Session 3: The Macro-Fiscal Nexus

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

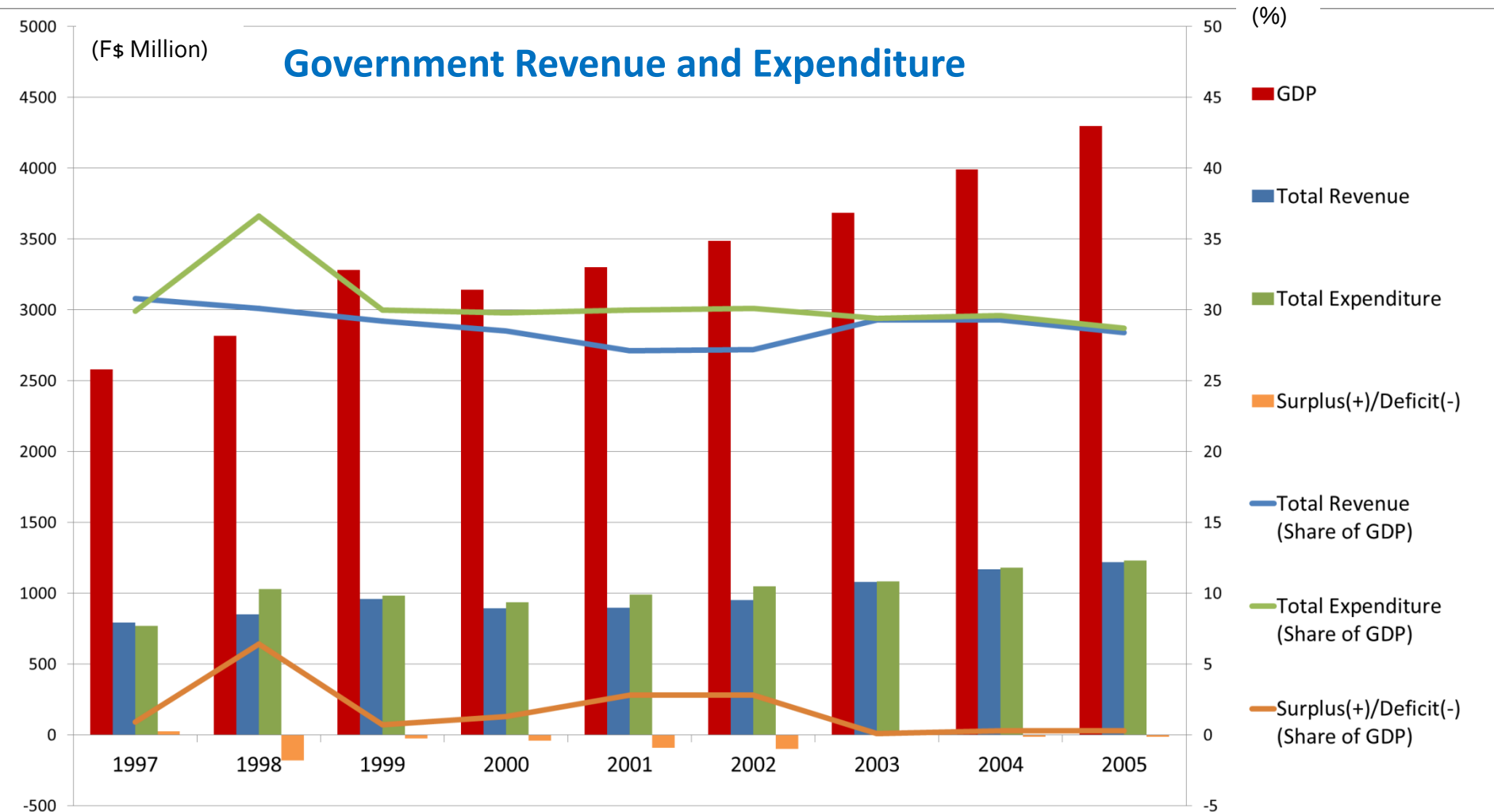# Yoshitaka Hosoi, PhD

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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**
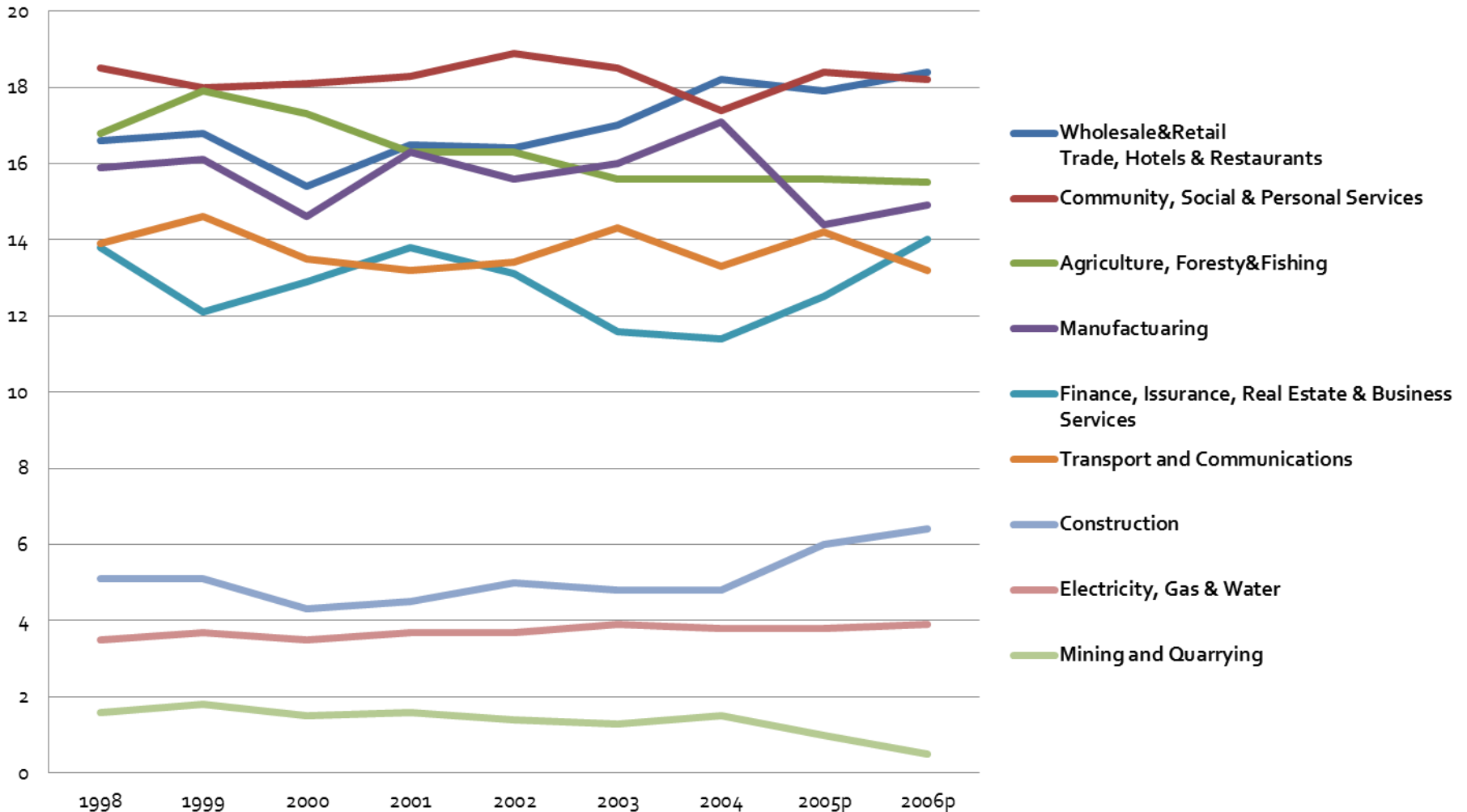
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- **Types and methods of ex-ante analyses**
- **Results and findings from the analyses**
- **Summary and the way forward**

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Government Revenue and Expenditure

Source: Fiji Islands Bureau of Statistics (2006)

GDP by Activity at Constant Prices of 1995 (%)

Legend:
- Wholesale&Retail Trade, Hotels & Restaurants
- Community, Social & Personal Services
- Agriculture, Foresty&Fishing
- Manufactuaring
- Finance, Issurance, Real Estate & Business Services
- Transport and Communications
- Construction
- Electricity, Gas & Water
- Mining and Quarrying

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Background of Fiji (3)

- **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**

（**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

Production value	**F$465.5 million/y** (equivalent to 13.5% of 2002 Fiji GDP)
	actual production value of mining was 1.4% (as of 2002)
Export value	**F$353.9 million/y** (equivalent to 30.2 % of 2002 total exports)
	Top 3 export industries (as of 2002): Tourism F$567.6 M, Garments F$245.4 M, Sugar F$235M
Employees	**1,200/y in operation stage for 29 years** (Paid employees in mining sector: 1,724 (2000); 1,885 (2003)
figures as of	• Copper price: US$1.00/lb = $2,204/t (2002) →US$3.44/lb = $9,400/t (2012) • Gold price: US$350/oz (2002) → $1,620/oz (2010) • Exchange rate F$1.00=US$0.65 (2002) → US$0.56 (2012)

Potential Government Revenue from the Project

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

Source: F/S report of Placer Pacific Namosi Limited.

- **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**

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（**Analysis on Project Benefit)**
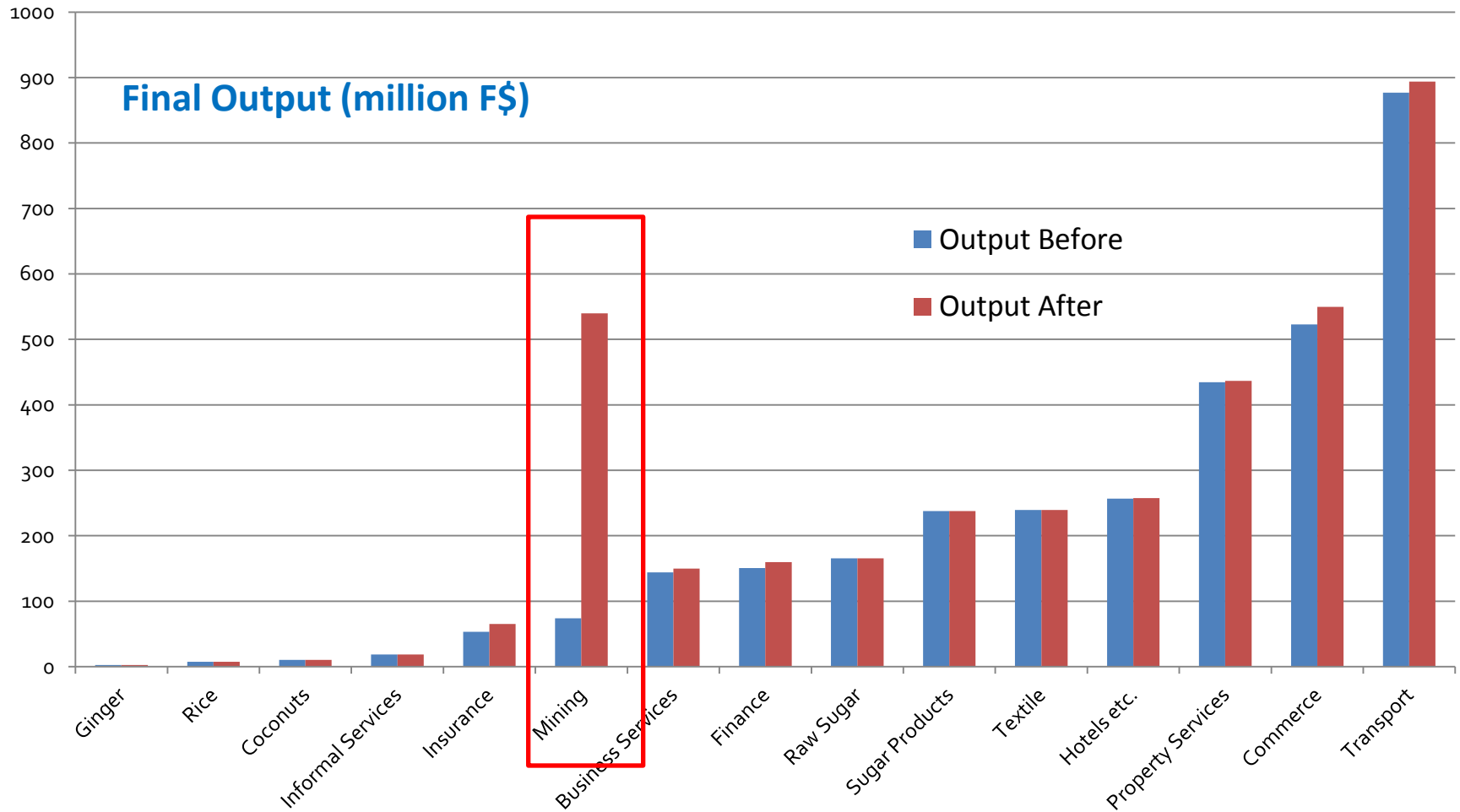
1. Government revenue

(Analysis on Macro Economic Impact)

2. Input-Output (I-O) model analysis

(Analysis on Macro Economic Phenomena)
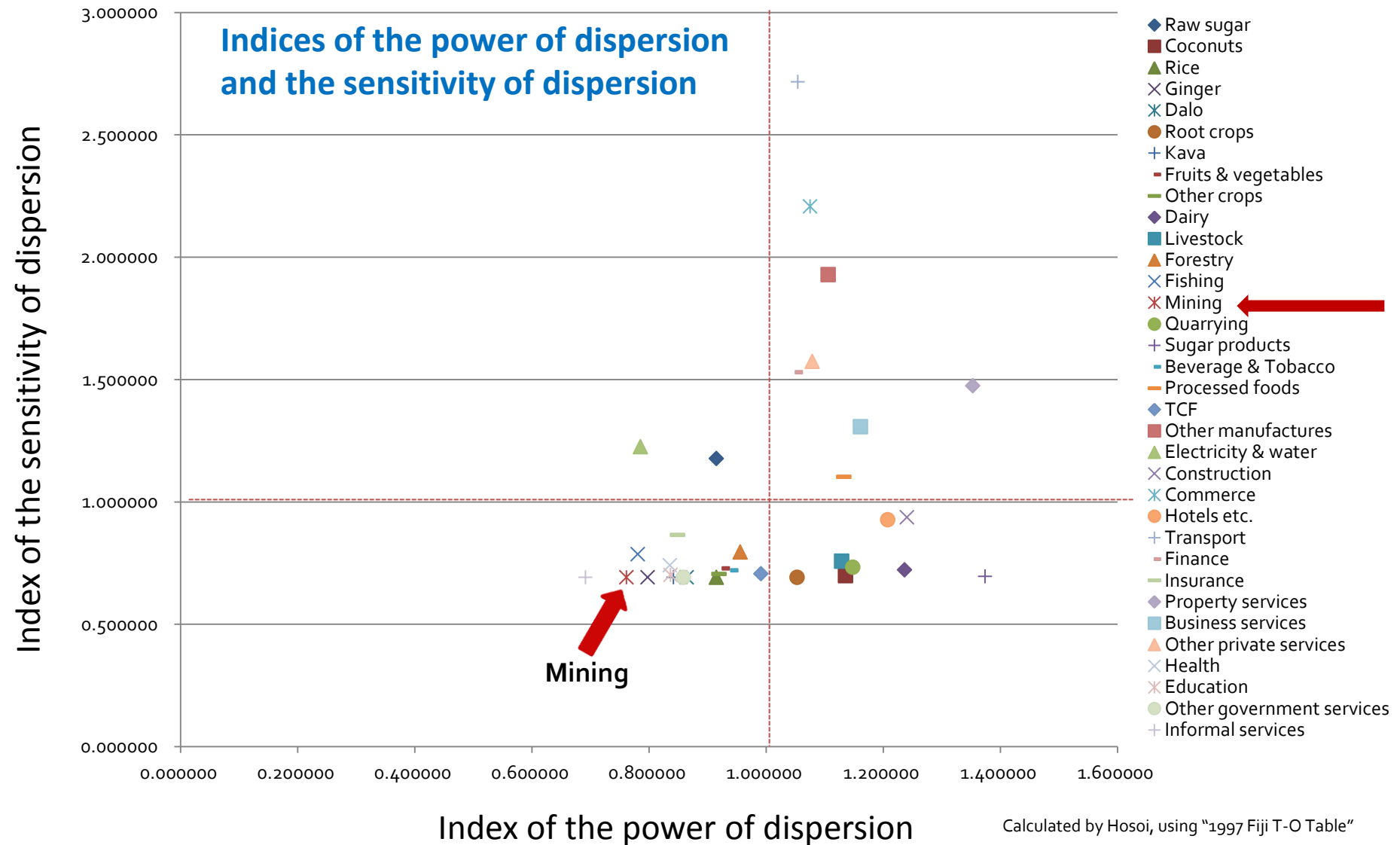
3. Computable General Equilibrium (CGE) model analysis

Results of I-O Analysis (1)

Final Output (million F$)

Legend: Output Before (blue), Output After (red)

Categories: Ginger, Rice, Coconuts, Informal Services, Insurance, Mining, Business Services, Finance, Raw Sugar, Sugar Products, Textile, Hotels etc., Property Services, Commerce, Transport

Calculated by Hosoi, using "1997 Fiji T-O Table"

*Output= Production

Results of I-O Analysis (2)

Indices of the power of dispersion and the sensitivity of dispersion

Index of the sensitivity of dispersion

Index of the power of dispersion

Mining

Legend:
- Raw sugar
- Coconuts
- Rice
- Ginger
- Dalo
- Root crops
- Kava
- Fruits & vegetables
- Other crops
- Dairy
- Livestock
- Forestry
- Fishing
- Mining
- Quarrying
- Sugar products
- Beverage & Tobacco
- Processed foods
- TCF
- Other manufactures
- Electricity & water
- Construction
- Commerce
- Hotels etc.
- Transport
- Finance
- Insurance
- Property services
- Business services
- Other private services
- Health
- Education
- Other government services
- Informal services

Calculated by Hosoi, using "1997 Fiji T-O Table"

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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.**

（**Analysis on Project Benefit)**

1. Government revenue
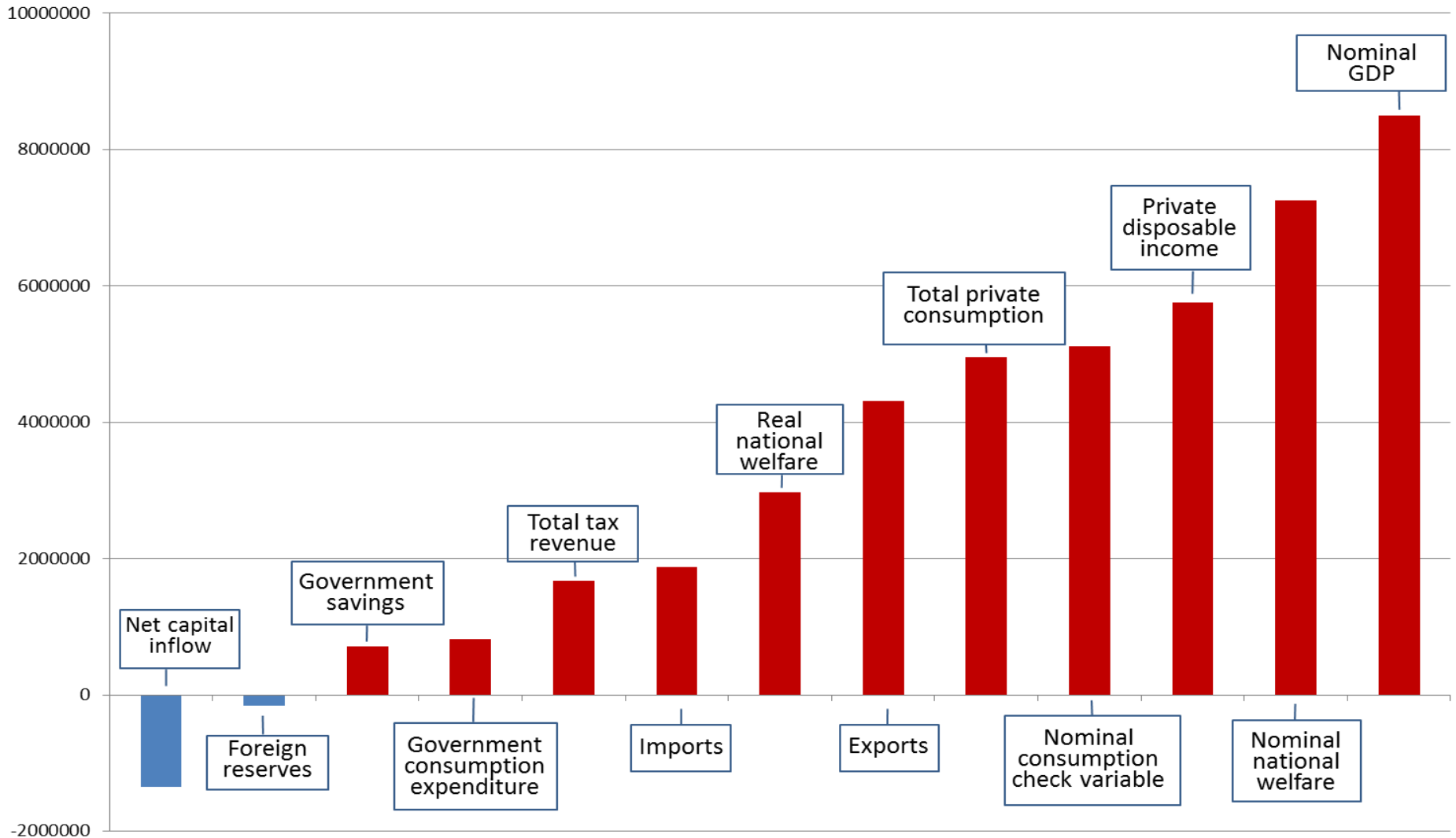
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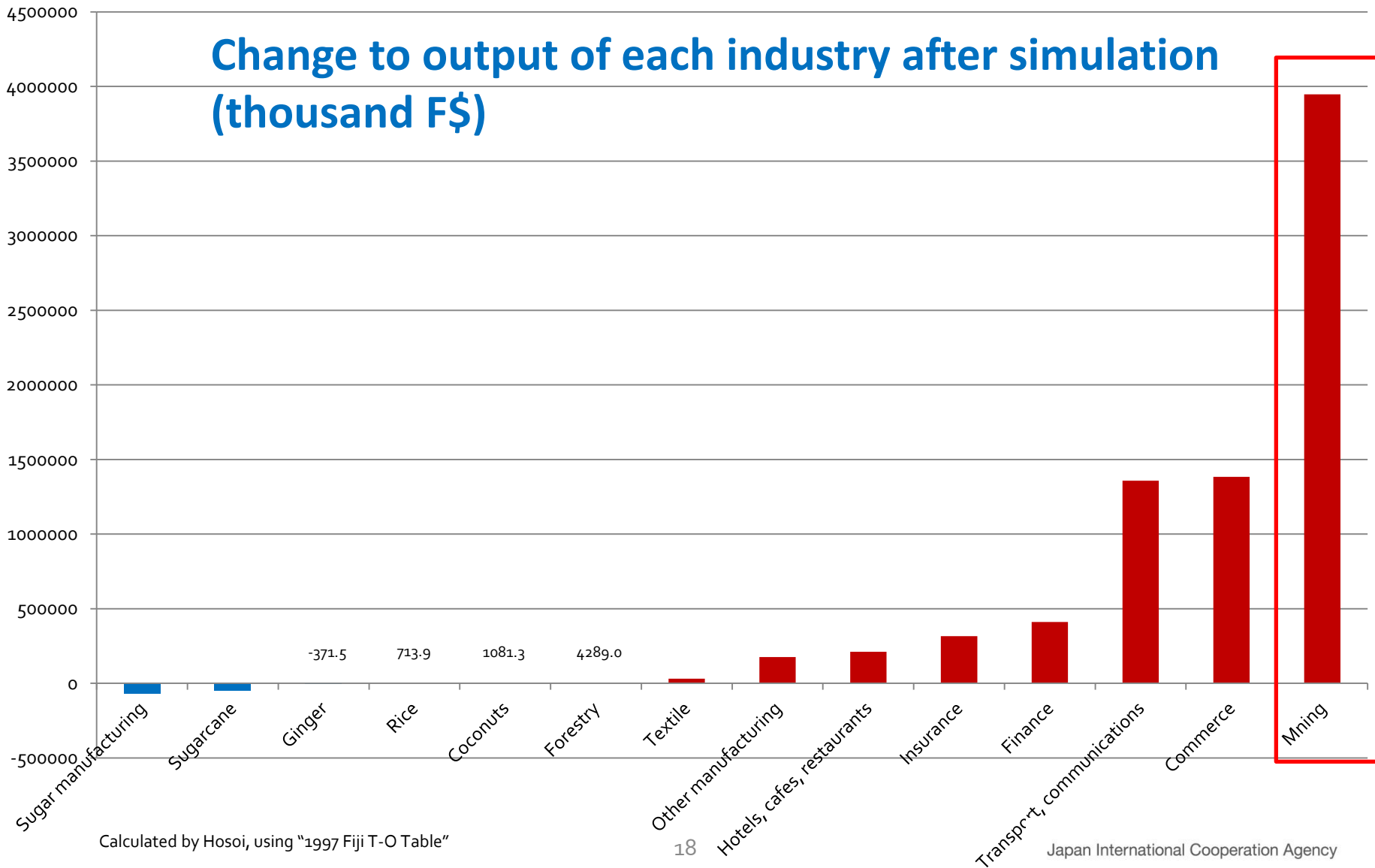
(Analysis on Macro Economic Phenomena)

3. Computable General Equilibrium (CGE) model analysis

Results of CGE Model Analysis (1)

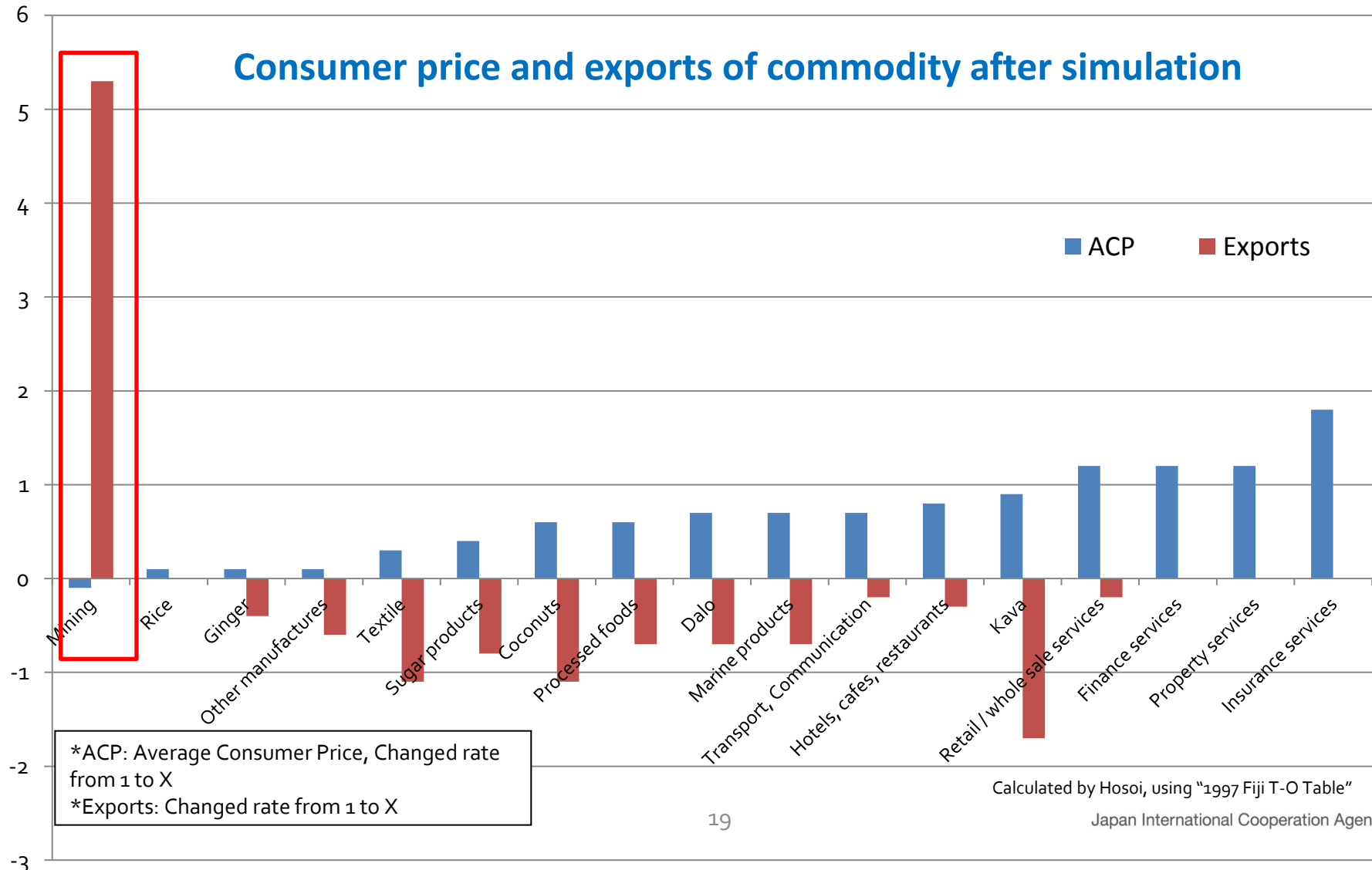## Macro-variables after simulation (change) (thousand F$)

Calculated by Hosoi, using "1997 Fiji T-O Table"

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

Chart values by industry:
- Sugar manufacturing
- Sugarcane
- Ginger: -371.5
- Rice: 713.9
- Coconuts: 1081.3
- Forestry: 4289.0
- Textile
- Other manufacturing
- Hotels, cafes, restaurants
- Insurance
- Finance
- Transport, communications
- Commerce
- Mning

Calculated by Hosoi, using "1997 Fiji T-O Table"

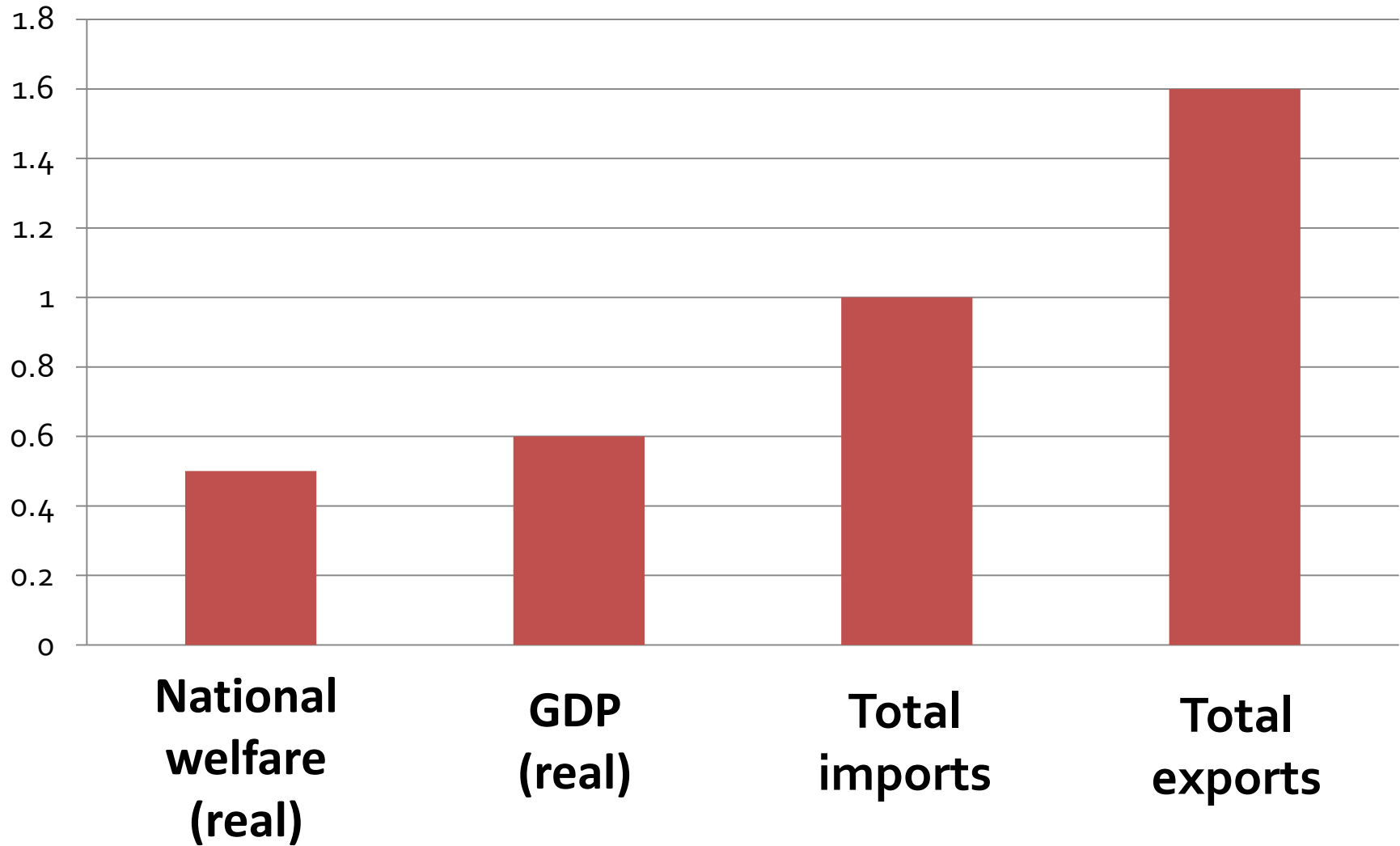Japan International Cooperation Agency

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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Macro-variables after simulation (change) (%)

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**

Summary and the Way Forward (2)

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**

Points of discussion – food for thought

- **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?**