates. Before populating them, I want to talk about one issue you may face in populating them. It is about fiscal year and calendar year. Sometimes most variables are available in the fiscal year, but some variables are only available in the calendar year. What should we do? This is the question we want to ask. In general, in the LIC DSA, we can use either fiscal year or calendar year. However, they should be clearly stated in the write-up and also should be consistently used throughout the DSA. In the case of Developia, the fiscal year starts in July. So for example, this is the fiscal year ending in 2014, so this is fiscal year 14 (FY14). Likewise, this is the fiscal year ending in 2015. But calendar year is of course starting in January, so this is calendar year 13. This is calendar year 14. For Developia, we have most variables available in the fiscal year basis. However, BOP series are not available in the fiscal year basis. So they are only available in the calendar year basis. So what can we do? If we have monthly data or quarterly data, then we can always construct the fiscal year variable. For example, if you have the monthly data, then the fiscal year 14 variable is the sum of monthly data from July, 2014 to June, 2014. So it is going to be monthly data July 13, August 13...until June 14. If you have quarterly data, you can do the same thing. So it is going to be the sum of third quarter of 2013, plus fourth quarter of 2013, first quarter of 2014, and the second quarter of 2014. However, sometimes we don't have monthly or quarterly data. What can we do? If there is no monthly or quarterly data available, then we can approximate the fiscal year variable. So there is something we can do. So consider the fiscal year 2014 again. Then it is second half of 2013, and first half of 2014. The fiscal year 2014 can be approximated by a half of calendar year 2013 and a half of the calendar year 2014. For Developia, we don't have monthly or quarterly BOP data. So this is what we are going to do in the template. Let's go to the template. OK. Now we are in the template and we are on the "Developia-Data" sheet. If you scroll down, there is a BOP series. Notice that the current account balance in the fiscal year is not available, but the calendar year is available. This is the 2002, so the fiscal year ending in 2002. We can apply the formula, which is 0.5 times 2001, plus 0.5 times 2002. Here is the approximated fiscal year current account balance in 2002. Let's do it again for 2003. It can be approximated by 0.5 times 2002, plus 0.5 times 2003, because the fiscal year starts in July and ends in June, 2003. We are comfortable with this formula, so we can copy it to the other years. In the exercise, you’re going to be asked to do the same thing for imports. So please construct the approximated fiscal year series for imports in the exercise. Thank you.

Unit 5: PPG External Debt Projections

Video-Overview

Machiko Narita: Hi everyone. So far, we've been talking about the "Data-Input" sheet. In this unit, we are going to move on to the other input sheets, which are the "Inp_Out_Debt" sheet and the "SDR" sheet. Let me begin with the "Inp_Out_Debt" sheet. The main objective of the "Inp_Out_Debt" sheet is to construct projections of PPG external debt series, which are outstanding, interest payments, and principal payments. In order to generate these projections, we need to provide more information about the PPG external debt, which are the projections of the debt service on the old debt, projections of new disbursements, assumptions on the contract terms of new debt. By the way, what is the old debt and new debt in the LIC DSA template? The old debt in the LIC DSA template refers to the outstanding debt disbursed before the first year of the projection. In our case, the first year of projection was fiscal year 2014. The new debt in the template refers to the new disbursements after the first year of the projections. The new disbursements can come from a new
contract or existing contracts. It doesn’t matter. What matters is the timing of the disbursements. Let’s take an example. Suppose the first year of the projection is fiscal year 2014, and suppose that the creditor A has been providing a loan to a country. And the debt outstanding at the end of fiscal year 2013 was $30 million. This $30 million is called old debt in the template. So we need to provide the projections on the debt service payments on this old debt. Now, suppose that the loan by the creditor A continues for next five years and additional $20 million will be disbursed. Then, this $20 million is called new debt in the LIC DSA template. So, for this new debt, we need to provide the projections on the disbursement and the assumptions on the contract terms. Let’s take a look at the template.

Now, we are on the “Inp_Out_Debt” sheet of the template. First thing you need to populate is the assumption on the new external debt, new debt. In this table, you have to provide the contract terms, which are interest rate, grace period, and loan maturity for each of the major creditors. There are columns for multilateral creditors, official bilateral creditors, and commercial creditors. So based on the ongoing discussions or the country experience in the past, you can provide the main major creditors and make assumptions on the contract terms. For example, in the IMF line, we make assumptions based on the typical PRGT facility. So, if you populate the interest rate, grace period, loan maturity in the table, then the template will automatically calculate the grant element of this loan. In this case we have 30.9%. Again, if you hover over red flag, you can have additional information. In addition to IMF and IDA, we can add more creditors. In the case of Developia, let’s add Regional Development Bank. So we can just override this column, Regional Development Bank. And the interest rate for the Regional Development Bank would be 1.5% based on the past experience, and grace period will be 10 years, and the maturity is 30 years. After filling in this information, here is the implied grant element of this loan, which is 43.5%. You can add one more creditor in here. But if there are more creditors, then you have to aggregate other creditors in this line. And you have to make assumptions on the average contract terms in this line. Similarly, you can fill in the official bilaterals and commercial creditors. OK, let’s take a break here.

**Video-Inputs and Outputs**

Machiko Narita: Hi. Welcome back. In the previous video, we worked on the assumptions on the contract terms on the new debt. In this video, we move on to the different parts of the ”Inp_Out_Debt” sheet. OK, we are now in ”Inp_Out_Debt” sheet of the template. The next thing we have to populate is the projections of the debt service payments on the old debt. The major creditors in this table have been automatically populated when you specified in the above table. So as you specified in here, we have Regional Development Bank. And as you specified in the exercise, you have Raccoonia under the Non-Paris Club bilateral creditors. Here, we have to populate the projections of the debt services on the old debt for each creditor. In the case of Developia, we have received the projections by our macroforecasting team. So as we did in the previous video, we just find the series in the ”Developia- Data” sheet, and populate in here. But let’s make sure, for example, the IMF debt service payments in 2014 is correctly linked. You can select this cell, and press Control and left bracket. Now we see the debt service payments on all debt for IMF in 2014. And also, units are US dollars, and scale is billions, as we specified in the ”Data-Input” sheet. So this input seems to be correct. So you can confirm other links, but basically you can populate them from the ”Developia-Data” sheet. When there is no input-- for the blank column-- you have to leave the line as blank. The template will treat it as zeros. After populating these projections of debt service payments, then this line 54 calculates the annual debt service payments on the old debt. Under the Total line, if you know how much of the debt service payments were on the principal payments, then you can also populate in here. In the case of
Developia, you notice that most of the debt service payments were actually the principal payments. It would reflect the low interest payment on the interest rate on the old debt. If you don’t have this component, then you can leave this line as blank. Finally, if you have the series on the stock of outstanding arrears, then you also need to populate in here. OK, the last thing you need to populate is the disbursements-- the projection of the disbursements-- on the new debt. We have the same list of the creditors as we specified above, and we need to populate the projections for each of the creditors. After populating individual projections, it calculates the totally new disbursements for each year. If you populate the contract terms on the new debt and the projection of the new disbursements, then the template will calculate the debt service payments on the new debt. Here is the total new debt service on the new debt. And it is followed by the individual projections of the interest payments and amortization, etc. But please go to the end of this table. It's line 213. Here we have Total public debt service. This line shows the projection of the debt service payments on the PPG external debt. And here is the principal component and the interest payment component. These are what we wanted in the "Data-Input" sheet. Do you remember? Now we want to confirm whether this number is actually used in the "Data-Input" sheet. Here is something you can use, which is Trace Dependents. If you want to confirm where this number is used in the template, select the cell you're interested in, then go to Formulas, Trace Dependents, and you click on the dotted arrow. Select the place you want to check, and click OK. Then the principal payments in 2014 is actually used in the principal payments for PPG debt in 2014. So we are now confirmed that the projections produced in the "Inp_Out_Debt" sheet is used in the "Data-Input" sheet. OK, now we have finished the heaviest input sheets in the template, so please have a good break, and see you in the next video. Thank you.

**Video-SDR Information**

Machiko Narita: Hi, welcome back. In this video, we are going to finish working on the input sheets. The last input sheet we are going to talk about is the "SDR" sheet. SDR stands for Special Drawing Right. SDR is an international reserve asset which was created by the IMF in 1969 in order to supplement its member countries' official reserves. In the "SDR" sheet, we have to populate the country's SDR allocation and the SDR holdings. In order to get such country-specific information on the SDR, we can go to the IMF website. Let me show you the website. Here is the IMF website, which is about the members' financial data, by country. On this website, you can select the country and the date. After selecting the country and date, you can click "Go", and get the country's SDR allocation and holdings on the specified date. OK now let's go to the template. Now we are on the "SDR" sheet in the template. What we have to populate is the SDR allocation and holdings at the end of 2013 in the fiscal year. In the case of Developia, we have $0.25 US billion, both allocation and holdings. Since the amount of SDR allocation is equal to the holdings, then Developia didn't have to pay any interest. If the country's allocation exceeds the holdings, then the country has to make the interest payments, but this is not the case for Developia. On the expected drawdown and possible reconstitution of SDR holdings, you can basically leave them as blank. If you have a certain or a confirmed plan to do so, then you can populate the plans. But otherwise, you can leave them as blank. Now we have finished populating necessary input to the template. Congratulations. In the next unit, we are going to talk about the output from the template. Thank you very much.
Unit 6: Output from the External DSA

Video-Baseline Scenario and Stress Tests

Machiko Narita: Welcome. In this unit, we are going to start talking about the output from the template. We begin with the output from the external DSA, because external DSA plays an important role in the LIC DSF. The "baseline scenario" is deemed to be the most likely scenario. It is derived from the assumptions and projections we have populated as input. "Stress tests" is the scenarios under different assumptions. It is used to assess the sensitivity of the baseline scenario to shocks and changes in the assumptions. There are standardized stress tests which are applied to all countries, regardless of their circumstances. Although the set of stress-test scenarios are common for all countries, the size of the shocks are calibrated to each country, using historical data in the past 10 years. In addition to the standardized stress test, you could also consider the customized scenarios. If you think there is country-specific vulnerability which is not well captured by the standardized stress test, then you can create your own customized scenario to assess it. One caveat you want to keep in mind is that stress test is a partial-equilibrium analysis. There is a macroeconomic adjustment process triggered by a shock, but the stress-test analysis doesn't take into account in the analysis. For example, the government may want to change its expenditure policy to cope with a certain shock, but the stress-test analysis doesn't take into account such actions. Now we are on the "Output Instructions" sheet in the template. The output from the external DSA is presented in different worksheets, depending on the inputs. This sheet will provide us the information with which worksheets we should look at. Based on these columns, we know that Developia doesn't have large remittances, and we know that Developia is in a borderline case. We will discuss what is a borderline case in a later video, but whatever it means, we know that we are in the borderline case. So in this table, since we are borderline case, we know that we have to look at these four tables for the output from the external DSA. If you click blue buttons, Excel moves to the corresponding Excel sheet. OK, let's take a break here.

Video-Results from the Baseline Scenario

Machiko Narita: Hi, welcome back. In this video, we are going to start analyzing the dynamics of external debt. The first thing we want to do is to understand the evolution of external debt. In principle, the evolution of external debt can be explained by the identified financing needs and other factors. Financing needs would be trade deficits and other CA outflows. Other factors would include non-debt financing and unidentified financing needs. When the financing needs goes up, then it is natural that the external debt is growing. But external debt could decrease when there is a lot of non-debt financing. So by looking at these factors, we can understand the evolution of external debt. When there is an increase in the current account deficit, which is not covered by the FDI inflows, then it is counted as the identified net creating flows. In the LIC DSA template, we usually look at the external debt-to-GDP ratio. Therefore, if there is a slowdown in the GDP growth, then this ratio would go up. Since we are looking at this ratio, the change in the prices or exchange rates also affects the dynamics of this ratio. Residuals in the template would reflect everything which is not captured by the identified flows, so the residuals would include non-debt financing and unidentified financing needs. Non-financing debt financing would include exceptional financing, such as arrears and debt relief, and drawdown of foreign assets, such as foreign reserves. Examples of unidentified financing needs would include unregistered imports and remittances. The financing needs would increase with unregistered imports, but decrease with the unregistered remittances inflows. Now let's go to the template. We are in the "Output-Instructions" sheet in the template. Now let's take a look at the first table. We are in the "Out-Table Baseline-External" sheet. In this sheet, there is a
summary table of the external debt dynamics under the baseline scenario. Everything is presented in percent of GDP, unless otherwise indicated. In this table, we have external debt, and the change in the external debt. As we discussed, the change in external debt can be broken down into identified net debt-creating flows and residuals. Under the identified net debt-creating flows, we have non-interest current account deficit, net FDI flows, and endogenous debt dynamics. In addition to this information, this table shows us the debt-burden indicators under the baseline scenario-- key macroeconomic assumptions, and memorandum items. In this table, these indicators are presented for the last three years, and the projections for the next 20 years. OK, let's take a break here.

Video-Consistency Checks

Machiko Narita: Hi, welcome back. In the previous video, we discussed many factors that could affect the evolution of external debt. But basically we were trying to understand the debt dynamics by looking at the identified flows and residuals. The change in external debt-to-GDP ratio can be explained by identified flows and residuals. If the change in the external debt-to-GDP ratio is mostly explained by the identified flows, then there is no mystery. However, if most of the change in the external debt-to-GDP ratio is explained by the residuals, then we still don’t know what’s going on. It is because residuals reflect everything that is not captured by the identified flows. Therefore, we need to understand what is in the residuals, especially when the residuals are large. In the previous video, we discussed that residuals could reflect exceptional financing, drawdown of foreign assets, and unexplained net debt-creating flows. In this video, I want to highlight another important factor which can be reflected in the residuals, which is inconsistencies in the input. Inconsistencies could be between the assumptions in the macroeconomic framework. For example, our macro-forecasting team may have assumed a large increase in the current account deficit, but a small increase in the external debt disbursements in the forecasting period. If there is a story to explain these projections, it is fine. But if there is no such story, then it is better to go back to the macro-framework and fix the inconsistency in the projections. Other inconsistencies can happen in the units, scales, and the use of fiscal year and calendar year. Some of the inputs may not be properly populated in the input. In the LIC DSA template, there are consistency-check columns that we can use in figuring out what is going on in the template. The first consistency check in the template is about outstanding and amortization about the old debt. It compares the PPG outstanding at the end of the data period, and the sum of the amortization on all debt in the projection horizon. The difference between the outstanding and the sum of amortization in the projection horizon would reflect the loans with longer maturities or inconsistencies. Our projection horizon was 20 years, so if all of the old debt has a maturity less than 20 years, then the difference should be equal to 0, because all of the old debt should be fully amortized in the projection horizon. However, if you see non-0 difference in this case, there must be some inconsistencies in the inputs. However, if there is a loan whose maturity is longer than 20 years, then the difference shouldn’t be equal to 0, because not every old debt is amortized in the projection horizon. So it is better to understand why the difference is not equal to 0 if it is the case. The second consistency check in the template is about the financing needs and debt financing. It compares the gross financing needs covered by the public sector, and the PPG external debt disbursements in the projection horizon. Gross financing needs is equal to the non-interest current account deficits, which is not financed by the FDI, plus debt services on external debt, minus the private external financing. The difference between the gross financing needs covered by the public sector and the PPG external debt disbursements would reflect the non-debt financing, limited coverage of the private debt, and other inconsistencies in the inputs. OK, now we are on the "Out Table Baseline-External" sheet in the template. This is the table we discussed in the previous video. Now we highlight the change in
external debt, identified net debt-creating flows and residuals. Let’s review how they look like in the case of Developia. By looking at these numbers, we notice that there is a small change in the external debt, but large movements in the identified flows and residuals. Since residuals are large, it’s better to check what is going on. We can also look at these numbers. One thing we notice is large numbers in the net FDI, so this is something we want to keep in mind. OK, now let's go to the consistency-check columns in the template. The first consistency-check column is in the "Inp_Out_Debt" sheet. It is in the cell E61. This cell is comparing the old debt outstanding at the end of the data period, and the sum of amortization in the projection period. Fortunately, we have 0 in this column, so it means there is no inconsistencies in this aspect. So we move on to the next consistency column in the template. The next consistency column is in the "Data-Input" sheet in line 87. This column is comparing the gross financing needs, which is covered by the public sector, and the disbursements of the PPG external debt. By looking at these numbers, we can notice that this cell always takes a negative number, so it’s better to check what is going on. And you also remember, the number in the FDI flow was large, so let’s check whether the FDI flow was properly populated. OK, here is the net foreign direct investment. By looking at the formula, we find something mysterious, which is 100. We need to show the net foreign direct investment in billions, so I wonder why we didn’t divide it by 1,000. Let’s make sure what was the scale in the "Developia-Data" sheet. Let’s press Control and the left bracket. Now we are in the "Developia-Data" sheet. We can find that the scale of the net foreign direct investment was millions. So in the "Data-Input" sheet, to make it billions, we should have divided by 1,000 instead of 100. So let’s fix the formula, and copy this corrected formula to the other years. Next, let’s look at the consistency-check column to see how it looks like. OK, now we have a smaller number, which is very close to 0. So it seems like the mistake was creating the discrepancy. Let’s go to the Output table to make sure the residuals look correct now. OK, now we are back in the "Out Table Baseline-External" sheet. Look at the numbers. Now we have very small residuals and small identified flows, and it is the case for the projection period as well. So it seems like the mistake in the FDI flows created large residuals. It was good to check. Now, since we have populated everything properly and checked the inconsistencies in the input, finally, let me explain the summary chart of the debt dynamics in the baseline scenario. This is a summary chart of debt accumulation in Developia under the baseline scenario. This graph shows the rate of debt accumulation in the bar, and grant element of new borrowing in the gray, solid line. You can notice that there is a boom in the debt accumulation in the first 10 years, but the debt accumulation will be stabilized in the long term. This boom of debt accumulation reflects a large-scale infrastructure investment by the government. Given the recent discovery of natural resources, the government is investing in infrastructure projects, and borrowing from external creditors. But in the long run, the accumulation will be stabilized. This is the summary of the baseline scenario. OK, let’s take a break. Thank you very much.

Unit 7: Assessing External Risks

Video-The Standardized Stress Tests

Machiko Narita: Hi. In this unit, we are going to talk about the stress tests in the external DSA, and how to assess the external risk rating. First, in this video, we are going to talk about the standardized stress tests in the external DSA. As we discussed in the previous video, standardized stress tests are applied to all countries, regardless of their circumstances. But the size of the shocks are calibrated to each country, using 10 years of historical data. When you populate necessary input to the template, it will automatically generate the
debt-burden indicators under the baseline scenario and the standardized stress test scenarios, which are the historical scenario and most extreme stress test. Historical scenario is the scenario where the key variables are kept at their 10-year historical average. The key variables are the real GDP growth, GDP deflator growth, the non-interest current account balance-to-GDP ratio, and the net FDI-to-GDP ratio. The historical scenario is used to assess the realism of the baseline scenario. If you assume different numbers on these key variables in the baseline scenario, then the baseline scenario will deviate from the historical scenario. Deviations from the historical scenario reflect non-representative events, such as a war, structural break—such as a natural resource discovery—and also excessive optimism in the baseline scenario. The most extreme stress test scenario is defined as the scenario that generates the highest level of the debt-burden indicator in the 10th year among all stress tests, which are the scenario with less favorable financing terms, and a bunch of shock scenarios. In the shock scenarios, we consider a temporarily negative shock to real GDP growth, exports, GDP deflator, other flows, and exchange rate. There is also a scenario which considers a combined shock. These stress tests are used to assess the sensitivity of the baseline scenario to shocks and changes in the assumptions. Additional financing in any of the stress tests are all covered by PPG external debt, and it will be based on the assumed contract terms for new debt, which we populated in "Inp_Out_Dept" sheet. Therefore, other debt, such as private external debt and short-term PPG external debt, are kept unchanged. Let's go to the template. Now we are on the "Out Stress Tests-External" sheet in the template. On this sheet, we have debt-burden indicators under the baseline scenario and the stress-test scenarios. We have PV of debt-to-GDP ratio, PV of debt-to-exports ratio, PV of debt-to-revenue ratio, debt service-to-exports ratio, and debt service-to-revenue ratio. In the next sheet, which is "Out Panel Chart-External" sheet, we have the summary chart of the debt accumulation under the baseline scenario, and the charts on the debt-burden indicators. In each of the debt-burden indicators, we have the lines under the baseline scenario, historical scenario, and most extreme scenarios. The footnote tells us which scenario is selected as the most extreme scenario for each of the debt-burden indicators. Let's take a look at the charts more closely in the case of Developia. You can notice that the historical scenario, which is the red lines, are always below the baseline scenarios. The question is, why? In the case of Developia, it was because there was less financing need in the past. First, there was smaller, non-interest current account deficits, because it was before the public infrastructure projects starts. Second, there were higher FDI inflows because of the recent discovery of natural resources. You can confirm these numbers in the "Out Table Baseline-External" sheet by comparing the historical averages, which are used in the historical scenarios, and the numbers in the business scenarios. OK, let's take a break here. Thank you very much.

**Video-Customized Scenarios**

Machiko Narita: Hi, welcome back. In this video, we are going to talk about the customized scenario. As we discussed in the previous video, the standardized stress tests are applied to all countries, regardless of their circumstances. However, if you wish to analyze the country-specific vulnerabilities, you can create your own customized scenario to assess it. It is the customized scenario. If you include the customized scenario, then the output chart from the external DSA will show the debt-burden indicators under the customized scenarios, in addition to the baseline scenario and the standardized stress test. Now, the question is, when to consider a customized scenario. First, it would be when we consider a high GDP growth in the baseline scenario. For example, we may assume a high return from an investment project. Then we may want to analyze what happens when the return turns out to be low. Second, it would be the case when there is a narrow export base in the economy. For example, the most of the exports are coming from oil exports—then you may want...
to analyze the impact of oil price shocks on the debt sustainability. Third, it would be the case when there is a significant amount of contingent liabilities. You may want to ask what happens if some of the contingent liabilities materialize. You can also use a customized scenario to assess the tail risks, such as a natural disaster. In the case of Developia, we can use a customized scenario to assess the impact of growth assumption in the baseline scenario. The baseline scenario assumes public infrastructure projects in the projection period, and their spillover effects in the other sectors. The spillover effects are represented as high growth and high exports in other sectors, and low import dependency in the long run, as the domestic economy grows. So we may want to ask, what if there are no such spillover effects in the other sectors, using a customized scenario. Here is what we have to do. First, we have to come up with the alternative protections under the customized scenario, so we need to discuss with the macro-forecasting team about how to modify the projections for the customized scenarios. In the case of Developia, we are going to have the alternative projections on the real GDP, GDP deflator, exports, imports, and external debt. Once you come up with the alternative projections, we just populate them in the "Customized Scenario-External" sheet in the template. Let's take a look at it. We are on the "Customized Scenario-External" sheet in the template. First thing you want to do on this sheet is set this as yes, because we are going to include a customized scenario. Here is some instructions you can read about this sheet. If you go to line 8, here is a cell that you can specify the name of the customized scenario. Let's specify it as "no spillover effects." Then here are some yellow cells you can populate with some numbers. As a default, they are populated with the projections in the baseline scenario. But in our case, we want to have a different, alternative projection for real GDP, for example. So we just overwrite this cell, and populate it with the alternative projections, which we received from the macro-forecasting team on the sheet of "Developia-Data." So here we have customized scenario projections, and we needed real GDP growth percentage change in 2014. So select it, and enter. And we copy this formula to other years. Then you can do the same thing for the GDP deflator. So it's coming from the "Developia-Data" sheet. In our customized scenario, we are not considering the commodity price shocks, so we leave them as 0's. Here we can specify the short name of the customized scenario, so let's specify it as "no spillover effects." And here are the contract terms assumed for the new PPG debt. So we are not going to change the contract terms, so we leave them as it is in the baseline scenario. And if you scroll down to the table here, you have external debt and exports, and imports. So you can populate the alternative projections from the Developia data. Once you populate the alternative projections under the customized scenario, then you can see the debt-burden indicators under the customized scenario in the output chart. Now we are on the "Out Panel Chart-External" of the template. Now we see a green line in each of the debt-burden indicator chart. This light-green line is the debt-burden indicators under no spillover effects scenario, which is our customized scenario. OK, let's take a break here. Thank you very much.

**Video-External Risk Rating**

Machiko Narita: Hi. In this video, we're going to start talking about how to determine the external risk rating. So far, we have generated debt burden indicators of PPG external debt under the baseline scenario and the stress test scenarios. What we are going to do is, basically, to compare the debt burden indicators with their thresholds, and determine the risk rating. The risk rating is classified into low, moderate, high, and in debt distress. In determining the external risk rating, we have to take the balance between the mechanical classification and judgments. In this video, first, we're going to talk about the mechanical classification of the external risk rating. The mechanical classification of risk rating is based on the number of breaches, that is, the number of debt burden indicators that are above their thresholds. Low risk is assigned when there are
no breaches. Moderate risk is assigned when there is no breaches under the baseline scenario, but there are some breaches under stress test. High risk is assigned when they're some breaches under the baseline scenario, as well as the stress test scenarios. "In debt distress" is assigned when the country is already experiencing difficulties in servicing debt. Here are the charts from "Out-Panel chart-External" sheet of the template. Let's take a look at the baseline scenario first. Do you see any breaches under the baseline scenario? No. We don't see any breaches in the case of baseline scenario. How about the stress test? In the case of stress test, yes, we see some breaches for the solvency indicators. So what is the mechanical classification of external risk rating for Developia based on the classification definition? It is moderate risk. In the next video, we're going to talk about the factors you must consider in determining the external risk rating. See you in the next unit. Thank you very much.

**Unit 8: Factors that you Must Consider**

**Video-Factors for Judgments**

Machiko Narita: Hi. Welcome. In this unit, we're going to talk about the factors that you must consider in determining the external risk rating. It is going to be the core of your analyses. First, in this video, we're going to talk about the factors for judgment. In the mechanical classification, we were checking the number of breaches. But as a factor for judgments, we also need to consider the nature of the breaches. It would be more worrisome, if the magnitude of the breach is large, if the duration of the breach is long, and the number of breaches are large. Therefore, for example, if there is a marginal and temporary breach of a threshold, then you want to think about whether you want to keep the risk rating or downgrade it. Similarly, if there is a near breach, you shouldn't just dismiss the near breach without careful consideration. The pace of debt accumulation is another factor for judgment. Therefore, for example, if there is a rapid increase in debt burden indicators, you may want to warn it or consider upgrading the risk rating, even if there is no breach. It is especially important for debt service indicators. The ability to pay that is not fully captured by the template is another factor to consider. Such ability is coming from foreign exchange reserves or public sector assets that could be quickly liquidated to service debt. Therefore, if there is a significant amount of such assets, then you need to be careful about the interpretation of DSF standard indicators, because they are based on the gross debt. If there is a large asset, you need to consider them as a factor for judgment. It is also important to consider the relevance of a stress test. For example, the depreciation scenario may not be that relevant to the country with long lasting fixed exchange rate. Therefore, if there is a single breach in the depreciation scenario, you may want to consider downgrading the rating. Another example is that the many breaches in a country that experienced the war in the past 10 years -- in this case, the size of the shocks may be too large, reflecting the work period, because the size of the shock is calibrated using the historical data in the past 10 years. In this case, you may still want to present the results as they are, but you want to explain. You need caution in interpretation in the DSA write-up. Let's take a look at the case of "Developia". If you look at the output chart from the "Out-Panel chart-External" sheet of the template. Then, you can find that there is a near breach under the baseline scenario. So, we have to think carefully whether we want to rate it as moderate or high. In the next video, we're going to talk about the tool that we can use in this kind of borderline case. See you in the next video. Thank you very much.
Video-The Probability Approach

Machiko Narita: Hi, welcome back. In the previous video, we saw there is a near-breach under the baseline scenario in the case of the Developia. In this video, we're going to talk about one approach that we can use in this kind of borderline case. It is the probability approach. The probability approach looks at the evolution of the probability of debt distress, rather than the evolution of the debt burden indicators. This approach is a complementary tool which is recommended to use when the risk rating is on the border between the two categories, like in the case of Developia. The borderline case is defined as the case where the largest breach, or largest near-breach, of a threshold falls within its 10% band. Let's take an example. Please look at the "Output" charts from the example. In this case, where do you find the largest breach, or largest near-breach? In this case, we find the largest breach in the PV of debt-to-export ratio, and the breach turns out to be within the 10% band of the threshold. Since there is no breach under the baseline scenario, and one breach under the stress test scenario, we are in the border between the low and moderate risk. Here is the "Output" charts from the probability approach. These charts looks similar, but they are showing the probability of debt distress for each indicator. In this case, do we see any breaches? No, we don't see any breaches both in the baseline scenario and stress test scenarios. So the probability approach in this case suggests the low risk rating. Let's take a look at the case of Developia. Here is the output chart from "Out-Panel Chart Probability" sheet of the template. Do you see any breaches? Let's take a look at the baseline scenario. In the baseline scenario, we don't see any breaches. How about the stress test scenarios? In the stress test scenarios, yes, we see a breach in that PV of debt-to-GDP ratio. So what is the recommendation by the probability approach? Since there is no breach under the baseline scenario, and there is a breach under the stress test scenario, the external risk rating recommended by the probability approach is moderate. OK, let's take a break here. Thank you very much.

Video-Realism of Macroeconomic Assumptions

Machiko Narita: Hi, welcome back. In this video, we are going to talk about the realism of macroeconomic assumptions. And at the end of this video, we are going to conclude the external risk rating for the case of Developia. OK, let's first recap how the DSAs are produced. The first step is to produce projections and assumptions in the macro framework. Then we populate them in the template, and assess the risks, based on the output from the template. Therefore, the DSA is only as good as the macro framework. If the projections and assumptions are good, then we can assess the debt sustainability well. Good projections and assumptions must be realistic, consistent with the policies of the country authorities, and consistent with each other within the framework. There are areas that you want to make sure the realism of the macro assumptions, which are the financing terms and mix, favorable outlook, public investment and growth nexus, and other realism checks. Regarding the financing terms, if you assume highly concessional terms, or even improved terms over the projection period, you want to make sure why it is realistic in the economy. In general, concessional financing is likely to decrease over time. It is because the government shifts toward more market-based financing, as economy grows. You also want to make sure the realism of the financing mix assumption. For example, if you assume domestic debt markets develop over the projection period, then it is consistent to have an increased share of domestic debt over the projection horizon. Another thing you want to consider is the realism of the favorable outlook. The examples of favorable outlooks are large fiscal adjustments, high GDP growth, and large FDI inflows. If you assume such favorable outlook in the baseline scenario, then you want to make sure whether they are large, compared with the historical average and regional average. If they are large, you want to ask why they are well justified, and explain it in the DSA write-up. You
also want to think carefully about the investment and growth nexus, which is an important topic in many low-income countries. In general, investment would promote growth in the long run. However, it is difficult to assess how much. The question is, "What we should do?" First, we should at least discuss the determinants of growth. For example, we can conduct growth accounting to see how much public investment contributed to the growth historically in the economy. Second, we can consider the evidence from empirical studies. In addition, if there is a scale-up in public investment in the economy, you can conduct more analysis. There are some models that you can use for this purpose— for example, the models developed by IMF and World Bank staff. There are other realism checks you can do. First, it is the deviation of the baseline scenario from the historical scenario. If there is a large deviation, then you need to justify it. What you want to make sure is, the deviation is not coming from the excessive optimism in the baseline scenario. Another thing you can look at is the forecast errors from the past projections. If you find past projections are always more optimistic than the actual outturn, you want to discuss why it’s happening. So in this case, in the write-up, you want to discuss causes for the major forecasting errors, and you also want to provide a table that compares the current and past projections. In the case of Developia, let’s assume we have confirmed all assumptions are fine. So we can conclude that the external risk rating for Developia is moderate. Thank you very much.

Video-Introduction

Machiko Narita: Hi, welcome. In assessing debt sustainability, it is important to consider the public investment and growth nexus. There are several models available that we can use to complement the LIC DSF. In this section, we invite Felipe Zanna, who is a Senior Economist in Development Macroeconomics Division of Research Department at the IMF. He will give us an introduction of a model-based approach to investment growth nexus.

Video-Public Investment, Growth and Debt Sustainability--A Model-Based Approach

Felipe Zanna: I will present a model-based approach to conduct public investment growth and debt sustainability analysis in low-income countries. This part contains two lectures. In the first lecture, I will describe three key building blocks of the model in some detail. In the second part, I will illustrate how the model can be used by discussing some examples that capture particular policy scenarios. Let's start by discussing the model. The main reference of what I'm going to present today is the IMF working paper 144 of 2012. The title of this paper is "Public Investment, Growth, and Debt Sustainability: Putting Together the Pieces" by Ed Buffie, Andrew Berg, Cathy Pattillo, Rafael Portillo, and Felipe Zanna. The paper provides a very detailed description of the structure of the model. Some of it I will briefly discuss today, as well as many more examples. The model is a consistent analytical framework capturing most of the main mechanisms and policy issues for debt sustainability analysis in low-income countries. It is a real, two-sector small open economy model that makes explicit the following elements: First, the public investment-growth nexus. Second, the fiscal adjustment that may be involved in borrowing to finance public investment surges. And by this, I mean that the model considers different types of debt financing, like concessional, external non-concessional, and domestic debt, as well as the fiscal policy reactions that may be necessary to ensure debt sustainability. And the third element is the reaction or the response of the private sector, which in turn may feed back into the investment-growth nexus and the fiscal adjustment. The model can be used to study the macroeconomic effects of public investment surges and the trade-offs and potential risks associated with different
financing schemes and fiscal policy reactions. It is also useful to study specific country cases, and in this regard, it can complement the IMF-World Bank Debt Sustainability Framework that you already studied. Why is this model useful? Because the model can help organize thinking, educating intuition about how various economic features and policies come together. Moreover, it helps systematically incorporate various sorts of empirical evidence. For instance, we may have a view on the efficiency of public investment or the return to this investment. But without a model, it is hard to get a feel for how they may determine the riskiness of a particular borrowing strategy for public investment, or the effects of a particular fiscal response. In addition, the model provides a vehicle for transparently producing alternative macroeconomic and policy scenarios, as I will show you. Let's proceed to describe in more detail the model, focusing in particular on the three elements or building blocks I mentioned before. That is, the investment-growth nexus, the fiscal adjustment, and the private sector response. How does the model capture the investment-growth nexus? The model incorporates a neoclassical production function of the following type, where output, denoted by the letter $q(t)$, is produced by combining public capital, denoted by $z(t)^e$, private capital, denoted by $k(t)$, and labor, denoted by $l(t)$. Then, because public capital is productive, government spending can raise output directly. And through raising the marginal productivity of private capital, it can crowd in private investment. The parameter "psi" of the production function determines the rate of return to installed public capital. And one can pick values of this parameter that help match the implied return of public capital of the model with empirical estimates. But there are also public investment inefficiencies in the model, as captured by the following public capital accumulation equation; in the sense that one dollar of public investment, denoted by $i(z,t)$, doesn't necessarily translate into one dollar of public capital. Depending on the efficiency of public investment, which in the model we associate with the parameter $s$, some of the investment spending may be wasted or spent on poor infra-marginal projects. So one dollar of public investment may actually yield less than one dollar of public capital. Regarding the fiscal adjustment, the model considers different government financing options. As the following government budget constraint states, when revenues fall short of expenditures, the resulting deficit is financed through domestic borrowing, external commercial borrowing, or concessional borrowing. What are the revenues? They correspond to grants, and taxes on consumption, and the VAT rate $h(t)$. On the other hand, expenditures correspond to interest payments on the three types of debt, public investment, and other non-capital expenditures, denoted by the letter $T(t)$. In our analysis, we take available grants and concessional borrowing flows as exogenously given, as well as public investment and other non-capital expenditures. Absent additional financing sources, if the plan for public investment and other expenditures cannot be fully covered by grants and concessional borrowing, it will generate a fiscal gap. The gap, then, can be covered by a combination of domestic borrowing, external commercial borrowing, and/or some tax adjustment. The model allows for the imposition of feasibility constraints on the pace or level of the fiscal adjustment for taxes, potentially yielding explosive debt trajectories. The VAT rate $h(t)$ is defined according to the following reaction function, which corresponds to the minimum between a ceiling on taxes and the value of the VAT rate $h(t)^r$, which is defined by a rule. This rule, in turn, implies that taxes feature some inertia and more importantly, respond to the fiscal gap and to the debt-to-GDP ratios. So in this model, taxes tried to stabilize debt levels over time. This reaction function and the previous expression for the fiscal gap embody the core policy dilemma. Fiscal adjustment is painful, especially when administered suddenly in large doses. The government would prefer, therefore, to phase-in tax increases. But if the government adjusts taxes too slowly, or if the ceiling on taxes constrains adjustment too much, interest payments will rise faster than revenue, causing the debt to grow explosively. The private sector response in the model is determined by the behavior of households and firms. There are two types of households: (1)savers, who have access to assets and can smooth consumption over time,
and (2) rule-of-thumb consumers who consume their current income every period and therefore, cannot save. In the model, fiscal adjustment and domestic borrowing can crowd out private consumption and investment. This is because of two reasons. First, tax increases, which are distortionary, lower consumption. And second, when the government uses domestic resources to invest, these resources are no longer available for private investment and consumption. On the other hand, firms in the model maximize profits under perfect competition. They use the production function I described before to produce goods, where increases in public capital raise the marginal productivity of private capital, and therefore, can crowd in private investment. In the end, the balance between crowding in and crowding out depends on many factors, as we will see in the examples. But in the long run, there is always crowding in if the projects are good, while in the short to medium run, crowding out may dominate, especially if there is not enough foreign financing. This concludes the brief description of the model. I presented a model-based framework for debt sustainability analysis in low-income countries, making explicit the following elements: First, the investment-growth nexus, which includes public capital in production and public investment inefficiencies. Second, the fiscal adjustment, which involves different debt financing schemes and fiscal reaction functions. And third, the private sector response, which is related to crowding in and crowding out effects on private demand.

**Video-Examples from the Model**

Felipe Zanna: Let's move on to the second lecture of this part, where I will provide some examples of how to use the model for policy analysis. I will discuss in particular two examples. The first one is the unconstrained tax adjustment case, where taxes are free to adjust, and they do so in order to always satisfy the government budget constraint. So by construction, additional borrowing is not necessary, and debt sustainability is ensured. The second example corresponds to the case of constrained tax adjustment supplemented with external commercial borrowing. In this case, I will allow for commercial borrowing while imposing some feasibility constraints on tax adjustment. Basically, taxes will adjust according to their reaction function we studied before, which included a ceiling. In both cases, I will assume that public investment, grants, and concessional borrowing are exogenously given and that the scaling up is such that grants and concessional borrowing alone cannot fully finance the investment plan. In the case of unconstrained tax adjustment, we will see that first, even when the long run looks OK, transition problems can be formidable when concessional financing does not cover the full cost of the investment program. Second, the required tax adjustment crowds out private investment and consumption, delaying the benefits of the public investment surge. Let's see some figures for this case. In all the figures I will show, variables are measured as percentage deviations from the original equilibrium of the economy, or a steady state, unless otherwise noted. The x-axis corresponds to time, which is measured in years. This first plot corresponds to the path of the assumed public investment surge, as well as the path for net concession loans. We can see that the path of investment is front loaded, and in the long run, stabilizes at a level which is higher than that of its initial equilibrium. Note also that the concessional borrowing is front-loaded and only finances about 50% of the investment plan. So what are the macroeconomic effects of these investment and concessional borrowing plans? Here they are. Start at the end of the projection period. At year 30, things look OK, as these are good projects. Private capital is somewhat crowding in, and real wages and real GDP grow. Note also that public debt has a hump-shaped path and looks sustainable. However, the short to medium-run dynamics are discouraging. Since concessional borrowing in the first decade does not fully cover the cost of the ambitious investment plan, the fiscal adjustment has to be demanding. The VAT rate rises from 15% to almost 19%, where the increase in the first decade is associated with demands from the
scaling up, while the increase after that is related to the needs for concessional debt repayment. The problem is that raising taxes reduces consumption and it's associated with an increase in the real interest rate that in turn affects negatively private investment. As a result of this fiscal adjustment, private consumption and investment are crowded out in the first five years, as you can see by the decline of this variable in this period. And this crowding out ends delaying the real benefits of the public investment surge. Because, by construction, taxes always adjust to satisfy the government's budget constraint, unstable dynamics for debt are ruled out from the analysis. Therefore, the key question from the fiscal perspective is whether the tax adjustment is feasible in practice. Actually, an increase from 15% to almost 19% of the VAT in less than five years seems implausible. So what if taxes follow a reaction function that allows for ceilings while the government has access to external commercial debt? We provide an answer to this question by studying the second example of constrained tax adjustment supplemented with external commercial borrowing. In this example, I will show that when concessional financing does not cover the full cost of the investment program, covering the gap with external commercial borrowing can smooth the difficult private sector adjustments while reconciling the scaling ups with constraints on feasible increases in tax rates. To show this, let's start with the case of unconstrained tax adjustment as reflected by the blue lines in this graph for the VAT rate, total public debt, GDP growth, private consumption, and private investment. And now imagine that taxes follow a staggered path where ceilings may become binding, as we show by the red line with dots. As tax adjustment is constrained, the fiscal gap is covered by borrowing external commercial terms. As a result, external commercial debt increases. Despite this, total public debt is still hump-shaped, suggesting that there are not debt sustainability problems. And since external commercial borrowing allows for tax increases to be phased in more slowly without requiring such a drastic adjustment as before, then it helps smooth the path of private consumption and investment. In fact, in this figure, the private demand crowding out problem that we discussed in the previous case seems to be practically gone. In this sense, external commercial borrowing can smooth difficult macroeconomic adjustments, reconciling the public investment scaling up with feasibility constraints on increases in tax rates. Based on this, one may conclude that there are some benefits associated with external commercial borrowing. However, this borrowing strategy may be also risky. To see this, start with the case of constrained tax adjustments supplemented with external commercial borrowing and consider the path of public capital, external commercial debt, and total public debt as reflected by the blue line in this figure. Imagine now that the government misplaces the blueprints for reforms to improve governance and the efficiency of public investment. With lower efficiency, less public capital is accumulated, there's less growth, and the commercial and total public debt-to-GDP ratios increase, as shown by the red lines with dots. And if efficiency is further lowered, again, there is much less public capital accumulated--even lower growth and higher commercial and total public debt-to-GDP ratios. And as the process continues, there is a point at which debt becomes unsustainable. The strategy of external commercial borrowing may be also risky if the required tax adjustment is significantly delayed. To see this, consider again the case of constrained tax adjustment supplemented with external commercial borrowing and recall the path of taxes, external commercial debt, and total public debt as reflected by the blue lines in this figure. If the tax adjustment is delayed, then the government has to borrow more, and the commercial and total public debt-to-GDP ratios increase, as featured by the red lines with dots. If tax adjustment is further delayed, then more debt is accumulated and so on, until the government loses the race against time and debt blows up. One can also use this model-based framework to study the implications for debt sustainability in terms of trade shocks, government external debt risk premium shocks, and total factor productivity shocks in the context of public investment surges. Similarly to the analysis of external commercial borrowing, the framework can be used to analyze the
macroeconomic effects of financing public investments surges with domestic borrowing. And as we did with taxes, the fiscal adjustment can be also achieved by imposing fiscal rules on government non-capital expenditures. Finally, in a recent paper by the staff, the model is extended to introduce a natural resource sector and a resource fund. This allows for analyzing the debt sustainability and macroeconomic effects of public investment plans in resource-abundant developing countries where these countries can borrow against future resource revenues to scale up public investment. In this lecture, I have presented some examples that illustrate how to use the model-based framework for debt sustainability analysis. The examples illustrate the trade-offs and potential risks associated with different financing schemes and fiscal policy reactions in the context of public investments scaling up.

**Unit 9: Drawing a Conclusion**

**Video—Public DSA**

Machiko Narita: Hi. So far we have finished the external DSA, which is the important part of the LIC DSF. In this unit, we are going to talk about other analysis in the LIC DSF. First, in this video we're going to talk about the public DSA. The public DSA is about the total public debt, which consists of PPG external debt and public domestic debt. Input to the public DSA are the data and projections, which we have already populated in the input sheets, and assumptions on additional financing under stress tests, which we will populate in the "Inp_Out_Debt" sheet later in this video. The main output of the public DSA is the evolution of debt burden indicators, like in the external DSA—those from baseline scenario and stress test scenarios. There are standardized stress tests which are applied to all countries regardless of their circumstances, but you can also create your own customized scenario and include it in the public DSA. The standardized stress tests under the public DSA include the historical scenario, alternative scenarios with fixed primary balance, and lower real GDP growth, and a bunch of shock scenarios. In the shock scenarios, we consider a negative temporary shock to real GDP growth, primary balance, exchange rate, and other debt-creating flows. There is also a scenario which considers a combined shock. The debt burden indicators under the public DSA consist of solvency indicators and a liquidity indicator, like in the external DSA. The difference from the external DSA is that we are looking at the total public debt, which consists of public domestic debt and the PPG external debt. Do you remember what type of debt we were looking at in the external DSA? Yes, we were looking at PPG external debt in the external DSA. But in the public DSA, we consider total public debt. Now, you also notice that we are looking at the present value of debt instead of the nominal value of debt. Do you remember why we want to look at the present value of debt? Yes, it is because we want to capture the concessionality of debt. So the solvency measure is the PV of total public debt to resource bases. The liquidity measure is the total public debt service-to-revenue ratio, which is another resource base. In the public DSA, there is no indicative threshold, but we have benchmarks. Benchmarks is about the present value of total public debt-to-GDP ratio, and it is provided for each category of policy performance. Benchmarks are used as reference points for deeper analysis of public domestic debt. We will talk more about this in the next video in the context of overall risk of debt distress. Now, let's go to the template. Now we are in the "Inp_Out_Debt" sheet of the template. We are on the cell I7. Here's the table where we can specify the assumptions on additional financing under the stress tests. Here we can specify the assumptions on the financing mix between the PPG external debt and domestic public debt. Below, we can specify the assumptions on the financing terms on the PPG external debt and
the public domestic debt. The financing terms of the PPG external debt was already populated based on the assumptions which we populated earlier on this sheet. But now we have to specify the assumptions about the domestic debt. So, we can specify these assumptions based on the country experiences in the past, but please keep in mind that these are the financing terms under the stress tests. So, please make sure that you don’t make too optimistic assumptions in here. Now we are on the "Customized Scenario fiscal" sheet of the template. If you want to include a customized scenario in the public DSA, you can specify this as "Yes" and populate the alternative projections under the customized scenario, like we did in the external DSA. Now we are on the "Output Instructions" sheet. We are in line 32, which is the section about the assessment of total public debt. So this is about the public DSA. There are three output sheets of the public DSA, and these are applicable to all country cases. So basically we have output table for baseline scenario, stress test scenario, and panel chart. Let’s go to the out table baseline fiscal sheet first. Now we are on the "Out-Table baseline Fiscal" sheet of the template. This table is similar to the baseline table in the external DSA. This table shows you the evolution of the total public debt and the change in the total public debt. And like in the external DSA, the change in the total public debt can be broken down to the identified debt-creating flows, and residuals. Below, the table shows you the debt burden indicators under the baseline scenario, and key macro and fiscal assumptions. Now we are on the "Out-Stress Tests Fiscal" sheet of the template. In this sheet, we have the debt burden indicators of the public DSA under the baseline scenario and stress test scenarios. We have the PV of debt-to-GDP ratio, PV of debt-to-revenue ratio, and debt service-to-revenue ratio. Here we are on the "Out-Panel Chart fiscal" sheet of the template. In this sheet, we have charts of the debt burden indicators under the public DSA. So there are three charts. The first one is on the debt-to-GDP ratio, debt-to-revenue ratio, and debt service-to-revenue ratio. Each chart shows you the debt burden indicators under the baseline scenario and other stress test scenarios. Let’s take a look at the first chart. This is about the PV of debt-to-GDP ratio. So it has a benchmark. So it shows the green dotted line on the chart. Look at the baseline case. Under the baseline scenario, there is no breach of the benchmark, and the debt-to-GDP ratio doesn't grow rapidly toward the benchmark of the debt-to-GDP ratio. But if you look at the stress test scenarios, there are breaches around here. In the next video, we’re going to talk about what to do in this kind of case, in the context of the assessment of the overall risk of debt distress. Let’s take a break. Thank you very much.

Video-Overall Risk of Debt Distress

Machiko Narita: Hi. Welcome back. In this video, we’re going to talk about the overall risk of debt distress. The assessment of the overall risk of debt distress is based on the analysis, on the public domestic debt, and private external debt. The overall risk of debt distress is used to flag additional risks that are not captured by the external risk rating. So this is about the risks associated with the public domestic debt and private external debt. The overall risk is assessed based on the deeper analysis on this kind of debt when it is indicated as necessary. So the question is, when do we need a deeper analysis? Deeper analysis on public domestic debt is recommended when total public debt-to-GDP ratio is moving rapidly toward or exceeding its benchmark in the baseline scenario. If it is the case, then the write-up should discuss trends, financing terms, and the composition of public debt as well as the contingent liabilities. Deeper analysis on private external debt is a recommended when the private external debt is substantial or projected to grow rapidly. If it is the case, then the write-up should discuss the risks related with sudden stops and pressures on exchange rate and other relevant risks. If you identify significant vulnerabilities in the public domestic debt or private external debt, then you need to assess the overall risk of debt distress in the write-up. There are some suggested phrases about the overall risk in the guidance note of the LIC DSF. And here is one example: "Country X faces a moderate risk of debt distress based on the
assessment of the PPG external debt, but it faces a heightened overall risk of debt distress, reflecting significant vulnerabilities related to private external debt." You can find more examples in the guidance note. OK. Let’s take a break. Thank you very much.

**Video-DSA Write-Up**

Machiko Narita: Hi. Welcome back. Now we have covered all analysis in the LIC DSF. In this video we’re going to talk about the DSA Write-Up, which is an important communication device with your colleagues, your bosses, and your counterparts. OK. What are the key elements in the DSA write-up? It is: background, underlying assumptions of the DSAs, results of the DSAs, and conclusion. In the background section, first we want to inform our reader about the recent developments, especially about debt. We want to write about the PPG external debt and total public debt. And if relevant, we also want to write about the private external debt and debt relief developments. It is also important to write about the scope of debt for DSAs. It is about the coverage of the public debt and definition of external debt and domestic debt. You also want to talk about the composition of debt, especially the creditor basis and concessionality of debt. In the underlying assumptions section, we want to explain our main macroeconomic assumptions. We want to explain the projections of the financing needs, such as current account deficits, financing sources such as FDI inflows, PPG external borrowing and projections of assets, such as foreign reserves. If you have conducted DSAs before, then you also want to discuss the main changes to the macro projections and causes for the major forecast errors in the past projections. In the results section, you want to explain the results from the external DSA and the public DSA. For the external DSA, you want to explain the evolution of projected debt burden indicators and whether there is a breach of threshold or not. And if relevant, we also want to write about the results from the probability approach, and if there is a sign, we want to conduct a deeper analysis on private external debt. For the public DSA, we also want to explain the evolution of projected debt burden indicators and whether there is a breach of the benchmark for the public debt-to-GDP ratio. And if there is a breach under the baseline scenario, we want to conduct a deeper analysis on the public domestic debt. In the conclusion section, you want to clearly state your assessment of the external risk rating. Please remember you need to take a balance between the mechanical classification and judgments of the risk rating. It is important to explain your judgments, especially. If relevant, you also want to assess the overall risk of debt distress in the conclusion section. Finally, let me briefly explain the DSA reports produced by the IMF and World Bank staff. DSA by IMF and World Bank staff are produced at least once every calendar year. However, a new DSA is additionally required when there is a request for IMF financing, or if there is a request related to IMF debt limits, or if there is a request related to IDA non-concessional borrowing policy. There are two types of DSA reports produced by the IMF and World Bank staff, which are full DSA and light update. Full DSA is basically produced every three years, but additionally, full DSA is required when there is a change in the external risk rating or in the overall risk of debt distress. Otherwise, the light updates are produced. The only difference between the full DSA and the light update is the format of the write-up. The full DSA has all of the key elements in the write up, but the light update focuses on the main changes in the underlying assumptions and its impact on the debt sustainability. OK. Now we have covered all about the LIC DSF. In the next unit, we will study real country examples of the LIC DSF. Thank you very much.
Unit 10: DSAs in Practice

Video-Introduction: The LIC DSA in Practice

Machiko Narita: Hi. In this unit, we are going to study a real country example of the LIC DSF. We invite Hajime Takizawa, who is a senior economist in the Debt Policy Division of the Strategy Policy and Review department at the IMF. He will lead us through a country example touching key aspects of the LIC DSF.

Video-LIC DSA in Practice

Hajime Takizawa: This unit uses a country example to illustrate the application of LIC DSA. In particular, the following main components of LIC DSA will be discussed: background, underlying assumptions, evolution of external and public debt indicators under the baseline scenario and stress tests, and conclusions, including risk rating for external debt distress and, if needed, overall risk of debt distress. As an example of the application of the LIC DSF, this unit discusses Cote d'Ivoire's DSA, prepared in the context of a staff report for 2013 Article IV consultation and the fourth review under the Extended Credit Facility (ECF). The DSA was jointly prepared by IMF and World Bank staff. This DSA was prepared based on the previous version of the guidance note, as no DSAs that incorporate key features introduced in the new guidance note have been published, as of end February 2014. DSA for Cote d'Ivoire begins with relevant background information. External debt is defined on a currency basis, rather than a residency basis. Cote d'Ivoire is a member of West Africa Monetary Union (WAMU); the same practice is followed in DSAs for other West African Monetary Union member countries. Cote d'Ivoire reached the HIPC completion point in June 2012. As a result, the debt-to-GDP ratio declined from 54.6% at the end of 2011 to 30.5% at the end of 2012. Key creditors are official bilateral creditors. At the end of 2012, they accounted for about 50% of public and publicly guaranteed external debt. Another 34% were accounted for by commercial creditors, and the rest by multilateral creditors. In late 2012, Cote d'Ivoire normalized its relationships with all its external creditors when commercial creditors agreed to a repayment plan for remaining arrears. The stock of domestic debt has increased from 11.2% of GDP in 2007 to 18.6% at end of 2011. In November 2011 and March 2012, the government and the T-bill holders agreed to restructure part of the outstanding T-bills. The write-up should discuss main changes to macroeconomic projections, compared to the previous DSA. Here's an example. Changes are shown in a text table, and also discussed in the main text. In this particular example, changes in the following items are discussed. First, both fiscal revenue and expenditure projections have been revised down. As a result, the primary deficit will be larger. Second, external borrowing has been revised down, based on commitments for new external loans under negotiation, even though borrowing plan now includes a Eurobond issue equivalent to $500 million US planned in 2014. Third, exports have been revised up, but so are imports, resulting in a higher external current account deficit. The discount rate used for calculating present values is 5% in this DSA, while in the last DSA it was 3%. The DSA should also include a Box on main assumptions in the macroeconomic framework, including growth, inflation, current account variables, fiscal balance, and borrowing plans. Let's look at the Box in Cote d'Ivoire's DSA. Growth will be driven by broad-based increase in private investment, supported by public investment in infrastructure and improvement of the business climate. Inflation will remain moderate. The primary fiscal balance will remain around 1.5% of GDP. Export performance will remain strong, supported by the expansion in supply, but imports will also increase. The current account deficit will rise, and will be partly financed by higher FDI inflows. Three large loans, including two concessional loans, to finance infrastructure projects and energy projects are incorporated as new borrowing during 2013 through '17. External DSA-- we first
look at the baseline scenario. In the LIC DSA framework, Cote d'Ivoire is rated as a weak performer, with a Country Policy and Institutional Assessment (CPIA) average rating for 2010 through ‘12 of 2.72. Threshold for indicators are determined by this CPIA score. Debt stock indicators will reach peaks in 2014, driven by the Eurobond issue, as you can see in this chart. The present value of debt-to-GDP ratio will rise close to the threshold. Under the new guidance note, this would trigger the use of a probability approach. After 2014, debt stock indicators declined gradually, mainly driven by strong FDI inflows, and to a lesser extent, endogenous debt dynamics. All debt stock indicators will remain below respective thresholds, as you can see in this chart. We now turn to debt-service indicators under the baseline scenario. Both debt-service indicators will rise over the medium term, and will peak in 2024. Amortization payments also increase in 2020 through ‘25, stemming from sizable borrowing in 2013 through ‘17 to finance infrastructure and energy projects, and the bullet repayment of the 10-year Eurobond. More broadly, compared with the last DSA, external debt-service indicators showed deterioration. This is because the authorities intend to issue the Eurobond to lengthen the average maturity of debt and reduce potential rollover risks for domestic debt. Debt-service indicators will remain below thresholds. Now let’s turn to stress tests. All debt indicators and the debt-service-to-GDP ratio exceed respective thresholds under stress tests. Present value of the debt-to-GDP ratio exceeds its thresholds under the historical and the combination shock scenarios. Present value of the debt-to-exports ratio exceeds its threshold here under an export shock scenario. Present value of debt-to-revenue ratio exceeds its threshold under a combination shock scenario, and debt-service-to-revenue ratio exceeds its threshold under a combination shock scenario. Since no debt-burden indicators exceed respective threshold in the baseline scenario, but most indicators do so under the stress test, the risk rating of external debt distress should be moderate, unless judgment overrides the results.

One potential mitigating factor is that a large part of official bilateral credit is French ODA claims that have been converted into debt reduction development contracts, a mechanism that allows claims to be refinanced through grants for poverty-reduction programs. The profile of debt service under this mechanism can be reviewed periodically by the authorities and the French Development Agency, to take into account Cote d'Ivoire’s capacity to pay and project-implementation capacity. It potentially offers Cote d'Ivoire some flexibility for managing its debt service. Despite this potential mitigating factor, the risk rating remains moderate. Now, let’s talk about the public DSA. LIC DSA also includes public DSA. Once domestic public debt is included, the present value of public debt-to-GDP ratio exceeds 40% of GDP in 2014. Under the new guidance note, the public DSA includes benchmarks for the present value of public debt-to-GDP that trigger a deeper analysis of domestic debt. Cote d'Ivoire’s CPIA is weak, and the benchmark is 38%. DSA for Cote d'Ivoire would have been required to include a deeper analysis of domestic debt. Now, finally, let’s look at the conclusion. Risk rating for external debt distress remains moderate. The conclusion section includes other recommendations as well. A sustainable external position can be maintained through sound macroeconomic policies, the selection of sound projects, and prudent debt management. The profile of debt indicators suggests that the buildup of non-concessional debt should be accompanied by prudent debt management. And caution is needed to avoid bunching of maturities, to prevent sizable peaks in debt service repayments. It is important to keep in mind that several features have been introduced in the new guidance note. These features are not reflected in this particular example, but would have been required under the new guidance note. The present value of the debt-to-GDP ratio would rise close to the threshold. Under the new guidance note, this would trigger the use of a probability approach. Furthermore, under the new guidance note, benchmarks for the present value of public debt would trigger a deeper analysis of domestic debt. Any additional risks would need to be flagged as part of the overall risk of debt distress. Here is a summary of this unit. LIC DSA starts with constructing macroeconomic framework, and making borrowing assumptions. It
assesses risks, both external and public, and it will be summarized in a write-up. Usually, write-up includes discussions of a background, underlying assumptions, including comparison of change of assumptions to the previous DSA, evolution of external and public debt indicators under baseline stress tests, and the conclusions, including rating of external debt distress, and overall risk of debt distress. It should include the views and comments of the authorities as well.

**Video-Final Remarks**

Machiko Narita: Hi. Now, we have finished all units of Part 3. So let’s recap what we learned in Part 3. First, we learned what is the LIC DSF. We discussed specific features of the LIC DSF and how it is used in practice. Second, we learned how to use the LIC DSA template by analyzing a model economy, Developia. We learned what is the input, what is the output of that LIC DSA template. We also discussed how to analyze the output from the template and how to make judgments. Finally, we also studied real country examples to learn about the DSAs in practice. It was my pleasure to work with you. I hope you enjoyed and found this useful. Now, please use this analysis to your country. We’re looking forward to hearing from you. Thank you very much.