Currency Crisis in the Two-Period General Equilibrium Model

Initial state of the fixed ex. rate regime and policy experiment

- Assume a fixed exchange rate
- Take as given the solutions for the general equilibrium of the two-period small open economy with money
- Assume at that initial solution the fixed exchange rate was sustainable
- The government steps in and attempts a fiscal stimulus in period 1 (via a tax cut)

Fiscal policy & gov. budget constraints

- Intertemporal government budget constraint:

$$\bar{G}_1 + \frac{\bar{G}_2}{1+r} = \left[TC_1 + \frac{TC_2}{1+r} + \frac{i_1}{1+i_1} m_1 + \frac{m_2}{1+r} \right] + T_1 + \frac{T_2}{1+r} + (1+r)R_0$$

- Fiscal policy: "wealth neutral" tax cut:

$$\downarrow T_1,\ \uparrow T_2 \quad such\ that\ T_1 + \frac{T_2}{1+r} = z\ is\ \ fixed\ \ at\ \ amount\ \ z$$

  – In principle, nothing should change (Ricardian Eq.)

- Date 1 gov. budget constraint:

$$\bar{G}_1 + R_1 = \left[TC_1 + m_1 \right] + T_1 + (1+r)R_0$$

$$R_1 = \left[TC_1 + m_1 \right] + \left(T_1 - G_1 \right) + (1+r)R_0$$

  – If money demand and consumption in fact don't change, this equation tells us how much reserves fall

Sustainable v. unsustainable peg

- Given the minimum level of reserves at which the currency peg collapses, then there is a critical size of the tax cut given by:

$$R_1^{\min} = \left[T\hat{C}_1 + \hat{m}_1\right] + T_1^{crit} - \overline{G}_1 + (1+r)R_0$$

  - For any $T_1 \geq T_1^{crit}$ the currency peg is sustainable, because reserves can fall to finance the tax cut without going below the minimum (Ricardian equivalence holds)
  - For any $T_1 < T_1^{crit}$ the currency peg is unsustainable, because financing the deficit would require leaving reserves lower than the minimum

Equilibrium if the currency collapses

- Rewrite previous solutions for consumption and money demand at date 1 as functions of *i*:

(5.2) $$c_1(i_1) = \frac{1+\delta}{1+\delta+H(i_1)}\left[W_1^{NF} - \left(\bar{G}_1 + \frac{\bar{G}_2}{1+r}\right) + (1+r)R_0\right]$$

(6.1) $$m_1(i_1) = c_1(i_1)\left(\frac{i_1}{1+i_1}\right)^{-\frac{1}{1+\gamma}}\left(\frac{1}{\gamma b}\right)^{-\frac{1}{1+\gamma}}$$

  – Recall $\partial H(i_1)/\partial i_1 > 0$, so consumption falls when the interest rate rises.

  – Money demand responds now to two interest rate effects: higher opp. cost (direct) and lower scale of transactions (indirect, due to lower consumption)

Financing the deficit after the collapse

- Consider the date 1 gov. budget constraint, now "spelling out" the transactions costs term and taking into account that reserves are at the min.:

$$\bar{G}_1 + R_1^{\min} = \left[c_1(i_1)\left(bV_1(i_1)^{\gamma} \right) + m_1(i_1) \right] + T_1 + (1+r)R_0$$

$$\bar{G}_1 - T_1 = \left[c_1(i_1)\left(bV_1(i_1)^{\gamma} \right) + m_1(i_1) \right] + (1+r)R_0 - R_1^{\min}$$

$$\bar{G}_1 - T_1 = \left[V_1(i_1)m_1(i_1)\left(bV_1(i_1)^{\gamma} \right) + m_1(i_1) \right] + (1+r)R_0 - R_1^{\min}$$

$$\bar{G}_1 - T_1 = \left[m_1(i_1)\left(bV_1(i_1)^{1+\gamma} + 1 \right) \right] + (1+r)R_0 - R_1^{\min}$$

  – The left-hand-side is the primary deficit. The right-hand-side are the financing sources, of which the term in "[.]" represents the revenue from inflation tax (which follows a Laffer curve)

Equilibrium interest rate

- Now solve for the interest rate that finances the deficit (i.e. that solves gov. budget const.)

$$\bar{G}_1 - T_1 = \left[m_1(i_1)\left(bV_1(i_1)^{1+\gamma} + 1\right) \right] + (1+r)R_0 - R_1^{\min}$$

  - Since the peg was unsustainable, it must be that the new interest rate satisfies $i_1 > i^* = r$
  - Nonlinear equation with two roots (intersections between Laffer curve and deficit net of reserves)
  - Assume gov. chooses interest rate in the efficient (upward sloping) side of the Laffer curve
  - Given the interest rate we also have:

$$\varepsilon_1 = i_1 - i^* = i_1 - r > 0, \qquad \pi = \pi^* + \varepsilon_1 = \varepsilon_1 > 0$$

Summary effects of the currency crash

- Date-1 effects of the collapse of the currency:

$$\uparrow i_1 \quad to \quad i_1 > i^* = r$$

$$\uparrow \varepsilon_1 \quad to \quad \varepsilon_1 > 0$$

$$\uparrow \pi_1 \quad to \quad \pi_1 > \pi^* = 0$$

$$\downarrow c_1 \quad to \quad c_1(i_1) < c_1(r)$$

$$\downarrow m_1 \quad to \quad m_1(i_1) < m_1(r)$$

$$\downarrow R_1 \quad to \quad R_1^{\min} < R_1(r)$$

$$\uparrow S_1 = \overline{Q}_1 - c_1 \quad to \quad S_1(i_1) > S_1(r)$$

$$\uparrow CA_1 = S_1 - \overline{I}_1 \quad to \quad CA_1(i_1) > CA_1(r)$$

By analogy, we get the effects of a temporary peg

- Suppose we started from high inflation an introduce a peg that will last only one period

$$\downarrow i_1 \quad to \quad i_1 = i^* = r < i_1^{old}$$

$$\downarrow \varepsilon_1 \quad to \quad \varepsilon_1 = 0$$

$$\downarrow \pi_1 \quad to \quad \pi_1 = \pi^* = 0$$

$$\uparrow c_1 \quad to \quad c_1(i_1^{old}) < c_1(r)$$

$$\uparrow m_1 \quad to \quad m_1(i_1^{old}) < m_1(r)$$

$$\uparrow R_1 \quad to \quad R_1(i_1^{old}) < R_1(r)$$

$$\downarrow S_1 = \bar{Q}_1 - c_1 \quad to \quad S_1(i_1^{old}) > S_1(r)$$

$$\downarrow CA_1 = S_1 - \bar{I}_1 \quad to \quad CA_1(i_1^{old}) > CA_1(r)$$