Optimal Currency Areas

$$E(m^K_t - m^R_{t})^2 = \frac{1}{2}\sigma^2 (1 - r_{KR})$$

The Euro

- The Euro is an example of a currency union.
- The nations abandoned independent monetary authority to get a common currency.

The Problem

- Suppose the city of Kent had its own currency (Kent $, or $\text{K}$) and its own monetary authority.
- The exchange rate against other currencies (such as Ravenna dollars, $\text{R}$, floats)

The Proposal

- Should the cities of Kent and Ravenna merge their currencies and create a common currency, $\text{KR}$?
- If they do, there will be a single monetary authority which will determine the optimal monetary policy for the Kent-Ravenna economy.
Advantages

- A single currency will mean lower transactions costs in so many ways.
- Persons in Ravenna can trade in Kent without having to worry about exchange fluctuations and without having to exchange $K$ for $R$.
  - And vice versa.

Advantages

- Investors in the Kent-Ravenna can invest with reduced worries about exchange rate fluctuations.
- Or alternatively: projects in Kent and Ravenna can attract out of area investment without having to guarantee investors against exchange rate fluctuations.

Disadvantages

- Right now the Kent monetary authority sets the rate of monetary expansion $m^K$ at $m^K_t$, the optimal rate for Kent.
- Ditto, in Ravenna where $m^K = m^K_R$.
- A single monetary authority will set

$$m^{KR}_t = \frac{1}{2} (m^K_t + m^R_t)$$

The Loss

$$m^{KR}_t = \frac{1}{2} (m^K_t + m^R_t)$$
$$m^K_t - m^{KR}_t = \frac{1}{2} (m^K_t - m^R_t)$$
$$\left( m^K_t - m^{KR}_t \right)^2 = \frac{1}{4} (m^K_t - m^R_t)^2$$
Some Analysis

- The optimal monetary policy at time $t$ is

$$m^K_t = m^K_* + \varepsilon^K_t$$

Some Analysis

$$m^K_t = m^K_* + \varepsilon^K_t$$
$$\varepsilon^K_t \sim N(0, \sigma^K_K)$$

Some Analysis

- The optimal monetary policy at time $t$ is

$$m^R_t = m^R_* + \varepsilon^R_t$$

Some Analysis

$$m^R_t = m^R_* + \varepsilon^R_t$$
$$\varepsilon^R_t \sim N(0, \sigma^R_R)$$

The Loss

$$\left( m^K_t - m^R_t \right)^2 = \frac{1}{4} \left( m^K_* - m^R_* + \varepsilon^K_t - \varepsilon^R_t \right)^2$$

Assume $m^K_* = m^R_*$. Assume $\sigma^2_K = \sigma^2_R$.

$$\left( m^K_t - m^R_t \right)^2 = \frac{1}{4} \left( m^K_* - m^R_* + \varepsilon^K_t - \varepsilon^R_t \right)^2$$
The Loss

\[ E \left( m_t^K - m_t^{KR} \right)^2 = \]
\[ \frac{1}{4} \left( \sigma_k^2 + \sigma_R^2 - 2 \text{cov}(\varepsilon_{K_t}, \varepsilon_{R_t}) \right) = \]
\[ \frac{1}{2} \sigma_k^2 (1 - r_{KR}) \]

The Loss

\[ r_{KR} = 1, \text{ no cost from merging} \]
\[ \frac{1}{4} \left( \sigma_k^2 + \sigma_R^2 - 2 \text{cov}(\varepsilon_{K_t}, \varepsilon_{R_t}) \right) = \]
\[ \frac{1}{2} \sigma_k^2 (1 - r_{KR}) \]

The Loss

\[ r_{KR} = 0, \text{ a cost from merging} \]
\[ \frac{1}{4} \left( \sigma_k^2 + \sigma_R^2 - 2 \text{cov}(\varepsilon_{K_t}, \varepsilon_{R_t}) \right) = \]
\[ \frac{1}{2} \sigma_k^2 (1 - r_{KR}) \]

The Theorem

- There are gains in lower transactions costs.
- But, if the two economies are independent, there will be a loss from having a monetary authority that is focused on the local area.
- The magnitude of the loss depends on the degree of independence

West Backwater

- West Backwater wants to join either the US dollar or the Euro.
- Gains in transactions costs but what about deviations from monetary policy?
- WB citizens do not vote in American elections and will get no say in FOMC.
West Backwater

- Do they do more trading with EMU or with US?
  - If US, use dollar.
  - If EMU use Euro.

The United Kingdom

- The UK does more trading with the EMU than with the US.
- Thus if they want to join, they should EMU but not use US $.
- Unlike West Backwater, they can get a seat on the board of the European Central Bank.

Canada

- If they want to join, they should use US $.
- But it seems unlikely that we would give Canada a seat on the FOMC.
- And they may be large enough that there are no gains in transactions costs.

Ecuador

- No hope of a seat on FOMC.
- But no one had confidence in domestic monetary policy.

End