EC933-G-AU – Lecture 3

2 November 2005

Macroeconomic Theories of Balance of Payments Adjustment: Stock and Stock-Flow Approaches

Alexander Mihailov

University of Essex

Plan of talk

- **introduction**
1. the monetary approach to BoP (peg)
2. the monetary approach to NER (float) ⇔ **the *monetary* model**
3. the portfolio approach to BoP (peg)
4. the portfolio approach to NER (float) ⇔ **the *portfolio balance* model**
5. types of *stock-flow* approaches to BoP/NER adjustment
- **wrap-up**

Aim and learning outcomes

- **aim:** understand and interpret the *stock(-flow)* approaches to BoP adjustment
- **learning outcomes**
  - distinguish the *stock* approaches from the *flow* approaches already studied
  - (derive and) interpret
    - the automatic (Humean) price-specie-flow mechanism of BoP adjustment
    - the monetary approach to BoP (under peg) and to NER (under float)
    - the portfolio approach to BoP (under peg) and to NER (under float)
  - analyse the policy implications of the *monetary model* and of the *portfolio balance model*, under peg vs float
  - summarise the major types of *stock-flow* approaches to BoP/NER

Classical price-specie-flow mechanism

- *classical* theory of BoP (that is, CA or TB) adjustment builds on Hume (1752): **automatic *price-specie-flow* mechanism**
- if BoP (CA or TB) **surplus**, $TB > 0$
  - *inflow* of specie (= gold = money, under the **gold standard**)
  - QTM valid, hence price level ↑
  - relative price of exports from surplus country ↑ => demand for exports by nonresidents ↓
  - relative price of imports to surplus country ↓ => demand for imports by residents ↑
  - initial BoP (trade) surplus tends to ↓ => **equilibrium restored:** $TB = 0$
- if BoP (CA or TB) **deficit**, $TB < 0$: *inverse* causation applies
- **origins** of the *monetary approach to BoP* can be traced back here

Monetary approach: assumptions

1. **LOP** in *goods* market (*individual* level) **=> PPP** (*aggregate* level)
2. **UIP** in *asset* (bond) market
3. ***flexible* prices**: *not fixed*, as in the *flow* approaches to BoP we studied earlier
4. focus on conditions for ***stock* equilibrium** in *money* market
5. **stable** *money demand* function
6. production at the level of ***full* employment** => real income *fixed*
7. **SOE**

Monetary approach to BoP: set-up

1. (credible) **peg** => *money supply* is **endogenous**(ly determined)

$$m_t^s \equiv (1-\theta)d_t + \theta r_t \quad \theta \equiv \frac{E[IR_t]}{E[MB_t]} \quad \mu \equiv \frac{E[MS_t]}{E[MB_t]} \quad MS_t \equiv \mu MB_t \equiv \mu(DC_t + IR_t)$$

2. *money demand* arises from transactions motive

$$m_t^d - p_t = \phi y_t - \lambda \iota_t + \epsilon_t \qquad 0 < \phi < 1 \qquad \lambda > 0 \qquad \epsilon_t \overset{iid}{\sim} (0, \sigma_\epsilon^2)$$

3. PPP: *goods market* equilibrium

$$p_t = \overline{s} + p_t^*$$

4. UIP with *static* expectations (since *peg*): *capital market* equilibrium

$\iota_t = \iota_t^* \qquad E_t[S_{t+1}] = S_t = \overline{S} = const$ for any t (hence $\ln \frac{E_t[S_{t+1}]}{S_t} = \ln 1 = 0$)

5. *money market* **equilibrium** $(1-\theta)d_t + \theta r_t = \underbrace{p_t}_{=\overline{s}+p_t^*} + \phi y_t - \lambda \underbrace{\iota_t}_{=\iota_t^*} + \epsilon_t$

Monetary approach to BoP: key result

$$\theta r_t = \underbrace{\overline{s} + p_t^* + \phi y_t - \lambda \imath_t^* + \epsilon_t}_{=m_t^d} - (1-\theta) d_t$$

- it is clear from key equation above that **if** SOE experiences any of
  - positive income growth
  - declining interest rates
  - rising prices

  demand for nominal money balances **will grow**
  - if it is not satisfied by an accommodating increase of domestic credit, the public will obtain the additional money it desires to hold by running a(n overall) BoP *surplus*, i.e. an *increase* in international reserves
  - if it is more than satisfied by central bank domestic credit expansion that exceeds it, the public will eliminate the excess supply of money (it does not wish to hold) by spending or investing it abroad and thus running a(n overall) BoP *deficit*, i.e. a *decrease* in international reserves
- hence, *money supply* in the monetary model under **peg** is **endogenous**, that is, determined by the above equation

Monetary approach to NER: set-up

1. **float** => also called the monetary model (of NER) => *money supply* **exogenous**(ly chosen), to equilibrate money markets in *H* and *F*:

$$\underbrace{m_t - p_t}_{\text{supply of real balances in } H} = \underbrace{\phi y_t - \lambda \iota_t}_{\text{demand for real balances in } H} \qquad \underbrace{m_t^* - p_t^*}_{\text{supply of real balances in } F} = \underbrace{\phi y_t^* - \lambda \iota_t^*}_{\text{demand for real balances in } F}$$

2. PPP: *goods market* equilibrium $s_t = p_t - p_t^*$
3. usual UIP: *capital market* equilibrium $\iota_t - \iota_t^* = E_t[s_{t+1}] - s_t$
4. definition of NER **fundamentals** $f_t \equiv (m_t - m_t^*) - \phi(y_t - y_t^*)$
5. substituting (in PPP) and solving

$$s_t = \underbrace{\frac{1}{1+\lambda}}_{\equiv\gamma} f_t + \underbrace{\frac{\lambda}{1+\lambda}}_{\equiv\psi=\lambda\gamma} E_t[s_{t+1}]$$

Monetary approach to NER: key result

- **general** forward-looking (RE) solution

$$s_t = \gamma \sum_{j=0}^{k} \psi^j E_t[f_{t+j}] + \psi^{k+1} E_t[s_{t+k+1}]$$

- **no-bubbles** solution (TVC)

$$0 < \psi \equiv \tfrac{\lambda}{1+\lambda} < 1 \qquad \lim_{k\to\infty} \psi^k E_t[s_{t+k}] = 0 \qquad s_t = \gamma \sum_{j=0}^{k} \psi^j E_t[f_{t+j}]$$

- **rational bubbles**

$$b_t = \tfrac{1}{\psi} b_{t-1} + \xi_t \qquad \xi_t \overset{iid}{\sim} N(0, \sigma_\xi^2) \qquad \widehat{s}_t = s_t + b_t$$

$$\lim_{k\to\infty} \psi^k E_t[\widehat{s}_{t+k}] = \underbrace{\lim_{k\to\infty} \psi^k E_t[s_{t+k}]}_{=0} + \underbrace{\lim_{k\to\infty} \psi^k E_t[b_{t+k}]}_{=b_t} = b_t \neq 0$$

- **interpretation:** monetary model is a useful first approximation in providing intuition about NER dynamics (asset price); RER?

Portfolio approach to BoP: summary

- focus on *stock adjustment* of **assets other than money**, under **peg**
- 3 **assets** available: domestic money and bonds and foreign bonds
- **demand** for assets $$1 \equiv \frac{M^d}{\mathcal{W}} + \frac{B^d}{\mathcal{W}} + \frac{B^{*d}}{\mathcal{W}}$$
- **supply** for assets set (exogenously) to equal demand

$$M^s = h(\imath, \imath^*, y)\mathcal{W}, \qquad B^s = g(\imath, \imath^*, y)\mathcal{W}, \qquad B^{*s} = f(\imath, \imath^*, y)\mathcal{W}$$

- **Walras law** in terms of the **sum** of *excess* supply/demand

$$[M^s - h(\imath, \imath^*, y)\mathcal{W}] + [B^s - g(\imath, \imath^*, y)\mathcal{W}] + [B^{*s} - f(\imath, \imath^*, y)\mathcal{W}] = 0$$

- 3 **endogenous** variables: domestic interest rate, stock of foreign bonds and stock of national money held by residents
- 4 **exogenous** variables: stock of domestic bonds, real income, foreign interest rate and wealth
- **graphical interpretation:** figures 13.1 and 13.2, Gandolfo (2001)

Portfolio approach to NER: summary

- **float** => also called the **portfolio balance model** (of NER)
- *simplest* version, following Frankel (1983), with *only 2* **bonds**
- with *perfect substitutability*, UIP holds
- but with **imperfect substitutability** there is a *divergence* between ι and $\iota^* + \frac{E[\Delta S]}{S}$, which determines allocation of wealth
- **wealth allocation** constraint $\mathcal{W} \equiv B^d + SB^{*d}$
- with **demand for** domestic and foreign **bonds**

$$B^d = g\left(\iota - \iota^* - \frac{E[\Delta S]}{S}\right)\mathcal{W} \qquad SB^{*d} = f\left(\iota - \iota^* - \frac{E[\Delta S]}{S}\right)\mathcal{W}$$

- imposing **equilibrium** b/n *supply* and *demand* in both bond markets and *dividing* the equilibrium conditions => NER as relative price of two assets (bonds) $S = \frac{B^d}{B^{*d}}\varphi\left(\iota - \iota^* - \frac{E[\Delta S]}{S}\right)$

Stock-flow approaches to BoP/NER: types

- asset stock adjustment in **partial equilibrium**
  - under *peg*
    - our preceding analysis of the portfolio approach under peg gives the flavour of such models
  - under *float*
    - Branson and Henderson (1985) chapter is a widely-cited reference
- portfolio *and* macroeconomic **general equilibrium**
  - under *peg*
    - O'Connel (1984) article
    - its summary in Gandolfo's (2001) textbook, section 13.3
  - under *float*
    - Branson and Buiter (1983) chapter
    - its summary in Gandolfo's (2001) textbook, section 13.4

Concluding wrap-up

- **What have we learnt?**
  - distinguish b/n the *stock* (and *stock-flow*) approaches to BoP/NER in the present lecture and the *flow* approaches to BoP/NER in the previous one
  - derive and interpret the *monetary* approach and the *portfolio* approach under both peg and float
  - summarise and compare the policy implications of *stock* adjustment models vs *flow* adjustment models considered
- **Where we go next**: to modelling the dynamics of the current account within the *intertemporal* approach to it