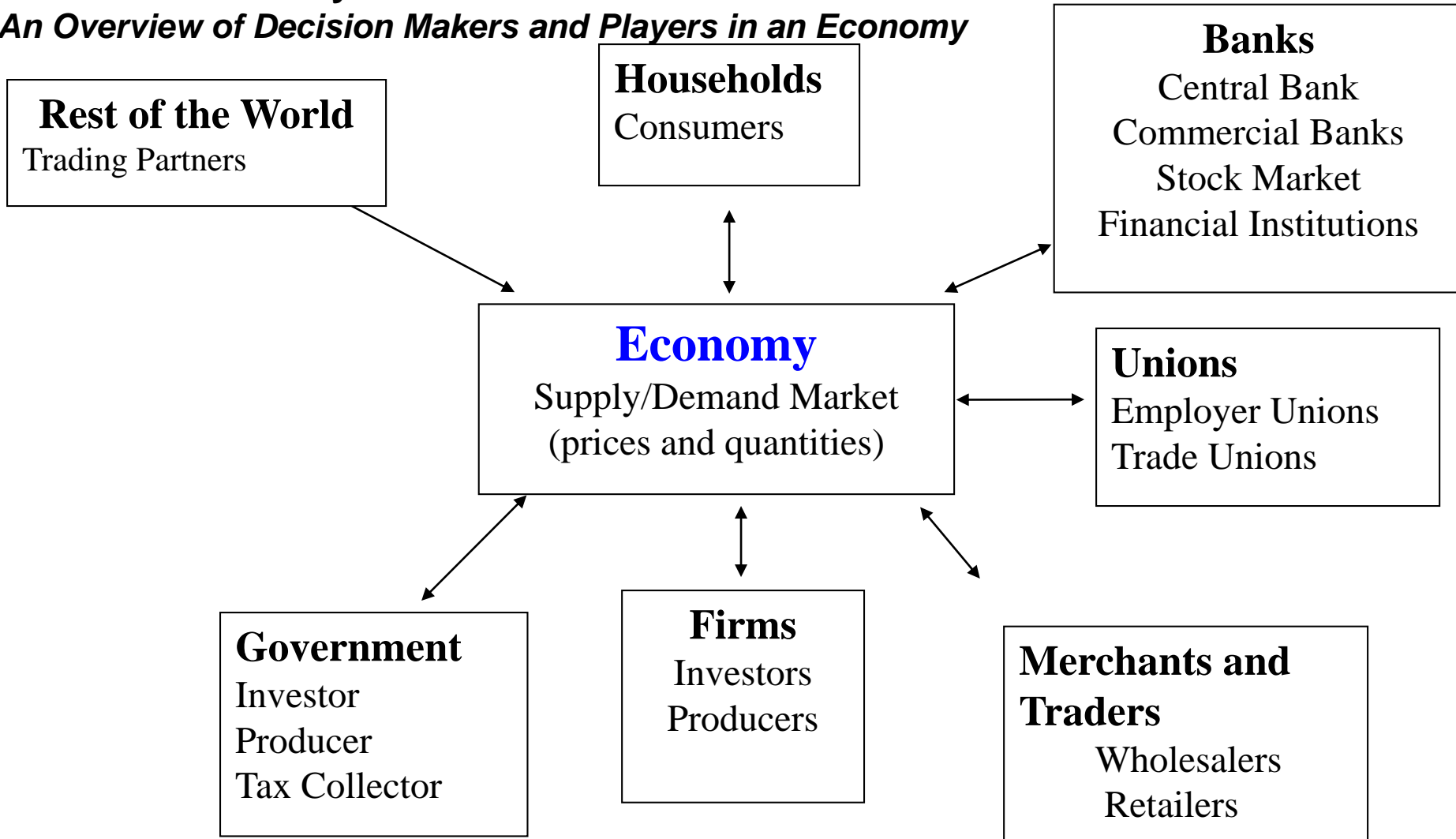# Aggregate Economic Equilibrium

Overview

o The Macroeconomy

o National Income Accounting

o Short-run Macroeconomic Equilibrium

o Long-run Macroeconomic Equilibrium

o Aggregate Economic Equilibrium

o Applied AEE Modeling: Hands-on Modeling Exercise
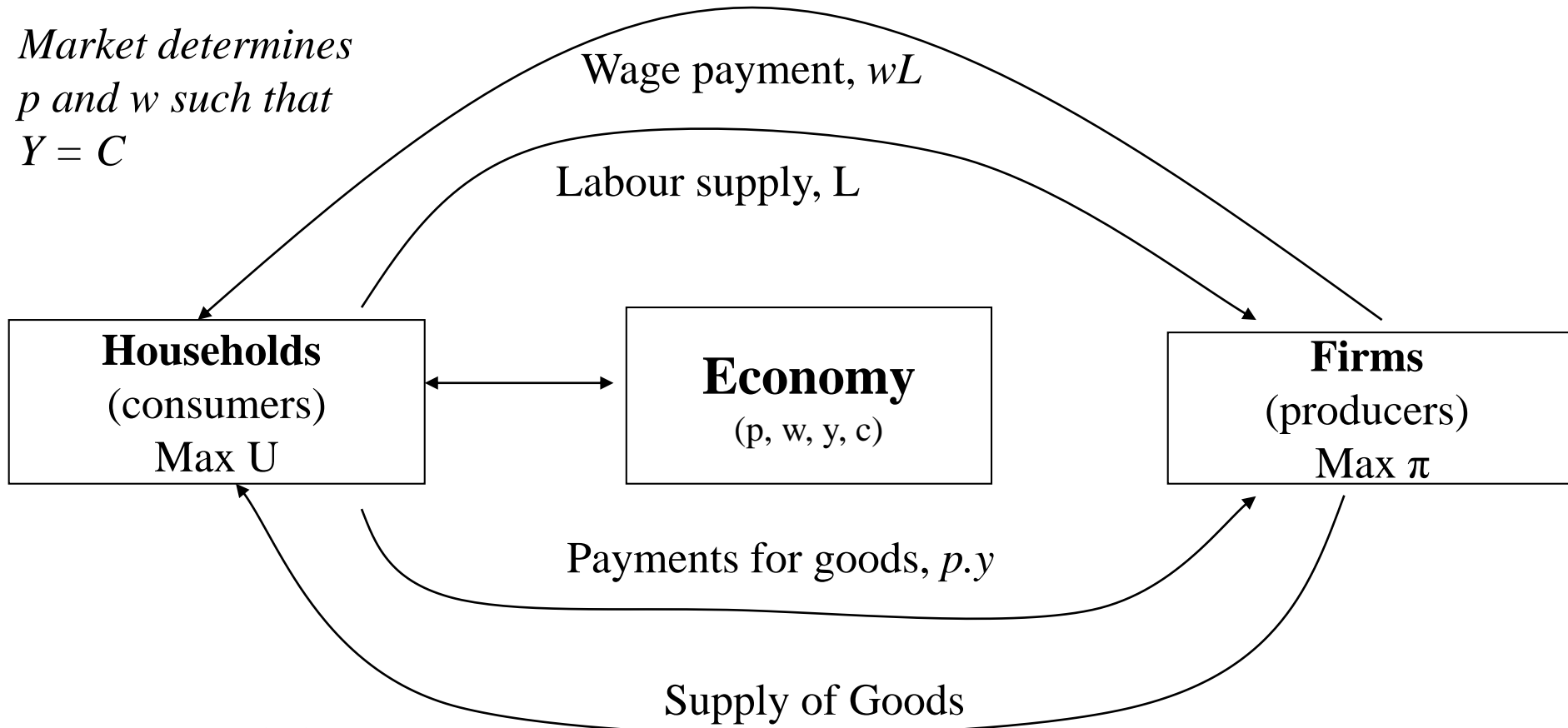
The Macroeconomy
An Overview of Decision Makers and Players in an Economy

Rest of the World
Trading Partners

Households
Consumers

Banks
Central Bank
Commercial Banks
Stock Market
Financial Institutions

Economy
Supply/Demand Market
(prices and quantities)

Unions
Employer Unions
Trade Unions

Government
Investor
Producer
Tax Collector

Firms
Investors
Producers

Merchants and Traders
Wholesalers
Retailers

The Macroeconomy

Micro Foundation to Macro Variables

*Market determines
p and w such that
$Y = C$*

Wage payment, wL

Labour supply, L

| Households (consumers) Max U | Economy (p, w, y, c) | Firms (producers) Max π |

Payments for goods, $p.y$

Supply of Goods

$$Max \quad U = U(C)$$
$$pC = wL + \pi$$

$$Max \quad \pi = py - wL - p_E E$$
$$Y = f(K, L, E)$$

National Income Accounting

o Non-productive wealth doesn't make anything

o Productive assets can be used to make:

> More productive assets (e.g making new machines). This is **investment**.

> Goods and services for **consumption**:

✓ Durables, which add to wealth (e.g. furniture)

✓ Non-durables, which are one-off consumption (e.g. ice-cream, hair cut)

> The total value of goods + services + investment is known as

Gross Domestic Product (GDP).

National Income Accounting

Three ways to measure GDP:

Total **expenditure** = personal consumption + gross private domestic

investment + government purchases + (exports – imports)
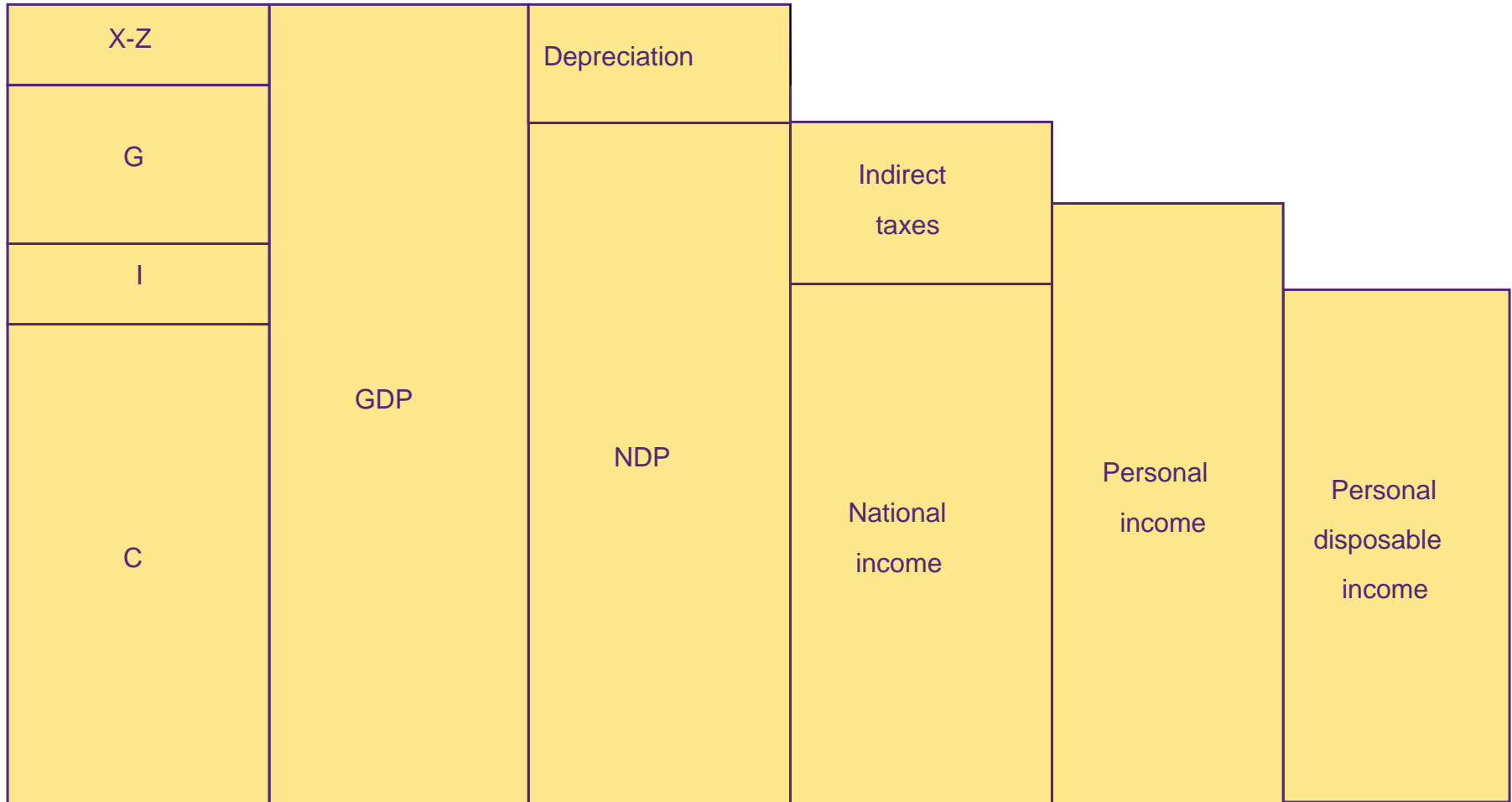
$$GDP = C + I + G + X - M$$

Total **income** = value added by all stages in production process

Total **production** = total value of all output produced in the economy

All three measures should be identical

National Income Accounting

Aggregate Supply and Demand

Aggregate Supply refers to the total quantity of output -in other words, real **GDP**- firms will produce and sell. It is the total supply of goods and services that firms in a national economy plan to sell during a specific time period. It is the total amount of goods and services that the firms are willing to sell at a given price level in the economy.

Aggregate Demand is the total demand for final goods and services in an economy at a given time. This is the demand for the gross domestic product of a country. It specifies the amount of goods and services that will be purchased at a given price level.
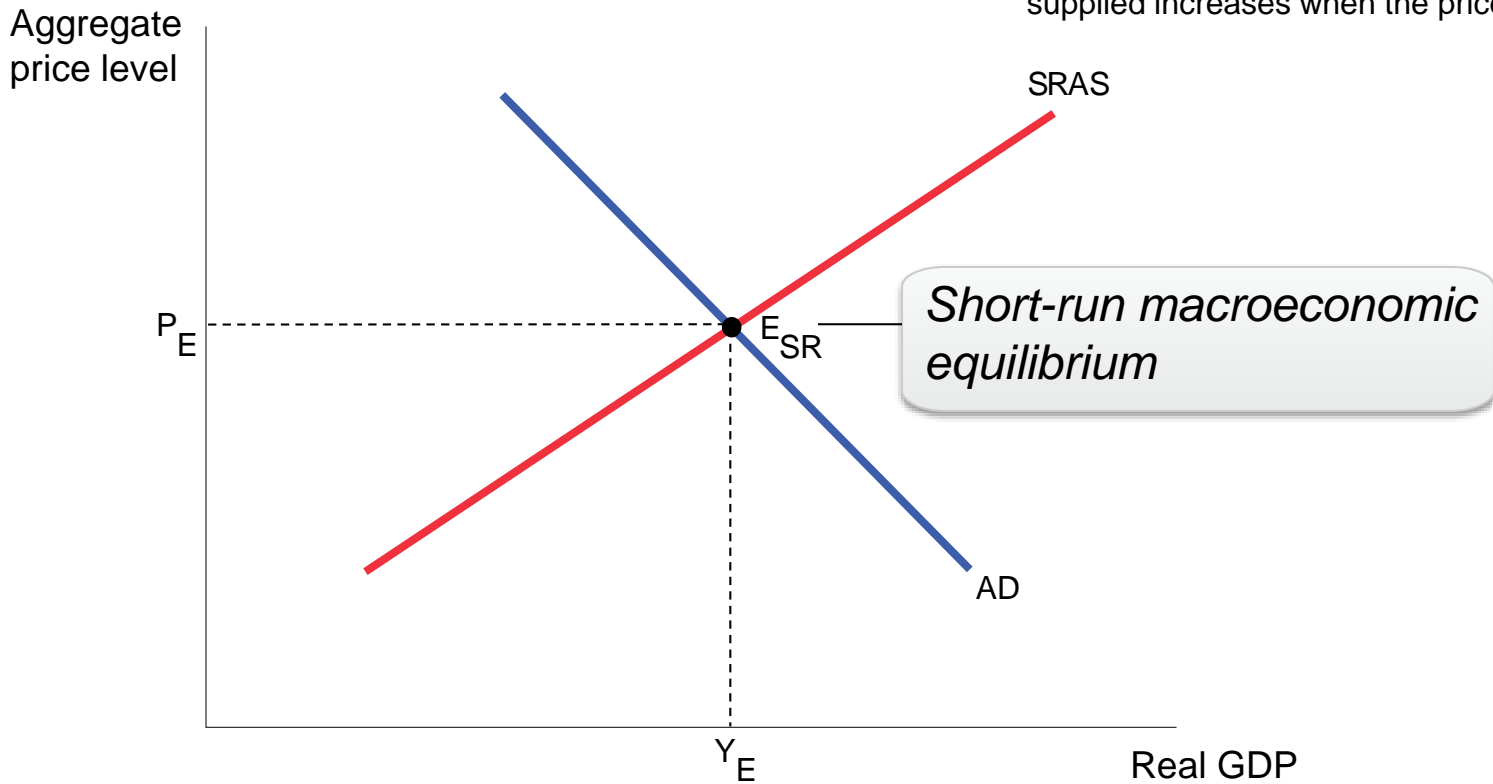
Short-Run Macroeconomic Equilibrium

- The economy is in **short-run macroeconomic equilibrium** when the quantity of aggregate output supplied is equal to the quantity demanded.

- The **short-run equilibrium aggregate price level** is the aggregate price level in the short-run macroeconomic equilibrium.

- **Short-run equilibrium aggregate output** is the quantity of aggregate output produced in the short-run macroeconomic equilibrium.
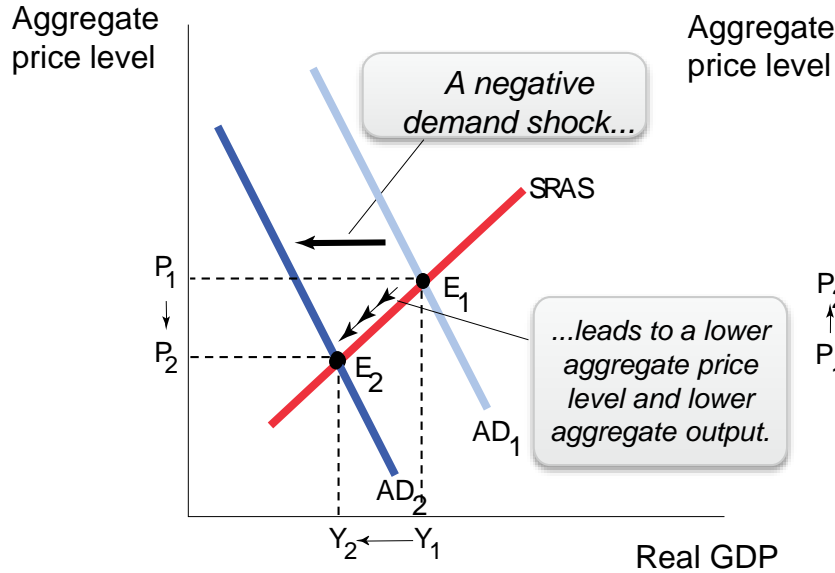
Short-Run Macroeconomic Equilibrium

The **Short-Run Aggregate Supply (SRAS)** curve is upward sloping because the quantity supplied increases when the price rises.
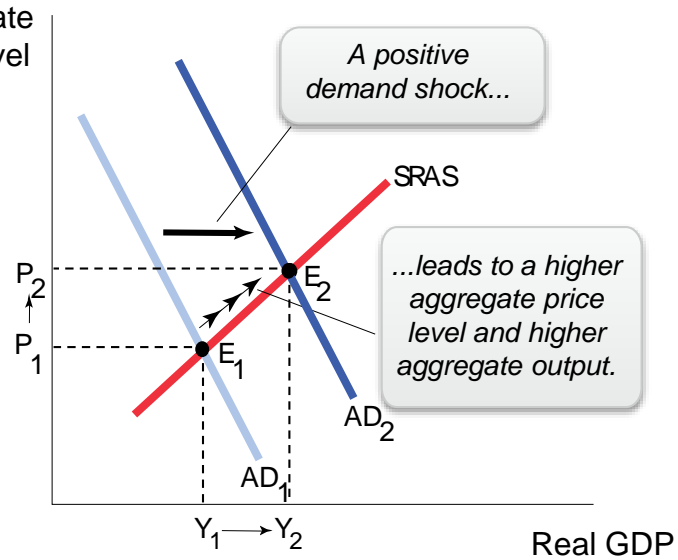

Short-run macroeconomic equilibrium

Demand Shocks

(a) A Negative Demand Shock

(b) A Positive Demand Shock

Aggregate price level

A negative demand shock...

SRAS

P_1

E_1

...leads to a lower aggregate price level and lower aggregate output.

P_2

E_2

AD_1

AD_2

$Y_2 \leftarrow Y_1$

Real GDP

Aggregate price level

A positive demand shock...

SRAS

P_2

E_2

...leads to a higher aggregate price level and higher aggregate output.

P_1

E_1

AD_1

AD_2

$Y_1 \rightarrow Y_2$

Real GDP
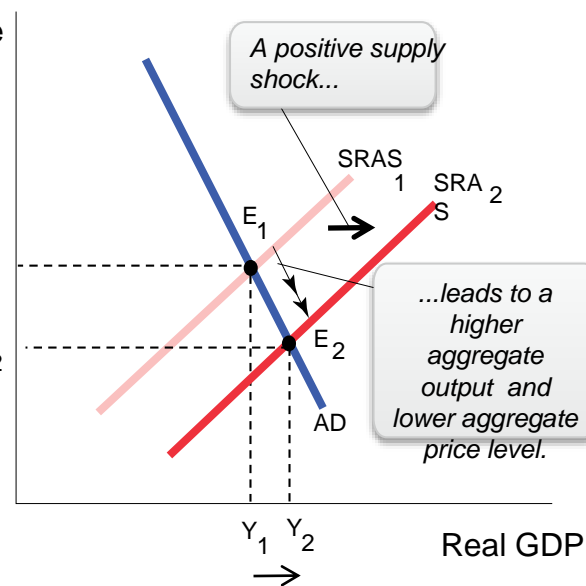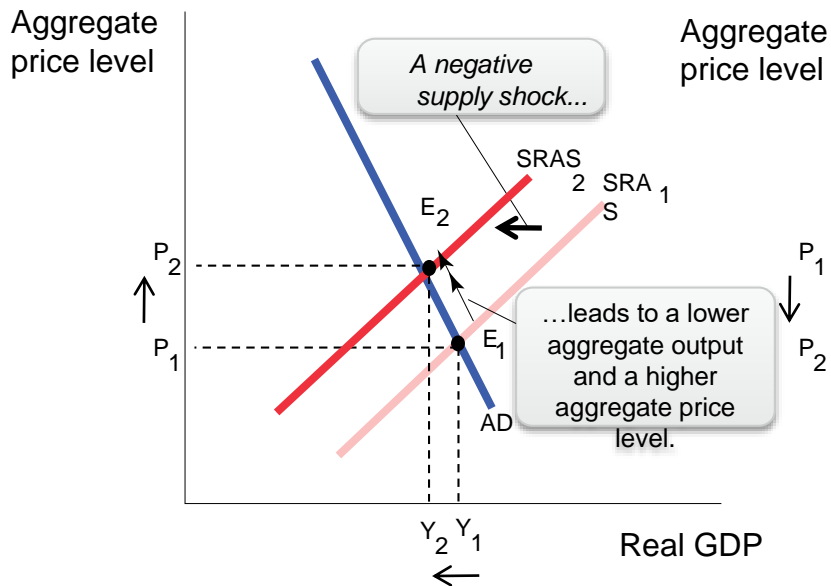
Supply Shocks

(a) A Negative Supply Shock

(b) A Positive Supply Shock

When the SRAS curve shifts inward the output and real GDP increase at a given price

When the SRAS curve shifts outward the output and real GDP increase at a given price
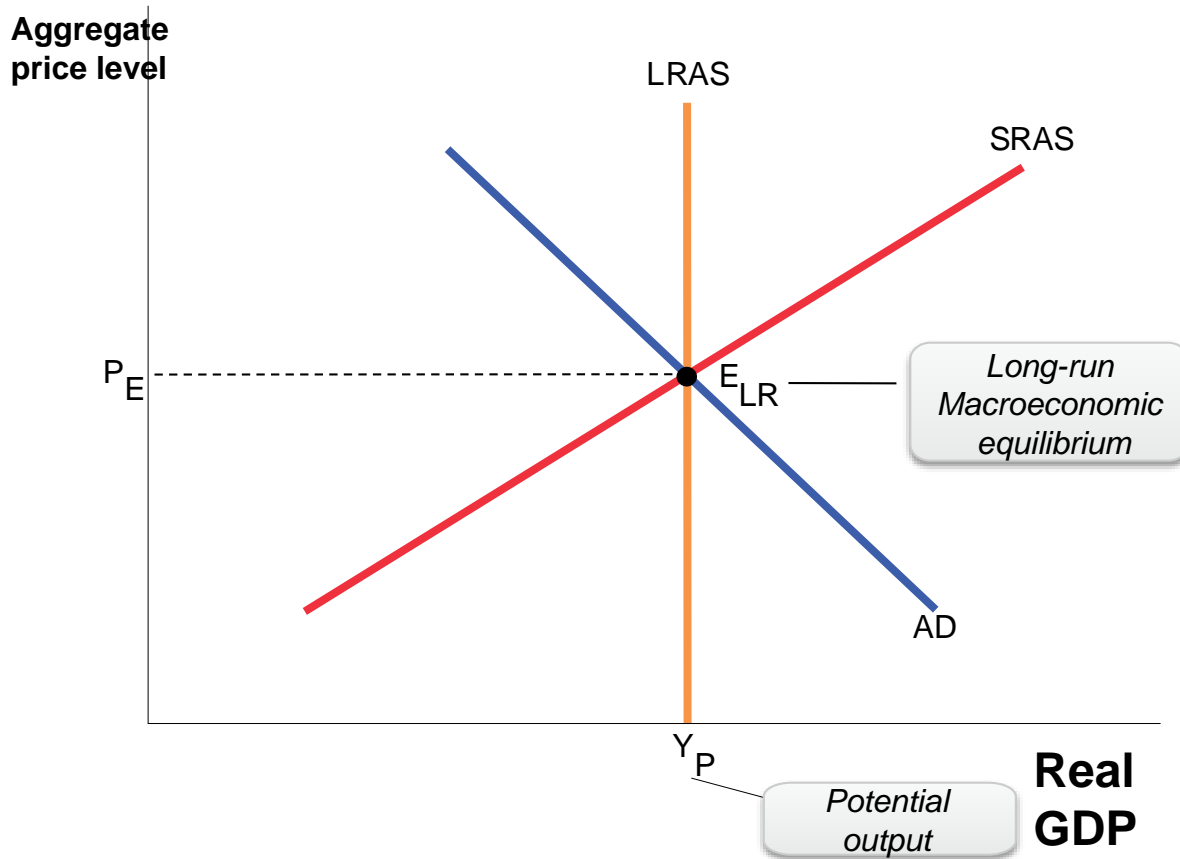
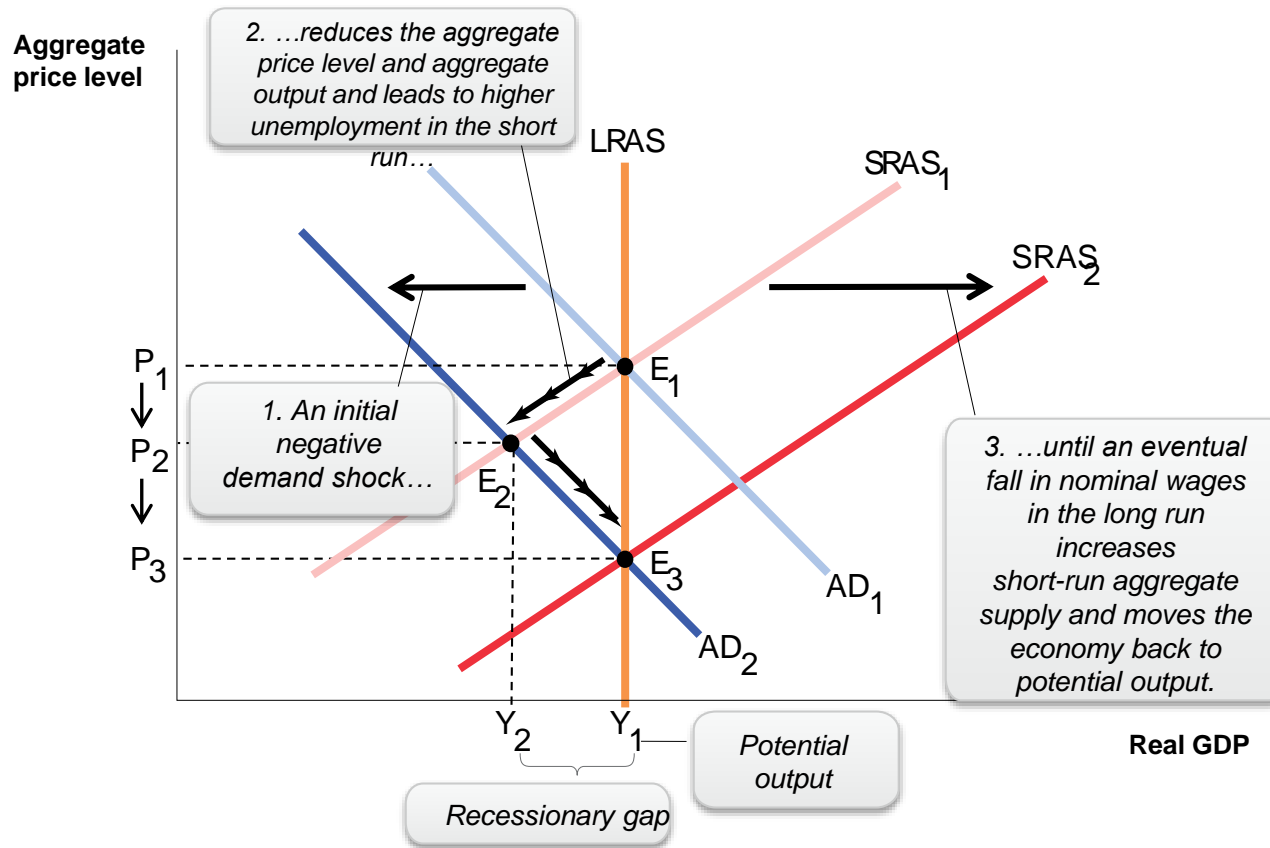## Long-Run Macroeconomic Equilibrium

The economy is in **long-run macroeconomic equilibrium** when the point of short-run macroeconomic equilibrium is on the long-run aggregate supply curve.

The Long-Run Aggregate Supply (LRAS) curve is vertical which reflects economists' beliefs that changes in the aggregate demand only temporarily change the economy's total output.
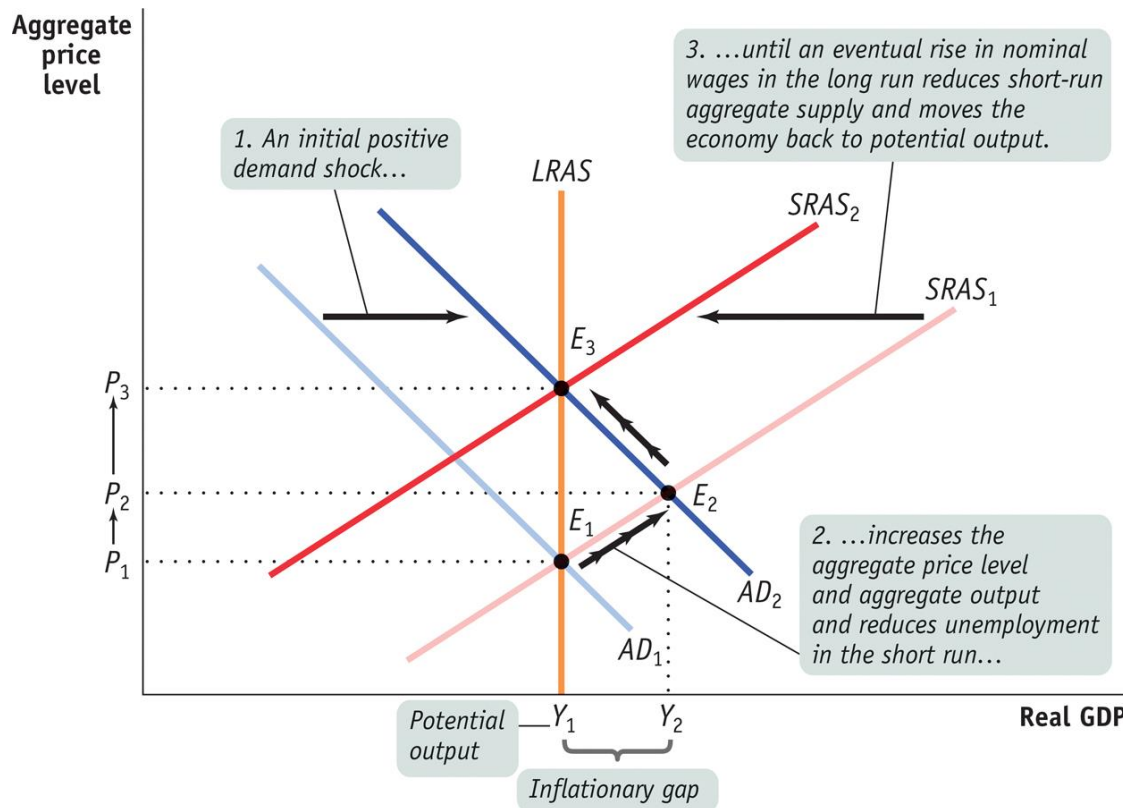
Long-Run Macroeconomic Equilibrium

Short-Run Versus Long-Run Effects of a Negative Demand Shock

Aggregate price level

2. …reduces the aggregate price level and aggregate output and leads to higher unemployment in the short run…

LRAS

$SRAS_1$

$SRAS_2$

P_1

E_1

1. An initial negative demand shock…

P_2

E_2

3. …until an eventual fall in nominal wages in the long run increases short-run aggregate supply and moves the economy back to potential output.

P_3

E_3

AD_1

AD_2

Y_2 Y_1

Potential output

Real GDP

Recessionary gap

Short-Run Versus Long-Run Effects of a Positive Demand Shock

Aggregate Economic Equilibrium

Determining the Economic Impacts of Energy Policies

• As a rough measure of the cost (or benefit) of a given energy policy, the '*Aggregate Economic Equilibrium*' approach calculates the impact upon aggregate GNP.

• The monetary value of this impact may be significant and highly relevant to energy policy (although this large sum might constitute only a small fraction of GNP)

• It is important to make a rough assessment of the magnitude of ***interdependencies between the energy industry and other industries***

Aggregate Economic Equilibrium

Energy-Economy Interactions

Input-Output Analysis

The **IO model** is centered on the idea of *inter-industry transactions*: Industries use the products of other industries to produce their own products. Hence, the output of any industry forms an input in other industries, or even for that industry itself. Outputs from one industry become inputs to another.

For example:

	Intermediate Purchasers		Final Purchasers	Total
	--Energy	*--Manufacturing*	*--Households*	**Sales (outputs)**
Intermediate Suppliers				
--Energy	10	30	60	100
--Manufacturing	30	10	10	50
Primary Suppliers				
--Households	60	10	0	70
Total Purchases (inputs)	100	50	70	220

Aggregate Economic Equilibrium

Quantitative Analysis of Energy-Economy Interactions in a 2-factor model
(aggregate view of the economy with a single output and 2 inputs)
<u>Inputs:</u>   Energy (E) with price PE
                    All other inputs (R) with price PR

Interindustry Transaction Flow Matrix which summarizes the accounting
conventions for the production and use of energy and nonenergy goods.

<u>Assume:</u> energy is treated as an intermediate product contributing to the
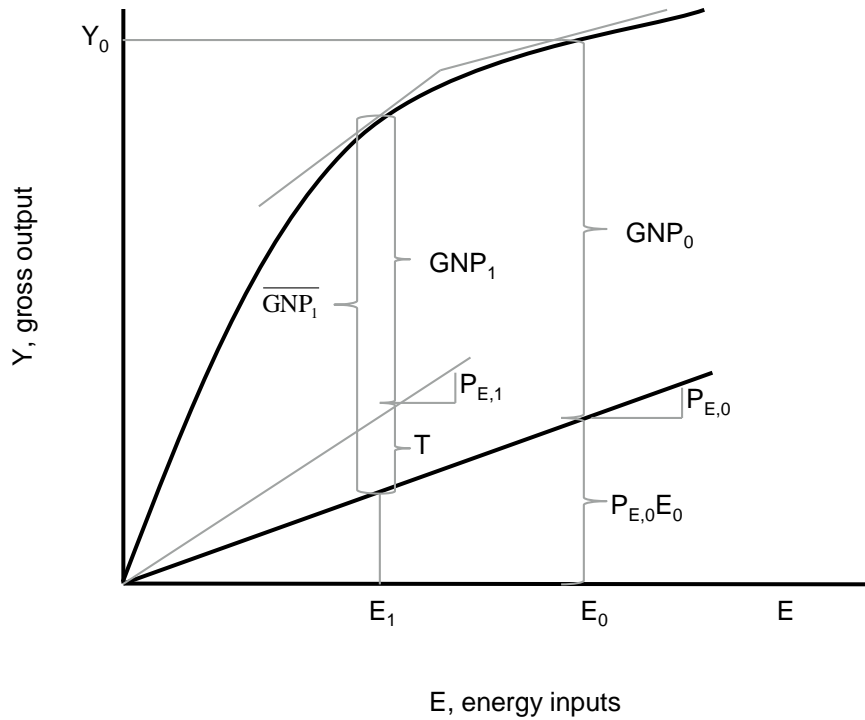production of goods and services for final demand.

Aggregate Economic Equilibrium

Interindustry Transaction FlowMatrix

To / From	Energy	Nonenergy	Final Demand
Energy	0	$P_E\,E$	0
Nonenergy	$P_E\,E$	0	GNP
Primary Factors		$P_R\,R$	

Applied Aggregate Economic Equilibrium Modeling

E, energy inputs

Applied Aggregate Economic Equilibrium Modeling

ETA-MACRO: A model of energy-economy interactions

Natural resources

Labor

Energy
Conversion
technologies

Energy
submodel

Energy

Energy costs

Economy
submodel

Consumption

Investment

Capital