



FISCAL AFFAIRS

HOW TO

NOTES

**How to Design a Fiscal Strategy
in a Resource-Rich Country**
Guidance Note on the Excel Template

Fiscal Affairs Department

How to Design a Fiscal Strategy in a Resource-Rich Country: Guidance Note on the Excel Template

Prepared by Olivier Basdevant, John Hooley, and Eslem Imamoglu

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Excel Template

Prepared by Olivier Basdevant, John Hooley, and Eslem Imamoglu

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HOW TO DESIGN A FISCAL STRATEGY IN A RESOURCE-RICH COUNTRY: GUIDANCE NOTE ON THE EXCEL TEMPLATE

Introduction

This guidance note describes how to use the Excel-based template developed by the Fiscal Affairs Department (FAD) of the IMF accompanying the note “How to Design a Fiscal Strategy in a Resource-Rich Country.”¹ This template uses data inputs to generate simulations of fiscal policy dynamics. It helps country authorities in RRCs and IMF teams analyze trade-offs associated with alternative fiscal strategies for the use of public resource wealth. Visualizing these trade-offs and assessing their sensitivity to underlying macroeconomic assumptions can help inform policymakers on the most appropriate fiscal strategy, given country-specific circumstances.

The template can be applied to any RRC with limited user-provided input. The data required include: i) medium-term forecasts of macroeconomic variables (that can be retrieved from the IMF World Economic Outlook database), ii) long-term projections of resource revenue, and iii) assumptions about the values of key parameters such as long-term GDP growth or fiscal multipliers. The template also enables the user to design fiscal strategies based on two baseline macro-fiscal frameworks (main and alternative), enabling the user to perform sensitivity analysis. By default, the template is calibrated for a fictional RRC.

The first exercise is the generation of a long-term sustainable fiscal framework. The template calibrates four alternative long-term fiscal sustainability anchors for the selected RRC, defined in terms of the non-resource primary balance (NRPB) and using inputted long-term projections of resource revenues and other macro-fiscal variables (under a “no uncertainty” assumption). The four fiscal anchors follow the different concepts of long-term sustainability for RRCs discussed in the How to Note:

- *Constant share of non-resource GDP*: The NRPB is constant over time as a percent of non-resource GDP.

¹A previous FAD template for RRCs accompanied IMF (2012). This template contains several modifications to the original template, based on a survey of IMF country teams conducted in 2016. See Annex for details.

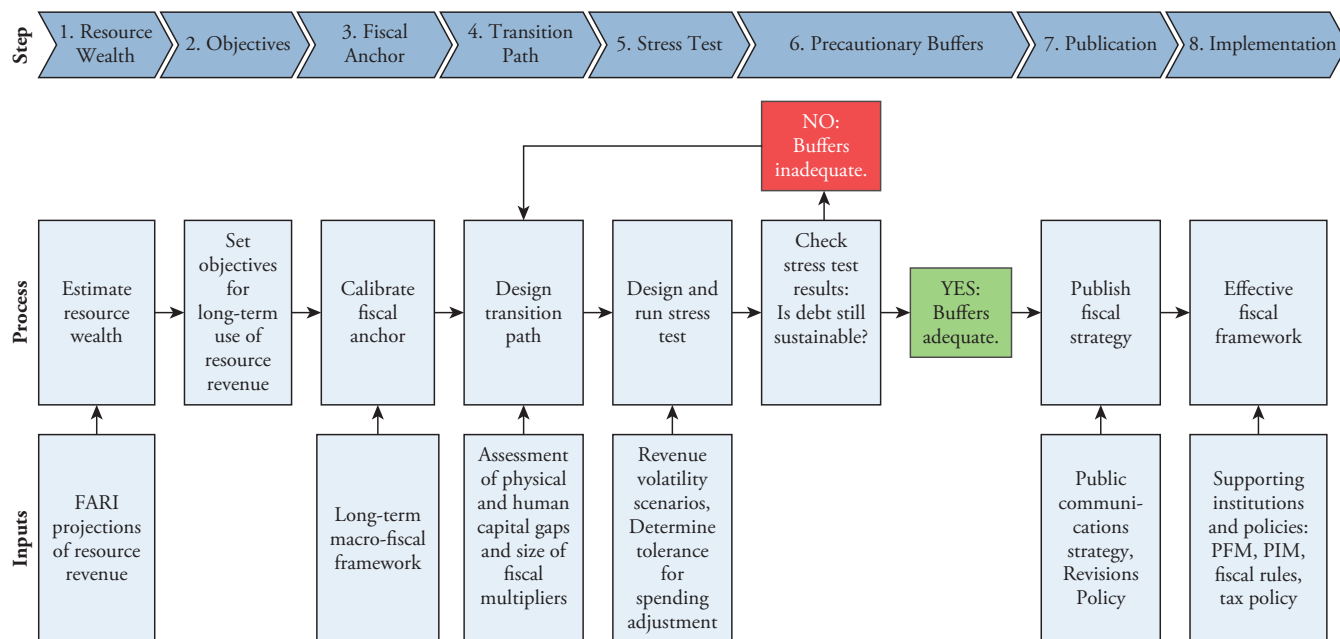
- *Real annuity per capita*. The NRPB is constant over time in real per capita terms.
- *Real annuity*. The NRPB is constant over time in real terms.
- *Bird-in-hand*. The NRPB is constant over time as a share of existing financial assets.

The template also enables the user to customize a transition path for fiscal policy, before attainment of the long-term anchor. The user can specify both the length and fiscal dynamics of the transition period. For example, in countries with a current fiscal stance that is too loose relative to the stance implied by the long-term sustainability anchor, the transition might involve a gradual fiscal consolidation, or an alternative path, such as an initial fiscal expansion (for example, to allow for a temporary scaling up of public investment), followed by fiscal consolidation in the latter part of the transition period. In countries with a fiscal stance that is tighter than the anchor-implied level, there may be an opportunity to increase spending. The template also incorporates the impact of different fiscal paths on non-resource output (and non-resource revenue) through user-specified fiscal multipliers.

To address issues of volatility, a second exercise performs a “volatility stress test” of the fiscal framework by simulating the impact of shocks to resource revenue on key macroeconomic and fiscal variables. The fiscal framework designed in the first exercise does not account for uncertainty. A second exercise therefore tests whether the framework is robust to potential shocks to resource revenue. The user can customize both the magnitude and duration of shocks to commodity prices and the desired fiscal adjustment strategy in response to revenue shortfalls. Simulations of the “shock paths” are produced for key variables such as liquid assets, public debt (and wealth), and government spending. The simulations incorporate the impact of the commodity shock on resource and non-resource GDP, and the impact on non-resource GDP of spending adjustments in response to the shock.

To account for uncertainty of long-term values of resource revenues and other economic variables, a third

Figure 1. Illustrative Framework for Designing a Fiscal Strategy in Resource-Rich Countries



Source: IMF staff.

exercise performs a comparison of the fiscal strategy and volatility stress tests under the baseline against an alternative scenario. The template allows the user to design a fully-fledged alternative macro-fiscal framework (for example, with more prudent assumptions for the value of resource wealth, GDP growth, interest rates, or fiscal multipliers) and compare the impacts on key variables over time, such as wealth, debt, and public spending.

Together, the three exercises help the user to design a sustainable and feasible fiscal strategy that is robust to shocks and accounts for uncertainty. The three exercises are designed to be conducted jointly to assess the trade-offs in managing fiscal sustainability under volatility and uncertainty. While several approaches to strategy design are possible, the template follows the framework in the How to Note summarized in Figure 1.

The following procedure can be pursued to operationalize the framework shown in Figure 1 using the template:

Description of the Template

The Excel-based template can be divided into 3 spreadsheet blocks. Block A contains a short descrip-

tion of the template and the data entry tabs. Block B contains all the calculations for the fiscal sustainability and volatility stress test exercises. Block C compiles all the results and presents them in a series of panel charts. In the next section, each tab is described in detail, organized by template block.

The spreadsheets in the Excel template are organized in a logical sequence and the three blocks described in the previous paragraph are distinguished by a different tab color. The tabs in the first block (data entry) are highlighted in yellow. The tabs in the second block (underlying calculations) are highlighted in blue, with a lighter shade for the alternative framework. The tabs in the third block (panel charts) are highlighted in green, again with a lighter shade for the alternative framework. Note that all tabs in the second block (underlying calculations) and tabs containing the alternative framework have been hidden by default, both to streamline the spreadsheet and recognize that not every user will need to construct an alternative scenario (these tabs can be easily unhidden).

The first block (Block A) is the only location in the template that requires direct user inputs. The cells or rows that demand input data from the user are identified clearly in yellow. These are the only cells and rows that the user needs to manipulate to run the model.

Color coding is also used to help the user understand the calculations. The color coding is as follows: data derived from other tabs are colored *green*, while data derived from calculations are colored *blue*. Check lines are colored *red* and should be zero at all times.

Block A. Instructions and Data Entry Spreadsheets (Yellow Tabs)

The first tab <SET UP> contains a short description of (and links to) all the tabs in the template. In this tab, the user is also required to input the country name, the names of the main commodities produced (maximum of two), the last year of historical data, the horizon for the medium-term forecast, and the fiscal coverage (central government/general government/non-financial public sector). The user can also select whether to construct a second alternative scenario to conduct sensitivity analysis. Note that tabs with the suffix *_A* (for example, Baseline projection_A) show data from the alternative macro-fiscal framework.

The next three tabs contain the data entry tabs. In the <MACRO INPUT> tab, historical data and medium-term projections are inputted for key macroeconomic variables (for example, from a country's medium-term fiscal framework or the IMF World Economic Outlook database). In the <RESOURCE REVENUE INPUT> tab, the user inputs long-term projections (to 2150) of public resource revenue for each commodity and the exchange rate.² In this tab, the user also has the option of specifying an alternative projection scenario for resource revenue, resource GDP, and the exchange rate that fed into the generation of the alternative macro-fiscal baseline framework.

The final three tabs in the block are where all the parameters and customized scenarios used in the models are populated. The tab <ASSUMPTIONS> is where all the key parameters are calibrated for the functioning of the template. There are three blocks of assumptions in this tab (with explanatory notes in column G), relating to:

In the tab <TRANSITION PATH CUSTOMIZE>, the user customizes a path for spending by specifying an adjustment compared to the baseline projection for both capital and current expenditure, as a percent of non-resource GDP. For example, a transition path

²Projections for resource revenue should be constructed using bottom-up methods (for example, the IMF's FARI model), where possible.

requiring a fiscal consolidation might require gradually lowering spending relative to the (unsustainable) baseline. A transition path incorporating some scaling up of public investment might have a higher level of investment spending relative to the baseline projection, possibly with offsetting reductions in current spending. Note that because the anchor is implemented only at the end of the transition period, wealth will be stabilized at its post transition period level. The user can, however, stabilize wealth at its initial level by modifying the transition spending paths.

The tab <STRESS TEST CUSTOMIZE> is where the resource revenue shocks used in the stress test are defined. First, the user inputs the projected baseline export price of each commodity (which can differ from the world price, due to variations in quality across countries, for example). The next step is to define the shocks, by specifying alternative paths for each commodity price over a 10-year horizon. The user can customize a temporary and permanent commodity price shock.³ Finally, the user also has the option of specifying an exchange rate movement associated with each commodity price shock.

Block B. Model Calculations (Blue Tabs, hidden)

All the underlying calculations in the template are contained in Block B. The first tab <Baseline projection> generates a baseline macro-fiscal framework out to the year 2150, based on the user inputted projections for the medium term and the long-term assumptions inputted in Block A. The next four tabs in this block contain the calculations for the long-term sustainability analysis and computation of the various anchors. In these and all other projections, it is assumed that any primary surpluses are used to accumulate net financial assets according to the following prioritization: i) repay excess debt (above the desired debt floor), and ii) build wealth fund assets.⁴ This prioritization is simply for illustrative purposes and does not affect the projections of net wealth.

³Shock paths for commodity prices can be based on historical volatility, information from financial futures markets, or using a simple rule of thumb, such as oil prices falling to \$30 a barrel.

⁴ Government deposits are assumed to always be at their steady-state level (user defined), financed through additional borrowing if necessary.

The following four tabs compute the long-term sustainability anchors.⁵ The tab <Anchor immediately> computes the NRPB consistent with each of the four anchor calibration methods described previously, under the assumption that the anchor is attained during the first year of the forecast horizon (although no multipliers are assumed). The tab <Anchor transition_no multiplier> performs the same exercise but under the assumption that an NRBP consistent with the anchor is attained only at the end of the transition period. The tab <Anchor transition_multipliers> incorporates the impact from fiscal multipliers, and any additional spending required to maintain the new level of the capital stock constant (for example, following any investment scale-up), to offset annual depreciation.

In the tab <Fiscal space counterfactual>, the long-term sustainability anchors are recomputed under the assumption of no future resource revenues. This allows the user to assess the additional “space” to spend or cut taxes generated by savings from natural resource revenues.⁶

The tab <Multipliers> computes the GDP impact of deviations in investment and current spending from the baseline using the short-term fiscal multiplier framework in IMF (2014).⁷ The template also computes the GDP impact of two other multipliers: a long-term multiplier for the impact on output from permanent increases in capital stock (for example, due to investment scaling up), and a multiplier to capture spillovers from shocks to resource GDP on non-resource GDP.

Finally, the tab <Stress test> calculates the impact of commodity price shocks on resource revenue and key macro-fiscal variables (the input variables are compiled

in <Buffer input>.⁸ Three adjustment strategies to the shock are considered: i) no adjustment (in which the pre-shock nominal path for spending is unchanged), ii) full adjustment (in which spending is reduced one-to-one with the shortfall in resource revenue, and iii) partial adjustment (in which spending is reduced to offset the shortfall in resource revenue but up to a maximum annual limit specified in the <ASSUMPTIONS> tab). In these simulations, any resource revenue shortfall not offset with spending reductions is assumed to be met first by drawing down liquid assets and second through new borrowing (that is, once liquid assets are exhausted). Output responds to the shock in three ways: through the impact of changes in i) resource revenue on resource GDP, ii) resource GDP on non-resource GDP, and iii) spending on non-resource GDP.⁹

Block C. Results and Panel Charts (Green Tabs)

The final block of the template presents the simulation results in a series of customizable panel charts. First, the template compiles all computations in a tab named <Chart Data>, which is used to create the panel charts.

- (i) <Initial Wealth Panel>. Charts of existing net financial wealth and total net wealth, broken down by asset and liability type.
- (ii) <Resource Revenue Panel>. Time series chart of projected resource revenues for each commodity and the present value of remaining in-the-ground resource wealth.
- (iii) <Anchor Calibration Panel>. Time-series charts to compare projected macroeconomic and fiscal variables under different sustainability anchor calibration methods. In these charts, the anchor is assumed to be attained immediately, with no impact from fiscal multipliers. A dropdown menu allows the user to select the Y-axis to use for normalizing the variables in each chart (percent of non-resource GDP/ total GDP, constant prices, constant prices per capita).

⁵Note that the computation of the permanent income hypothesis-based anchor (see the main How to Note for a more detailed discussion) requires using the same interest rate to discount all assets and liabilities. In the template, the effective interest rate on net financial wealth is used. The result that wealth is stabilized once the NRPB anchor is attained also depends on constant values for interest rates, inflation, and growth; where these vary during the projection period (for example, the medium-term forecast horizon) wealth will not necessarily be constant.

⁶This counterfactual exercise is highly simplified and should be used for illustrative purposes only. Past fiscal policy in RRCs would likely have been very different in the case of no resource revenues.

⁷See IMF (2014), “Fiscal Multipliers: Size, Determinants, and Use in Macroeconomic Projections,” for guidance on calibration of fiscal multipliers. IMF (2014), “Is It Time for an Infrastructure Push? The Macroeconomic Effects of Public Investment,” provides empirical estimates of investment spending multipliers.

⁸The change in resource revenues is assumed to be proportional to the change in commodity prices (though non-linear responses can be accommodated through overwriting the “shock” resource revenues series).

⁹These output responses are based on the fiscal multipliers in the <ASSUMPTIONS> tab. A unitary elasticity of non-resource revenues with respect to changes in non-resource GDP is assumed.

- (iv) <Fiscal Strategy Panel>. Time-series charts showing projected macroeconomic and fiscal variables for the chosen anchor calibration method (selected in in the dropdown menu) and transition path. This panel can also provide a useful summary overview of the chosen fiscal strategy.
- (v) <Stress Test Panel>. Time series charts showing the impact of the commodity price shock on key macro-fiscal variables for different responses of fiscal policy (no adjustment, partial adjustment, full adjustment). Users can specify in the dropdown menu to show the results for either a temporary or permanent commodity price shock.
- (vi) <Sensitivity Analysis Panel>. Time series charts showing a comparison of the main and alternative macro-fiscal frameworks for key macro-fiscal variables (the user specifies the anchor calibration method and transition path assumptions in the dropdown menu).
- (vii) <Sensitivity Analysis Stress Test>. Time series charts showing the impact of the commodity price shock on key macro-fiscal variables for different responses of fiscal policy (no adjustment, partial adjustment, full adjustment) and for the two versions of the macroeconomic framework (main and alternative). Users can specify in the dropdown menu to show the results for either a temporary or permanent commodity price shock and specify the adjustment scenario.

Annex 1. Comparison with Previous (2012) Template¹

2012 Template: Suggested Areas for Improvement ²	Modifications in the 2020 Template
A more intuitive presentation of results to help countries to think in PIH terms.	<ul style="list-style-type: none"> • Two variations of the long-term sustainability anchor introduced: “constant real annuity” and “constant real annuity per capita.” These anchors have a more intuitive interpretation than the traditional PIH anchor (constant share of non-resource GDP). • New charts showing “savings out of resource revenue” and “fiscal space from resource revenue.”
More flexibility to incorporate different fiscal paths toward the long-term anchor.	<ul style="list-style-type: none"> • User can define a transition path and associated fiscal multipliers.
Time varying (rather than static) growth and interest rate assumptions.	<ul style="list-style-type: none"> • User-defined medium-term macroeconomic projections are combined with long-term assumptions.
More flexibility in modeling investment scaling-up.	<ul style="list-style-type: none"> • The user specifies short-term and long-term investment multipliers and a depreciation rate. An option to specify different paths for current and capital spending is included.
Greater capability for scenario analysis.	<ul style="list-style-type: none"> • Option to create an alternative macro-fiscal framework for sensitivity analysis—varying assumptions for resource revenues, growth, interest rates, multipliers, and so on, and instantly compare the impact on the key variables. • Volatility stress test added. The user can assess the impact of commodity price shocks on key variables.

¹The previous template was a companion to IMF (2012a).

²Based on a 2016 survey of IMF country teams.

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