

# General Equilibrium Analysis Part II

## A Basic CGE Model for Lao PDR

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# Introduction

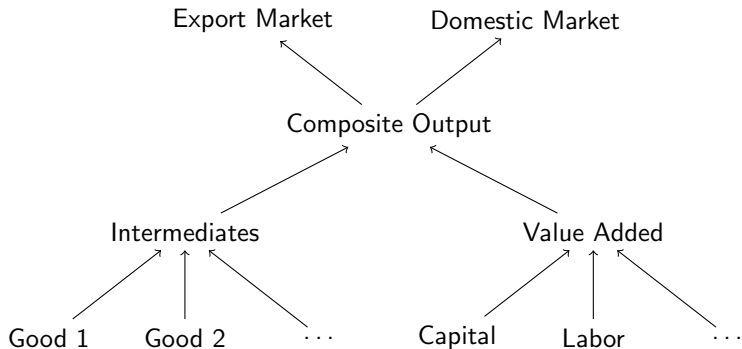
- In this session we will discuss a basic CGE model of an economic system applied to Lao PDR.
- We will talk about the general structure of the model, which is typical of most CGE models, the assumptions of the model, and the data that it requires.
- We will then explore the model code (briefly).
- Next session we will get some hands-on experience running simulations with the model.

# Agents

- There are five basic types of **agent** in the model.
- A **representative household** that owns the resources and generates private final demand.
- **Firms** that hire resources from the household, and produce the final goods, which are then sold to the agents.
- A **government** that spends on public goods, collects taxes and disburses subsidies.
- An **investor** that takes household savings and allocates it to investment.
- A **rest of world** that supplies imports to the economy and acts as a source of demand for exports, and is a potential source of savings.

- Industries operate under perfectly competitive market conditions, with a representative firm in each industry.
- Each firm maximizes profits, treating prices of inputs and outputs as given.
- The technology uses primary factors in variable proportions, combined with intermediate goods used in fixed proportions.
- Each industry produces a differentiated product, with one version aimed at foreign markets and another aimed at the domestic market (households, government, investment and intermediates).

# Production Structure



# Theory – Household

- The representative household has a Stone-Geary utility function which allows for variation in income elasticities.
- It maximizes utility subject to its budget constraint, generating a linear expenditure demand system.
- Household income is equal to factor payments, less tax payments to the government.

# Theory – Government and Investment

- Government consumption and investment are fixed in quantity terms (they vary in value terms with prices).
- Government revenues are determined endogenously, with all tax rates exogenous.
- Government savings (i.e., the budget deficit or surplus) is variable, financed by (implicit) transfers from the household.
- Household savings varies to match aggregate investment needs.

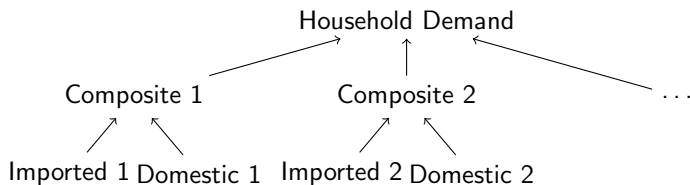
- The economy is assumed to be small with respect to import markets.
- Foreign demand for exports is modeled using the constant elasticity of demand function (just like in our partial equilibrium model).
- The current account balance (i.e., foreign lending or borrowing) is fixed.



# Theory – International Trade

- International trade is modeled via the [Armington assumption](#) – horizontal product differentiation by source.
- There is a single Armington composite for household, intermediate, government and investment demands.

# Structure of Household Consumption



# Theory – Factor Market

- By default, the factor market closure is neoclassical.
- This means that all factors of production are available in fixed total supply, mobile across the sectors in which they are used, and that factor prices adjust to maintain full resource use.
- This is a medium-run closure, but it can be easily adjusted if necessary (by altering the underlying SAM, discussed next; factors that appear in only one activity are treated as fixed).

# Distortions

- The model allows for multiple distortions in the economic system in the form of taxes/subsidies.
- These are allowed in imports, exports, and consumption by all agents.

# Data – Social Accounting Matrix

- The model is calibrated to a Social Accounting Matrix for Lao PDR.
- The data is drawn from GTAP9, and represents the economy as at 2011.
- There are 6 productive sectors, and 5 productive factors.
- The data is described in the file 12\_CGE\_II.xlsx.

# Data – Required Parameters

- Elasticities of substitution in value-added (by sector).
- Elasticities of substitution in trade (Armington elasticities, by sector).
- Foreign export demand elasticities (by sector).
- Elasticities of transformation between foreign export supply and domestic supply (by sector).

# Computing Requirements

- The model is built using the GAMS language.
- The demonstration version of GAMS can solve the current model.
- If you expand the theory and/or data dimensions significantly, you would need to move to the full version.

# Program Structure

- Sets
- Flow Data
- Parameter, Variable and Equation Declarations
- Parameter, Variable and Equation Assignments
- Model and Solve Statement
- [Review of the Code](#). The file is 12\_CGE\_LaoPDR.gms.