

Introduction to Macroeconomics

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Outline

Introduction

National accounts

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The financial market

The IS-LM model

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Phillips curve, Okun's Law, and medium-run dynamics

The open economy

These slides follow the original slides of QUIJANO/QUIJANO that accompany the BLANCHARD textbook.

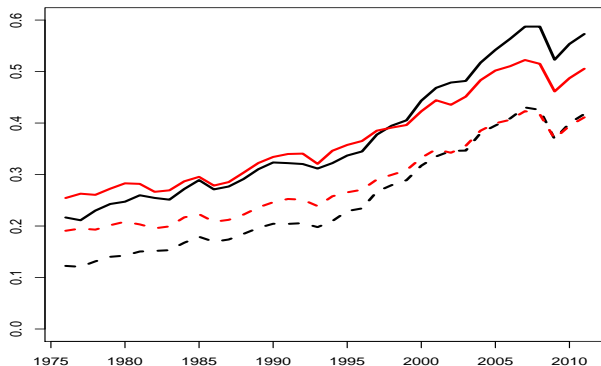
Three aspects of openness

The hitherto considered *closed* economy does not exist in the real world. Actual economies are open in three dimensions:

- ▶ **Openness in goods markets.** Most (not all) economists think that *free trade* is beneficial for all participants. Extant free-trade restrictions include **tariffs** and **quotas**.
- ▶ **Openness in financial markets.** **Capital controls** place restrictions on the ownership of foreign assets.
- ▶ **Openness in factor markets:** The ability of firms to choose where to locate production, and workers to choose where to work. The movement of production factors is globally strongly restricted. Regions (EU, NAFTA) aim at openness also in factor markets.

Here, we focus on openness in goods and financial markets.

Exports and imports as ratios of GDP



Austrian goods (dashed) and total (solid) exports (black) and imports (red) as ratios of GDP from 1976. Note that shares increase over time, except during the global crisis.

Openness in goods and services increases globally

In most countries, economies are getting more and more open, they trade much more than some decades ago.

Although imports and exports follow broadly the same upward trend, they often diverge for long periods of time, generating sustained trade surpluses and trade deficits.

A good index of openness is the proportion of aggregate output composed of **tradable goods**—or goods that compete with foreign goods in domestic or foreign markets. For example, estimates are that tradable goods represent around 60% of aggregate output in the United States today.

Export ratios in a cross-country comparison

Table: Ratios of exports to GDP for selected OECD countries, 2006

Country	Export ratio (%)	Country	Export ratio (%)
United States	11	Switzerland	54
Japan	18	Austria	62
United Kingdom	30	Netherlands	80
Germany	48	Belgium	92

The main factors behind differences in export ratios are geography and country size:

- ▶ Distance from other markets;
- ▶ Size also matters: The smaller the country, the more it must specialize in producing and exporting only a few products and rely on imports for other products.

No upper bound for export ratios

Q: Can exports exceed GDP?

A: Yes, and this is actually the case for some small countries. Countries can have export ratios larger than one, as exports and imports may include exports and imports of intermediate goods.

There is no known macroeconomic concept that determines a dynamic equilibrium value for export or import ratios. For the time being, these ratios continue to increase without any recognizable upper bound.

The choice between domestic and foreign goods

When goods markets are open, domestic households must decide not only how much to consume and save, but also whether to buy domestic or foreign consumer goods. Similarly, firms will decide whether to purchase domestic or foreign investment and intermediate goods.

Central to this choice between domestic and foreign goods is the price of domestic goods relative to foreign goods, or the **real exchange rate**.

In order to be able to consider real exchange rates, we must first define nominal exchange rates.

Nominal exchange rates

Nominal exchange rates between two currencies can be quoted in one of two ways:

- ▶ As the price of the domestic currency in terms of the foreign currency;
- ▶ As the price of the foreign currency in terms of the domestic currency.

The textbook by BLANCHARD adopts the first definition for E . Earlier issues use the second definition, which is slightly more immediate: the price of an asset (foreign currency) in domestic currency, like any other price. However, then depreciation corresponds to a higher exchange rate, which may confuse.

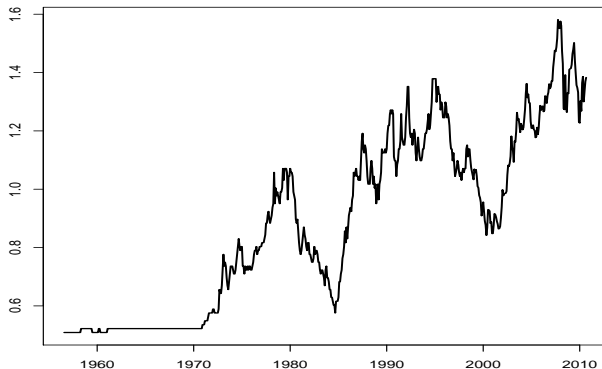
Appreciation and depreciation

Note that we have conformed that the nominal exchange rate is the price of the domestic currency in terms of foreign currency.

- ▶ An **appreciation** of the domestic currency is an increase in the price of the domestic currency in terms of the foreign currency, which corresponds to an increase in the exchange rate;
- ▶ A **depreciation** of the domestic currency is a decrease in the price of the domestic currency in terms of the foreign currency, or a decrease in the exchange rate.

The terms '**revaluation**' (instead of 'appreciation') and '**devaluation**' (instead of 'depreciation') apply for changes in the exchange rate implemented as an instrument of economic policy, usually in the presence of otherwise fixed exchange rates.

The dollar/euro exchange rate



The dollar price of one euro or (until 1998) of the equivalent in local Austrian currency.

Stylized facts of the exchange rate vis-a-vis U.S. dollars

Note the two main characteristics of 'our' E :

- ▶ *The trend increase in the exchange rate.* Put another way, there was an appreciation of the domestic currency vis-a-vis the dollar over the period. Following the fixed-rate regime of Bretton Woods, European currencies were appreciating, a development most recently interrupted by the uncertainty surrounding the introduction of the euro.
- ▶ *The large fluctuations in the exchange rate.* Movements of the exchange rate are not always easily explained and often are not grounded in the development of economic variables, such as budget deficits, trade deficits, purchasing power: the 'dance of the dollar'.

From nominal to real exchange rates

Suppose there are two countries: domestic economy and the rest-of-the-world. A doubling of E does not necessarily imply that domestic residents can buy the double amount of foreign goods. Prices P (domestic) and P^* (foreign) may also change.

The **real exchange rate** ε is defined by

$$\varepsilon = \frac{EP}{P^*},$$

the value of a unit of domestic goods measured in foreign goods.

Note:

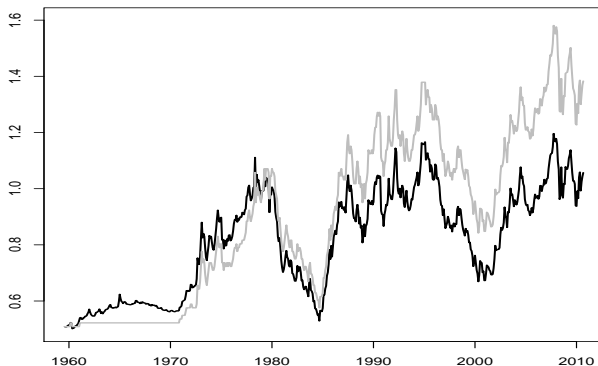
- ▶ E is the price of a domestic currency unit in foreign currency;
- ▶ P^*/E is the price of a foreign good unit in domestic currency;
- ▶ P is the price of a domestic good in domestic currency;
- ▶ ε is the ratio of P and P^*/E .

Real appreciation and depreciation

Like nominal exchange rates, real exchange rates move over time:

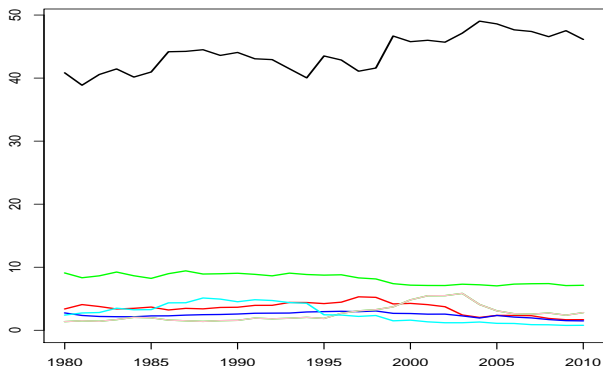
- ▶ An increase in the relative price of domestic goods in terms of foreign goods is called a **real appreciation**, which corresponds to an increase in the real exchange rate ε . It may be caused by a (nominal) appreciation or by P rising faster than P^* ;
- ▶ A decrease in the relative price of domestic goods in terms of foreign goods is called a **real depreciation**, which corresponds to a decrease in the real exchange rate ε . It may be caused by a (nominal) depreciation or by P rising less than P^* .

The real exchange rate versus the U.S. dollar



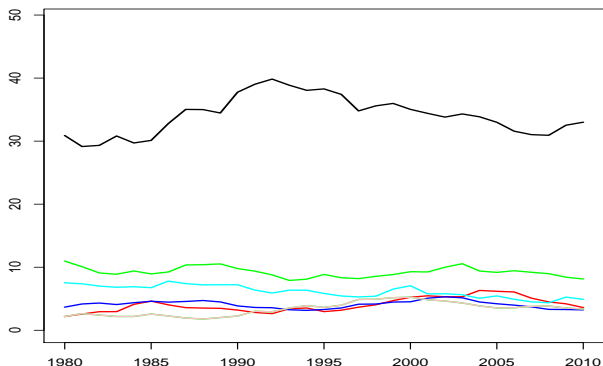
The real exchange rate has increased less than the nominal exchange rate.
 Around 1980, U.S. accumulated inflation has overtaken Austrian inflation.

Austrian import shares by country



Most imports come from Germany (black) and Italy (green). Other important countries of origin are USA (red), UK (blue), Hungary (pink), and Japan (cyan).

Austrian export shares by country



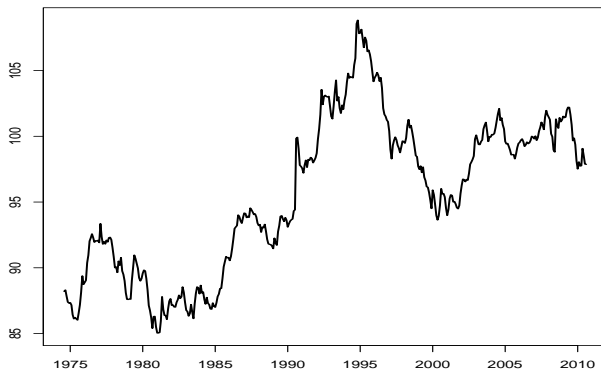
Most exports go to Germany (black) and to Italy (green). Other important target countries are USA (red), UK (blue), Hungary (pink), and Switzerland (cyan).

Multilateral exchange rates

Bilateral exchange rates are exchange rates between two countries. **Multilateral exchange rates** are exchange rates between several countries, particularly between one 'domestic economy' and several 'foreign' economies.

For example, to measure the average price of Austrian goods relative to the average price of goods of Austrian trading partners, we use the share of import and export trade with each country as the weight for that country, or the multilateral real exchange rate. This index is commonly called the **real effective exchange rate (REER)**.

The real effective exchange rate (REER) for Austria



The REER is usually interpreted as an index of purchasing power on the world market. For Austria, purchasing power was increasing for a long time but has levelled out recently.

Openness in financial markets

The purchase and sale of foreign assets implies buying or selling foreign currency—sometimes called **foreign exchange**.

Openness in financial markets allows:

- ▶ Financial investors to diversify—to hold both domestic and foreign assets and speculate on foreign interest rate movements.
- ▶ Countries to run trade surpluses and deficits. A country that buys more than it sells must pay for the difference by borrowing from the rest of the world ('Saving of the RoW').

Remember the balance of payments

The **Balance of Payments (BOP)** books all border-crossing transactions. It has two accounts, the **Current account** and the **Capital account**:

- ▶ The current account adds three separate balances: the **trade balance** for exports minus imports of goods and services; the **balance of primary incomes** for border-crossing profits and wages; the **balance of transfers** for border-crossing transfers;
- ▶ The capital account registers the transfer of ownership in domestic assets to foreigners and in foreign assets to residents.

Except for some short-run positions and some statistical discrepancy, the two balances are identical with opposite sign. A current account deficit corresponds to an increased ownership of domestic assets by foreigners.

The choice between domestic and foreign assets

The decision whether to purchase domestic or foreign assets (here, assume that these assets are bonds with interest rates i and i^*) depends not only on interest rate differences, but also on your expectation of what will happen to the nominal exchange rate:

- ▶ The value of a given amount x that is used to purchase domestic bonds in year t will be $x(1 + i_t)$ in year $t + 1$;
- ▶ Buying foreign bonds entails three steps:
 1. Exchanging x into xE_t foreign currency units;
 2. Waiting for this value to grow to $xE_t(1 + i_t^*)$ in year $t + 1$;
 3. Exchanging back to domestic currency at the unknown and expected exchange rate E_{t+1}^e , which yields the unknown amount $xE_t(1 + i_t^*)(1/E_{t+1}^e)$.

Uncovered interest parity

Domestic and foreign bonds must have identical expected yields, otherwise one option would not be used by rational agents: an arbitrage condition. For this reason,

$$1 + i_t = E_t(1 + i_t^*)(1/E_{t+1}^e) = (1 + i_t^*) \frac{E_t}{E_{t+1}^e}$$

must hold. This important relation is called the **uncovered interest parity (UIP)**.

The UIP ignores

- ▶ Transaction costs;
- ▶ Risk (expectations of exchange rates, default risk of bonds);
- ▶ So-called futures (covered interest parity).

The approximative form of UIP

The UIP formula can be re-arranged, such that it shows a relation between the domestic nominal interest rate, the foreign nominal interest rate, and the expected rate of appreciation of the domestic currency:

$$1 + i_t = \frac{1 + i_t^*}{1 + (E_{t+1}^e - E_t)/E_t}.$$

Viewing the denominator as the sum of a geometric series and discarding any higher-order terms of that series yields the approximation formula

$$i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t},$$

which is widely used.

UIP and expected appreciation or depreciation

Consider the approximative UIP

$$i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t}.$$

Arbitrage implies that the domestic interest rate must be (approximately) equal to the foreign interest rate plus the expected depreciation rate of the domestic currency. If a depreciation is expected, $i_t > i_t^*$ is needed to attract funds. If an appreciation is expected, $i_t < i_t^*$ suffices. In particular,

$$E_{t+1}^e = E_t \Rightarrow i_t = i_t^*.$$

The IS relation in an open economy

In the following, an extension of the IS model to the open economy is considered.

As a first step, we must be able to distinguish between the *domestic demand for goods* and the *demand for domestic goods*.

Some domestic demand falls on foreign goods, and some of the demand for domestic goods comes from foreigners.

The demand for domestic goods

In a closed economy, demand is given by

$$Z = C + I + G.$$

In an open economy, the **demand for domestic goods** is given by

$$Z = C + I + G - IM/\varepsilon + X,$$

where the first three terms—consumption C , investment I , and government spending G —constitute the **domestic demand for goods**. Note that there are two adjustments here:

- ▶ First, we must subtract imports (adjusted by $\frac{1}{\varepsilon}$ in order to be comparable to other aggregates);
- ▶ Second, we must add exports.

The determinants of C , I , and G

First consider domestic demand:

- ▶ Consumption C depends on disposable income $Y - T$, the exchange rate plays no role, though it will affect the composition of C . At higher ε , more consumer goods will be imported;
- ▶ Investment I depends on income Y and on the interest rate i , the exchange rate plays no role, though it will affect the composition of I . At higher ε , more investment goods will be imported;
- ▶ Government spending G is assumed exogenous. At higher ε , even the government may prefer imported goods.

The real exchange rate affects the composition of consumption and investment, but not the overall level of these aggregates.

The determinants of imports

Imports react to domestic income Y and to relative prices (real exchange rate ε):

$$IM = IM(Y, \varepsilon)$$

(+, +)

- ▶ An increase in domestic income Y leads to an increase in imports;
- ▶ An increase in the real exchange rate ε leads to an increase in imports IM , as imports become cheaper relative to domestically produced goods.

The determinants of exports

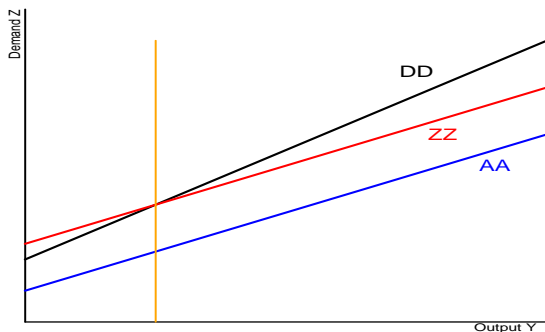
Exports react to foreign demand (foreign income Y^*) and to relative prices:

$$X = X(Y^*, \varepsilon)$$

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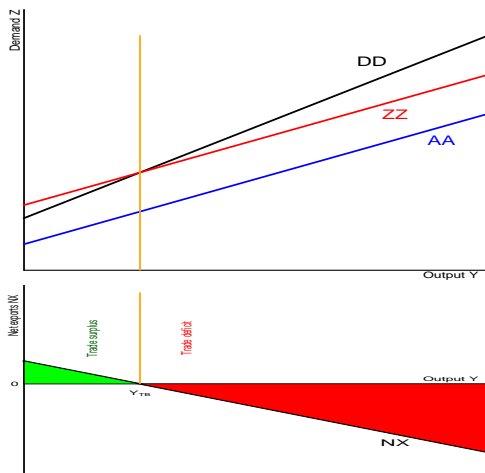
- ▶ An increase in foreign income Y^* leads to an increase in exports;
- ▶ An increase in the real exchange rate ε leads to a decrease in exports X , as exports become more expensive relative to foreign goods.

Demand in the open economy: a graph



The black DD curve shows domestic demand, which would be 'demand' in a closed economy. The blue AA curve is $C + I + G - \frac{1}{\epsilon}IM$, domestic demand for domestic goods. IM is the wedge between the AA and DD curves. The red ZZ curve is $C + I + G - \frac{1}{\epsilon}IM + X$, demand for domestic goods.

Trade surplus and deficit: graphs



A summary of the features

- ▶ AA is flatter than DD. As income increases, the domestic demand for domestic goods increases less than total domestic demand;
- ▶ As long as some of the additional demand falls on domestic goods, AA has a positive slope. ZZ has the same slope, as exports do not depend on domestic demand;
- ▶ $NX = X - \frac{1}{\epsilon}IM$ is a falling function of Y . For small demand, there is typically a trade surplus $NX > 0$. For large demand, there is a trade deficit $NX < 0$;
- ▶ Y_{TB} is the value of output that corresponds to a (zero) trade balance $NX = 0$.

Equilibrium in the open goods market

The goods market is in equilibrium when domestic output equals the demand—both domestic and foreign—for domestic goods:

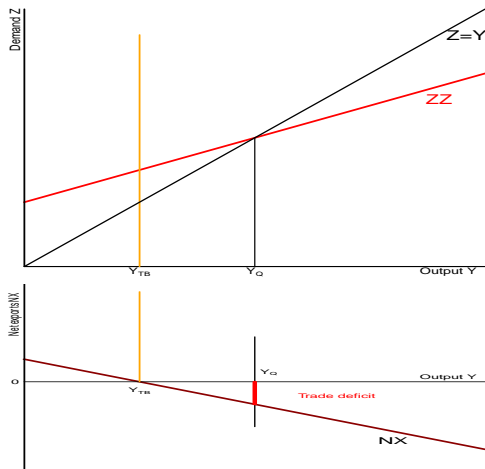
$$Z = Y$$

Collecting the relations we derived for the components of the demand for domestic goods Z , we get:

$$Y = c_0 + c_1(Y - T) + I(Y, i) + X(Y^*, \varepsilon) - \frac{1}{\varepsilon}IM(Y, \varepsilon)$$

The resulting equilibrium Y_Q need not correspond to Y_{TB} . If $Y_Q > Y_{TB}$, there will be a trade deficit. If $Y_Q < Y_{TB}$, there will be a trade surplus.

Trade deficit at equilibrium output: graphs

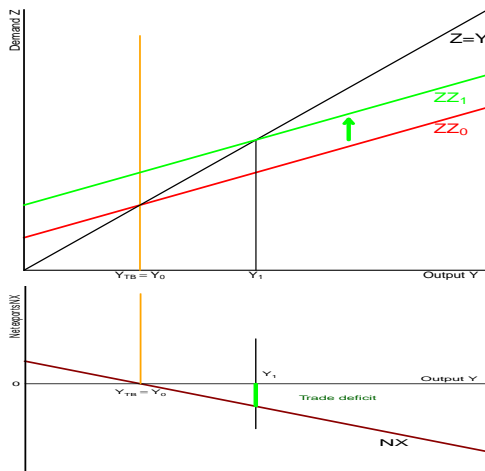


Two basic experiments in the open goods market

Consider two basic experiments in the open goods market, starting from a hypothetical situation where $Y_{TB} = Y_Q$:

- ▶ An increase in domestic demand, for example by a fiscal expansion of increasing G ;
- ▶ An increase in foreign demand, for example by a comparable foreign fiscal policy.

Trade deficit after fiscal expansion: graphs

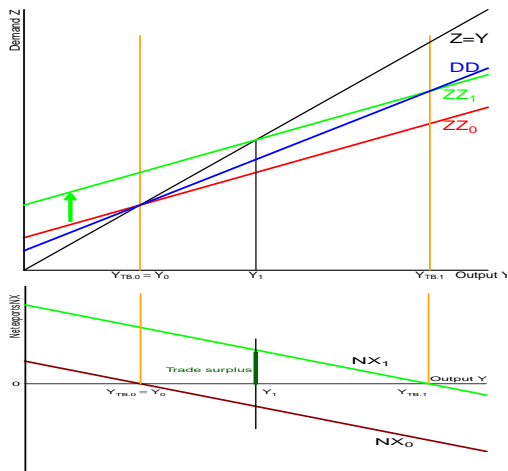


Fiscal expansion in an open economy: summary

There are important differences regarding the reaction to fiscal policy in open and closed economies:

- ▶ There is an effect on the trade balance: The increase in output from Y_0 to Y_1 leads to a trade deficit. Imports increase, and exports do not change;
- ▶ The effect of government spending on output is smaller than it would be in a closed economy. The (fiscal) multiplier is smaller in the open economy;
- ▶ A fiscal contraction improves the trade balance;
- ▶ An increase in autonomous consumption (higher c_0) has effects identical to a fiscal expansion: deterioration of trade balance.

Trade surplus after export boom: graphs



Increase in foreign demand: summary

The direct effect of an increase in foreign output is an increase in exports by some amount, which we shall denote by ΔX :

- ▶ For a given level of output, this increase in exports leads to an increase in the demand for domestic goods by ΔX , so the demand curve for domestic goods shifts up by ΔX from ZZ_0 to ZZ_1 ;
- ▶ While this reaction may be identical to a comparable fiscal expansion, the domestic demand curve (DD) does not budge. The zero trade balance point Y_{TB} at the intersection of DD and ZZ shifts right, such that $Y < Y_{TB}$ and a trade surplus results;
- ▶ For a given level of output, net exports go up by ΔX . So the line showing net exports as a function of output in the lower panel also shifts up by ΔX , from NX_0 to NX_1 .

Implications for fiscal policy

We have derived two basic results so far:

- ▶ An increase in domestic demand leads to an increase in domestic output, but leads also to a deterioration of the trade balance;
- ▶ An increase in foreign demand leads to an increase in domestic output and an improvement in the trade balance.

For this reason:

- ▶ Faced with widespread recession, countries have a strong incentive to wait for others to implement a fiscal stimulus;
- ▶ Countries have a strong incentive to promise to coordinate, and then not deliver on that promise.

What about exchange rate policy?

Assume countries are also able to change the real exchange rate

$$\varepsilon = \frac{EP}{P^*},$$

which affects exports and imports. They may be able to move the E part at least. Net exports are defined as

$$NX = X(Y^*, \varepsilon) - \frac{1}{\varepsilon} IM(Y, \varepsilon).$$

As the real exchange rate ε enters the right side of the equation in three places, a real depreciation affects the trade balance through three separate channels:

- ▶ Exports X increase;
- ▶ Imports IM decrease;
- ▶ The relative price of foreign goods in terms of domestic goods $1/\varepsilon$ increases.

The Marshall-Lerner condition

A depreciation has two 'good' effects (substitution of imports and more demand for exports) and one 'bad' effect (imports are more expensive). The **Marshall-Lerner condition** is the condition under which a real depreciation (a decrease in ε) leads to an increase in net exports.

The Marshall-Lerner condition usually holds for most developed economies (successful devaluations of Scandinavian currencies in the 1990s). A devaluation race is not feasible for the major currencies. In the short run, the 'bad' effect of expensive imports may dominate.

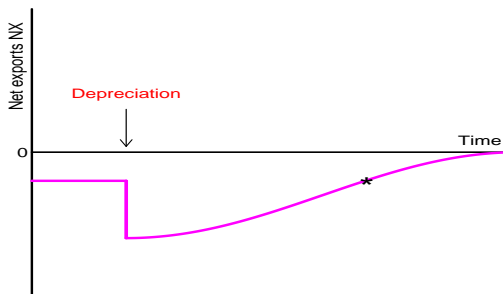
A suggested policy mix

To eliminate a trade deficit without changing output, the government must both achieve a *depreciation* and *decrease government spending*. In detail, it must do two things:

- ▶ It must achieve a depreciation sufficient to eliminate the trade deficit at the initial level of output. This alone would increase NX and hence Y ;
- ▶ The government must reduce government spending. This neutralizes the increase in Y .

The resulting equilibrium Y is identical, though with a different composition: less G and IM and more X . Households and firms have substituted imports by domestic goods.

Dynamic effects of a depreciation: graph



A real depreciation leads initially (until '*', two years?) to a deterioration and then to an improvement of the trade balance. The shape of the curve is reminiscent of the letter 'J'. The curve is called the J-curve.

The jay for the J-curve?



Saving and investment in an open economy

Also in an open economy, investment equals saving. Consider the basic identity:

$$Y = C + I + G + X - \frac{1}{\varepsilon}IM$$

Subtracting $C + T$ from this equation yields for household saving S_H :

$$S_H = Y - C - T = I + G - T + X - \frac{1}{\varepsilon}IM$$

or

$$NX = X - \frac{1}{\varepsilon}IM = S_H + (T - G) - I,$$

with $T - G$ representing government saving.

Some implications

Now consider the identity

$$NX = S_H + (T - G) - I.$$

From this equation above, we conclude:

- ▶ An increase in investment must be reflected in either an increase in private saving or public saving, or in a deterioration of the trade balance;
- ▶ An increase in the budget deficit must be reflected in an increase in either private saving, or a decrease in investment, or a deterioration of the trade balance;
- ▶ A country with a high saving rate must have either a high investment rate or a large trade surplus.

Note: even though the exchange rate ε does not show here, this does not mean that NX is independent of ε .