Lecture 8: The international transmission mechanism: New Open Economy Macroeconomics

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Exercise based on Corsetti & Pesenti

Hypotheses

- Two-country microfounded general-equilibrium model,
- In each country, the size of population is normalized to unity.
- Households' preferences:

$$U = \ln C - \kappa \ell$$

- Aggregate consumption in a closed-economy:

$$C = \left[\int_0^n C(h)^{\frac{\theta-1}{\theta}} dh \right]^{\frac{\theta}{\theta-1}}$$

- Aggregate consumption in open-economy: $C = C_H^{0.5} C_F^{0.5}$ where C_H and C_F are Dixit-Stiglitz aggregators of the n and $1-n$ varieties produced in the Home and Foreign countries respectively.
- Assets markets are complete $\Rightarrow$ 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:

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

Hypotheses (2)

- Firms are monopolistic supplier of one variety of the consumption good.
- Labor is the only input in production.
- Perfectly competitive labor market.
- Short-run nominal price rigidities: firms preset their price at the beginning of the period, either in their own currency or in the currency of the final consumer. Once prices are set, firms stand ready to meet current demand at this price during the period.
- In the open-economy case, the domestic price level is defined by: $P = 2P_H^{1/2}P_F^{1/2} \Rightarrow$ Nominal price rigidities do not necessarily rule out endogenous fluctuations in the consumer price indexes P, which may reflect imported inflation.

General equilibrium

- Aggregate demand schedule: equalizes nominal spending to the money supply

$$PC = \mu$$

- Aggregate supply schedule: relates output to total employment
  - In a closed economy: $C = Z\ell$ where Z denotes labor productivity
  - In open economy:

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

    It takes $1/\tau$ units of Home output to buy one unit of the Home consumption basket C. τ is a negative function of the terms of trade (price of imports in terms of the price of exports $P_F/(\mathcal{E}P_H^*)$)

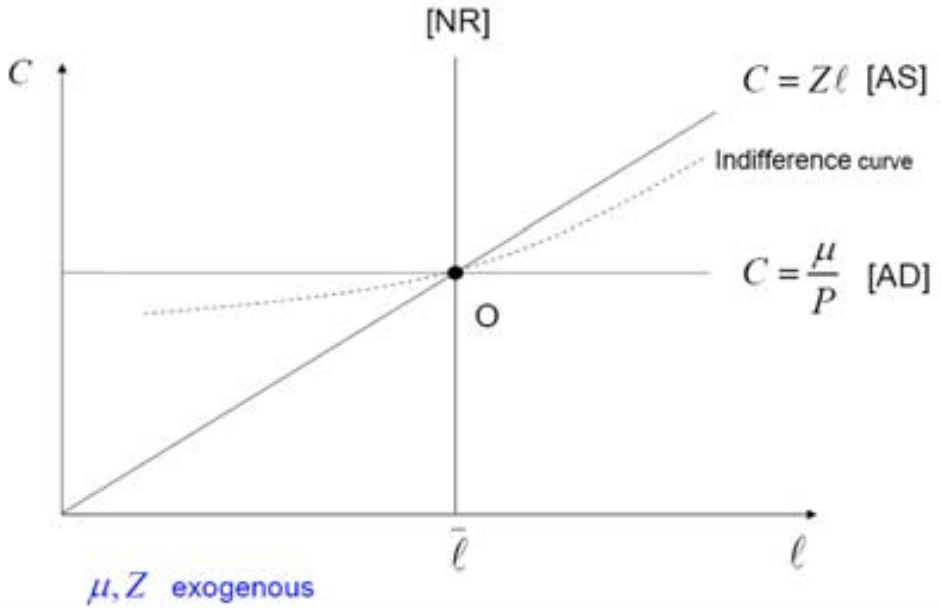
- Natural Rate schedule: employment under flexible prices

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

General equilibrium in a closed economy

Figure 1

Equilibrium in closed economy



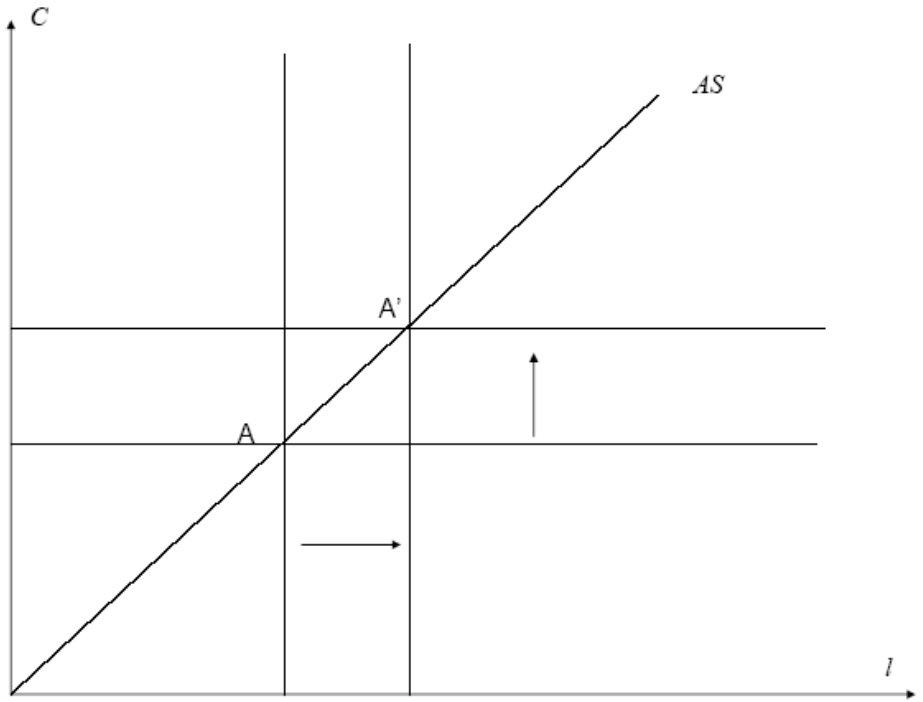
Shock to the disutility of labor in closed economy

- Suppose there are shocks to the disutility of labor (κ).
- Consumption ($C = Z\ell$) is affected by the shock only if labor supply is affected.
- **Under flexible prices**, imperfectly competitive firms set prices: $P^{flex} = \frac{\theta}{\theta-1}\frac{W}{Z}$. With a perfectly competitive labor market, the equilibrium wage rate in units of consumption is equal to the MRS between consumption and leisure of the representative agent: $W = \kappa PC = \kappa\mu \Rightarrow$ the nominal wage decreases with a negative shock on κ and the natural rate of employment increases $\Rightarrow$ Consumption: $C = Z\frac{\theta-1}{\theta\kappa}$ also increases.
- Graphically, the AD curve and the NR curve shift.

$\Rightarrow$ 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.

Shock to the disutility of labor in closed economy (2)

Figure: Long-run impact of the κ shock



Shock to the disutility of labor in closed economy (3)

- **In the short-run**, firms preset prices by maximizing expected discounted profits:

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

$\Rightarrow$ The AD curve does not shift up because prices are fixed and aggregate demand is pinned down by monetary policy $\Rightarrow$ 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 optimal fall in prices by an expansionary policy (μ increases) that leads to an increase in demand and employment.

Shock to the disutility of labor in open economy

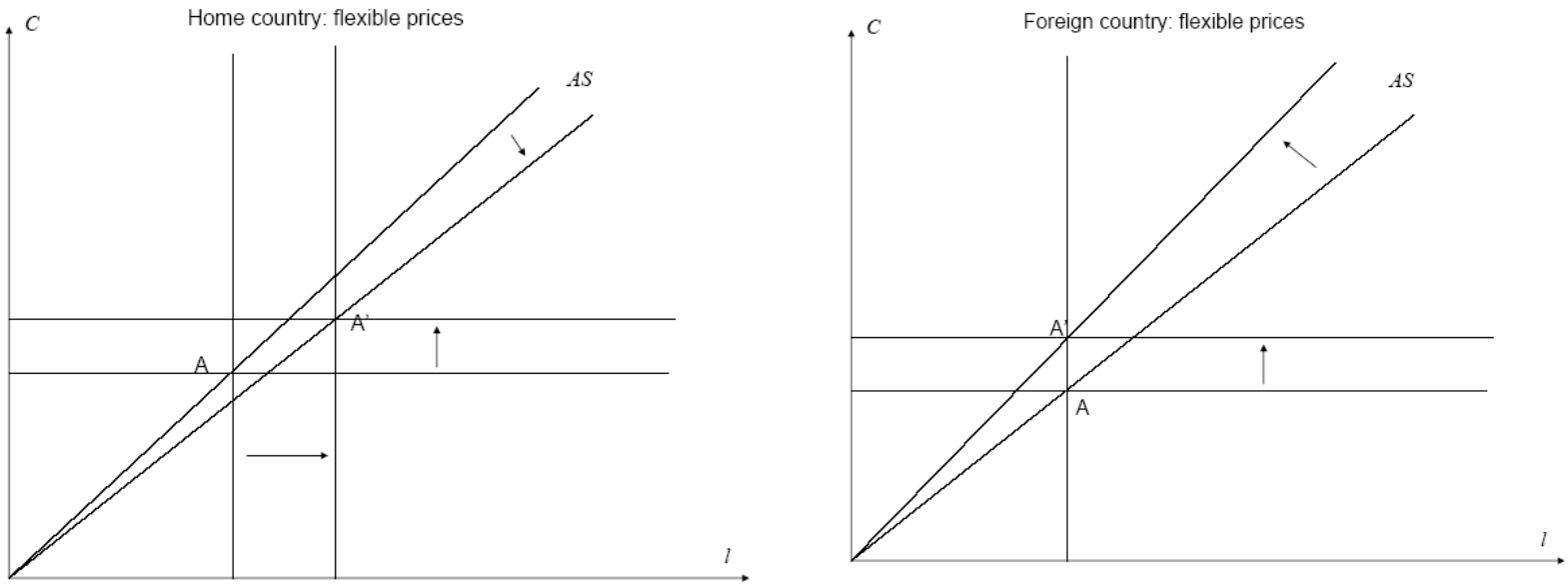
- The κ shock in the **flexible price situation** means a fall in Home wages and therefore Home prices $\Rightarrow$ Terms of trade deteriorate in the Home economy

$\Rightarrow$ The supply of Home goods increases due to the increase in employment. The Home country works more and consumes more.

$\Rightarrow$ The Foreign country enjoys higher consumption due to the improvement in the terms of trade.

Shock to the disutility of labor in open economy (2)

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



Shock to the disutility of labor under PCP

- Firms preset prices in their own currency $\Rightarrow$ Complete pass-through:

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

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

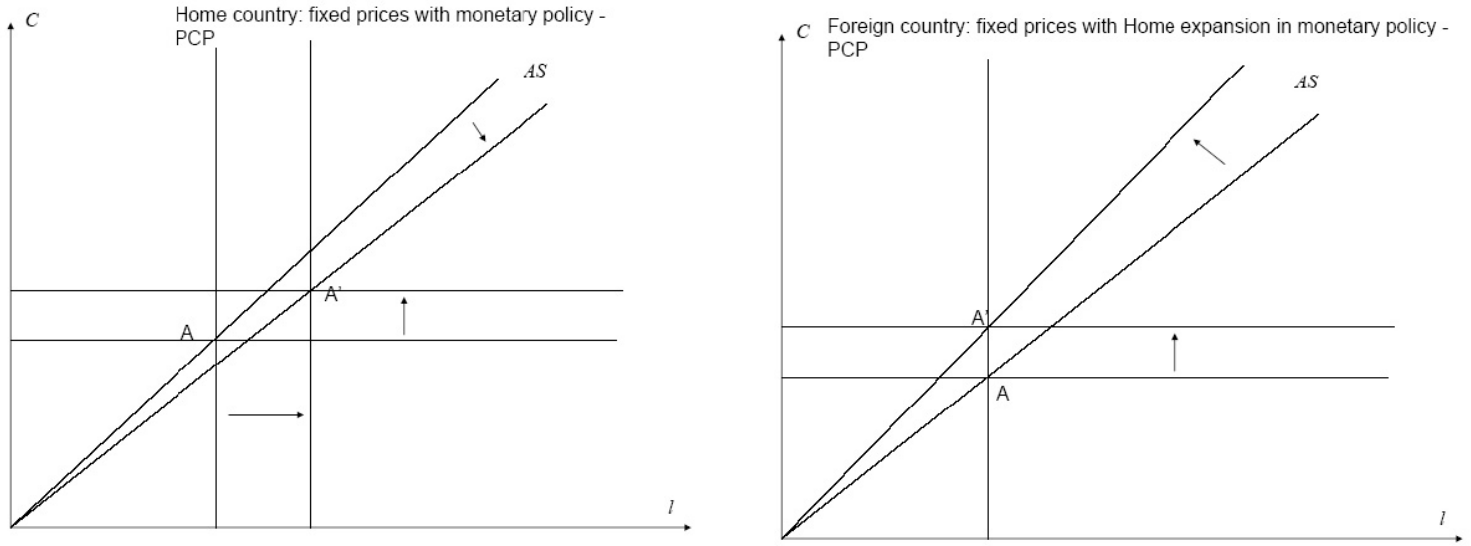
- Since P_H and P_F^* are preset, the Home terms of trade worsens with a nominal depreciation of the Home currency (i.e. a higher $\mathcal{E}$)$\Rightarrow$ World consumption of Home goods increases relative to consumption of Foreign goods ("expenditure switching effects")
- Following the κ shock, given 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.

Shock to the disutility of labor under PCP (2)

- To compensate for the labor gap, the monetary policy needs to expand aggregate demand and should therefore increase μ.
- The monetary policy has two effects:
  - increases Home aggregate demand (shift of the AD curve) and close the employment gap at Home.
  - depreciates the nominal exchange rate as $\mathcal{E} = \mu/\mu^*$ due to the complete markets assumption $\Rightarrow$ ToTs deterioration $\Rightarrow$ The open economy AS curve shifts right and the AS* curve shifts left $\Rightarrow$ part of the expansion in the labor supply benefits the Foreign country through lower consumer prices $\Rightarrow$ Foreign consumption increases whereas employment is not affected.
    $\Rightarrow$ The exchange rate depreciation creates imported inflation in the Home market, which mitigates the aggregate demand increase.

Shock to the disutility of labor under PCP (3)

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



Shock to the disutility of labor under LCP

- Firms preset prices in the final consumer's currency $\Rightarrow$ No pass-through:

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

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

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

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

- Since P_H^* and P_F are preset, the Home terms of trade $P_F/(\mathcal{E}P_H^*)$ improves with a nominal depreciation of the Home currency (i.e. a higher $\mathcal{E}$) But no "expenditure switching effects"
- Following the κ shock, 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.

Shock to the disutility of labor under LCP (2)

- To compensate for the labor gap, the monetary policy needs to expand aggregate demand and should therefore increase μ.
- The monetary policy has two effects:
  - increases Home aggregate demand (shift of the AD curve) and close the employment gap at Home.
  - depreciates the nominal exchange rate as $\mathcal{E} = \mu/\mu^*$ due to the complete markets assumption $\Rightarrow$ ToTs improvement but expenditure switching effect $\Rightarrow$ The open economy AS curve shifts left and the AS* curve shifts right $\Rightarrow$ Negative international transmission

Shock to the disutility of labor under LCP (3)

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