Introduction to open macroeconomics

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First class B of International Economic Policy

Introduction

- In this class we will deal with
  - the balance of payments, which keeps track of economic transactions between residents in a given economic system and the rest of the world
  - key concepts in open macroeconomic accounts and some behavioural functions of economic agents
  - the concepts of exchange rate and exchange rate regimes

The balance of payments

- Definition: the balance of payments is an accounting scheme that register all the economic (either commercial or financial) transactions among resident and not-resident agents in a given year.
- Resident agents are all the natural and giuridical persons that have their main economic interests located in a national State
- The balance of payments is made of two sections:
  - the current account (CA), which deals with not-financial transactions concerning exchanges of goods, services, factor incomes and unilateral transfers
  - the capital account (KA), which concerns transactions producing changes in foreign financial assets (AFE) or liabilities (PFE) held by residents other than the central bank

How the balance of payments works

- A US car dealer buys a \$20000 worth car produced by FIAT. This generates a positive item in *CA*. FIAT might use the check it receives in different ways:
  - deposit it in a US bank, acquiring a foreign assets. This generates a $-$ item in *KA*.
  - deposit it in an Italian bank, which can
    - buy a US asset, generating a $-$ item in *KA*
    - lend the money to an italian firm, which uses it to import, for instance, a PC, generating a $-$ item in *CA*
  - ask the ECB to change it into Euros, producing an increase in its official reserves in dollars.

The current account

- The balance of the current account is the sum of three elements
  - the trade balance (TB): the difference between imports and exports
  - the service balance (BS): the difference between the income and the expenditure due to sevice activities, such as tourism, insurance, transports, renting, technological assistance, factor incomes and so on. We will make the assumption that $BS_t = rB_{t-1}$, where B is a country's external net position at the end of the previous period and r the interesr rate paid/received on foreign financial assets or liabilities.
  - unilateral transfers that we assume to be nil.
- Therefore we can write the balance of the current account as

$$CA_t = TB_t + rB_{t-1} \tag{1}$$

Capital movements

- The balance of the capital accounts is the sum of three elements
  - foreign direct investments: financial transactions aimed at gaining either partial or full control over a foreign asset for a long period of time. They are not liquid and they tend to show a certain stability over time.
  - portfolio investments: financial transactions concerning, for instance, equities, deposits, derivatives, bonds. They are very liquid and they show a marked volatility over time.
  - other investments: transactions concerning trade credits, bank and other kinds of loans, and so on. Usually they do not have a big magnitude.
- Therefore we can write

$$KA_t = FDI_t + PI_t = \Delta PFE - \Delta AFE$$

- A net capital inflow, $KA_t > 0$, implies $\Delta PFE > \Delta AFE$.

Official reserves

- Definition: foreign currencies, gold, Special Drawing Rights, and foreign net assets held by a central bank.
- Recall that the Special Drawing Rights (SDR) are a peculiar kind of currency. They are the unit of account of the IMF (International Monetary Fund), whose value is based on a basket of national currencies. The aim of SDR is to replace gold in international transactions: for this reason SDR are also called paper gold (Wikipedia: http://it.wikipedia.org/wiki/Diritti_Speciali_di_Prelievo).
- According to IMF (1993) official reserves should include only activities that are under the direct control of monetary authorities and that are readily available for interventions on currency markets or to finance disequilibria of the balance of payments.

A synthesis

- On the basis of what seen above we can write

$$BP_t = CA_t + KA_t = \Delta RU_t \tag{2}$$

- It is not possible to keep complete track of international transaction, so the two terms in (2) are equalized summing to KA an item called "Errors and omissions".
- Following the IMF's recommendations we can write instead

$$BP_t = CA_t + KA'_t = 0 \tag{3}$$

where $KA'_t = KA_t - \Delta RU_t$.

- We will make reference to (2) and not to (3).

A synthesis

- We can define the net external position of a country, B_t, as

$$B_t = RU_t + AFE_t - PFE_t$$

- Therefore

$$\Delta B_t = \Delta RU_t + \Delta AFE_t - \Delta PFE_t = \Delta RU_t - KA_t$$

- From (2) it follows that

$$\Delta B_t = CA_t = TB_t + rB_{t-1} \tag{4}$$

A synthesis

- From (4) it follows that
  - an economy with a current account deficit is using more resources than what it can produce, therefore, to satisfy excess demand, it has to get into debt.
  - an economy with a current account deficit for many years will see its external debt to increase, causing an increase in its interest payments and new deficits.

An example of balance of payments

Items	2000	2001
Current account	-6305	-178
Goods	10368	17775
Services	1167	338
Factor income	-13099	-11575
Unilateral transfers	-4742	-6716
Capital account	3195	938
Intangible assets	-72	-311
Unilateral transfers	3267	1249
Financial account	4287	-2889
Direct investments	1149	-7377
Portfolio investments	-26255	-7640
Derivatives	2501	-477
Other investments	29950	12121
Change in official reserves	-3058	484
Errors and omissions	-1177	2129

National accounts in a closed economy

- In a closed economy without public sector
  - output , Y_t, has to be equal to consumption, C_t, plus investments, I_t:

$$Y_t = C_t + I_t$$

  - given that economic agents cannot either borrow or lend money abroad, savings will be equal to investments

$$S_t = Y_t - C_t = I_t$$

- In a closed economy with the public sector
  - private output and savings, S_t^p, are given by

$$\begin{aligned} Y_t &= C_t + I_t + G_t \\ S_t^p &= Y_t - T_t - C_t \end{aligned} \tag{5}$$

National accounts in a closed economy

- In a closed economy with the public sector
  - savings of the public sector, S_t^g, are given by

$$S_t^g = T_t - G_t$$

  - total savings are given by

$$S_t = (Y_t - T_t - C_t) + (T_t - G_t) = S_t^p + S_t^g = I_t$$

National accounts in an open economy

- In an open economy savings and investments do not necessarily coincide, given that residents in a country can borrow from abroad to invest.
- The identity between aggregate output and demand, (5), becomes

$$Y_t = C_t + I_t + G_t + (EX_t - IM_t) \tag{6}$$

- Disposable income is given by output minus taxation plus revenues from the external net position, rB_{t-1}:

$$Y_t - T_t + rB_{t-1} = C_t + I_t + (G_t - T_t) + (EX_t - IM_t) + rB_{t-1}$$

- From which one can obtain

$$S_t^p + S_t^g - I_t = CA_t = (B_t - B_{t-1})$$

National accounts in an open economy

- Domestic savings can be used to finance either domestic investments or net investments in foreign assets. If an economy saves more than what consumes and invests domestically, it will be able to invest in foreign assets, running a surplus of the current account. On the contrary, if it either consumes or invests more than what it produces, it will have to decrease its external net position as it will run a deficit of the current account.
- Let us define the domestic absorption as $A_t^d = C_t + I_t + G_t$ and the total absorption, A_t, as $A_t = A_t^d + IM_t$. Therefore (6) can be re-written as

$$Y_t = A_t^d + EX_t - IM_t \tag{7}$$

- Adding to both sides of the equation rB_{t-1}, substituting in (7) $A_t^d = A_t - IM_t$ and keeping in mind (1) one can obtain

$$Y_t - A_t^d + rB_{t-1} = CA_t$$

If an economy absorbs more than what it produces and than its foreign revenues, it will have a negative balance of the current

Intertemporal approach: a two-periods model

- Let us consider the case of a small open economy: that is an economy that is influenced by its financial and trade links with the rest of the world, but that cannot influence them in its turn.
- Let us assume that there exists only one representative agent and that, therefore, the aggregate variables coincide with individual ones.
- Let us assume that there exists perfect capital mobility and, therefore, that the domestic interest rate r is equal to the world interest rate r^*. If it was not so, there would be a mismatch between savings and investments, generating a disequlibrium in the current account, which should sooner or later be adjusted.

Intertemporal approach: a two-periods model

- Let us consider a time horizon of two periods, 1 and 2. At time 1 the net foreign position of the country is nil, $B_0 = 0$. Therefore

$$CA_1 = B_1 - B_0 = B_1 = Y_1 - I_1 - C_1 \tag{8}$$

- In the second period the current account will be

$$CA_2 = B_2 - B_1 = Y_2 + rB_1 - C_2 - I_2 \tag{9}$$

- However, $B_2 = 0$, otherwise the domestic economy would have in the second period a credit or a debt impossible to redeem. $I_2 = 0$ because otherwise there would be investments with unexplotable yields.

Intertemporal approach: a two-periods model

- Therefore (9) can be written as

$$CA_2 = -B_1 = Y_2 + rB_1 - C_2 \tag{10}$$

- Substituting (8) in (10) one can obtain the intertemporal balance constraint

$$C_1 + \frac{C_2}{1+r} = Y_1 - I_1 + \frac{Y_2}{1+r}$$

  according to which the expected value of consumption has to be equal to the expected value of output minus investments.
- Let us define $U(C_t)$ the individual utility function at time t $(t = 1, 2)$ and let us suppose that $U'(C) > 0$ and $U''(C) < 0$

Intertemporal approach: a two-periods model

- The aim of the individual is to minimize the sum of the discounted utility in the two periods subject to the intertemporal budget constraint

$$\max_{C_1, C_2} V = U(C_1) + \delta U(C_2) \tag{11}$$

$$s.t.\ C_1 + \frac{C_2}{1+r} = Y_1 - I_1 + \frac{Y_2}{1+r} \tag{12}$$

  where δ is the discount rate.

- Figure 1.1 gives a graphical account of the solution. The optimum is given by the tangency point between indifference curves and the budget constraint.

Intertemporal approach: a two-periods model

- Analitically, we solve (12) with respect to C_2 and we substitute the result into (11), obtaining

$$\max_{C_1} V = U(C_1) + \delta U\left[(1+r)(Y_1 - I_1 - C_1) + Y_2\right]$$

- The first order condition (or Euler equation) is

$$U'(C_1) = \delta(1+r)U'(C_2) \tag{13}$$

Intertemporal approach: a two-periods model

- (13) can be interpreted in different ways
  - Let us suppose that the individual reduces his/her consumption by one unit, investing it at the market interest rate r, and that s/he consumes this unit plus its yield in the second period. Reducing current consumption produces a reduction in utility equal to $U'(C_1)$, on the other hand greater future consumption entails an increase in the discounted utility equal to $\delta(1+r)U'(C_2)$. (13) entails that the two variations are equal.
  - δ e $(1+r)$ can be interpreted as how much the individual and the market respectively value future and current consumption
    - $\delta > 1/(1+r)$ (13) implies that $C_1 < C_2$ because saving and investing one unit of output the individual gains $(1+r)$ at the cost of $1/\delta$
    - $\delta < 1/(1+r)$ (13) implies that $C_1 > C_2$
    - $\delta = 1/(1+r)$ (13) implies that $C_1 = C_2$

Exchange rate regimes

- Definition: the exchange rate is the number of units of a currency necessary to obtain one unit of another currency.
- For example, if the Dollar/Euro exchange rate is 1.5, it means that one Dollar and a half are necessary to obtain a Euro.
- Definition: an appreciation (a depreciation) in the exchange rate is a decrease (increase) in the number of units necessary to buy one unit of foreign currency.
- Fig. 1.3 here.

Exchange rate regimes

- Flexible exchange rate: the exchange rate is free to move, compensating excess demand and supply of a currency with respect to another. For example: Euro/Dollar, Euro/Yen, ecc...
- Fixed exchange rate: a country fixes the price of its currency, trying to keep it constant. In other terms the central bank tries to satisfy whatever excess demand or supply of either the foreign or the domestic currencies, using its official reserves.