FOUNDATION OF ECONOMIC SCIENCE
1° BAI

Written By:
Costinescu Rares

2024-2025 edition

Chapter 1

→ Slope of the isocost line is equal in modulus to the relative price of one good in terms to another one

→ A production function describes the relationship between the amount of output produced and the amounts of inputs used to produce it ($Y = f(H)$)

→ Average product is equal to the production function divided by H

→ The marginal product is equal to the first derivative of the production function and it measures the additional output that is produced if the use of labor is increased by one unit, holding everything constant

→ The production function is strictly concave because MP is strictly decreasing in H(which implies decreasing average products) which signifies the law of diminishing returns

→ Malthus' model implies a vicious circle that leads to an equilibrium in which income per capita is stuck at the subsistence level; in this model, technological improvements do not improve living standards; their only effect is to permanently increase the population level

→ We escaped the Mathusian trap because 1) technological progress happened at a faster rate than the population growth, offsetting the diminishing average product of labor and 2) at some point, the demographic transition (a decline in birth and death rates induce by better education and economic development) took place, reverting the relationship between income and fertility => industrial and capitalist revolutions

NOTIONS

equilibrium = A model outcome that is self-perpetuating. In this case, something of interest does not change unless an outside or external force is introduced that alters the model's description of the situation.

relative price = The price of one good or service compared to another (usually expressed as a ratio).

incentive = Economic reward or punishment, which influences the benefits and costs of alternative courses of action.

diminishing average product of labour = A situation in which, as more labour is used in a given production process, the average product of labour typically falls.

reservation option = A person's next best alternative among all options in a particular transaction.

economic rent = A payment or other benefit received above and beyond what the individual would have received in his or her next best alternative (or reservation option)

isocost line = A line that represents all combinations that cost a given total amount.

innovation rents = Profits in excess of the opportunity cost of capital that an innovator gets by introducing a new technology, organizational form, or marketing strategy. Also known as: Schumpeterian rents**.**

Chapter 2

→ Utility is an indicator of the value one places on an outcome such that higher valued outcomes will be chosen over lower valued ones

→ An indifference curve is the geometrical locus of all bundles that provide a given level of utility to the individual

→ The marginal rate of substitution is the trade-off that an individual is willing to make between two goods, while keeping the same level of utility; it is equal to the IC's slope

→ 3 important properties of ICs: 1) ICs slope downwards due to trade-offs: the bundle that has more of one good must have less of the other; 2) Higher ICs corresponds to higher utility levels and 3) ICs do not cross

→ The shape of the ICs can be justified by the "law of satiation of wants": the value to the individual of an addition unit of consumption declines the more that is consumed (diminishing marginal returns to consumption)

→ Diminishing marginal returns for both goods mean that one prefers more "balanced" bundles

→ The economic cost is defined as its out-of-pocket cost(the accounting cost) plus its opportunity cost

→The feasible set comprises all bundles that an agent could choose given the constraints he/she faces

→ The feasible frontier is the curve that defines the maximum feasible quantity of one good for a given quantity of the other

→ The marginal rate of transformation measures the quantity of some good that MUST be sacrificed to acquire one additional unit of another good => opportunity cost and it is equal to the feasible frontier's slope

→ The optimal bundle is the point where the highest IC touches the feasible frontier (MRS = MRT)

→ The budget constraint identifies the feasible set and frontier

→ The real wage corresponds to the MRT of leisure into consumption and therefore, to the opportunity cost of leisure

→ When the real wage increases(it produces and outwards pivot of the frontier), there are 2 logically distinct effects: 1) income effect (which also happens when there is an additional exogenous income) = the feasible set expands, when one earns more real income for each hour worked and 2) substitution effect = the opportunity cost of leisure is higher and one has the incentive to work more

→ The demand curve represent the inverse demand function in which the price is expressed as a function of quantity($p = P(q)$) ; the demand function, instead, expresses the quantity demand as a function of the price ($q = D(p)$)

→ The demand curve is downward-sloping, which is known as the "Law of demand"

→ The average cost ($AC(q) = C(q)/q$) measures the average cost per unit produced

→ The marginal cost ($MC(q)$ = first derivative of $C(q)$) measures the cost of producing one additional unit of a good, when the production level equals q

→ AC and MC are related: 1) when MC>AC, AC is increasing in q; 2) when MC<AC, AC is decreasing in q; 3) MC and AC intersect in sa local minimum of AC

→ The marginal revenue ($MR(q) = R'(q) = P(q) * q$) measures the increase in revenue obtained by producing and selling one additional unit of good

→ If P'(q) <= 0(demand curves are usually negatively sloped), then MR <= p and the intuition goes as follows: if the firm sells one additional unit of output at the price p. the firm's revenue increases by p => however, in order to stimulate demand for that additional unit, the firm needs to slightly decrease the price on all units => hence, there is a positive effect on revenue, p > 0, and a possibly negative one, P'(q)q <= 0

→ The price elasticity of demand (ε) measures the % change in demand that would occur in response to a marginal % increase in price : $\varepsilon = - 1/P'(q) * p/q$

→ Demand is elastic if $\varepsilon > 1$ and inelastic if $\varepsilon < 1$

→ The optimality condition for the purpose of plain profit maximization: MR = MC: the firm will raise q iff the revenue obtained by the production of an additional unit of output is greater than the associated cost; and can be written as $(p - MC)/p = \mu = 1/\varepsilon$

→ p - MC is the profit margin, and if we divide it by p, is called the markup => the firm's markup is inversely proportional to ε

→ If $\varepsilon \to$ infinity, the demand curve becomes horizontal, the firm loses its market power, and takes the market price as given, becoming a price take

NOTIONS

scarcity = A good that is valued, and for which there is an opportunity cost of acquiring more.

opportunity cost = When taking an action implies forgoing the next best alternative action, this is the net benefit of the foregone alternative.

marginal product = The additional amount of output that is produced if a particular input was increased by one unit, while holding all other inputs constant.

indifference curve = A curve of the points which indicate the combinations of goods that provide a given level of utility to the individual.

marginal rate of substitution (MRS) = The trade-off that a person is willing to make between two goods. At any point, this is the slope of the indifference curve.

marginal rate of transformation (MRT) = The quantity of some good that must be sacrificed to acquire one additional unit of another good. At any point, it is the slope of the feasible frontier

diminishing marginal returns to consumption = The value to the individual of an additional unit of consumption declines, the more consumption the individual has

feasible set = All of the combinations of the things under consideration that a decision-maker could choose given the economic, physical or other constraints that he faces.

feasible frontier = The curve made of points that defines the maximum feasible quantity of one good for a given quantity of the other.

budget constraint = An equation that represents all combinations of goods and services that one could acquire that exactly exhaust one's budgetary resources.

income effect = The effect that the additional income would have if there were no change in the price or opportunity cost.

substitution effect = The effect that is only due to changes in the price or opportunity cost, given the new level of utility**.**

Chapter 3

→ Disposable income, or income tout court, is the amount of money received as profit, interest, rent, labor earning (wages and salaries) and other payments (including transfers), net of taxes, over a period of time

→ Income is a flow variable, being measured per unit of time

→ Wealth is the market value of the stock of assets owned, including real assets (buildings, land, capital goods) and financial assets (share or bonds), net of outstanding debts (mortgages)

→ Wealth is a stock variable, being measured at a point of time; wealth is the accumulation of past and current savings; wealth is the largest amount you could consume without borrowing

→ The value of real assets tends to decline, either due to use or simply the simply passage of time, which is called as depreciation

→ Net income is income minus depreciation; net income is the maximum amount you could consume and leave your wealth unchanged

→ Assets like shares, loans and bonds provide a stream of income in the future

→ One is offered a financial contract that promises to pay F in one year's time; alternatively, he/she could deposit his money in his bank account and earn a yearly interest rate i; the maximum price p he/she would be willing to pay for his IOU is known as BREAK - EVEN PRICE: $p * (1+i) = F$

→ He/She values the IOU no more that $p = F/(1+i)$, which is known as the present value of the future payment F

→ The current price of the bond and its yield are inversely related

→ Consider now a different situation, we receive a coupon C every year

for T years and the face value F at maturity; the break-even price for this asset is

$$p = \sum_{z=1}^{T} \frac{C}{(1+i)^z} + \frac{F}{(1+i)^T}$$

→ Borrowing and lending are about shifting consumption and production over time

→ Intertemporal budget constraint: present value of consumption flow needs to be less or equal to the present value of income

→ Impatience is the physiological characteristic of an individual who values and additional unit of consumption now over the same additional unit later

→ Impatience is typically caused by: 1) myopia = people experience present satisfaction more strongly than they imagine the same satisfaction at a future date; 2) prudence = people know that the future is uncertain and prefer to enjoy current satisfaction as long as they can

→ Impatience implies that ICs are characterized by a MRS > 1

→ A balance sheet summarizes what a household or firm owns and what it owes to other

→ Net worth(wealth) = assets - liabilities and represent accumulated savings over time; it does not change when you lend or borrow

→ A loan creates both an asset and a liability on your balance sheet

→ Financial transactions are settled through the transfer of legal tender, which is also called base money(to be accepted by law)

→ Base money comprises cash and commercial bank reserves

→ In modern economies, CBs are concerned with monetary policy, financial stability and the workings of the payment system

→ Banks create bank money, which is not legal tender, in the form of bank deposits in the process of supplying credit

→ Bank money is a liability of commercial banks, while base money is seen as liability of the CB

→ Broad money comprises of coins and bank money

→ Banks do not need to have available the legal tender to cover all transactions or demand for cash; this is known as fractional-reserve banking

→ Banks' role as of providers of credit and payment services is reflected in their ability to transform risky(for the bank), illiquid, long - maturity assets into relatively safe(for the depositors), liquid, short - maturity liabilities

→ With this business model, the bank takes on 2 types of risks: 1) credit risk: the risk of a borrower being unable to repay her debt => balance sheet insolvent; 2) liquidity risk: the risk that a large number of depositor may withdraw their savings at once, leaving the bank short of legal tender => cash-flow insolvent

→ Banks borrow from each other on the interbank market since, at any moment, some bank will have excess reserves and other not enough; most of these loan are being overnight

→ Transaction among bank in the interbank market may affect the distribution of reserves, not their overall amount; the banking system as a whole cannot increase or decrease the total amount of reserves on its own initiative

→ The supply of reserves and base money is firmly in the hands of CB, which gives the CB also the power to control the short-term interest rate

→ The CB broadly manages the supply of reserves in 2 ways: 1) Open Market Operations, which are initiated by CB; 2) Stunting facilities, which are initiated by CBs' counterparties

→ The marginal lending facility provides collateralized overnight loans on demand, at the marginal lending rate

→ The deposit facility allows counterparties to deposit funds with the CB, remunerated at the deposit rate

→ Buying and selling securities from the non-bank private sector affects the money supply

→ Bank lending increases the supply of broad money, but not permanently

→ The need to borrow short-term in order to reach the desired reserve ratio makes lending and purchasing securities a costly activity, over and above the pure credit risk and limits the supply of broad money

NOTIONS

money = Money is something that facilitates exchange (called a medium of exchange) consisting of bank notes and bank deposits, or anything else that can be used to purchase goods and services, and is generally accepted by others as payment because others can use it for the same purpose. The 'because' is important and it distinguishes exchange facilitated by money from barter exchange in which goods are directly exchanged without money changing hands.

broad money = The stock of money in circulation, which is defined as the sum of bank money and the base money that is in the hands of the non-bank public.

base money = Cash held by households, firms, and banks, and the balances held by commercial banks in their accounts at the central bank, known as reserves. Also known as: high-powered money.

bank money = Money in the form of bank deposits created by commercial banks when they extend credit to firms and households.

wealth = Stock of things owned or value of that stock. It includes the market value of a home, car, any land, buildings, machinery or other capital goods that a person may own, and any financial assets such as shares or bonds. Debts are

subtracted—for example, the mortgage owed to the bank. Debts owed to the person are added.

income = The amount of profit, interest, rent, labor earnings, and other payments (including transfers from the government) received, net of taxes paid, measured over a period of time such as a year. The maximum amount that you could consume and leave your wealth unchanged.

pure impatience = This is a characteristic of a person who values an additional unit of consumption now over an additional unit later, when the amount of consumption is the same now and later. It arises when a person is impatient to consume more now because she places less value on consumption in the future for reasons of myopia, weakness of will, or for other reasons.

collateral = An asset that a borrower pledges to a lender as a security for a loan. If the borrower is not able to make the loan payments as promised, the lender becomes the owner of the asset.

balance sheet = A record of the assets, liabilities, and net worth of an economic actor such as a household, bank, firm, or government.

asset = Anything of value that is owned

liability = Anything of value that is owed

net worth = Assets less liabilities

equity = An individual's own investment in a project. This is recorded in an individual's or firm's balance sheet as net worth

solvent = A firm or individual for which net worth is positive or zero. For example, a bank whose assets are more than its liabilities (what it owes).

credit-constrained = A description of individuals who are able to borrow only on unfavourable terms

credit-excluded = A description of individuals who are unable to borrow on any terms.

policy (interest) rate = The interest rate set by the central bank, which applies to banks that borrow base money from each other, and from the central bank. Also known as: base rate, official rate

Chapter 4

→ A whole economy is better viewed as a systems where various agents interact

→ Gross Domestic Product (GDP) is a statistic that measures the value of the aggregate production in a given time period

→ The Circular Flow model implies that: value of final sales = income

→ From the production side: GDP is the market value of all final goods and services within an economy during a given period of time

→ From the income side: GDP is the sum of all incomes generated and distributed in the economy in a given period of time

→ The Gross Domestic Product is the market value of all final goods and services within an economy during a given period of time

- **gross** = not accounting for depreciation of capital;
- **market value** = market prices are used;
- **all** = all items produced in a economy and sold;
- **final** = intermediate goods are not counted, to avoid double counting;
- **good and services** = both tangible good and intangible services
- **produced** = currently produced, not including things produced in the past
- **within an economy** = production within the geographical boundaries of a region
- **during a given period of time** = flow of income and expenditure during a given period of time

→ Value added is defined as the value of production minus the value of intermediate goods used in production => GDP is the sum of the value added in economy during a given period of time

→ GDP is not a measure of social welfare

→ Nominal GDP is the sum of the quantities of final goods and services produced times their current market price

→ Real GDP is constructed as the sum of the quantities of the final goods and services times constant prices; those constant prices are the prices that prevailed in some specific base year => in base year: RGDP =GDP

→ The GDP deflator is a price index defined as the ratio of the nominal GDP to real GDP; it tracks the change in prices of all domestically produced final goods and services; it can be interpreted as the general price level

→ The Consumers Price Index(CPI) measures the general level of prices that consumers have to pay for goods and services, including consumption taxes; it is based on a carefully constructed representative basket of consumption goods, whose prices are sampled at regular intervals; it excludes exports but includes imports; changes in the total cost of this representative basket capture the evolution of the cost of living

→ The movement from boom, to recession, and back to boom is known as business cycle

→ The Okun's law refers to the changes in the rate of growth of the GDP are negatively correlated with the rate of the unemployment

→ For credit-constrained individuals the correlation between current income and current consumption tends to be quite high

NOTIONS

recession = The US National Bureau of Economic Research defines it as a period when output is declining. It is over once the economy begins to grow again. An alternative definition is a period when the level of output is below its normal level, even if the economy is growing. It is not over until output has grown enough to get back to normal. The latter definition has the problem that the 'normal' level is subjective.

Okun's law = The empirical regularity that growth of GDP is negatively correlated with the rate of unemployment.

aggregate demand = The total of the components of spending in the economy, added to get GDP: $Y = C + I + G + X - M$. It is the total amount of demand for (or expenditure on) goods and services produced in the economy

consumption © = Expenditure on consumer goods including both short-lived goods and services and long-lived goods, which are called consumer durables.

investment (I) = Expenditure on newly produced capital goods (machinery and equipment) and buildings, including new housing.

government spending (G) = Expenditure by the government to purchase goods and services. When used as a component of aggregate demand, this does not include spending on transfers such as pensions and unemployment benefits

government transfers = Spending by the government in the form of payments to households or individuals. Unemployment benefits and pensions are examples. Transfers are not included in government spending (G) in the national accounts

exports (X) = Goods and services produced in a particular country and sold to households, firms and governments in other countries.

imports (M) = Goods and services produced in other countries and purchased by domestic households, firms, and the government.

consumer price index (CPI) = A measure of the general level of prices that consumers have to pay for goods and services, including consumption taxes.

GDP deflator = A measure of the level of prices for domestically produced output. This is the ratio of nominal (or current price) GDP to real (or constant price) GDP.

Chapter 5

→ I is formed of fixed investments(non residential investment + residential investment) and of change in inventories

→ G does not include government transfers nor interest payments on public debt

→ Trade balance is equal to net exports

→ Y = C + I + G + X - M

→ Disposable income is defined as income minus taxes

→ Consumption depends positively on disposable income(C(Yd) = c0 + c1 * Yd); 1 > c1 > 0 is the marginal propensity to consume = the effect that one additional unit of disposable income has on C) ; c0 is the autonomous consumption level

→ Autonomous consumption captures all the other influences on consumption that are not related to disposable income

→ Keynesian approach : firms do not operate at full capacity, meaning there are underutilized resources => "demand creates its own supply"

→ The equilibrium condition can be summarized as $Y = (\frac{1}{1-c_1}) \times A$. where A is the autonomous depend (does not depend on income)

→ $\frac{1}{1-c_1}$ is known as the multiplier of aggregate demand, which is the sum of all the successive increases in production by the initial rise in A

→ If there is an increase in autonomous demand , there will be 2 effects on AD: 1) direct effect: the increase in A causes a one-to-one increase in Ad, being the former a component of the latter, and therefore in output, Y; 2) indirect effect: the initial rise in Y generates a less-than-proportional increase in

C => it causes a further increase in Y, which drives C up again and so on and so forth

→ In a closed economy, we have the IS relation: the aggregate level investment is identically equal to savings

→ The paradox of thrift states that: consumers try to save more, reduce aggregate demand, induce a drop in income and end up saving the same amounts as before

→ The government can dampen the business cycle in 3 ways: 1) sheer the size of the government sector: unlike private I and C, government I and C is usually stable; 2) unemployment benefits(and other automatic stabilizers): these help to smooth consumption; 3) fiscal policy: the government can directly and deliberately intervene to stabilize the AG

→ When the government cuts taxes or increase G in a recession, it's called a fiscal stimulus

→ Firm invest in order to build additional productive capacity or maintain the existing one

→ A profit-maximizing firm will invest as long as the expected rate of return exceeds the interest rate; a higher interest rate reduces I and vice versa

→ Imports depend on domestic income ($M = m * Y$), where m denotes the marginal propensity to import

→ The size of the multiplier is inversely related to the tax rate and the marginal propensity to import

→ With fully employed resources, an increase in government spending would displace, or even crowd out, some private spending, reducing possibly to 0 the multiplier's effect

→ Fiscal policy multipliers are larger in a recession than in an expansion

NOTIONS

multiplier process = A mechanism through which the direct and indirect effect of a change in autonomous spending affects aggregate output

multiplier model = A model of aggregate demand that includes the multiplier process.

marginal propensity to consume (MPC) =The change in consumption when disposable income changes by one unit.

marginal propensity to import =The change in total imports associated with a change in total income.

consumption function (aggregate) = An equation that shows how consumption spending in the economy as a whole depends on other variables. For example, in the multiplier model, the other variables are current disposable income and autonomous consumption.

investment function (aggregate) = An equation that shows how investment spending in the economy as a whole depends on other variables, namely, the interest rate and profit expectations.

goods market equilibrium = The point at which output equals the aggregate demand for goods produced in the home economy. The economy will continue producing at this output level unless something changes spending behaviour.

autonomous consumption = Consumption that is independent of current income.

autonomous demand = Components of aggregate demand that are independent of current income.

fiscal stimulus = The use by the government of fiscal policy (via a combination of tax cuts and spending increases) with the intention of increasing aggregate demand.

paradox of thrift = If a single individual consumes less, her savings will increase; but if everyone consumes less, the result may be lower rather than higher savings overall. The attempt to increase saving is thwarted if an increase in the saving rate is unmatched by an increase in investment (or other source of aggregate demand such as government spending on goods and services). The outcome is a reduction in aggregate demand and lower output so that actual levels of saving do not increase.

business cycle = Alternating periods of faster and slower (or even negative) growth rates. The economy goes from boom to recession and back to boom.

long run (model) = The term does not refer to a period of time, but instead to what is exogenous. A long-run cost curve, for example, refers to costs when the firm can fully adjust all of the inputs including its capital goods; but technology and the economy's institutions are exogenous

medium run (model) = The term does not refer to a period of time, but instead to what is exogenous. In this case capital stock, technology, and institutions are exogenous. Output, employment, prices, and wages are endogenous.

short run (model) = The term does not refer to a period of time, but instead to what is exogenous: prices, wages, the capital stock, technology, institutions.

Chapter 6

→ For each level of employment, the wage-setting curve determines the real wage that results from the wage-setting process

→ The ws-curve can be interpreted in the following ways: 1) if $w = w_{ws}$, them employers are paying and employees earning a real wage that both consider optimal given the current labor market conditions; 2) if $w > w_{ws}$, then the employers are paying a real wage higher than the optimal one and they will use their bargaining power to reduce the nominal wage; 3) if $w < w_{ws}$, then the employees are earning a real wage lower than their optimal one: they will bargain for a higher nominal wage

→ The ws-curve is upward sloping because an increase in unemployment will reduce the employees individual bargaining power and increase the employers one

→ The economy-wide real wage compatible with profit maximization is equal to the average output per worker, λ, minus the real profit per worker, λμ

→ The price-setting curve identifies the real wage that is consistent with the markup over costs, when all firms set their profit-maximizing price; it does not depend on the level of employment(λ - λμ)

→ In equilibrium there's no incentive to change the nominal wage nor the price level

→ There are 2 models of output and employment connected by the aggregate production level: 1) a demand-side model: the multiplier model explains how spending decisions generate demand for goods and services, and , as a result, employment and output; 2) a supply-side model: the labor market model focuses on how labor is employed to produce goods and services, and how wages and prices react to changes in market conditions

→ As long as output and employment are above the natural level, and therefore unemployment is below its own, the wage-price spiral generates positive and sustained inflation

→ The bargaining gap and its effect on inflation can be jointly represented using the Phillips Curve diagram; PC identifies the positive relationship between the level of employment and the rate of inflation and the negative relationship between the level of unemployment and the inflation rate

→ The PC is condemned to be unstable, since the trade-off between inflation and unemployment can only be temporary, not permanent

→ The PC is not a set of feasible choices: if a government tries to keep unemployment " too low" the result will be not just high inflations, but raising inflation

→ Agents are forward looking and they treat prices as messages

→ The wage bargaining process is eminently forward-looking: workers and firms care about the evolution of their purchasing power over the labor contract period

→ Even if the bargaining gap is zero, a positive rate of expected inflation will induce upward pressure on the nominal wage and therefore a positive rate of inflation

→ If the bargaining gap is positive/negative, the upward pressure on W will be stronger/weaker than the one implied by expected inflation alone, and the inflation will be higher

→ An increase in expected inflation implies an upward shift of the PC

→ CBs try to control the inflation rate using: 1) short-term interest rate: CBs directly control the cost of reserves and therefore the short-term interest rate; 2) expectations: Cbs can influence expectations about future interest and inflation rates, taking advantage of their credibility; 3) long term interest rates and overall financial conditions: CBs can purchase long-term bonds, possibly

directly from the public (Quantitative easing) in order to induce a drop in long-term interest rates, provide liquidity and clean up balance sheets

→ The set of policies that CBs implement in the pursuit of their goals is known as monetary policy

→ In normal times, the CB is neither involved in direct lending to the private sector or the government, nor in outright purchases of government bonds, corporate debt or other types of debt instrument

NOTIONS

disinflation = A decrease in the rate of inflation.

inflation = An increase in the general price level in the economy. Usually measured over a year

deflation = A decrease in the general price level

real interest rate = The interest rate corrected for inflation (that is, the nominal interest rate minus the rate of inflation). It represents how many goods in the future one gets for the goods not consumed

Phillips curve = An inverse relationship between the rate of inflation and the rate of unemployment.

bargaining gap = The difference between the real wage that firms wish to offer in order to provide workers with incentives to work, and the real wage that allows firms the markup that maximizes profits given the degree of competition.

quantitative easing (QE) = Central bank purchases of financial assets aimed at reducing interest rates on those assets when conventional monetary policy is ineffective because the policy interest rate is at the zero lower bound

inflation targeting = Monetary policy regime where the central bank changes interest rates to influence aggregate demand in order to keep the economy close to an inflation target, which is normally specified by the government.

Chapter 7

→ In an open economy, some relevant income flows originate from abroad

→The Net Income From Abroad(NIFA) is the net primary income from abroad i.e. net factor incomes from abroad plus net transfers from abroad

→ GDP + NIFA = Gross National Disposable Income (GNDI)

→ GNDI - T - C - I = G - T + NX + NIFA is called the sectoral balance, where GNDI - T = after-tax disposable income, GNDI - T - C - I = surplus of private sector, G - T = (primary) deficit of public sector, NX + NIFA = deficit of foreign sector

→ If disposable income exceeds the private's sector's spending on consumption and investment, the private's sector net worth increases, either through purchases of additional assets or repayments of existing debt obligations

→ If the public sector's total expenditure exceeds taxes and other revenues, the public sector's net worth decreases

→ If the value of exports, plus net income from abroad is larger than the value of imports, then the foreign sector's net worth decreases

→ Since each sector can only trade with the remaining 2, its surplus/deficit implies an decumulation/accumulation of financial claims on one of the other sectors, or on both

→ The financial imbalances of all sectors must sum to zero

→The domestic economy's net worth reduces to the value of its stock of real assets plus its net foreign asset position(foreign assets owned by its residents - domestic assets owned by foreigners)

→ A primary budget deficit will decrease the government's net worth, but will increase that of the private or foreign sectors

→ If the government issues sovereign bonds to finance its deficit, then either the private sector or the foreign sector will acquire them, and increase their holdings of financial assets

→ The Current Account (CA = NX + NIFA) records the difference between the sum of exports and income receivable from non-residents and the sum of imports and income payable to non-residents

→ The national accounting identity can be rewritten as: S - I = CA where S - I = the joint surplus of the domestic private and public sectors i.e. the surplus of the domestic economy; CA = the deficit of the foreign sector

→ The surplus of the domestic economy is always equal to the deficit of the rest of the world

→ The balance of payments: CA + I - S = 0, where CA = current account balance, I - S = capital + financial accounts balance

→ There are 3 ways for the government to financing its deficit, and all them will decrease the public sector's net worth: 1) borrow domestically: the government can issue sovereign debt and sell it to the domestic private sector; 2) borrow abroad: the government can issue debt denominated in domestic or foreign currencies and sell it to the foreign sector; 3) " print money" : the government can issue sovereign debt and sell it directly to the domestic CB, in exchange for CB reserves

→ B^{T}_{t-1} = the total stock of sovereign debt(domestic and external) outstanding at the end of period t - 1, and therefore at the beginning of period t; i_{t} = the nominal interest rate to be paid on the stock of debt, outstanding at the beginning of period t; B^{CB}_{t-1} = the stock of sovereign debt in the hands of the CB $B_{t-1} = B^{T}_{t-1}$ - B^{CB}_{t-1} = the stock of sovereign debt in the hands of the public; M_{t-1} = the stock of base money

→ $\Delta M = M_{t} - M_{t-1}$ = seigniorage = the revenue from base money creation

→ The consolidated government's budget constraint:

$D_t + i_t B_{t-1} = \Delta B_t + \Delta M_t$, where D_t = government primary deficit, $i_t B_{t-1}$ = interest payments, $D_t + i_t B_{t-1}$ = total government deficit, and $\Delta B_t + \Delta M_t$ = change in government liabilities = change in stocks

→ There are 2 important implicit assumptions that guarantee the formal validity of the above constraint: 1) absence of default: the government is always paying the interest and principal matured in the period; 2) liquid markets: domestic and foreign private investors are willingly catering to the government borrowing needs

$$\rightarrow b_t = (1 + i_t) \times \frac{b_{t-1}}{1+\pi_t} + cd_t, \text{ where } cd_t = d_t - m_t + \frac{m_{t-1}}{1+\pi_t} => a$$

positive ex-post inflation rate acts as a negative interest rate on the consolidated government's liabilities: inflation shrinks the real value of the stocks of sovereign debt and base money inherited from t - 1(which is known as inflation tax)

→ A positive inflation rate allows the government to issues new nominal debt and new base money without increasing the real value of its liabilities

→ The Fisher equation link the real interest rate to the nominal rate and the expected inflation rate: $1 + r_t = \frac{1+i_t}{1+\pi_t^e}$ => unexpected inflation cannot be compensated by higher nominal interest rates

→ If inflation is completely expected, the inflation tax hits exclusively the stock of non-interest-bearing base money; however, if some ex-post inflation is unexpected, then inflation tax hits to the stock of sovereign debt too, effectively decreasing its real value

→ The government's ability to service a stock of debt depends on the size of its tax base, which is proportional to GNP

$$\rightarrow R_t = \frac{1+\bar{r}_t}{1+\gamma_t}, \text{ where } \gamma_t = \text{the net growth of the real GNP}$$

→ The budget constraint can be restated as a linear non-autonomous first-order difference equation: $b_t = R_t \times b_{t-1} + cd_t$

→ A balanced consolidated primary budget implies $cd_t = 0 \Rightarrow$ G is fully financed via T or ΔM , while the maturing stock of debt and the flow of interest are financed with the new debt, so that $b_t = R_t \times b_{t-1}$

→ Rational and forward-looking savers may not be fond of lending to a borrower who is never going to pay principal and interest => at some point, investors may start to worry about the debt's sustainability and stop buying newly emitted bills

→ To avoid this possibility, we impose the so-called No-Ponzi-Game(NPG) condition and assume that b grows in the long run(t → infinity) at a gross rate strictly smaller than R

→ Any amount of initial debt must be covered by the present discounted value(PDV) of all future consolidated primary balances

$$\rightarrow b_0 + \sum_{s=1}^{infinity} \frac{g_s}{R^s} = \sum_{s=1}^{infinity} \frac{\tau_s}{R^s} + \sum_{s=1}^{infinity} \frac{se_s}{R^s} \text{ , where } \sum_{s=1}^{infinity} \frac{g_s}{R^s} =$$

PDV of government expenditure, $\sum_{s=1}^{infinity} \frac{\tau_s}{R^s} =$ PDV of taxes and $\sum_{s=1}^{infinity} \frac{se_s}{R^s} =$

PDV of seigniorage => any fiscal deficit must be covered by future fiscal surpluses or future seigniorage

→ A permanent roll-over strategy can be sustainable when R < 1: the government can finance some its expenditure with new debt and roll it over indefinitely if private investors are willingly buying new emissions

→ When R > 1, the situation is very different: investors would not allow the government to run a permanent roll-over scheme, and this represents a financial constraint on the government's fiscal plans

@astrabocconi

@astrabocconi

@astrabocconi