USING MODELING FOR FISCAL RISK ASSESSMENT

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Fiscal Affairs Department

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Fiscal Risk Assessment and Compliance Modeling: An emerging and potentially high-value application of the FARI methodology

- What is a Risk-Based Compliance Strategy?
- What role can fiscal modeling play in this process?
- Linkage to / contrast with policy and revenue forecasting modeling
- Examples from Mozambique and elsewhere
- Process
- Challenges
Risk Based Compliance Strategy

“A high level plan which brings together a description of the most significant risks identified in the tax system and details strategies as to how the revenue authority intends to respond to these risks”

Provides a basis for the Revenue Authorities to properly allocate its limited resources
A compliance management strategy requires:

✓ A framework to identify analyze and prioritize risks
✓ Understanding and recognition of causal affects of non-compliance;
✓ Use of multiple remedies across multiple functional lines to address non-compliance;
✓ Clear comprehensive strategy to address the most serious risks.

Modeling ➜ Quantification ➜ Prioritization
Using project models for fiscal risk analysis

1. Understanding the projects
2. Understanding the fiscal regime
3. Identifying fiscal risks
4. Quantifying the risks
5. Prioritizing risks and designing compliance activities

**Backward** looking: verifying past tax returns and “history matching”

**Forward looking**: planning future compliance activities, as well as comprehensive project-specific revenue forecasts

The process of building and populating a model builds understanding:
this is a valuable exercise in itself
# Identifying key risks

<table>
<thead>
<tr>
<th>Risk area</th>
<th>Modeling approach</th>
<th>Risk assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td>• Production, sales and stockpile reconciliation</td>
<td>Replicate royalty calculations; deductions; rates</td>
</tr>
<tr>
<td></td>
<td>• Realized prices and revenues</td>
<td></td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>• Cost by Activity</td>
<td>Trend / ratio analysis and benchmarking</td>
</tr>
<tr>
<td></td>
<td>• Cost by Category</td>
<td>Quantify fiscal risk from transfer mis-pricing</td>
</tr>
<tr>
<td></td>
<td>• High-risk categories: (related party; international; transfer pricing)</td>
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<tr>
<td><strong>Financing costs</strong></td>
<td>• Understand financing structures &amp; terms by replicating the calculations</td>
<td>Quantify impact on fiscal revenues (often much greater than expected)</td>
</tr>
<tr>
<td></td>
<td>• Interest deducted directly versus capitalized into costs</td>
<td></td>
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<tr>
<td><strong>Fiscal regime</strong></td>
<td>• Clarify regime interpretation</td>
<td>Replicate/Reconcile to tax returns</td>
</tr>
<tr>
<td></td>
<td>• Replicate calculations</td>
<td></td>
</tr>
<tr>
<td><strong>International tax issues</strong></td>
<td>• Ownership (equity &amp; debt) structure; Affiliate transactions; Withholding tax applicability; Double tax agreements</td>
<td>Quantify impact on revenues; Identify treaty shopping</td>
</tr>
</tbody>
</table>
Mining project transactions

- What transactions
- Who with
- How sourced (tendered?)
- How priced
- How contracted/documented
- Which jurisdictions involved
- Any related parties?

By Activity

- Mineral 1 revenue
- Mineral 2 revenue
- Exploration
- Development costs
- Sustaining capital
- Operating costs
- General and administrative costs
- Decommissioning

By category

- Volume x price +/- quality adjustment – marketing fees
- Volume x price +/- quality adjustment – marketing fees
- Expat Labour
- Local Labour
- Mining contractor?
- EPCM contractor
- Mine/processing
- Fuel/Power
- “Owners” cost
- EPCM contractor
- Railway
- EPCM contractor
- Port
- Management fees
- Insurance
- Technology license fees
- Other costs

Not to scale: for illustrative purposes only
Not to scale, or complete: for illustrative purposes only
Oil & gas project transactions

- What transactions
- Who with
- How sourced (tendered?)
- How priced
- How contracted/documented
- Which jurisdictions involved
- Any related parties?

By Activity

- Oil LPG and Condensate
- Gas revenue
- Exploration costs
- Development and Production capital
- Operating costs
- Service costs
- General and administrative costs
- Decommissioning

By category

- Volume x price
- Marketing
- LNG shipping
- Expat Labour
- Drilling contractor
- Rig hire
- Fuel/Power
- "Owners" cost
- Management fees
- Insurance
- Technology license fees
- Other costs

Not to scale: for illustrative purposes only

Not to scale, or complete: for illustrative purposes only
Risk Assessment Model Example: Mozambique Coal Mine

**Outputs**
- Identified and quantified compliance risks
- Charts

**Fiscal calculations US$**
- IPM US$
- Depreciation US$
- Income tax US$

**Project cashflows US$**
- Project cashflows Revenues, OPEX & CAPEX

**Calculations**
- CAPEX & Financing US$ MZN
- Coal production volumes and prices Actual + forecast

**Inputs**
- Coal production and sales Actual
- Coal pricing Actual
- CAPEX & Financing Actual
- OPEX Actual
- Fiscal regime

**Time & escalation track**
- Identified and quantified compliance risks
- Charts

**Sources**
Mozambique coal project: issues identified

- Still in early stages; sorting out data collection challenges & inter-institutional issues
- But the model is already providing valuable risk-identification benefits
  - First ever evaluation of realized coal prices versus international benchmarks
  - Quantification of impact of debt finance
  - Quantification of local currency devaluation on tax calculations
  - Verification of transport cost tariffs and royalty deductions
  - Interpretation of special fiscal concessions
  - Other potential focus: related party transactions
- Will provide a robust basis for revenue forecasting for Ministry of Finance; Bank of Mozambique
  - When will the project start paying income tax?
- Data collection process has prompted a review of royalty assessment process & addressing inter-institutional issues
Risk Assessment Model Example: Mozambique Ruby Mine

Outputs
- Key project indicators (NPV and IRR)
- Government revenues US$
- Govt revenues MZN
- Govt revenues MZN converted to US$
- Unit cost analysis
- Fiscal risk register
- Charts

Fiscal calcs US$
- IPM US$
- AMORTIZATION US$
- INCOME TAX US$
- IRRM US$

Cash flows US$
- CASH REVENUES
- CASH COSTS
- CASH BALANCES

Calculations
- Production and Sales
  - Ruby categories from production report
  - With switch for price scenarios

Fiscal calcs MZN
- IPM MZN
- AMORTIZATION MZN
- INCOME TAX MZN
- IRRM MZN

Cash flows MZN
- CASH REVENUES
- CASH COSTS
- CASH BALANCE

Inflows
- Prices:
  - CPR prices
  - Actual plus CPR prices

Fiscal regime scenarios:
- 2012 terms
- 2014 terms
- Actual plus IRRM

Production and cost scenarios:
- CPR
- Actual plus CPR
- Actual plus revised forecast
- Actual plus latest development plan

Similar design, tailored to specifics of each project and fiscal regime
Ruby mine model focus

- Similar model structure, but different issues
- Ruby sales and valuation
- Management / marketing fees
- International transactions
- Fiscal regime interpretation / policy
  - Royalty rates and determination of base
  - What would government take be under new fiscal regime including resource rent tax?
Reconciled to Regulator data

Profit and Loss per financial statements
- Production & sales volume
- Realized prices
- Revenue by mineral
- Production cash costs by financial statement category
- Accounting Depreciation
- Other Non-cash P&L
- Financing costs expensed
- Profit (loss) per P&L
- Detailed cost breakdown
  - By process
  - By Activity
  - By related party

Reconciling items to taxable income
- Profit (loss) per P&L
- Add: depreciation
- Deduct: capital allowances
- Other Adjustment 1
- Other Adjustment 2
- Other Adjustment 3
- Other Adjustment 4
- Other Adjustment 5
- Taxable income before losses
- Carried forward losses
- Taxable income after losses
- Reconcile to payments

Capital allowances reconciliation
- Capital allowances aggregate
- Capital allowance: Asset category 1
- Asset category 2
- Asset category 3
- Asset category 4
- Asset category 5
- Asset category 6
- Asset category 7
- Financing costs capitalized
- Financing costs Expensed
- Loan 1
- Loan 2
- Loan 3
- Loan 4
- Other

Financing cost reconciliation
- Other schedules as required

Reconciled to Regulator data
FEEDBACK TO POLICY

- Fiscal regime interpretation issues
  - Rulings? Regulations? Change the law?
- Quantify impact of fiscal regime concessions / tax expenditures
  - Tax holidays; accelerated depreciation; etc.

INPUT TO REVENUE FORECASTING

- Models reconciled to actual collections & tax returns: “back-casting”
- Use to improve forecasting

INPUT INTO PROJECT EVALUATION

- Ensure tax issues identified and addressed early
Link between Fiscal Risk Analysis and Revenue Forecasting Models: Mozambique

Ministry of Finance: Aggregated sector modeling

Tax Authority: separate detailed models for each project
Models reconciled to tax returns

Interaction with sector ministry / regulator modeling also needs to be considered
### Revenue Forecasting Versus Fiscal Risk Assessment Models

- Greater level of detail required for fiscal risk modeling and reconciliation to tax returns
- Individual project models
- Focus on reconciling the past - this then informs assumptions for forecasting the future

#### Contrasting level of detail for revenue forecasting versus fiscal risk analysis modeling

<table>
<thead>
<tr>
<th>Revenue forecasting model</th>
<th>Risk analysis model</th>
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<tbody>
<tr>
<td><strong>Production/sales</strong></td>
<td><strong>Sales iron ore</strong></td>
</tr>
<tr>
<td><strong>Sales iron ore</strong> DMT</td>
<td><strong>Sales iron ore</strong></td>
</tr>
<tr>
<td><strong>Mineral prices</strong></td>
<td><strong>Key impurities impacting price</strong></td>
</tr>
<tr>
<td><strong>Benchmark price</strong> $ / tonne</td>
<td><strong>Benchmark price</strong> $ / DMT</td>
</tr>
<tr>
<td><strong>Transport cost</strong> $ / tonne</td>
<td><strong>Transport cost</strong> $ / WMT</td>
</tr>
<tr>
<td><strong>Other Differentials</strong> %</td>
<td><strong>Commission</strong> $/t or %</td>
</tr>
<tr>
<td><strong>Realized price FOB</strong> $ / DMT</td>
<td><strong>Quality difference 1</strong> calc</td>
</tr>
<tr>
<td><strong>Realized price FOB</strong> $ / DMT</td>
<td><strong>Quality difference 2</strong> calc</td>
</tr>
<tr>
<td><strong>Other differences</strong> % or $</td>
<td><strong>Realized price FOB</strong> $ / DMT</td>
</tr>
</tbody>
</table>

#### Cost structure

<table>
<thead>
<tr>
<th>Costs by activity</th>
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</thead>
<tbody>
<tr>
<td>Exploration $ mn</td>
<td>Exploration category 1 $ 000</td>
</tr>
<tr>
<td>Development $ mn</td>
<td>Exploration category 2 $ 000</td>
</tr>
<tr>
<td>Sustaining capital $ mn</td>
<td>Exploration category 3 $ 000</td>
</tr>
<tr>
<td>Operating costs $ mn</td>
<td>Exploration category 4 $ 000</td>
</tr>
<tr>
<td>Decommissioning costs $ mn</td>
<td>Development cost category 1 $ 000</td>
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<td></td>
<td>Development cost category 2 $ 000</td>
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<tr>
<td></td>
<td>Development cost category 3 $ 000</td>
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<td>Development cost category 4 $ 000</td>
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<td>Operating cost category 1 $ 000</td>
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<td>Operating cost category 2 $ 000</td>
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<td>Operating cost category 3 $ 000</td>
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<td>Operating cost category 4 $ 000</td>
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<td>Operating cost category 5 $ 000</td>
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<td></td>
<td>Total costs $ xxxx</td>
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<td></td>
<td>Cost by cost type</td>
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<tr>
<td></td>
<td>Labour $ 000</td>
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<td>Fuel $ 000</td>
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<td></td>
<td>Non-resident Contractors $ 000</td>
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<td></td>
<td>Resident contractors $ 000</td>
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<tr>
<td></td>
<td>Contract mining etc. $ 000</td>
</tr>
<tr>
<td></td>
<td>Total costs $ xxxx</td>
</tr>
</tbody>
</table>

#### Financing

<table>
<thead>
<tr>
<th>Single aggregated loan</th>
<th>Breakdown for each finance facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawdowns $ mn</td>
<td>Drawdowns $ 000</td>
</tr>
<tr>
<td>Repayments $ mn</td>
<td>Repayments $ 000</td>
</tr>
<tr>
<td>Interest $ mn</td>
<td>Interest $ 000</td>
</tr>
<tr>
<td>Fees $ mn</td>
<td>Fees $ 000</td>
</tr>
</tbody>
</table>
Fiscal Risk Assessment Modeling Process

✓ Start simple & evolve as data and capacity permits
✓ Decide project priorities: start with big $ projects or smaller projects as a learning experience?
✓ First step: summarize tax returns in excel
✓ Focus on establishing robust & repeatable data collection mechanisms
  – Close collaboration with sector ministry / regulator
✓ Models should follow common standard but tailored to each specific project & fiscal regime. Ideally a standardized approach to modeling across government.
✓ Reconciliation to actuals
  – Royalty returns; tax returns; production sharing returns
  – Reconciling tax returns to other data reported to sector ministry / regulator. This should be routine but is often not done at all ...

Ultimately the process matters more than the spreadsheet ...
Challenges

- Understanding of projects and fiscal regimes
- Data!
- Inter-institutional coordination and data sharing
- Record keeping in tax authority and other institutions
  - IT systems; spreadsheets; paper files
- Excel & modeling skills
- Tax Authority incentives: focus on short-term revenues at the expense of long-term?
  - Should Tax authority do a payroll audit for $100,000 one-off adjustment versus a mineral transfer pricing audit worth $100,000,000 over the project life?
- Lack of compliance activities pre-production (cost verification)
Risk Assessment Remains Relevant Across The Entire Project Life-cycle

✓ At the **Feasibility study** stage: to identify fiscal regime interpretation issues and high risk transactions.
  ✓ Government retains higher leverage prior to project approval

✓ **During development**: planning cost verification activities; revising revenue forecasts as actual development costs incurred

✓ **During production period**: verifying past tax returns; planning future compliance activities

✓ **At project Termination**: settling final tax liabilities
QUESTIONS ?