Session 3: The Macro-Fiscal Nexus

Mineral Resource Development
Ex-Ante Impact Analysis on the Case of Fiji

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Purpose of Presentation

- Understand characteristics of mine development in country context
- Conduct solid ex-ante analysis when making new / additional investments
- Such analysis shall assist and reveal:
  - Value of the project
  - Estimate macro impacts and risks associated with the project
  - Decision making for the investment
- Case study: Analysis of a new mine development project in Fiji (2002) submitted to the government as a policy recommendation
  - A new industry that may have potential to boost its economy
Table of Contents

- Background of the case project
- Types and methods of ex-ante analyses
- Results and findings from the analyses
- Summary and the way forward
Background of Fiji (1)

Government Revenue and Expenditure

Background of Fiji (2)

GDP by Activity at Constant Prices of 1995 (%)

- Wholesale & Retail Trade, Hotels & Restaurants
- Community, Social & Personal Services
- Agriculture, Forestry & Fishing
- Manufacturing
- Finance, Insurance, Real Estate & Business Services
- Transport and Communications
- Construction
- Electricity, Gas & Water
- Mining and Quarrying

Source: Fiji Islands Bureau of Statistics (2005)
Production of existing industries have been stagnated ➔ Needed to diversify/transform industries

A new mine development plan was proposed.

- Raised concerns about macro impacts
- So they need to take policy precautions

Ex-ante analysis will show positive/negative impacts from the project
Proposed Project

- Ore volume and grade: 930 million tons grading 0.43 % copper and 0.14 g/t gold with a cut-off grade of 0.30 % copper.
- Two large-scale open pits
- Production: 100,000 tons per day ore plus 125,000 tons per day waste rock
- Construction term: 3 years
- Production term: 29 years
Why Conduct Ex-Ante Analysis?

This presentation will explain necessary process for decision making on the new or expansion investment in mining industry focusing on:

Numbers below correspond to the next slide

1. **Financial viability—fiscal nexus**
   - Focus on government revenue

2. **How mine development will affect various sectors at the national macro economy level**
   - Macro Economic Impact

3. **Whether “Dutch disease” will occur from mine development and if so, its level of severity**
   - Macro Economic Phenomena
Methods of Impact Analysis (1)

(Analysis on Project Benefit)
1. Government revenue

(Analysis on Macro Economic Impact)
2. Input-Output (I-O) model analysis

(Analysis on Macro Economic Phenomena)
3. Computable General Equilibrium (CGE) model analysis
### Potential Economic Scale of the Project

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production value</td>
<td>F$465.5 million/y</td>
<td>(equivalent to 13.5% of 2002 Fiji GDP)</td>
</tr>
<tr>
<td></td>
<td>actual production value of mining was 1.4% (as of 2002)</td>
<td></td>
</tr>
<tr>
<td>Export value</td>
<td>F$353.9 million/y</td>
<td>(equivalent to 30.2 % of 2002 total exports)</td>
</tr>
<tr>
<td></td>
<td>Top 3 export industries (as of 2002): Tourism F$567.6 M, Garments F$245.4 M, Sugar F$235M</td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>1,200/y in operation stage for 29 years</td>
<td>(Paid employees in mining sector: 1,724 (2000); 1,885 (2003)</td>
</tr>
<tr>
<td></td>
<td>figures as of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Copper price: US$1.00/lb = $2,204/t (2002)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ US$3.44/lb = $9,400/t (2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Exchange rate F$1.00=US$0.65 (2002) → US$0.56 (2012)</td>
<td></td>
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</tbody>
</table>
## Potential Government Revenue from the Project

<table>
<thead>
<tr>
<th>Item</th>
<th>Construction stage (3 years)</th>
<th>Operation stage (29 years)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Revenue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Royalties</td>
<td></td>
<td>F/S table, Total F$ 41M</td>
<td>1% Net Profit or F$1M (greater of)</td>
</tr>
<tr>
<td>Income Taxes</td>
<td></td>
<td>F/S table, Total F$ 179M</td>
<td>Year 1-12: 0%, Year 13-29: 30%</td>
</tr>
<tr>
<td>Lease Fees &amp; Charge</td>
<td>Total F$ 1.2M</td>
<td>F/S report, Total F$ 13M</td>
<td></td>
</tr>
<tr>
<td>Personnel Taxes</td>
<td>Total F$ 50M</td>
<td>F/S report, Total F$ 220M</td>
<td>from employees’ wages</td>
</tr>
</tbody>
</table>

Findings from the Analysis

- Given the minable ore, the project has a huge potential which is worth developing.
- The project shall attract private incentives and investment.
  - Operators’ priority: globally competitive profitability (financial feasibility).
- The government may secure substantial revenue to save up for the wealth fund and spend on other policy measures to mitigate negative impact caused by the project.
Methods of Impact Analysis (2)

(Analysis on Project Benefit)
1. Government revenue

(Analysis on Macro Economic Impact)
2. Input-Output (I-O) model analysis

(Analysis on Macro Economic Phenomena)
3. Computable General Equilibrium (CGE) model analysis
Results of I-O Analysis (1)

Final Output (million F$)

*Output= Production

Calculated by Hosoi, using “1997 Fiji T-O Table”
Results of I-O Analysis (2)

Indices of the power of dispersion and the sensitivity of dispersion

Calculated by Hosoi, using “1997 Fiji T-O Table”
Findings from I-O Analysis

- Predicts macro economic impacts.
  - Positive and negative effects on production, output and export by each sector
- The project has a huge potential to increase the production in mining sector.
  - This project has relatively small influence on other sectors
- If the project will have adverse effects on other sectors, the government shall consider policies that will mitigate/cope such problems.
Methods of Impact Analysis (3)

(Analysis on Project Benefit)
1. Government revenue

(Analysis on Macro Economic Impact)
2. Input-Output (I-O) model analysis

(Analysis on Macro Economic Phenomena)
3. Computable General Equilibrium (CGE) model analysis
Results of CGE Model Analysis (1)

Macro-variables after simulation (change) (thousand F$)

- Nominal GDP
- Private disposable income
- Total private consumption
- Real national welfare
- Nominal consumption check variable
- Nominal national welfare
- Imports
- Exports
- Government consumption expenditure
- Government savings
- Net capital inflow
- Foreign reserves

Calculated by Hosoi, using "1997 Fiji T-O Table"
Results of CGE Model Analysis (2)

Change to output of each industry after simulation (thousand F$)

Calculated by Hosoi, using “1997 Fiji T-O Table”
Results of CGE Model Analysis (3)

Consumer price and exports of commodity after simulation

*ACP: Average Consumer Price, Changed rate from 1 to X
*Exports: Changed rate from 1 to X

Calculated by Hosoi, using “1997 Fiji T-O Table”

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Results of CGE Model Analysis (4)

Macro-variables after simulation (change) (%)

National welfare (real)  GDP (real)  Total imports  Total exports

Calculated by Hosoi, using "1997 Fiji T-O Table"
Findings from CGE Analysis

- Projects macro economic indices.
  - Predicts “Dutch disease”

- The project may entail Dutch disease; but positive macro impacts are likely to exceed negative impacts caused by Dutch disease

- Economy boosted by increase in mining output and export is a typical characteristic seen in many other resource rich countries

- Implies fiscal soundness including tax and royalty, but need to accord expenditures under sustainable fiscal management

- Most importantly, “National Welfare” index shows significant increase (+50%)
Ex-ante analysis

➢ To identify Dutch disease and affected sectors/indices
➢ And it is important that stakeholders should be notified of positive/negative impacts and side effects
Results of ex-ante analysis can be used to consider:

What are the policy options that the government can take to avert/mitigate such impacts and risks?

- Opportunity to transform economic structure
  - New, pioneer, growth industry

- Promote enabling environment
  - Expansion of investment (domestic and FDI)
  - Stabilize national revenue vs Maximize incentives of private investors

- Workers can also transform!
  - Labor force plan, capacity development
However, challenges still exist in terms of inclusive development.

- What are the micro effects on traditional industries such as farmers and fishermen?
- What are the policy options that the government can take to avert/mitigate such risks?
- How much can the government spare budget for such policy options?
- What can the private sector do?