National Income & Business Cycles

Ohio Wesleyan University
Goran Skosples

6. The Open Economy

Key Concepts
- Net exports
- Trade balance
- Capital mobility
- Net capital outflow
- Small open economy
- World interest rate
- Nominal exchange rate
- Real exchange rate
- Purchasing power parity
- Trade policy
- Large open economy

Impacts and exports of selected countries, 2017

- accounting identities for the open economy
- the small open economy model
  - what makes it “small”
  - how the trade balance and exchange rate are determined
  - how policies affect trade balance & exchange rate
In an open economy,

- spending need not equal \_
- saving need not equal \_

\[ EX = \text{exports} = \text{foreign spending on domestic goods} \]

\[ IM = \text{imports} = \text{domestic spending on foreign goods} \]

\[ NX = \text{net exports (a.k.a. the “trade balance”)} = EX - IM \]

The national income identity in an open economy

\[ Y = C + I + G + NX \]

or, \[ NX = Y - (C + I + G) \]

- trade surplus: output ___ spending and \[ EX \_\_ IM \]
- trade deficit: spending ___ output and \[ IM \_\_ EX \]

International capital flows

- Net capital outflow
  \[ = S - I \]
  = net outflow of “loanable funds”
  = net purchases of foreign assets
  the country’s purchases of foreign assets
  minus foreign purchases of domestic assets

- When \[ S > I \], country is a \_
- When \[ S < I \], country is a \_

The link between trade & cap. flows

\[ NX = Y - (C + I + G) \]

implies

\[ NX = \]

Thus,
a country with a trade deficit (\[ NX < 0 \])
is a net \_
\[ (S < I) \].
Saving, investment, and the trade balance 1960–2018

- Investment
- Saving
- Trade Balance

Saving and investment in a small open economy

- An open-economy version of the loanable funds model from Chapter 3.
- Includes many of the same elements:
  - production function \( Y = \bar{Y} = F(\bar{K}, \bar{T}) \)
  - consumption function \( C = C(Y - T) \)
  - investment function \( I = I(r) \)
  - exogenous policy variables \( G = \bar{G}, \ T = \bar{T} \)

Assumptions re: Capital flows

a. domestic & foreign bonds are perfect _______
   (same risk, maturity, etc.)

b. perfect capital _______
   - no restrictions on international trade in assets

c. economy is _______
   - cannot affect the world interest rate, denoted \( r^* \)

\[ a \& b \text{ imply } ______ \]
\[ c \text{ implies } r^* \text{ is } ________ \]
**Investment: The demand for loanable funds**

Investment is still a \[ \text{sloping function} \] of the interest rate, but the exogenous world interest rate... ...determines the country's level of ________.

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**Point**

Trade balance is determined by saving and investment at the world interest rate.

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**If the economy were closed...**

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**Three experiments:**

1. Fiscal policy at home
2. Fiscal policy abroad
3. An increase in investment demand
1. Fiscal policy at home

An increase in $G$ or decrease in $T$ _______ saving.

Results:
\[ \Delta I = \]
\[ \Delta NX = \]

2. Fiscal policy abroad

Expansionary fiscal policy abroad _______ the world interest rate.

Results:
\[ \Delta I = \]
\[ \Delta NX = \]

3. An increase in investment demand

ANSWERS:
\[ \Delta I , \]
\[ \Delta S , \]
net capital outflow and
\[ NX ________ \]
Two exchange rates

\( e = \) nominal exchange rate,
the relative price of domestic currency
in terms of foreign currency
(e.g. Yen per Dollar)

\( \varepsilon = \) real exchange rate,
the relative price of domestic goods in
terms of foreign goods
(e.g. Japanese Big Macs per U.S. Big Mac)

Understanding the units of \( \varepsilon \)

\[
\varepsilon = \frac{e \times P}{P^*}
\]

\[
= \frac{(\text{Yen per } \$) \times (\text{per unit U.S. goods})}{\text{Yen per unit Japanese goods}}
\]

\[
= \frac{\text{Yen per unit U.S. goods}}{\text{Yen per unit Japanese goods}}
\]

\[
= \frac{\text{Units of Japanese goods}}{\text{per unit of U.S. goods}}
\]

~ McZample ~

- one good: Big Mac
- price in Japan: \( P^* = 200 \) Yen
- price in USA: \( P = 2.50 \) $.
- nominal exchange rate \( e = 120 \) Yen/$

To buy a U.S. Big Mac, someone from Japan would have to pay an amount that could buy ___ Japanese Big Macs.

How \( NX \) depends on \( \varepsilon \)

\( \uparrow \varepsilon \Rightarrow \) U.S. goods become more expensive relative to foreign goods

\( \Rightarrow \) \( EX, IM \)

\( \Rightarrow \) \( NX \)

The net exports function

- The net exports function reflects this inverse relationship between \( NX \) and \( \varepsilon \):

\[
NX = \]
U.S. net exports and the real exchange rate, 1973–2012

How $\varepsilon$ is determined

- The accounting identity says $NX = S - I$
- We saw earlier how $S - I$ is determined:
  - $S$ depends on domestic factors (output, fiscal policy variables, etc)
  - $I$ is determined by the world interest rate $r^*$
- So, $\varepsilon$ must adjust to ensure

The $NX$ curve for the U.S.

How $\varepsilon$ is determined

Neither $S$ nor $I$ depend on $\varepsilon$, so the net capital outflow curve is _______.

$\varepsilon$ adjusts to _______ $NX$ with net capital outflow, _______.
Four experiments:

1. Fiscal policy at home
2. Fiscal policy abroad
3. An increase in investment demand
4. Trade policy to restrict imports

1. Fiscal policy at home
\[ \uparrow G \]
\[ \rightarrow \]
\[ S_1 - I(r^*) \]
\[ \rightarrow \]
\[ \epsilon_1 \]
\[ \rightarrow \]
\[ NX(\epsilon) \]
\[ \rightarrow \]
\[ NX_1 \]
\[ \rightarrow NX \]

2. Fiscal policy abroad
\[ \uparrow G \text{ abroad} \]
\[ \rightarrow \]
\[ S_1 - I(r^*_1) \]
\[ \rightarrow \]
\[ \epsilon_1 \]
\[ \rightarrow \]
\[ NX(\epsilon) \]
\[ \rightarrow \]
\[ NX_1 \]
\[ \rightarrow NX \]

3. Increase in investment demand
\[ \uparrow I \]
\[ \rightarrow \]
\[ S_1 - I_1 \]
\[ \rightarrow \]
\[ \epsilon_1 \]
\[ \rightarrow \]
\[ NX(\epsilon) \]
\[ \rightarrow \]
\[ NX_1 \]
\[ \rightarrow NX \]
4. Trade policy to restrict imports

At any given value of $\varepsilon$, an import quota
⇒ $\downarrow IM \Rightarrow NX$
⇒ demand for dollars ______

Trade policy ______ affect $S$ or $I$, so capital flows and the supply of dollars ________

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The determinants of the nominal exchange rate

- Start with the expression for the real exchange rate:
  $$\varepsilon = \frac{e \times P}{P^*}$$
- Solve for the nominal exchange rate:

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The determinants of the nominal exchange rate

- So $e$ depends on the real exchange rate and the price levels at home and abroad...
- ...and we know how each of them is determined:

  $$e = \varepsilon \times \frac{P^*}{P}$$

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The determinants of the nominal exchange rate

- Rewrite this equation in growth rates
  (recall “arithmetic tricks for working with % changes”)

- For a given value of $\varepsilon$, the growth rate of $e$ equals the difference between ____________________

The U.S. as a large open economy

- So far, we’ve learned long-run models for two extreme cases:
  - closed economy (chap. 3)
  - small open economy (chap. 5)
- A large open economy – like the U.S. – falls __________ these two extremes.
- The results from large open economy analysis are a __________ of the results for the closed & small open economy cases.
- For example…

Data: decade averages; all except r and ε are expressed as a percent of GDP; ε is a trade-weighted index.
A fiscal expansion in three models

A fiscal expansion causes national saving to fall. The effects of this depend on openness & size:

<table>
<thead>
<tr>
<th>closed economy</th>
<th>large open economy</th>
<th>small open economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>( r )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I )</td>
<td></td>
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<tr>
<td>( NX )</td>
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</tbody>
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Summary

1. Net exports—the difference between
   - exports and imports
   - a country’s output \( (Y) \) and its spending \( (C + I + G) \)

2. Net capital outflow equals
   - purchases of foreign assets minus foreign purchases of the country’s assets
   - the difference between saving and investment

3. National income accounts identities:
   - \( Y = C + I + G + NX \)
   - trade balance \( NX = S - I \) net capital outflow

Summary

4. Impact of policies on \( NX \):
   - \( NX \) increases if policy causes \( S \) to rise or \( I \) to fall
   - \( NX \) does not change if policy affects neither \( S \) nor \( I \). Example: trade policy

5. Exchange rates
   - nominal: the price of a country’s currency in terms of another country’s currency
   - real: the price of a country’s goods in terms of another country’s goods.
   - the real exchange rate equals the nominal rate times the ratio of prices of the two countries.

Summary

7. How the real exchange rate is determined
   - \( NX \) depends negatively on the real exchange rate, other things equal
   - The real exchange rate adjusts to equate \( NX \) with net capital outflow