

FISCAL MANAGEMENT OF MINING AND PETROLEUM IN WEST AFRICA

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Overview of FARI for Revenue Forecasting

Diego Mesa Puyo and Alistair Watson

Fiscal Affairs Department



Australian Government
Department of Foreign Affairs and Trade



Ministry of Foreign Affairs of the Netherlands



Norad



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Confederation

Federal Department of Economic Affairs,
Education and Research SHER
State Secretariat for Economic Affairs SHER

Agenda

1. Using the FARI model for revenue forecasting
2. Model structure
3. Setting up an inter-ministerial modeling unit

USING THE FARI MODEL FOR REVENUE FORECASTING

Starting Point

- Decide the desired degree of sectoral breakdown
 - Ideally, all major projects should be individually included in the model
 - Smaller projects could be modelled in aggregate with average fiscal terms, but this creates accuracy issues
- Decide on macroeconomic assumptions, such as inflation, interest rates, prices

Required Data and Information

- Production and cost profiles for each product from each project included in the model
- Costs broken down into appropriate level of detail for reasonably accurate fiscal calculations
 - Exploration; Development; Other capital; Operating costs; Decommissioning.
- Aim for life-of-project analysis, even if forecasting emphasis is on short-term
- If information is available, the model could allow a choice of different development scenarios

Required Data and Information (2)

- Financing structure for each project must be modelled as this can materially impact government revenues
- The modeling framework should enable different price scenarios for relevant commodities
- A stochastic commodity price routine could be included to enable Monte Carlo-type simulations of the effect of price volatility on future revenue
 - Basis for macroeconomic management of revenues

Required Data and Information (3)

- Specific fiscal terms applicable to each project under legislation or mining agreement
- Royalty and/or production sharing
- Income tax rules
- Other applicable taxes such as dividend and interest withholding taxes, VAT and import duties
- State participation
 - Also need to consider the taxation / dividend policy for state owned entity. Often a sensitive topic!

Forecasting is an Ongoing Process

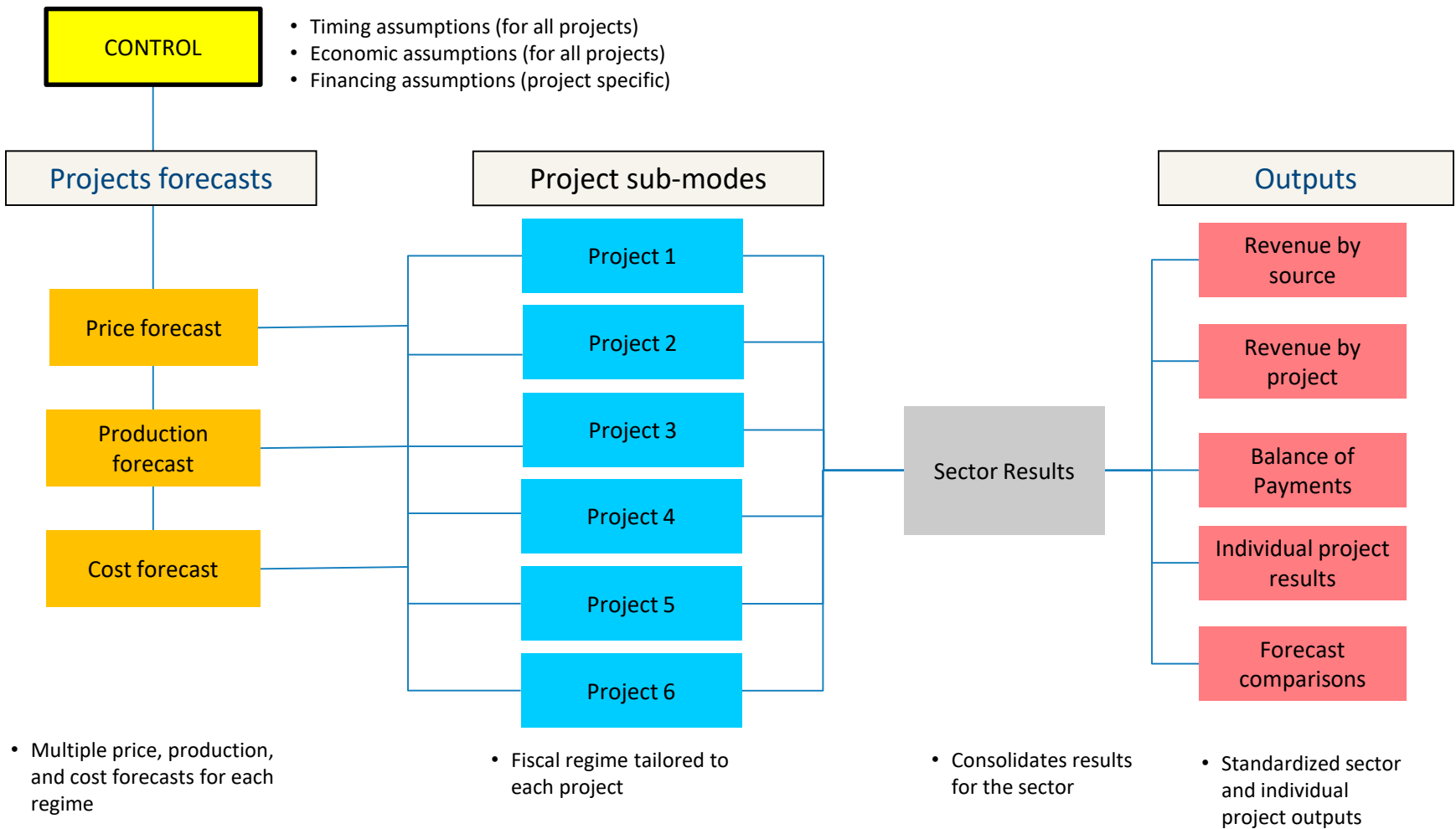
- New projects usually included in revenue forecasts once investor Final Investment Decision (FID) is made
 - Analysis should start before production starts
 - Verification of past costs by tax authority should not be left until then
- At least annual update, synchronized with the budget cycle
 - In EI dominated countries, revenue forecast is the foundation of the budget

MODEL STRUCTURE

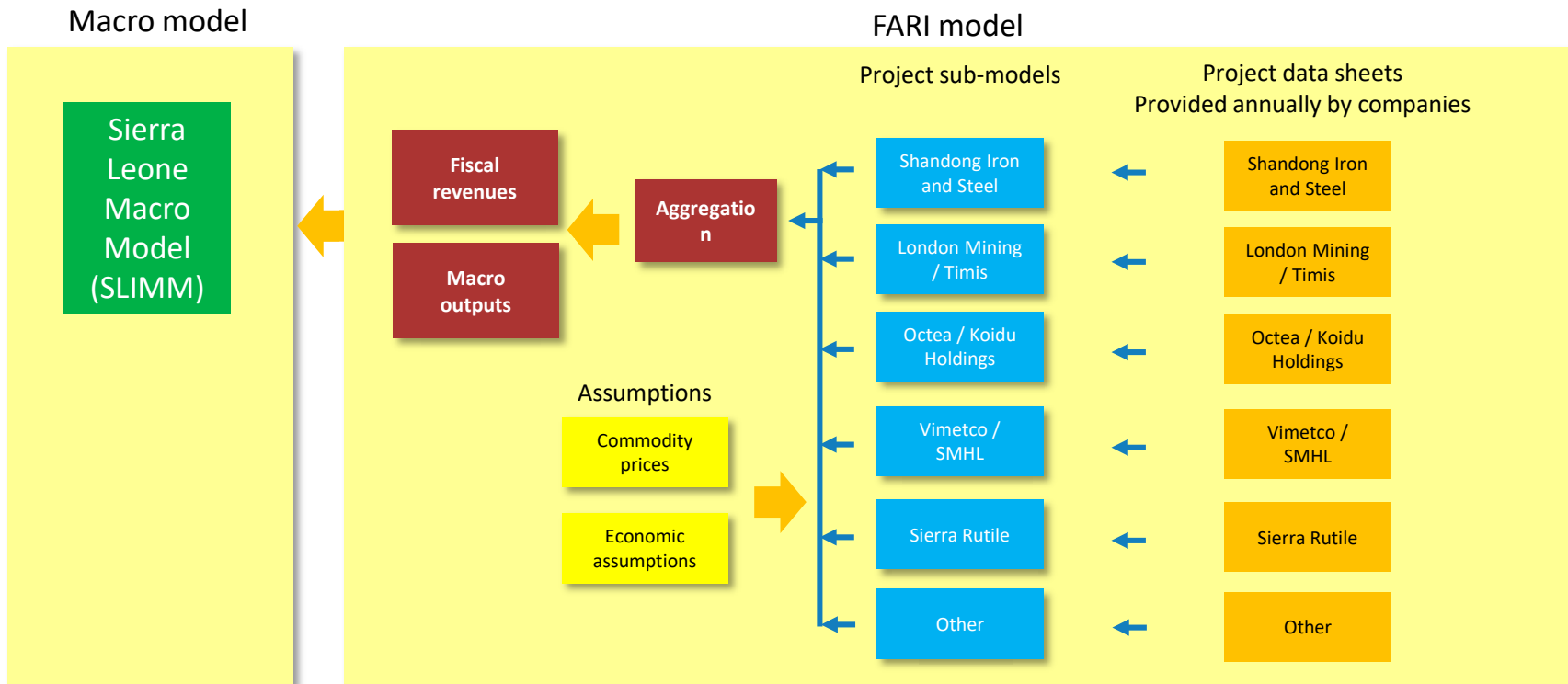
Brief overview of the FARI model as used in revenue forecasting

- Discounted cash flow model
- Individual project based, with sectoral aggregation
- Logical flow (inputs -> workings -> outputs)
- Standardized outputs

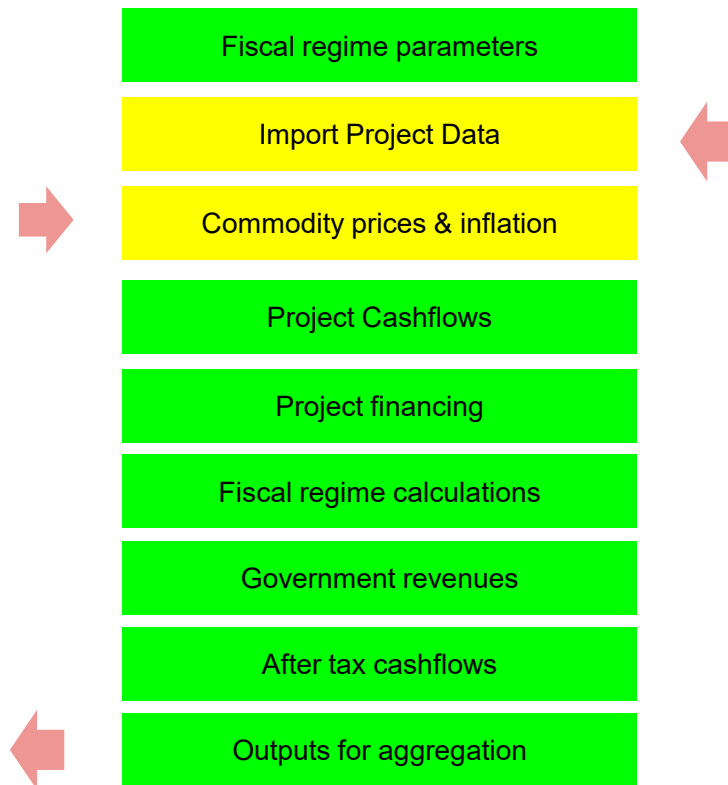
Sectoral Forecasting Model Structure



FARI sectoral model as used by Sierra Leone Ministry of Finance



Individual project sub-model



Actual vs. forecast data

- The model should be updated with actual data (annually, quarterly, etc)
 - Actual gradually overwrites forecast
- Prior forecasts should be compared to actual; with analysis of differences used to improve future forecasts
- New forecasts entered into the model to replace old forecasts
- Ideally, the model should be capable of reproducing old forecasts

Multiple scenarios

- Model should include options for various production paths, cost profiles and price scenarios
- A starting point could be to have alternative **scenarios** around a central forecast:
 - Low case scenario (low prices, low production, high cost)
 - Base case (primary) forecast
 - High case scenario (high prices, high production, low cost)
- However, the modelling framework should be easily adjusted to accommodate additional scenarios
- In addition **sensitivity analysis** should be performed around a central forecast

Revenue forecasting versus policy design

FARI for policy design / regime comparison	Revenue Forecasting
Focus on fiscal regime design	Focus on sector revenue forecast
Apply multiple fiscal regimes to one project at a time	Models each existing project with its corresponding regime & aggregate results
Informs tax policy decisions and contract negotiations	Input into budget and other macroeconomic analysis
Main outputs relate to fiscal indicators (i..e, AETR, METR, etc)	Revenue forecast as well as macro indicators such as BoP; contribution to GDP etc.
Used on as needed basis	Periodic updates (annually)
Fiscal calculations are laid out broadly the same in both models, but there may be some additional detail captured in revenue forecasting models	

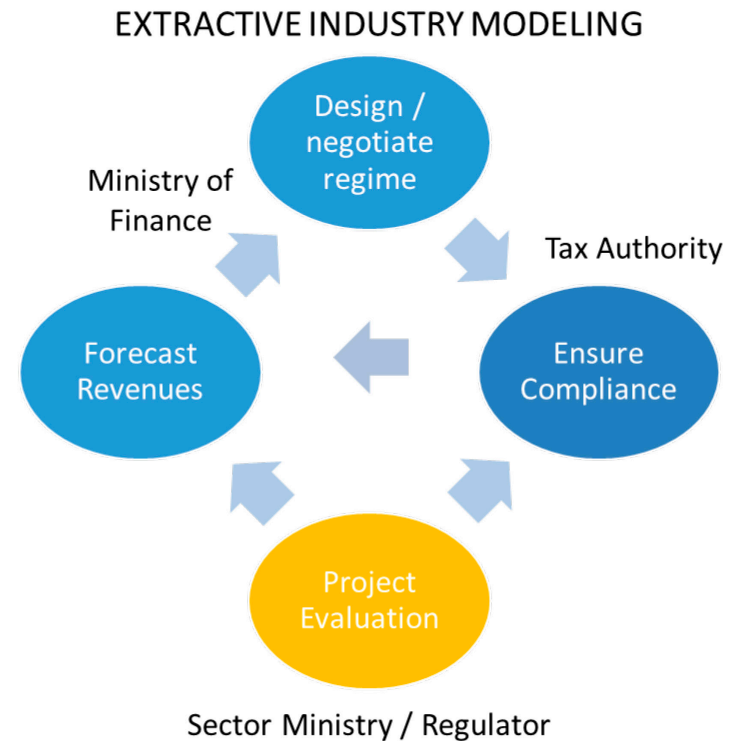
SETTING UP AN INTER- MINISTERIAL MODELING GROUP

Inter-Ministerial Modeling Group

- A inter-ministerial modeling group can help to coordinate extractive industry fiscal modeling across government
- Ensure a consistent approach is applied by modelers in each institution and coordinate sharing of data
- Ensure capacity is developed & maintained
- Such a group would usually be led by the MOF and comprise officials from the sector ministries, revenue authority, regulators, state-owned companies and central bank
- Alternatively, the group could operate as a secretariat that does the Ei modeling on behalf of the various institutions
 - This approach may be appropriate in the early days of the sector

Multiple models

- There are three main applications for *fiscal* analysis:
 - Fiscal regime design
 - Revenue forecasting
 - Tax compliance and risk assessment
- Sector ministry will usually also have models for project evaluation, with scope extending beyond fiscal analysis



Who does what?

- Responsibilities between institutions should be well defined and understood
 - Who is responsible for providing the data and other inputs?
 - Who is responsible for running the models?
 - With whom are results shared?
 - How often are the models updated?
- These responsibilities could change over time

Institutional responsibilities

- **Sector ministry / regulator:**
 - Has technical understanding of projects, mineral valuation, project economics
 - Usually responsible for approving development/work plans in the first place
 - Principal point of contact with investors
 - But MOF should go direct to investors if need be

Institutional responsibilities (2)

- **The MOF** provides economic assumptions:
 - Price scenarios (spot, benchmarks, budgetary prices)
 - Inflation assumptions
 - Interest rates
 - Financing assumptions
- **Tax Authority** should provide guidance on tax related issues
 - Ensure models results are calibrated to actual outcomes

Quality assurance

Formalized processes for:

- Self-audit
- Peer-audit within agency
- Peer-audit between agencies
- External audit where appropriate (for critical forecasts or decisions)

QUESTIONS?