

In an open economy, monetary policy can affect the level of economic activity via trade flows. Higher interest rates cause the currency to appreciate, reducing net exports.

In a *closed economy*, we normally think that monetary policy works mainly by changing interest rates and credit conditions, which in turn affects the amount of investment spending by businesses and households. We can see this in the flowchart: The central bank raises interest rates; higher interest rates reduce investment; lower investment leads to lower GDP; and lower GDP leads to higher unemployment and lower inflation. (This is *contractionary* monetary policy; *expansionary* policy would be the opposite changes in each variable.) We could add further details, but in a closed economy the transmission mechanism of monetary policy looks essentially like this.

In an *open economy*, monetary policy has a second channel by which it can affect the level of economic activity.

a An important part of foreign investment is lending and borrowing across borders, including purchases of foreign bonds. Owners of financial assets prefer a higher return to a lower one, all else equal, so they will prefer to lend where interest rates are high. So a higher interest rate leads to an increase in net foreign investment

into our country. This includes both increased purchases of our assets by foreigners, and reduced purchases of foreign assets by domestic wealth owners.

- b* Purchases of our assets have to be made using our currency. So higher foreign investment increases the demand for our currency, which tends to raise its price. In other words, increased foreign investment will normally cause a *nominal appreciation* of our currency.
- c* An increase in the value of our currency relative to other currencies will, all else, cause our goods to become more expensive relative to foreign goods. In other words, when there is a nominal appreciation, there will tend to be a *real appreciation* as well.
- d* An increase in the price of our goods and services will lead people to purchase foreign substitutes instead. This is likely to lead to lower net exports, as our newly cheap exports fall and our newly cheap imports rise.
- e* Net exports are a component of GDP, so lower net exports will reduce GDP just as lower investment or lower government spending would. The fall in GDP may be greater or less than the fall in net exports, depending on the *multiplier*.

An increase in interest rates leads to a stronger currency, which lowers net exports (or equivalently, causes the trade balance to move toward deficit), reducing aggregate demand. So higher interest rates are contractionary by this channel as well; the two transmission mechanisms do not conflict, they reinforce each other.

The importance of the exchange-rate channel of monetary policy transmission depends on how easy it is to lend money and trade assets across borders; how large trade is relative to domestic production of goods and services; and how sensitive trade is to changes in the exchange rate.

How powerful the exchange-rate channel of monetary policy is in practice depends on several factors.

First, foreign investment flows must reliably respond to interest rate differentials. This requires, first of all, that there is a high degree of *capital mobility*, without prohibitive legal or institutional barriers to loans and asset sales across borders. But it also requires that investors be very quick to change their portfolios in response to interest rate differentials. And, it requires that factors outside the central bank's control don't move foreign investment and/or demand for the currency too much for it to counteract.

Second, trade flows must reliably respond to exchange rate changes. This may or may not be the case. Trade normally involves contracts that are signed long in advance of the delivery of the goods, and even in the absence of contractual commitments it takes time to find new suppliers for imported goods and new markets for exports. And there are not always good domestic substitutes for imported goods. Exporters may also be willing to accept lower profits rather than give up market share. As a result, the short-run response of trade to exchange rates may be quite small. Many economists believe that the trade balance follows a *J-curve* after a devaluation. Initially, net exports actually fall, since trade volumes have not changed much and imported goods are now more expensive. But eventually, perhaps after a year or two, people's buying patterns will change in response to the new prices and net exports will rise.

Finally, trade flows must be large relative to the economy. In the United States in the 1950s and 1960s, imports and exports made up less than 5 percent of GDP. In those conditions, the exchange-rate channel could not be an important part of the transmission mechanism for monetary policy even if it had a big effect on trade, because trade flows were just too small.

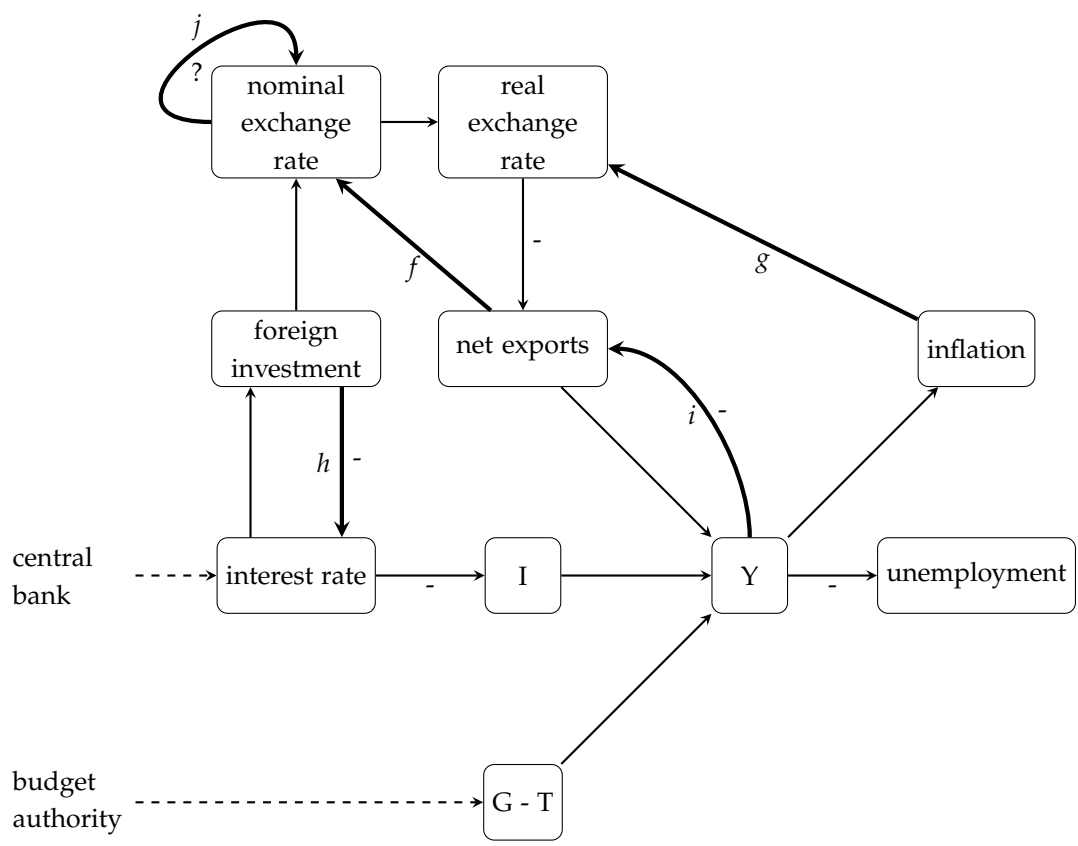
There are a number of feedback mechanisms in the open economy that can limit the effectiveness of macroeconomic policy.

The second flowchart adds five feedbacks, shown in bold.

The currency may appreciate in response to a trade surplus, and depreciate in response to a trade deficit. (f)

Purchases of our goods create demand for our currency, causing it to appreciate. Similarly, our purchases from foreigners reduce demand for our currency relative to theirs, causing ours to depreciate. So higher net exports should lead to appreciation, and lower net exports to depreciation. If this effect is strong enough, we should not see persistent trade imbalances; they will automatically correct themselves through the adjustment of nominal exchange rates.

When *floating exchange rates* were first widely adopted in the 1970s, many economists expected them to lead to balanced trade for this reason.



Higher inflation implies a real appreciation of a country's currency. (g)

Faster GDP growth is likely, all else equal, to cause prices to rise more quickly. A depressed economy is likely to experience low inflation or even *deflation*. This will affect the price of the country's goods relative to those produced elsewhere.

Both the response of prices to output, and the response of trade to prices, are quite slow. So this effect can only be important over long horizons – periods of several years or more.

If this effect is strong enough, it can help stabilize output and/or trade flows. In principle, as long as an economy remains depressed long enough, its prices will fall relative to its trade partners. Eventually, this fall in relative prices should boost net exports enough to bring the country back to full employment, without the need for any use of *expansionary policy*. This is sometimes described as an *internal devaluation*, in contrast to a normal devaluation that involves a change in the nominal exchange rate.

In the 18th century, David Hume described a similar mechanism to this in his *specie-flow mechanism*. (Specie is an old word for gold.)

Hume imagined that countries with trade surpluses would gain gold, causing their prices to rise, while countries with trade deficits would lose gold, causing their prices to fall. Eventually these relative price movements would always restore trade to balance, Hume argued, so there was no need for governments to concern themselves with the level of imports and exports.

Inflows of foreign investment reduce domestic interest rates. (h)

If this effect is strong enough, there will be a single "world interest rate," and it will be impossible for national central banks to move their individual countries' rates away from the world rate.

Former Fed Chairman Alan Greenspan has suggested that this is the situation faced by central banks today, even in the United States. But while foreign investment flows may limit the divergence of different countries' interest rates, it is clear there is still some space for it. For example, interest rates on governments bonds in the US are currently about two points higher than rates on similar bonds in Germany.

A fraction of every additional dollar is spent on imports. So faster GDP growth leads to lower net exports. (i)

In addition to relative prices, our imports depend on our income, while our exports depend on incomes in the rest of the world. That means that faster income growth here will tend to reduce net exports ($X-M$). The degree to which imports respond to changes in income is referred to as the *income elasticity* of imports. The degree to which imports and exports respond to changes in the real exchange rate is referred to as their *price elasticity*.

This relationship is the most important factor in short-run changes in trade flows, and it may be the dominant factor in the long run as well. While income elasticities of imports vary across countries, they seem quite stable for a given country. Differences in income growth seem to explain a large fraction of historical trade shifts.

Some economists combine this observation with the assumption that trade does not respond much to relative prices (either because price elasticities are low, or because real exchange rates do not change much), and the assumption that trade must be balanced in the long run (that is, countries cannot run trade deficits indefinitely). If this is the case, it follows that GDP must adjust to whatever level is consistent with balanced trade. This is the theory of *balance of payments constrained growth*, and it seems to explain a large part of the variation in economic growth across countries.

Fiscal policy is weaker in an open economy than in a closed one, because some stimulus leaks away as imports.

The same link from GDP to imports limits the effectiveness of fiscal policy in an open economy. Since some of each dollar spent goes abroad to pay for imports, less is left to circulate domestically and raise spending here. This means that the *multiplier* will normally be smaller in an economy with a large share of imports, and larger in an economy where the import share is high. This does not mean that stimulus (or austerity) has a lower total effect on GDP in an open economy, it just means that some of that effect shows up in the country's trade partners rather than in the country itself.

In the short run, foreign exchange markets are driven by expectations of future exchange rates. This may be either stabilizing or destabilizing, depending how exchange rates are formed. (j)

In the short run (over periods much less than a year, perhaps several years) exchange rates are determined almost entirely by *speculation* – investors trying to guess how exchange rates will change. That means that whether a currency appreciates or depreciates depends on whether speculators expect it to appreciate or depreciate in the future. This can be stabilizing, if investor expectations are *anchored* – that is, if they have a definite idea of the normal or usual level of exchange rates. In this case, if a currency becomes unusually strong, speculators are likely to expect a depreciation and will sell it, bringing its price back toward the normal level. But expectations can also be *extrapolative*, meaning that when investors see a change in value, they expect that change to go further. In this case, when a currency becomes unusually strong, speculators will expect it to appreciate further, and will buy it – which will ensure that it does in fact appreciate. Since speculators are mainly trying to guess what other speculators will do, many different beliefs about future exchange rates can be "self-confirming" – over short periods, exchange rates will just be at whatever level speculators expect them to be at.

The central role of speculation in foreign exchange markets means that, at least over periods less than a year or so, exchange rates do not respond reliably to any macroeconomic variables. Central banks that wish to control short-run movements in their exchange rates must be able to influence the expectations of market participants. In other words, they must have *credibility*. Over the longer run, interest rates, relative prices and trade flows do influence exchange rates, but it may take several years for these factors to overcome the "noise" of speculation.