Master EPP, International Macroeconomics
Lecture 8
The international transmission mechanism: New Open Economy Macroeconomics

1 Exercise based on Corsetti and Pesenti (2005)

1. Think of a decrease in κ and explain briefly what it does to optimal labor and consumption.

Remember that consumption is: $C = Z\ell$ (Aggregate Supply equation) so that consumption is affected by a shock to the disutility of labor only if labor supply is affected. To find the natural rate of employment, suppose prices were flexible. Imperfectly competitive firms would then set prices by charging an optimal markup over their marginal costs: $P^{flex} = \frac{\theta}{\theta-1}\frac{W}{Z}$. With a perfectly competitive labor market, the equilibrium wage rate in units of consumption (W/P) is equal to the MRS between consumption and leisure of the representative agent: $W = \kappa PC = \kappa\mu$. Thus, the nominal wage decreases with a negative shock on κ. Putting these together, we obtain that:

$$\ell = \frac{\theta - 1}{\theta\kappa} = \bar{\ell}$$

so that the natural rate of employment increases when the disutility of labor decreases. Hence, consumption: $C = Z\frac{\theta-1}{\theta\kappa}$ also increases.

2. In the closed economy, and using the graphs, explain what happens in the case where prices are fully flexible. In the case where prices are fixed, explain why a labor gap opens relative to the optimal level desired by workers. What should monetary policy do to close the gap? Explain the intuition.

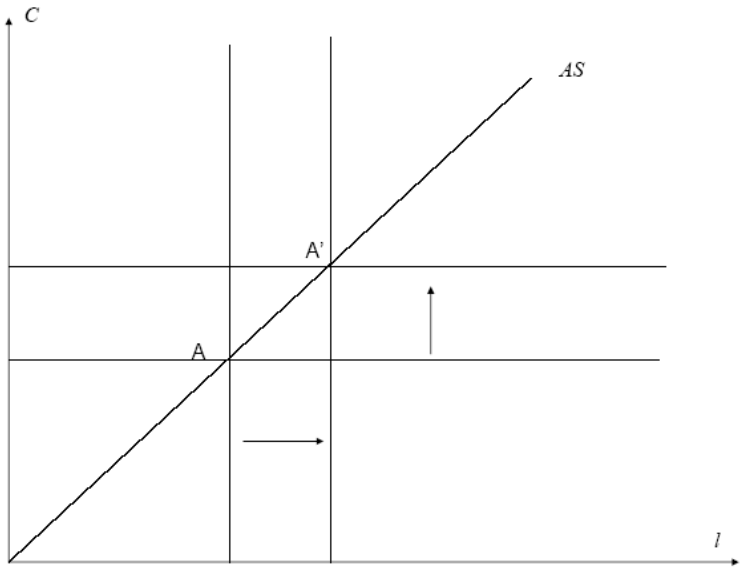
When prices are flexible the AD curve and the NR curve shift (see graph below). Intuitively, employment increases so that aggregate supply increases. Both nominal wages and prices fall so that aggregate demand increases. No output or employment gap is created.
If prices are not flexible, then firms preset prices by maximizing expected discounted profits. In our setting we have:

$$P = \frac{\theta}{\theta - 1} E\left\{\frac{W}{Z}\right\} = \frac{1}{Z}\frac{\theta}{\theta - 1} E\left\{\kappa\mu\right\}$$

as productivity is constant and uncertainty comes from the κ shock. In this case, the AD curve does not shift up because prices are fixed. Employment is below the desired level by workers. The NR curve shifts as in the graph but the AD curve does not.
Monetary policy can mimic the fall in prices that is optimal in this situation by an expansionary policy (μ increases) that leads to an increase in demand and employment. Note that nominal wages fall in one case and stay constant in the other case. Monetary stance that brings employment and output to their natural rates is expansionary when the economy experiences a shock that opens a negative employment and output gap.

3. In the open economy, show graphically and explain what happens in both countries when prices are flexible. What happens to the terms of trade? What is the transmission mechanism?
The (Home) 'AD' schedule is associated to: $\mu = PC$. Nominal spending on consumption is equally divided between H and F goods, $P_H C_H = \frac{1}{2}PC$. Hence, relative to the closed economy case, the domestic price level is an equally weighted index of domestic and import prices $P = 2P_H^{1/2}P_F^{1/2}$. For

Figure 1: Long-run impact of the κ shock



this reason, nominal price rigidities do not necessarily rule out endogenous fluctuations in the consumer price indexes P, which may reflect imported inflation.
The nominal exchange rate: $\mathcal{E} = \mu/\mu^*$ only depends on the relative monetary stance as a direct consequence of the assumption of complete markets. With full risk-sharing, the ratio of the marginal utilities of Home and Foreign consumption in any state of nature must be proportional to the relative price of consumption (i.e. the real exchange rate):

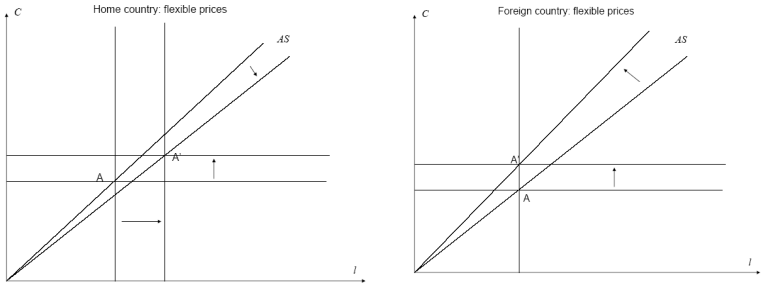
$$\frac{\partial U/\partial C}{\partial U^*/\partial C^*} = \frac{P}{P^*\mathcal{E}}$$

Given the specification of utility (log consumption), the previous expression can be written as: $\frac{C^*}{C} = \frac{P}{P^*\mathcal{E}}$, so that, accounting for the 'AD' equations, $\mathcal{E} = \mu/\mu^*$.
The aggregate supply curve is different from the closed-economy, since it now translates the supply of domestic goods into the consumption of both domestic and imported goods. Namely, the 'AS' curve becomes:

$$\begin{aligned}
& C_H + C_H^* = Z\ell \\
\Leftrightarrow \quad & \frac{1}{2}\frac{PC}{P_H} + \frac{1}{2}\frac{P^*C^*}{P_H^*} = Z\ell \\
\Leftrightarrow \quad & \frac{PC}{2}\left[\frac{1}{P_H} + \frac{1}{P_H^*}\frac{P^*C^*}{PC}\right] = Z\ell \\
\Leftrightarrow \quad & C = Z\ell\left\{\frac{P}{2}\left[\frac{1}{P_H} + \frac{1}{P_H^*\mathcal{E}}\right]\right\}^{-1} \\
\Leftrightarrow \quad & C = Z\ell\tau
\end{aligned}$$

Intuitively, it takes $1/\tau$ units of Home output to buy one unit of the Home consumption basket C (a symmetric definition applies to the Foreign economy). τ is a negative function of the terms of

Figure 2: Long-run impact of the κ shock, Open economy



trade between the two countries, defined as the price of imports in terms of the price of exports, or $P_F/(\mathcal{E}P_H^*)$. In an open-economy context the 'AS' can tilt downward either because of exogenous shocks, or because of endogenous relative price movements depreciating the domestic terms of trade. The natural rate of employment is the same as in the closed economy. Without nominal rigidities, firms charge an optimal fixed markup over marginal costs. We now have four equations determining the four (flexible) prices:

$$P_H^{flex} = \mathcal{E}\ P_H^{*\ flex} = \frac{\theta\kappa}{\theta - 1}\frac{\mu}{Z}$$
$$P_F^{*\ flex} = \frac{P_F^{flex}}{\mathcal{E}} = \frac{\theta\kappa}{\theta - 1}\frac{\mu^*}{Z^*}$$

With linear technologies and constant-elasticity demand functions, there is no incentive for a firm to price-discriminate across markets. The natural rate can be easily calculated using these expressions together with the 'AD' and 'AS' equations. Note: with complete markets, we do not need an equation for the current account.

The κ shock in the flexible price situation means a fall in Home wages and therefore Home prices. However, this means that terms of trade deteriorate in the Home economy. The supply of Home goods increases due to the increase in employment. Hence (see graph below), the Home country works more and consumes more. The Foreign country enjoys higher consumption due to the improvement in the terms of trade.

4. Suppose prices are sticky under producer currency pricing.

a) What happens to the transmission mechanism in the case of the κ negative shock? Show this graphically and explain.

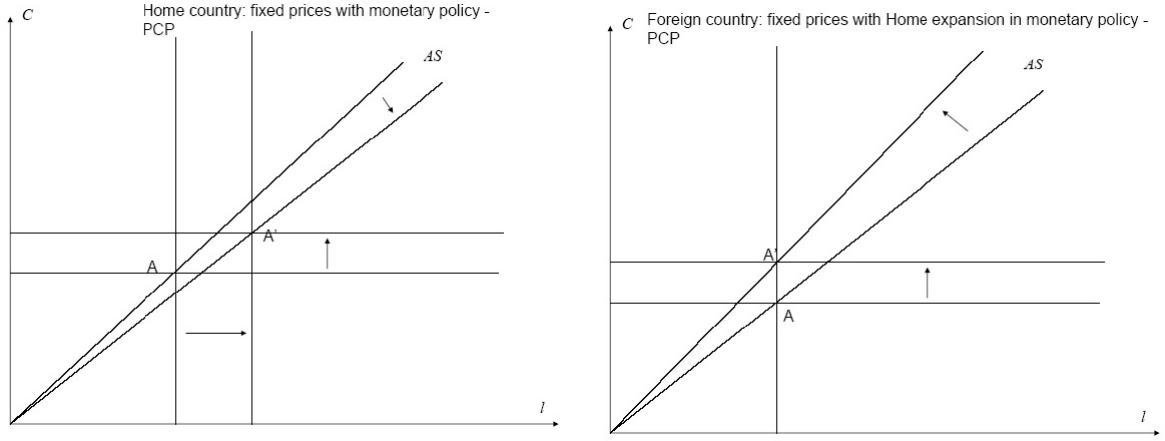
b) What should monetary policy do in this case to shift employment to its desired level? What happens in the foreign country? Show this graphically and explain.

Firms preset prices in their own currency and let prices abroad move one-to-one with the exchange rate. With PCP, firms optimally set:

$$P_H = \mathcal{E}P_H^* = \frac{1}{Z}\frac{\theta}{\theta - 1}E\left(\mu\kappa\right)$$
$$P_F^* = \frac{P_F}{\mathcal{E}} = \frac{1}{Z^*}\frac{\theta}{\theta - 1}E\left(\kappa^*\mu^*\right)$$

There is one-to-one pass-through of exchange rate movements onto the price of imports, at both the border and the consumer-price level. Hence, once measured in the same currency, goods prices are

Figure 3: Impact of the κ shock with monetary policy, Fixed prices, PCP

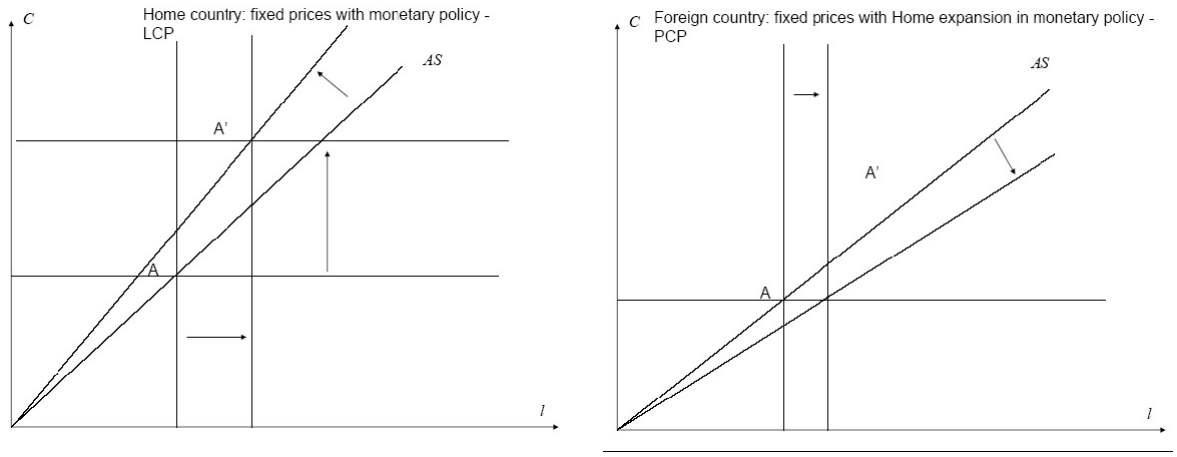


identical in all markets: the law of one price holds. The terms of trade $P_F/(\mathcal{E}P_H^*)$ is equal to $P_F^*\mathcal{E}/P_H$. Since P_H and P_F^* are preset, the Home terms of trade worsens with a nominal depreciation of the Home currency (i.e. a higher $\mathcal{E}$). When the Home currency weakens, Home goods are cheaper relative to Foreign goods in both the Home and the Foreign country. As demand shifts in favor of the goods with the lowest relative price, world consumption of Home goods increases relative to consumption of Foreign goods. These are referred to as "expenditure switching effects" of exchange rate movements. Independently of which pricing specification is selected, expected employment is always equal to its natural rate, exactly as in the closed economy. As a straightforward implications of the equations presented above, we will have: $E(\ell) = E(\ell^*) = \frac{\theta-1}{\theta\kappa}$ for any specification of export prices.
What happens when κ decreases in the PCP case? Given that prices and productivity are fixed, aggregate demand is not affected but, as in the closed economy, a production and employment gap opens in the Home country. Nothing happens in the Foreign economy. Hence, the graph of the closed economy is basically valid here.
To compensate for the labor gap, the monetary policy needs to expand aggregate demand and should therefore increase μ. This monetary policy has two effects: it increases Home aggregate demand (shift of the AD curve). This allows to increase employment and close the employment gap at Home. It also depreciates the nominal exchange rate as $\mathcal{E} = \mu/\mu^*$ due to the complete markets assumption. This tends to deteriorate the terms of trade in the Home country so that the open economy AS curve shifts right. This means that part of the expansion in the labor supply benefits the Foreign country through lower consumer prices as prices are rigid in the producer currency. Hence, the Foreign open economy AS curve shifts left and Foreign consumption increases whereas employment is not affected. Moreover, the exchange rate depreciation creates imported inflation in the Home market, which mitigates the aggregate demand increase.

5. Answer the same question in the case of local currency pricing.

Firms preset a price in domestic currency for the domestic market, and a price in foreign currency for

Figure 4: Impact of the κ shock with monetary policy, Fixed prices, LCP



the export markets. With LCP firms optimally set:

$$P_H = \frac{1}{Z}\frac{\theta}{\theta-1}E\left(\kappa\mu\right)$$
$$P_H^* = \frac{1}{Z}\frac{\theta}{\theta-1}E\left(\frac{\kappa\mu}{\mathcal{E}}\right)$$
$$P_F^* = \frac{1}{Z^*}\frac{\theta}{\theta-1}E\left(\kappa^*\mu^*\right)$$
$$P_F = \frac{1}{Z^*}\frac{\theta}{\theta-1}E\left(\mathcal{E}\kappa^*\mu^*\right)$$

Exchange rate pass-through on import prices is zero at both the border- and the consumer-price level. The law of one price is violated anytime the exchange rate fluctuates unexpectedly. With P_H^* and P_F predetermined and therefore fixed in the short run, a nominal depreciation of the Home currency improves the Home terms of trade $P_F/(\mathcal{E}P_H^*)$. Correspondingly, the Foreign terms of trade worsens. The effects of currency movements on the terms of trade go in the opposite direction relative to the PCP case. Since prices are preset in local currency, exchange rate fluctuations do not affect the relative price faced by importers and consumers. There is no "expenditure switching effect" of exchange rate movements.

With LCP, without monetary policy given that prices are fixed and exchange rates only respond to monetary policy the answer is the same as in 4) a). The effect of a Home monetary expansion on Home aggregate demand is stronger given that prices are fixed in the consumer's currency. This means in particular, that there is no imported inflation. Also, the depreciation that follows the monetary expansion means an increase in Home terms of trade (a deterioration of Foreign terms of trade) as the value of exports in Home currency are now higher. There is however no expenditure switching effect with LCP. Hence, at Home the AS shifts left and consumption increases both because employment rises and because of the terms of trade improvement. Abroad, consumer prices do no change but the terms of trade improvement means a rightward shift of the AS curve so that employment increases for a given consumption level. The international transmission is negative.