Introduction to Macroeconomics · The orthodox basics

1. Representation of an economy

• An economy can be simplified to two elements: the <u>transactions</u> that occur (what is bought and sold, who buys and who sells) and the <u>outcomes</u> of those transactions (the price at which sales and purchases take place, and the amount bought and sold).

• There are two basic transactions: <u>financial</u> transactions and <u>real</u> transactions.

2. Financial transactions and the financial sector (or financial side) of an economy

• <u>Financial transactions involve the buying and selling of financial assets</u>. <u>Financial assets</u> (like bank deposits, mortgages, corporate bonds or Treasury bills —T-bills—) <u>are debt (and credit) instruments</u> (credit is the reverse of debt and vice versa). The buyer of a financial asset is implicitly extending credit (lending money) to the seller of the financial asset. Symmetrically, the seller of a financial asset enters into debt with the buyer of the financial asset. The interpretation is that:

  (i) <u>buyers of financial assets save money by lending it</u>: through the purchase of the financial asset, they lend money now to receive money in the future (therefore, the agents demanding financial assets simultaneously supply liquidity);

  (ii) <u>sellers of financial assets spend borrowed money</u>: through the sale of the financial asset, they raise money now to purchase goods and promise to repay money in the future (consequently, the agents supplying financial assets simultaneously demand liquidity).

• The collection of all financial transactions in an economy defines the economy's <u>financial sector</u>. Thus, the study of the financial sector of an economy consists of the analysis of

  (i) what determines the buying and selling of financial assets (or, equivalently, the supply of, and the demand for, liquidity; see §4) and

  (ii) how financial variables (financial prices and financial amounts) change.

3. Real transactions and the real sector (or real side) of an economy

• <u>Real transactions involve the buying and selling of goods or services</u>. Goods and services represent <u>wealth</u>. Wealth (understood in an economic sense: economic wealth) means ability to satisfy some need or having some intrinsic value.

• <u>Financial assets are not wealth</u>; they are instead referred as 'financial wealth'. Financial wealth means monetary value. Money is not (economic) wealth, because, in general, money has no intrinsic value or satisfies no need. Money is used to acquire wealth, but in itself it is not wealth (this interpretation contradicts the popular view that identifies money with wealth).

• The collection of all real transactions in an economy defines the economy's <u>real sector</u>. Thus, the study of the real sector of an economy consists of the analysis of

  (i) what determines the buying and selling of goods and services, and

  (ii) how real variables (prices and quantities of goods and services) change.

4. Liquidity and interest rate

• <u>Financial transactions involve two flows</u>: a <u>flow of money</u> from the purchaser of a financial asset to the asset's seller; and a <u>flow of financial assets</u> from the seller of the asset to its buyer.

• Two equivalent approaches can be followed to analyze financial transactions. <u>One approach focuses on the flow of financial assets</u> and hence studies the demand for financial assets, the supply of financial assets, the price of financial assets and the volume of financial assets bought/sold). The other approach pays attention to the <u>money flow</u> and thus studies the demand for liquidity, the supply of liquidity, the <u>price of getting liquidity (called 'the interest rate'</u>) and the volume of liquidity generated.

• <u>Liquidity</u> is a term that refers to <u>money and all financial assets considered to be sufficiently equivalent to money</u>. For instance, bank deposits are a financial asset taken to be as good as money for practical purposes (taxes and purchases can be paid with deposits). In fact, monetary aggregate M1 includes cash —a form of legal money created by the central bank that is 'money' by definition— but also bank deposits —a financial asset created by banks and sometimes called 'bank money'—.

• <u>Money could be viewed as a special kind of financial asset</u> (one having maximum liquidity, no risk and no profitability). Conversely, all financial assets could be regarded as more or less good money imitators: more or less imperfect forms of money (the closer the financial asset to money, the more liquid the asset).

5. A simple model of the financial sector: the liquidity market model

• <u>The liquidity market model focuses on the analysis of the flows of money in financial transactions</u>. From that perspective:

(i)   <u>the purchaser of a financial asset lends money</u> (and thereby creates supply of liquidity);

(ii) <u>the seller of a financial asset borrows money</u> (and thereby creates demand for liquidity).

• <u>The liquidity market model is a standard supply and demand model</u> in which 'price' is the interest rate (the price of borrowing money) and 'quantity' is the volume of liquidity created.

• <u>The agents behind the supply of liquidity function are those that lend money</u>: the central bank, banks (banks lend and borrow money but, in net terms, they are lenders) and the buyers of financial assets (those purchasing financial assets 'supply' money: they get the assets and deliver money in exchange).

• <u>Those factors making the lending of money more attractive, or that directly increase the liquidity supply, will shift the supply of liquidity function to the right</u>. For instance, if the government lowers the taxes that lenders of money must pay or if more people decide to buy financial assets, the supply of liquidity function will shift to the right. Conversely, factors disencouraging the lending of money (like becoming less optimistic or more uncertain about the evolution of the economy or believing that it is more risky to lend money) will shift the supply of liquidity function to the left.

• <u>The agents behind the demand for liquidity function are those that typically borrow money (in net terms)</u>: households, firms, governments (local, regional, national) and the sellers of financial assets (among which there will be households, firms and governments).

• Those factors making the borrowing of money more attractive or necessary, or that directly increase the liquidity demand, will shift the demand for liquidity function to the right. For instance, if the government issues (creates and sells) T-bills or new firms are created, the demand for liquidity function will shift to the right. Conversely, factors disencouraging the borrowing of money (like becoming less optimistic or more uncertain about the evolution of the economy or believing that your future income lowers) will shift the demand for liquidity function to the left.

• This model offers four basic predictions when only one function shifts:

(i)   if the supply of liquidity expands, then the interest rate falls and liquidity grows;

(ii) if the supply of liquidity contracts, then the interest rate rises and liquidity declines;

(iii) if the demand for liquidity expands, then both the interest rate and liquidity go up;

(iv) if the demand for liquidity contracts, then both the interest rate and liquidity go down.

• When the only information is that two functions shift simultaneously, the outcome (what happens to liquidity and the interest rate) may be uncertain (the specific result depends on the intensity of the changes). For example, if the supply of liquidity contracts and the demand for liquidity expand, it is certain that the interest rate rises (as each shift, separately, increases the interest rate), but what occurs to the volume of liquidity is uncertain (the supply change tends to lower liquidity, whereas the demand change tend to raise it —if the supply shock is stronger than the demand shock, then liquidity will fall; if the demand shock dominates, then its effect on liquidity will also dominate; and if the two changes are equally strong, liquidity will remain constant).

6. Inflation rate and GDP

• Inflation rate and GDP are two variables summarizing outcomes of the real sector. The inflation rate is the rate of change of some general price index (typically, a consumer price index measuring how, on the aggregate, the prices of the goods and services characteriscally consumed in the economy change during a given period of time). GDP is a measure of aggregate production: the amount of final goods and services produced in the economy (during a given period of time).

• The expression 'business cycle' refers to the oscillations in GDP: one of the regularities of the real sector of an economy is that its GDP fluctuates. For some periods, GDP grows (and the economy is said to expand or that it is booming or that it is in the expansionary phase of the business cycle). For some others, GDP falls (the economy contrats, enters into a recession or is in the contractionary phase of the business cycle). A depression is a sufficiently intense or long recession.

• The phenomenon of inflation is said to occur (during a certain period of time) when (during that period) the inflation rate is positive (indicating a rise in the general price level of goods and services —bear in mind the price of financial assets (asset inflation or deflation) does not directly affect the inflation rate). Deflation is the opposite phenomenon: if, during a certain period, the inflation rate is negative, there is deflation during that period. Reflation occurs (during a certain period) if (during that period) the inflation rate tends to rise. Disinflation is the opposite to reflation: a tendency for the inflation rate to fall. A hyperinflation is a reflation in which the value of the inflation rate are sufficiently high (an annual inflation rate of at least around 500%). A stagflation takes place when an economy experiences, at the same time, inflation and recession.

7. **A simple model of the real sector: the aggregate supply and aggregate demand model**

• The aggregate supply and aggregate demand (AS-AD) model is a sort of macroeconomic version of the standard, microeconomic supply and demand model (there are important conceptual differences that can be left aside in a first study of the model). Inflation rate plays the role of 'price' in the microeconomic version and GDP is the equivalent to 'quantity' is that model.

• [Heteredox remark. An unorthodox macroeconomic view holds that an economy is 'normal circumstances' is quite different from one in 'uncommon, extraordinary circumstances', so perhaps different models are required to study what occurs to an economy in normal and abnormal states. Hyperinflation is an example of uncommon state. A lasting deflation could be another one. All the models presented here presume 'normal' conditions and are in general not apt to handle abnormal ones. Specifically, the AS-AD model implicitly assumes that the inflation rate is neither 'too high' nor 'too low'. Also, the AS-AD model disregards the environmental consequences (like pollution, global warming, biodiversity loss, soil erosion) of a very large GDP (or of reaching a high GDP level in a relatively short period of time).]

• The AS function represents the production side of the real sector: how the decisions of firms to produce goods and services influence the inflation rate. In essence, the AS function captures the production capabilities of an economy and how these capabilities create inflationary pressures. In parallel, the AS function summarizes the outcomes of the transactions involving intermediate goods (that is, the AS function is the result of the working of markets for inputs, like the labour market – if it makes sense to define such a market).

• The basic factors affecting the AS function are: the number of firms, the cost of production (which is determined by the prices of the inputs, like the wages paid to workers or the price of energy), the state of the production technology, how efficiently production is organized, the amount of resources available (workers, raw materials, energy sources), the level of investment (as this affects the production capacity of an economy), taxes (and macroeconomic policies in general), borrowing and credit conditions (as much of the production activities require paying in advance of selling the output, so most firms rely on short-run credit: a lower interest rate encourages borrwing to invest), expectations (are businessmen optimistic or pessimistic about the future?)…

• Anything encouraging, facilitating, reducing the cost, increasing the productivity … of production activities, or raising the production potential of the economy, will shift the AS function to the right (meaning that the economy can generate any GDP level with a lower inflationary cost). Technological regress, cost increases, loss of resources, destruction of firms, tax rises, worsening of expectations, investment cuts… are factors shifting the AS function to the left: now it is more costly, in inflation rate terms, to generate the same GDP.

• The AD function represents the expenditure side of the real sector: how the inflation rate in the economy affects the consumption decisions (investment is consumption of capital goods). It is common to split total expenditure in an economy into four categories: expenditure C by households (consumption), expenditure I by firms (investment: improving production capacities), expenditure G by the government (public expenditure, which consists of purchases of both consumption and capital goods by all the public administrations) and net exports NX, which is the net demand from the rest of the world (the difference between exports EX and imports IM).

• Anything increasing the expenditure potential (households with more income, tax cuts, more firms or consumers, a rise in foreign income, a fall in the domestic interest rate, a depreciation of the domestic currency, a rise in the foreign inflation rate, a fall in unemployment, optimistic expectations) will shift the AD function to the right (meaning that a higher aggregate demand corresponds to any given inflation rate). The opposite moves the AD function to the left: lower income, higher taxes, fewer consumers or firms, higher interest rates, lower foreign income, an appreciation of the domestic currency, rise in unemployment, pessimistic expectations...

• This model, in assuming an upward-sloping AS function and a downward-sloping AD function, offers four basic predictions when just one function is shifted:

   (i)   if AS expands, then the inflation rate falls and GDP grows (disinflationary expansion);

   (ii)   if AS contracts, the inflation rate rises and GDP falls (stagflation: inflationary recession);

   (iii)   if AD expands, then both the inflation rate and GDP go up (inflationary expansion);

   (iv)   if AD contracts, then both the inflation rate and GDP go down (deflationary recession).

• As in the liquidity market model, the effect on the inflation rate or on GDP may be uncertain when two functions shift. To analyze two shifts occuring simultaneously, investigate every shift separately and next combine the corresponding results.

8. Connecting economies: the exchange rate

• Different economies have different moneys. This means that to purchase goods/services or financial assets in another economy, it is in general necessary to convert the domestic currency into the foreign currency. This occurs in the currency market and the price at which the conversion is done is called 'exchange rate' (between the two currencies): how much of one currency one gets per unit of the other currency.

• [Sometimes the seller of a good/service or financial asset maybe be willing to accept foreign currency (probably, Argentinian exporters would be happy to get paid in dollars rather than Argentinian pesos). In that case, the foreign purchaser need not go through the currency market to spend domestic money in a foreign economy.]

• In the sequel, suppose that the two currencies are the euro € (domestic currency) and the US dollar $ (foreign currency). There are two ways of quoting the euro-dollar exchange rate: in €/$ units (how many euros one gets per dollar) or in $/€ units (how many dollars one gets per euro). There is no substantial difference between the two ways: one can pass from one to the other by inverting the exchange rate value and the units. For example, 2 $/€ (two dollars per one euro) is the same exchange rate as 1/2 €/$ (0.5 euros per dollar or, multiplying by 2, one euro per two dollars).

• The convention adopted in these notes is to place the domestic currency (the euro) in the denominator: $/€. This choice has an advantage in terms of interpretation: when the exchange rate expressed in $/€ units increases, the euro gains value (that is, the euro appreciates against the dollar). For example, in passing from 2 $/€ to 4 $/€, one euro was initially worth two dollars and was afterwards worth four dollars (so more dollars per euro). Symmetrically, when the exchange rate expressed in $/€ units decreases, the euro depreciates against (or with respect to) the dollar.

9.   **A simple model of the link between two economies: the currency market model**

• The currency market model is a standard supply and demand model in which 'price' is the exchange rate (in $/€ units) and 'quantity' is the amount of euros exchanged. The aim of the model is to explain the value of an exchange rate.

• [There is no loss of generality in choosing euros as a variable for the model and quoting the exchange rate in $/€ units. Equivalent results would be obtained if dollars were chosen instead of euros and the exchange rate's units were €/$. The model explained next focuses on the supply of euros and the demand for euros; the alternative model would be based on the supply of dollars and the demand for dollars.]

• The model exclusively considers the demand for foreign goods/services and for financial assets by domestic agents (the demand for domestic goods/services by those same agents is analyzed in the AS-AD model, whereas these agents' demand for domestic financial assets is studied in the liquidity market model). This means that the only relevant factors for the $/€ model are:

  (i)   the demand by Europeans for American goods/services;

  (ii)   the demand by Europeans for American financial assets;

  (iii)   the demand by Americans for European goods/services;

  (iv)   the demand by Americans for European financial assets.

• The supply of euros is, in general, represented by Europeans (as it is natural for European to have euros, so it is easier for Europeans to sell euros in the currency market). Assuming this, the only factors than could shift the supply of euros function are given by (i) and (ii). Specifically, whatever induces Europeans to buy more American goods/services or more American financial assets, will make it necessary for Europeans to get more dollars in the currency market; and to get those additional dollars, Europeans will have to sell (supply) more euros. In sum, everything increasing the demand by Europeans of American goods, services or financial assets will shift the supply of euros to the right. Conversely, the supply of euros function will shift to the left if European become less willing or interested in buying American goods, services or financial assets.

• What would encourage Europeans to purchase more American goods/services? A rise in European income, a fall in the American prices of goods/services (or, similarly, a fall in the American inflation rate) and a rise in the European prices of goods/services (or, similarly, a rise in the European inflation rate). The effect of other factors on the Europeans' demand for American goods/services can be found out by analogy with the three factors above.

• What would encourage Europeans to purchase more American financial assets? Anything making American financial more attractive in comparison with European financial assets. For instance, a rise in the American interest rate (buying US financial assets is like lending in the US economy, and a rise in the US interest rate means that lenders earn more when lending dollars), anything else raising the profitability of American financial assets, or a fall in the risk of American financial assets. The reverse would lower the European purchase of American financial assets: a fall in the US interest rate (or, symmetrically, a rise in the European interest rate) or an increase in the risk associated with US financial assets (or, symmetrically, a fall in the risk of European financial assets).

• <u>What about Europeans buying American firms</u>? Firms are non-financial assets and could be analyzed like a purchase of goods (capital goods).

• <u>The analysis of the demand for euros is analogous to the analysis of the supply of euros</u>. In fact, <u>the demand for euros is, in general, represented by Americans</u>, because, in the currency market:

   (i)   the demand for euros is equivalent to the supply of dollars (because those willing to buy euros, American citizens, have, and have to sell, dollars to get those euros);

   (ii)   the demand for dollars is equivalent to the supply of euros (Europeans typically demand dollars and also typically own euros).

• Remember that, in the currency market model, selling euros implies buying dollars; and selling dollars implies buying euros. Therefore, the reasons explaining why European supply more or less euros are analogous to the reasons explaining why American supply more or less dollars (and, therefore, demand more or less euros). In particular, as the demand for euros is based on the demands in (iii) and (iv) above:

   (i)   the demand for euros function shifts to the right whenever Americans increase their demand for European goods, services or financial assets;

   (ii)   the demand for euros function shifts to the left whenever Americans decrease their demand for European goods, services or financial assets.

• In general, <u>what induces Europeans to buy less in the US economy also induces American to buy more in the European economy</u>. For example, if the US interest rate falls, it is better for both Europeans and Americans to purchase more European financial assets (and hence less American financial assets). Similarly, if the US inflation rate goes up, it is better for both Europeans and Americans to purchase more European goods and services (and hence less American goods and services). An exception to this rule is given by local factors: something that, at least initially, just affects one of the two economies (like a change in aggregate income in only one economy: when Europeans become richer, it is reasonable to expect that they will buy more American goods/services, but there is no obvious reason why Americans should buy fewer European goods or more American goods).

10. Another representation of an economy: the three-sector model

• <u>The representation of an economy studied so far was based on classifying economic activities</u>: the financial sector collected financial transactions, whereas the real sector included supply-side activities (production of goods/services) and demand-side activities (purchase of goods/services).

• <u>Another generally used representation is based on classifying economic actors</u>. This representation organizes an economy in three sector: the <u>private</u> sector (which gathers activities carried out by firms and households, be the activities financial or real), the <u>public</u> sector (economic activities by all the public administrations) and the <u>foreign</u> sector (economic activities involving agents from the domestic economic and the rest of the world).

• <u>The three-sector division can be used to analyse the income and expenditure flows between sectors</u>. One important result of this analysis is the sectoral identity.

11. The sectoral identity

• The sectoral identity expresses a tautology: that <u>the sum of the inflows</u> (that is, the income) <u>to the three sectors equals the sum of the outflows</u> (that is, the spending) <u>of the three sectors</u>.

• [A tautology is a claim that is necessarily (or logically) true. For instance, another tautology is that, in a market, the total quantity sold is equal to the total quantity bought: an item can only be sold if, at the same time, someone buys it.]

• <u>The orthodox version of the sectoral identity presumes that GDP (call it Y) is generated in the private sector</u>. Hence, Y is the inflow to the private sector: GDP is the source of income for the private sector. Its outflows (ways of spending the outcome) are two: consumption C (private sector spending in final goods/services) and investment I (private sector spending in capital goods/services, that is, goods/services used to produce other goods). In symbols:

$$Y \rightarrow \boxed{\text{Private Sector}} \rightarrow C + I.$$

Since Y > C, define savings S as S = Y – C. That is, S is income net of consumption. As a result:

$$S \rightarrow \boxed{\text{Private Sector}} \rightarrow I.$$

In view of this, <u>the balance of the private sector (difference between inflows and outflows) is the net private savings, NPS</u>.

$$NPS = S - I$$

• <u>For the public sector, taxes T are the source of income</u>, whereas spending take the form of public expenditure G and transfers TR (transfers to the private sector). In symbols:

$$T \rightarrow \boxed{\text{Public Sector}} \rightarrow G + TR.$$

<u>The balance of the public sector (difference between inflows and outflows) is the public savings (or budget surplus), PUS</u>.

$$PUS = T - G - TR$$

• <u>For the foreign sector</u> (that is, the rest of the world, ROW) the <u>income</u> that it takes from the economy <u>comes from the exports that the ROW makes to the economy</u>. But the exports of the ROW to the economy are the economy's imports, IM. Analogously, the spending that the ROW makes on the economy are the ROW's imports, which coincide with the economy's exports EX to the ROW. In sum,

$$IM \rightarrow \boxed{\text{Foreign Sector}} \rightarrow EX.$$

Thus, the balance of the foreign sector (difference between inflows and outflows) is the foreign savings, FS (observe that the economy's net exports EX – IM equals –FS).

$$FS = IM - EX$$

Though it may appear counterintuitive, when an economy runs an external (or trade) deficit (that is, the economy imports more than it exports: FS > 0), it follows that the economy is using foreign saving (the ROW is financing the economy's external deficit).

• The sectoral identity holds that the sum of the three balances add up to zero:

$$NPS + PUS + FS = 0.$$

This must be true since (being the three sectors a closed system) it is not possible for all sectors to run a deficit (or for all to run a surplus). If, for example, two sectors are in deficit (their inflows are smaller than their outflows: what enters each sector is smaller than what leaves the sector), then necessarily the third sector must finance the deficit of the other two sectors (that is, what enters the third sector must be larger than what leaves the sector; moreover, the third sector's surplus must offset the deficit coming from the remaining sectors).

As an illustration, suppose PUS < 0; that is, G + TR > T (the public sector runs a budget deficit: spending surpasses tax revenue). Suppose as well that NPS < 0; that is, I > S (the private sector invests more than it saves). Then the remaining sector (the foreign sector) must finance the join deficit run by the public and private sectors: as NPS + PUS < 0, it must be that FS > 0; that is, IM > EX (which means that the ROW has a trade surplus and, hence, the economy has a trade deficit).

• Given the definitions of NPS, PUS and FS, the sectoral identity can be equivalently expressed as:

$$S - I = (G + TR - T) + NX.$$

(This is equivalent to equating total inflows S + T + IM with total outflows I + G + TR + EX)

That is, net private savings must be equal to the public deficit (G + TR – T) plus the trade balance (or net exports, EX – IM). In the preceding illustration, S – I < 0 and G + TR – T > 0. Consequently, it must be that NX < 0: if in an economy private savings are insufficient to finance investment and the government budget is in deficit, then the economy must run an external deficit.

• The usefulness of the sectoral identity lies in identifying what is impossible. For instance, in the preceding illustration, it is impossible for an economy to have a trade surplus when the government runs a budget deficit and the private savings are not enough to finance investment.

12. Macroeconomic policy

• The most orthodox view contends that the private sector works economically well when left by itself: this is the 'invisible hand' idea operating at the macroeconomic level. A less orthodox view holds that some macropolicy is often needed to <u>stabilize the macroeconomic behaviour of the private sector</u>.

• <u>The central bank and the government are the two main agents of macroeconomic policy</u>. The central bank decides and executes <u>monetary policy</u> (measures to regulate liquidity or the interest rate) and thereby intervenes in the financial sector. The government decides and executes <u>fiscal policy</u> (measures affecting the government budget; that is, measures affecting taxes, public expenditure or transfers) and therefore the government typically intervenes in the real sector.

(i) Monetary and fiscal policies are <u>demand-side policies</u>, since they can modify aggregate demand. The policy is <u>expansionary</u> if its shifts the AD function to the right; it is <u>contractionary</u> if the AD is shifted to the left.

(ii) <u>Supply-side policies</u> (decided and executed by the government) are those measures having an impact on aggregate supply. The aim of supply-side policies is to <u>expand or improve the production capacity of an economy</u>. In the AS-AD model, a supply-side policy shifts the AS function to the right.

• <u>The central bank conducts monetary policy by operating in the liquidity market</u>, by regulating liquidity or the interest rate. The final goal of central bank intervention is to stabilize the inflation rate by expanding or contracting aggregate demand: a fall in the interest rate stimulates aggregate demand (consumption and investment), whereas a rise in the interest rate curbs aggregate demand.

• <u>The central bank's monetary policy tools</u> are:

(i) open market operations;

(ii) standing facilities (procedures allowing <u>banks to exchange liquidity directly with the central bank</u>);

(iii) reserve requirements (a certain amount of reserves banks must deposit at the central bank);

(iv) interest rates set by the central bank (such as the policy interest rate and those associated with the standing facilities).

• <u>Open market operations are sales or purchases of financial assets by the central bank</u>. When the central bank purchases financial assets, the corresponding payment increases the economy's liquidity. This constitutes an expansionary open market operation, which is represented in the liquidity market model by a shift to the right of the supply of liquidity function (the result being a fall in the interes rate). Conversely, when the central bank sells financial assets, the corresponding payment the central bank receives reduces liquidity. This constitutes a contractionary open market

operation, which is represented in the liquidity market model by a shift to the left of the supply of liquidity function (the result being a rise in the interes rate).

• <u>There are four basic transimission channels of monetary policy</u>; that is, four links between the monetary policy tools and aggregate demand.

(i)   The <u>interest rate channel</u>: i affects C and I.

(ii)   The <u>exchange rate channel</u>: i affects e and e affects NX = EX – IM ($\downarrow e \Rightarrow \uparrow$NX).

(iii)   The <u>credit channel</u> works through credit supply and demand (for example, if i rises, firms are less profitable and hence are less eligible for bank credit);

(iv)   The <u>stock market channel</u> operates through changes in the stock prices (and, in general, in the financial asset prices): $\uparrow i \Rightarrow \downarrow$price of shares $\Rightarrow \downarrow$financial wealth $\Rightarrow \downarrow$C $\downarrow$I.

• <u>Exchange rate policy involves the decision to regulate or stabilize the exchange rate</u> (sometimes exchange rate policy is decided by the government but executed by the central bank; in other cases, the central bank does all the job). In a <u>flexible exchange rate regime</u> the policy is to have not policy: the exchange rate is determined by the currency market without central bank intervention. In a <u>fixed exchange rate regime</u> a value for the exchange rate is chosen and intervention in the currency market is conducted to align the market exchange rate with the fixed (policy) exchange rate. Specifically, if the market value is above the fixed exchange rate (the market overvalues the exchange rate, in comparison with the official rate), then the central bank must intervene to depreciate the domestic currency. Hence, the central bank has to sell the domestic currency and buy foreign currency. Conversely, if the market value is below the fixed exchange rate (the market undervalues the exchange rate), then the central bank must cause an appreciate by buying the domestic currency (and, accordingly, selling foreign currency).

• <u>The government's fiscal policy tools are essentially three: tax rates, transfers and public expenditure. The effects of fiscal policy on the real sector can be represented in the AS-AD model</u>. An <u>expansionary fiscal policy</u> (lower tax rates, higher transfers, more public expenditure) shifts the AD function to the right and causes a rise in the inflation rate and GDP growth. Contrariwise, a <u>contractionary fiscal policy</u> (higher tax rates, less transfers, less public expenditure) shifts the AD function to the left and causes a fall in both GDP and the inflation rate.

• <u>Expansionary fiscal policies tend to increase the public deficit</u> (revenues fall or spending rises or both). Therefore, expansionary fiscal policies create a collateral problem: the need to finance the additional deficit the policies generate. There are three basic <u>ways of financing a deficit</u>, the first two provoking a contractionary effect on aggregate demand.

(i)   Tax now option: increase current <u>taxes</u> or create new ones (higher taxes reduce C and/or I).

(ii)   Tax later option: issue <u>financial assets</u> (like T-bills), with tends to rise i and this reduce C+I.

(iii)   <u>Monetize the deficit</u>, that is, create monetary base (by printing money and/or selling financial assets to the central bank).

13. Useful equations, definitions, effects, claims

- Linking nominal GDP and real GDP   Nominal GDP = Real GDP · GDP deflator

- Inflation rate π_t in period t $\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$ (where P_k is some price index for period k)

- Aggregate demand AD   AD = C + I + G + EX – IM

- Monetary base M0   M0 = E + R   (E = cash held by people, R = bank reserves)

- Monetary base M1   M1 = E + D   (D = bank deposits)

- Money multiplier mm (definition) mm = M1/M0

- Money multiplier formula $mm = \frac{1+l}{r+l}$ (with $l = \frac{E}{D}$ and $r = \frac{R}{D}$ both constant)

- Nominal exchange rate e Expressed in S/€ (foreign currency / domestic currency)

- Real exchange rate e_r $e_r = e \cdot \frac{P}{P^*}$ (P = domestic CPI, P^* = foreign CPI)

- Purchasing power parity exchange rate $e_{PPP} = \frac{P^*}{P}$ (has the same units as e)

- Fisher equation (real interest rate i_r) $i_r = i - \pi$ (i = nominal interest rate)

- Linking i and the price of T-bills $P_{T-bill} = \frac{V}{1+i}$ (V is the nominal value of the T-bill)

- Discount factor δ (based on i) $\delta = \frac{1}{1+i}$ (present value of one future money unit)

- Quantity equation   M · V = P · Y   (M = M1, P · Y = nominal GDP, V = number of times that on average money is used to purchase goods)

- Quantity equation (with rates of change)   r.o.c M + r.o.c V ≈ r.o.c P + r.o.c Y   (r.o.c P = π)

- Unemployment rate u $u = \frac{unemployed}{unemployed + employed}$

- Okun's law   Inverse relationship between unemployment rate and GDP growth ($\uparrow Y \Rightarrow \downarrow u$)

- Phillips curve   Inverse relationship between unemployment rate and inflation rate ($\downarrow u \Rightarrow \uparrow \pi$)

- Fisher effect   One more percent point in $\pi \Rightarrow$ One more percent point in i ($\uparrow \pi \Rightarrow \uparrow i$)

- Crowding-out effect   The orthodox claim that an increase in G causes a reduction in I (public expenditure crowds out private expenditure)

- Open economy trilemma   Impossible to choose i, fix e, and be financially integrated with ROW

- Fallacy of composition   The claim that what holds for individuals need not hold for collectives

- Goodhart's law   'When a measure becomes a target, it ceases to be a good measure.'

- Sturgeon's law (Ted Sturgeon, 1953)   <u>90% of everything is trash</u>