# Final Exam "International Monetary Economics II"

March 1, 2012

## Question 1 (35%)

Consider a two-period model of a small open economy without investment. At the beginning of the first period, the economy is burdened with a foreign debt of $D_0 = 45$ (inherited from the past). First-period GDP is $Y_1 = 124$, second-period GDP is $Y_2 = 144$. The economy faces an exogenous interest rate on the world capital market which is constant at *20%* throughout the two periods. The foreign debt must be fully paid back by the end of period 2. Representative households choose consumption in each time period $C_i$ *(i = 1, 2)* so as to maximize utility $U = \ln C_1 + 0{,}9 \cdot \ln C_2$ while observing their intertemporal budget constraint.

a) Determine the intertemporal budget constraint of the economy.

b) Determine the intertemporal Euler equation of the economy.

c) How does the economy pay back its foreign debt over the two periods, and what does this imply for net exports and the current account balance in each period?

## Question 2 (30%)

The simplest variant of the monetary model of exchange rate determination is based on just two equations (all variables are logs, notation as usual):

$$m_t - p_t = -\eta E_t\{p_{t+1} - p_t\}$$

$$p_t = e_t + p_t^*$$

a) Explain the theoretical content of the two equations

b) Explain why expected future fundamentals affect the current exchange rate in this model.

c) Compare and explain the differing exchange rate responses
   ca) to a permanent increase in the money supply;
   cb) to a temporary increase in the money supply (increase in $t_0$, reset in $T > t_0$)
   cc) to a permanent increase in the rate of growth of the money supply.
   *(Draw a diagram in which you sketch the different scenarios for the money supply and the exchange rate against the time axis; no formal derivation required here).*

## Question 3 (10%)

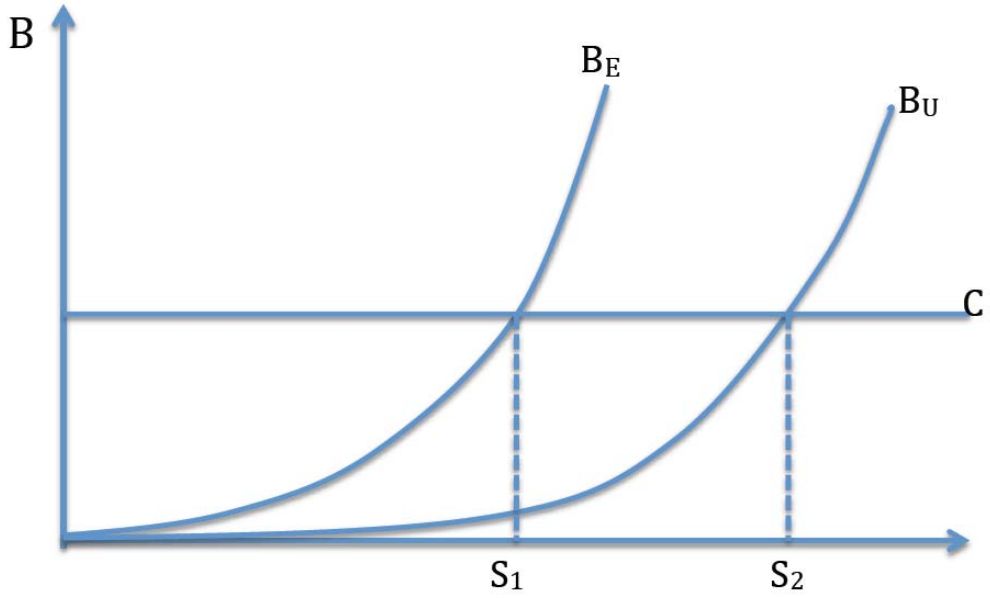
When Prime Minister Margaret Thatcher deliberated whether or not to take the U.K. into the European Monetary System, her adviser Sir Alan Walters counselled against. His key argument became known as the "Walters Critique". What was his point and in which way did it later become relevant to the working of the European Monetary Union?

## Question 4 (25%)

In the lecture, the graph below (by Paul De Grauwe) was used to explain the fragility of a government's solvency.

a) What is the meaning of B, $B_E$, $B_U$, C, and S, and what is the point made by the diagram?

b) How does the solvency issue differ between countries inside and outside the eurozone?



# Final Exam *International Monetary Economics II*

March 1, 2012

*Outline of solution*

## Question 1

**a)** Budget constraint:

$C_2 = Y_2 - (1+r)\cdot D_1$ where $D_1 = (1+r)\cdot D_0 - (Y_1 - C_1)$

$\Rightarrow\ C_2 = Y_2 - (1+r)^2 \cdot D_0 + (1+r)\cdot (Y_1 - C_1)$

Or in terms of present values:

$$C_1 + \frac{C_2}{(1+r)} = Y_1 + \frac{Y_2}{(1+r)} - (1+r)D_0$$

Disposable income is reduced, due to the obligation to repay the inherited debt.

**b)** Euler Equation:

*i) Trade-off between $C_1$ and $C_2$ in the budget constraint:*

$$\frac{dC_1}{dC_2} = -(1+r)$$

*ii) Marginal rate of substitution:*

$$dU = \frac{1}{C_1}dC_1 + \frac{0{,}9}{C_2}\cdot dC_2 = 0\ \Rightarrow\ \left.\frac{dC_2}{dC_1}\right|_{\bar{U}} = -\frac{C_2}{0{,}9\cdot C_1}$$

Optimality condition (Euler Equation): $\frac{C_2}{C_1} = 0{,}9\cdot(1+r)$

**c)** Initial debt: $D_0 = 45$

Solving for consumption (Euler equation in budget constraint):

$$C_1 + 0{,}9\cdot C_1 = Y_1 + \frac{Y_2}{(1+r)} - (1+r)D_0 = 124 + 120 - 54 = 190$$

$\Rightarrow\ C_1 = 100,\ C_2 = 108$

Net exports:

$NX_1 = Y_1 - C_1 = 24$

$NX_2 = Y_2 - C_2 = 36$

$CA_1 = -D_1 + D_0 = NX_1 - rD_0$

$CA_1 = -D_1 + 45 = 24 - 9 = 15$

$CA_1 = 15$

Debt at the end of period 1: $D_1 = 30$

$CA_2 = -D_2 + D_1 = NX_2 - rD_1$
$CA_2 = D_1 = 36 - 6 = 30$
$CA_2 = 30$

Debt at the end of period 2: $D_2 = D_1 - CA_2 = 0$ → <u>all foreign debt paid off</u>

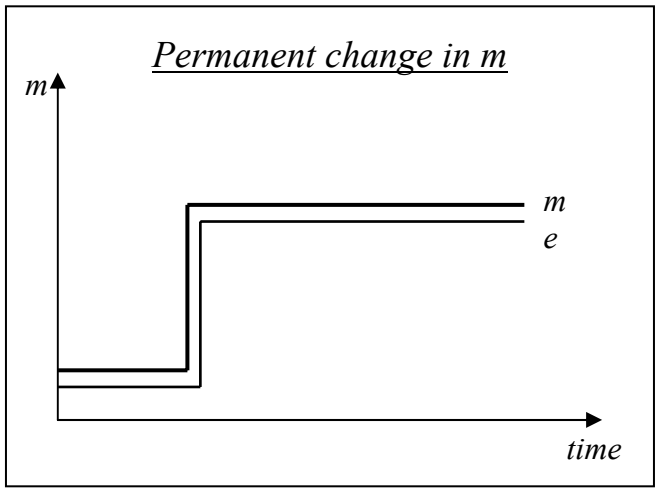
## Question 2

**a)** Equation 1 : Special case of the LM-curve for a hyperinflation environment, flexible prices and demand for real balances entirely depending on expected future values of inflation (ignoring output and the interest rate). The inflation rate represents the opportunity cost of holding money. $\eta$ is the semi-elasticity of money demand with respect to inflation.

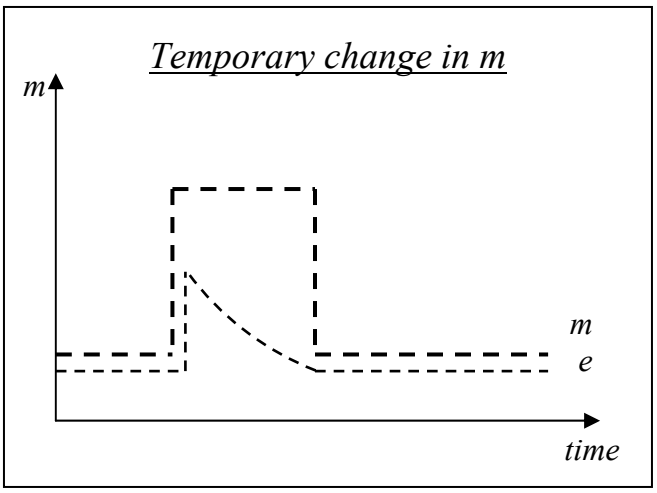
Equation 2 expresses the law of one price (absolute PPP).

**b)** If we solve the model for the current exchange rate $e_t$, it turns out that $e_t$ depends on current fundamentals ($m_t$) and the expectation of $e_{t+1}$ ($E_t e_{t+1}$). By forward iteration, $e_{t+1}$ in turn depends on next period's fundamentals ($m_{t+1}$) and on $E_{t+1} e_{t+2}$. Continuing the forward iteration ad infinitum reveals that $e_t$ is affected by current and all expected future fundamentals ($m_t$, $m_{t+1}$, $m_{t+2}$…).

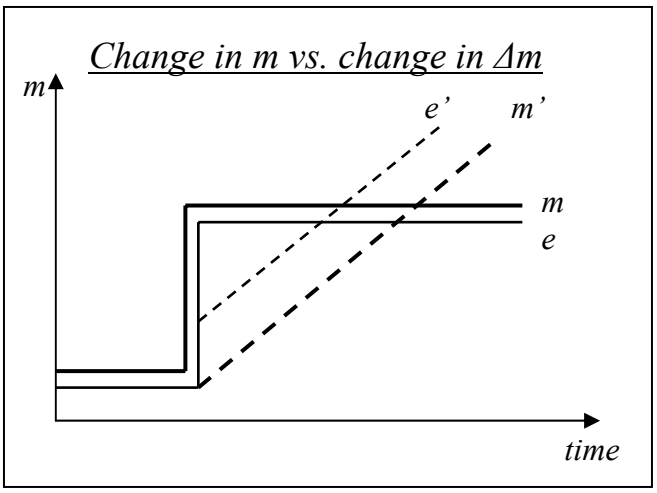
**c)**




The exchange rate instantaneously increases in proportion to m.




The fact that the increase in money is temporary dampens the instantaneous exchange-rate response and induces a gradual return of the exchange rate to its initial level. m and e are back to their original values at the same time.




An increase in the rate of change of the money supply induces an equal change in the rate of change of the exchange rate. In addition, the exchange rate (and the price level) must jump to a higher level to allow for the required reduction of real money holdings.

*(Solutions assuming expected changes of m were treated as equivalent, if solved correctly.)*

**Question 3**

The Walters Critique aimed at the loss of monetary autonomy in a monetary union and at the following destabilizing real-interest-rate effects of a one-size fits all monetary policy. The single nominal interest rate of the monetary union would be too high for countries in a recession, yet too low for countries in a boom. Booming countries would experience rising inflation and thus falling real interest rates. The opposite would occur in countries in recession. The resulting changes in real interest rates would exacerbate the initial disequilibrium and thereby destabilize the individual economies.

The mechanism played a role in the first 10 years of the European Monetary Union. Countries at the periphery (Spain, Ireland) boomed while countries like Germany experienced stagnation and below-average inflation. Booms in the periphery were reinforced by low real interest rates while Germany was held back by its high real interest rate. Currently, we see this pattern being reversed gradually.

## Question 4

**a)** *S*: *Solvency shock*: Deterioration of solvency caused by a recession, loss in competitiveness etc.
*C*: *Cost of default* (e.g. loss of reputation)
*B*: *Benefits of default* (haircut on outstanding debt): Reduces burden of debt so that less politically costly austerity is needed. Increasing in the size of the shock as lager shock means a heavier burden of debt.
$B_U$: *Benefit of an unexpected default*
$B_E$: *Benefit of default in case of an expected default*. $B_E > B_U$ because expectation of default entails a risk premium on bonds which increases the burden of debt.

The model illustrates the possibility of multiple equilibria with regard to sovereign debt default in a monetary union. There are four possible scenarios:
For $S < S_1$, the cost of default is higher than the benefit, regardless of expectations. Thus, default will not occur.
For $S > S_2$, the benefit of default outweighs the cost, regardless of expectations. Thus, default is inevitable.
In the intermediate range $S_1 < S < S_2$, the decision whether or not to default is driven by market expectations: If markets do not expect default, $B_U < C$ (no default). However, if markets do expect default, $B_E > C$ so that default is the preferred choice.

**b)** A stand-alone country with its own currency can avoid default by letting the central bank act as a lender of last resort. Liquidity in this case cannot dry up in the short run due to changes in expectations. Multiple equilibria will not occur. However, a solvency shock may strengthen the incentive to inflate (part of) the debt away. As a consequence, bond holders will lose money through inflation instead of default.