Pierre Ly
course webpage: http://www.geocities.com/lypierrem
My office: D310
office hours: Room D318, Thursday: 2-3pm

Price levels and the exchange rate in the long run

Long run?

- In "Mundell Fleming" (lecture 2), we studied a model that describes output and the exchange rate in the short run, that is, with price levels FIXED.
- **"Long run"** means that **prices** of goods and services, and of the factors of production that build those goods and services, **adjust** to supply and demand conditions so that their markets and the money market all reflect full employment.
- Because prices are allowed to change, they will influence interest rates and exchange rates in the long run models.
- NB: Throughout this lecture, we assume a floating exchange rate regime (we'll have a lecture on fixed exchange rates at some point)

Law of one price

- The **law of one price** simply says that the same good in different competitive markets must sell for the same price, when transportation costs and barriers between markets are not important.
- Consider a pizza restaurant in Seattle and one across the border in Vancouver. The law of one price says that the price of the same pizza (**using a common currency to measure the price**) in the two cities must be the same if barriers between competitive markets and transportation costs are not important:
- $P = e\ P^*$

Purchasing Power Parity (PPP)

- **Purchasing power parity** is the application of the law of one price across countries for *all* goods and services, or for representative groups ("baskets") of goods and services.
- $P = e\ P^*$
- P: Price level of goods and services at home
- P*: " " " abroad
- Here, exchange rate e = domestic currency per unit of foreign currency
- Purchasing power parity says that each country's currency has the same purchasing power

PPP (2)

- PPP implies that $e = P/P^*$
- PPP says that each country's currency has the same purchasing power.
- Equivalently, PPP states that countries' price levels are equal when measured in the same currency.
- Ex: Say e (£/$) = 0.5. Then, if a coffee costs £2 in the UK, PPP implies that it costs $4 in the US.
- Remark: this is *absolute* PPP. You can also define *relative* PPP: between 2 period (t and t+1), changes in exchange rates equal changes in prices (inflation), that is
- $[e(t+1) - e(t)] / e(t) = \pi_{UK} - \pi_{US}$
- Where π_i = inflation rate from t to t+1 in country i.

The Monetary approach to exchange rates

- Uses monetary factors to predict how exchange rates adjust in the long run.
- It assumes absolute PPP: $P = e\ P^*$
- It assumes prices adjust immediately to their long run levels.
- In particular, price levels adjust to equate real (aggregate) money supply with real (aggregate) money demand. This implies:
- $M/P = L(r,Y)$ and $M^*/P^* = L(r^*,Y^*)$ where * indicates "foreign".

Monetary approach

- If PPP hold, and if prices adjust in the way mentioned above, we have the following prediction:
- The exchange rate is determined in the long run by prices, which are determined by the relative supply of money across countries and the relative real demand of money across countries.
- Formally: $P = M/L(r,Y)$; $P^* = M^*/L(r^*,Y^*)$; and $e=P/P^*$
- So that in the long run, $e = (M/M^*)[L(r^*,Y^*)/L(r,Y)]$
- (note that it is implicitly assumed that we are in a floating exchange rate regime)

Monetary approach

- It is then easy to study the effect on e of changes in money supply, interest rates, and output.
- All 3 changes affect money supply or money demand, thereby causing prices to adjust to maintain equilibrium in the money market, thereby causing exchange rates to adjust to maintain PPP.
- Also, a change in the growth rate of the money supply results in a change in the growth rate of prices (i.e. a change in inflation)
- Let's see how inflation affects nominal interest rates

The Fisher effect

- Describes the relationship between nominal interest rates and inflation.
- Start with interest parity condition: $R_{£} - R_{\$} = (e_E - e)/e$ (with e in £/dollar)
- If financial markets expect (relative) PPP to hold, then
- $(e_E - e)/e = \pi_{UK} - \pi_{US}$
- Thus, $R_{£} - R_{\$} = \pi_{UK} - \pi_{US}$
- The Fisher effect: a rise in the domestic inflation rate causes an equal rise in the interest rate on deposits of domestic currency in the long run, with other things held constant.

The Fisher effect (2)

- Suppose that the Bank of England (central bank) unexpectedly (so that e_E is unaffected) and permanently increases the growth rate of the money supply.
- This leads to a similar increase in inflation (growth rate of prices), to maintain equilibrium on the money market: P = M/L(r,Y). That is, P jumps.
- Then, the interest rate adjusts according to the Fisher effect to reflect this higher inflation rate.
- To maintain PPP (e=P/P*), e jumps as well. And the domestic currency depreciates at the same rate as the new growth rate of M and P.

Little Empirical support for PPP

- There is little empirical support for purchasing power parity: the prices of identical commodity baskets, when converted to a single currency, differ substantially across countries.
- All versions of the PPP theory do badly in explaining facts. In particular, changes in national price levels often tell us nothing about exchange rate movements.
- However, PPP is a key building block for other models of exchange rates, more realistic than the monetary approach. So it is important to understand it.

Beyond PPP:
A general model of long run exchange rates

- Recall: the real exchange rate is the relative value of good and services between 2 countries. Let's call it q. (in UK goods per unit of US good)
- Then, $q = e P^*/P$
- A real depreciation of the Pound is an increase in q (you need more UK goods per unit of US good).
- Recall: according to PPP, the nominal exchange rate is determined by the price ratio: $e=P/P^*$
- According to the more general real exchange rate approach, nominal exchange rates may also be influenced by the real exchange rate: $e = q P/P^*$

So what influences the real exchange rate?

- When the real exchange rate is high, UK goods are relatively cheaper, and relative demand for UK goods is high. So RD is increasing in q. (see graph)
- An *increase in the relative demand for UK products* (RD shifts right) causes P/P* to rise, which makes q fall . This is a *real appreciation* of the Pound.
- In the long run, the supply of goods and services in each country depends on factors of production and the technology, not exchange rates and prices (so relative supply curve RS is vertical)
- Similarly, an *increase in the relative supply of UK products* (caused by an increase in UK productivity) causes P/P* to fall, which makes q rise. This is a *real depreciation* of the Pound.

REAL EXCHANGE RATE (CONTINUED)

- Allowing the real exchange rate to change allows a more general approach to explaining exchange rates. Now, both monetary factors *and real* factors influence nominal exchange rates:
- Changes in M lead to price level changes
- Increase in growth rate of M lead to persistent inflation
- Increase in RD lead to real appreciation (q falls)
- Increase in RS leads to real depreciation (q rises).

What are the effects on the nominal exchange rate?

- $e = q \, P/P^*$
- When only monetary factors change and PPP holds, we have the same predictions as before. No changes in the real exchange rate ever occur.
- However, when factors influencing real output change, the real exchange rate changes:
- With changes in RD. the change in q determines the change in e.

Effects of changes in RS

- Increase in RS leads to real depreciation (q rises).
- But there are also more transactions in the UK (higher Y), which increases money demand in the UK, L(r,Y). But because of the equilibrium condition on the domestic money market, P = M/L(r,Y) , P falls relative to P*.
- The net effect on e = q P/P* is therefore ambiguous.

Conclusion

- When all economic changes are the result of monetary factors, nominal exchange rates will behave in accordance with (relative) PPP over the long run.
- When economic changes are the result of factors that affect real output, exchange rates will not follow relative PPP even in the long run: real exchange rate changes (which are deviations from PPP) will occur.
- Indeed: PPP says $e = p/P^*$. If it holds, $q = eP^*/P=1$, so it never changes. (it is normal that it equals 1 under PPP, since this is precisely what PPP means: The price of goods in the UK and in the US, when expressed in the same currency, are the same: so when PPP holds, it means you can exchange one unit of UK good for one unit of US good)