1 Macroeconomics

Macroeconomics (Greek *makro* = 'big') describes and explains economic processes that concern *aggregates*. An aggregate is a multitude of economic subjects that share some common features. By contrast, microeconomics treats economic processes that concern individuals.

Example: The decision of a firm to purchase a new office chair from company X is not a macroeconomic problem. The reaction of Austrian households to an increased rate of capital taxation is a macroeconomic problem.

Why macroeconomics and not only microeconomics? The whole is more complex than the sum of independent parts. It is not possible to describe an economy by forming models for all firms and persons and all their cross-effects. Macroeconomics investigates aggregate behavior by imposing simplifying assumptions ("assume there are many identical firms that produce the same good") but without abstracting from the essential features. These assumptions are used in order to build macroeconomic *models*. Typically, such models have three aspects: the 'story', the mathematical model, and a graphical representation.

Macroeconomics is 'non-experimental': like, e.g., history, macroeconomics cannot conduct controlled scientific experiments (people would complain about such experiments, and with a good reason) and focuses on pure observation. Because historical episodes allow diverse interpretations, many conclusions of macroeconomics are not coercive.

Classical motivation of macroeconomics: politicians should be advised how to control the economy, such that specified targets can be met optimally.

policy targets: traditionally, the 'magical pentagon' of good economic growth, stable prices, full employment, external equilibrium, just distribution

of income; according to the EMU criteria, focus on inflation (around 2%), public debt, and a balanced budget; according to BLANCHARD, focus on low unemployment (around 5%), good economic growth, and inflation (0–3%). In all specifications, aim is meeting several conflicting targets simultaneously.

Examples for further typical questions to macroeconomics: what causes business cycles (episodes of stronger and weaker economic growth)? can an increase in the monetary supply by the central bank cause real effects? what is responsible for long-run economic growth? should the exchange rate of a currency be kept at a fixed level? can one decrease unemployment, if one accepts an increase in inflation?

A survey of world economics: three large economic blocks (Europe, USA+Canada, Japan+Far East) with different problems, the remainder mostly developing countries.

1. **USA**: good growth, low inflation, tolerable unemployment rate, persistent external deficit, increasing income inequality.

2. **EU**: moderate growth, low inflation, in some countries high unemployment, inconspicuous external balance (total EU active, in Austria recently turned active), for some countries large public debt, currently important unification process, convergence and heterogeneity of individual countries. 'Richest' EU countries Luxembourg, Denmark, then 'mid-field' with Austria, IRL, B, NL, UK, D, F, FIN, I, S; slightly below E, GR, SLO, P. Last come most 'new' (2004 accession) countries (from Malta down to Latvia). Very 'rich' non-EU countries Norway, Iceland, and Switzerland.

3. **Japan**: recently weak growth, large external surplus, deflationary tendencies.

of the world', provided there are transactions with resident units. The same person can be part of a private household and of an enterprise (rents out an apartment, or even only uses his/her own condo but is assumed to rent it out to him/herself).

resident is an institutional unit that is situated on a country's territory. Citizenship is not the criterion for residence. However, foreign students or short-term foreign workers are not viewed as resident.

private households: produce and invest relatively little, consume, obtain wage and profit income from corporations and from the government. As self-employed persons, they obtain '*mixed income*', though the separation of households from corporations is occasionally difficult. Small (non-corporate) firms and farms are counted as private households.

general government ('public sector'): receives taxes from enterprises and from private households, provides public goods ('consumes them by itself' according to SNA), no intention of profit.

corporations: produce and invest, do not consume, intention of profit. Corporations, not the government sector, comprise also firms in public property, if they cover 50% of their costs from sales. Because depreciation is now called 'consumption of fixed capital', it represents a kind of consumption of corporations. Corporations are either *financial* (banks etc.) or *non-financial*.

non-profit institutions serving households (NPIsH): institutions (such as schools, churches) that cover less than 50% of their production costs from sales; idea: no intention of profit. A small sector, for simplification often added to households.

rest of the world: consumes goods and services produced by residents (*exports*) and produces goods and services consumed by residents (*imports*).

imports of services: includes travels abroad by residents

means

$$\begin{aligned} M^s &= \bar{M} \\ M^d &= \$YL(i) \\ M^s &= M^d \end{aligned}$$

Graphically, the vertical line $M^s = \bar{M}$ intersects the money demand curve at a unique point, which determines the interest rate i. Thus, a given $\bar{M}$ determines i uniquely. The equation $M = \$YL(i)$ is called **LM** identity, which is for 'liquidity is money' and is the counterpart to the IS identity 'investment is saving'. If both the LM and the IS identity hold, there is equilibrium in the goods market *and* in the money market.

Experiments:

1. The nominal income $\$Y$ is increased exogenously, for example by increasing government expenditure. $\bar{M}$ is set by the central bank and does not budge. The money demand curve shifts outward, the equilibrium interest rate i rises.

2. The central bank increases the money supply $M^s = \bar{M}$. The vertical line shifts to the right, the money demand curve does not move. The equilibrium interest rate i falls.

How does the central bank do it? The central bank can use three different tools: open-market operations, reserve requirements, discount rate. In open market operations, the central bank buys or sells bonds or other assets and pays or receives money. It thus increases or decreases the amount of money in circulation. Tightening the reserve requirements leads to tightening of money, similar to an increase of the discount rate. Currently, the most important instrument is open-market policy.

4.4 The money multiplier

The stock of printed money H (*high-powered money*) is called **monetary base** and is partly stocked at the commercial banks, partly it is circulating:

$$H = CU + R$$

R denotes the reserves of banks, CU for '*currency*' (cash money). Today, usually 'money supply' is defined as **M1**, the sum of currency and demand deposits:

$$M = CU + D$$

The banks can create money far beyond the monetary base. They face two restrictions:

1. The minimum reserves required by the central bank, which are kept by the banks at low or no interest, lock the ratio $\theta = R/D$ from below.
2. The economic agents determine their own (street-corner shop, newspapers) cash demand coefficient $c = CU/M$.

From the relations, we obtain for demand deposit money D

$$D = M - CU = (1 - c)M$$

and therefore for the monetary base

$$H = CU + R = cM + \theta D = (\frac{c}{1-c} + \theta)D = \frac{c + \theta(1-c)}{1-c}D$$

and thus by inverting the ratio for demand deposit money

$$D = \frac{1-c}{c + \theta(1-c)}H$$

and for total 'money'

$$M = \frac{1}{1-c} D = \frac{1}{c + \theta(1-c)} H \quad .$$

The value $1/\{c + \theta(1-c)\}$ is called the *money multiplier*, as it indicates, by how much the money supply increases, if the central bank prints one additional unit of money. For small c and small θ, the multiplier becomes particularly large.

Example. BLANCHARD assumes $\theta = 0.1$, we further assume that $c = 0.05$ (compare this to your own private allocation between cash and demand deposits!). Then, the purchase of a bond for 1000 euro by the central bank against emission of ten 100 euro notes causes the bond seller to increase his demand deposit by 950 euro, while 50 euro of cash remain in the trouser pocket. The bank keeps 95 euro as reserve and buys bonds for 855 euro from a different bond seller. This bond seller keeps 42.75 euro in cash in the pocket of her jacket, while she increases her demand deposit by 855-42.75=812.25 euro. Even now, money M1 has almost doubled, but the chain continues and finally leads to $1/(0.05+0.1(0.95))$ euro, i.e. around 7000 euro, therefore to a sevenfold increase according to the above formula.

How is household wealth really allocated in Austria? Most Austrians do not own shares or stocks, the largest part is still kept in *saving accounts*. The wide-sense definition of money (M3) comprises cash money, demand deposits and also saving accounts. The graph (Figure 6) shows how the shares of these components have developed during the most recent decades.

nal (M, i) diagram. The vertical money supply line remains fixed, the money demand curve shifts right, as $\$Y$ rises. Therefore, a higher i corresponds to the same real income Y.

5.4 Fiscal policy in the IS-LM model

Fiscal policy is any economic policy by the government that concerns a change in government expenditure G or in government revenues T. In order to reduce a budget deficit (consolidation), either G can be lowered (less expenditures, difficult) or T can be increased (tax increase, introduction of new taxes, less difficult). Both cases are summarized as **restrictive fiscal policy**. In order to stimulate demand, the government may decrease taxes or increase expenditures. This is called **expansionary fiscal policy**. The expression 'restrictive' is more neutral than 'contractionary', as occasionally a restrictive policy may avoid contractionary effects on output.

In its narrow sense the **IS-LM model** is the cross that consists of the IS and LM curves in the (Y, i) plain. A change in the exogenous variables or in the parameters shifts one or both curves, and a new equilibrium is generated for both markets, a new point (Y, i). Typically, interest focuses on the question whether the change has resulted in a rise or fall of i or Y (**comparative statics**). More complex is the answer to the question, how the economy moves from the old to the new equilibrium and how long it takes (**dynamics**).

Government raises taxes T. The IS curve shifts left, as described before. The LM curve does not budge, as T does *not* occur in the money market model. Therefore, a new equilibrium to the left and below the old one is obtained. Y and i must both fall. Comparative statics is clear. One can only surmise the dynamics. With regard to Y, the immediate effect runs via

6 The labor market

Together with the goods and financial markets, the labor market, as a third market, completes the (open or closed) economy. While inventories in the goods market are often kept deliberately and financial markets move to their equilibria quickly, the labor market seems to be in a state of persistent disequilibrium, as there are **unemployed** persons who, though willing to supply labor, do not find a corresponding demand.

Supply and **demand**: Contrary to the goods and financial markets, where supply comes from the mighty firms or the powerful central bank and the demand side are the small households, in the labor market the suppliers are the households and demand comes from the firms (and the government). In more detail, supply of labor comes from all persons in the *labor force* (labor supply, work force). The share of the labor force in the active population (definitions vary, e.g., resident population from 15/18 and 65) is called the (labor) **participation rate**. The narrow sense *labor force* (*dependent labor force*) is determined by the *total labor force* minus the *self-employed workers*. The quotient of unemployed (=*labor force* minus employed persons) and *labor force* is the **unemployment rate**, which today is mostly measured by census methods. The **wage** is the price of the good 'labor' on the labor market.

Austria. The unemployment rate amounts to, according to various methods of measurement, around 4–7% and presently appears to be relatively constant after a long and steady increase. A stock of around 200,000 unemployed (in winter more, in summer less) corresponds to a flow of 40,000–50,000 persons, who become unemployed within every month or (while hitherto unemployed) find an employment (or reach the age of retirement, though these are relatively few). For the USA, the share of 'fluctuation' (inflow, outflow) in the unemployed is higher (>1/3). If the Austrian participation rate is

one has analogously

$$\begin{aligned} \frac{P_t}{P_{t-1}} &= \frac{P_t^e}{P_{t-1}}(1+\mu)(1+z_t-\alpha u_t) \quad , \\ \pi_t &\doteq \pi_t^e + \mu + z_t - \alpha u_t \quad . \end{aligned}$$

Here the *expected rate of inflation* π_t^e is defined by $(P_t^e - P_{t-1})/P_{t-1}$, i.e. by the inflation that is expected in $t-1$ for t. In the following '$\doteq$' will simply be replaced by '=', which is justified, as the form $F(u,z) = 1 + z - \alpha u$ was assumed arbitrarily.

Conclusion: The rate of inflation π_t tends to rise at higher **inflationary expectations**, as the wage earners demand for a higher wage rise, to compensate the price increases; it also rises at a higher **markup**, as then firms will even add more to wages; it falls with higher **unemployment**, as the bargaining power of workers drops; many more factors affect this relation.

Evidence: While, for many years, the curve appeared to fit the data well, it broke down in the 1970s (at least, this is what the text books say). Friedman explained this disappearance by several factors :

1. The OPEC price shock led to additional inflation that was not rooted in the price-wage spiral of the home economy. This implied high inflation at rather high unemployment.

2. A closer view of the modified Phillips curve reveals that a negative relationship is only possible when $\pi_t^e \neq \pi_t$. For 'rational' inflationary expectations $\mathrm{E}_{t-1}\,\pi_t = \pi_t^e$, π_t and π_t^e only differ by an unsystematic error, the values of u cluster around a 'natural unemployment rate', notwithstanding the level of the (on average, correctly expected) inflation. Trade unions, firms, wage earners learn sooner or later, how to form expectations rationally.

(modified) Phillips curve implies the relationship

$$\pi_t = \pi_{t-1} + \mu + z_t - \alpha u_t$$

and one obtains a relation between changes in the rate of inflation and unemployment rate

$$\pi_t - \pi_{t-1} = \mu + z_t - \alpha u_t \tag{24}$$

This function, which is in the focus of the text book and which is called the 'accelerating PHILLIPS-curve', is not satisfactory either, as a long-run stable variable (u) is equated with the growth rate of inflation. Then the rate of inflation would behave like a 'random walk', i.e. like a stock price, which is not plausible. If one trusts in (24), one sees that there is a value of u, for which the right side equals 0. Because price expectations are satisfied for the natural unemployment rate u_n, it must also hold that $\pi_{t-1} = \pi_t$ and therefore u must equal u_n. Therefore, u_n is also called the **NAIRU** (*non-accelerating inflation rate of unemployment*), as for this value the inflation does not accelerate. In theory, the form of the accelerating PHILLIPS-curve implies a NAIRU of

$$u_n = \frac{\mu + z}{\alpha} \quad .$$

Because, however, z is only a catchall variable without known numerical value, one cannot really calculate the NAIRU from this formula. Adepts of this specification can explain changes in the NAIRU by changes in the mark-up μ or in the bargaining power of workers z.

Note. The NAIRU formula $u_n = (\mu + z)/\alpha$ coincides with the natural rate u_n as determined from $F(u, z) = 1/(1+\mu)$, if one uses the approximation $1 - \mu = 1/(1 + \mu)$, which is valid for a small mark-up μ.

moderate economic performance. Comparative country studies confirm that Austria is an exception.

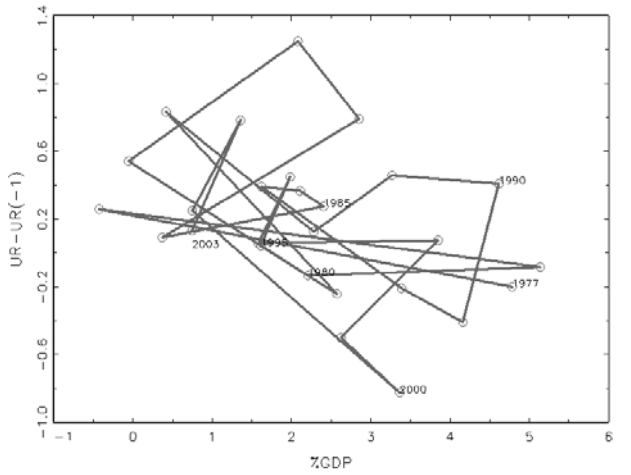

Figure 13: Okun's Law for Austrian data.

Note. OKUN's law focuses on growth rates. These are the main subject of so-called growth theory, which addresses long-run economic developments. The natural growth rate (e.g. 3%) is sometimes derived informally by considering a simple production function such as $Y = AN$. Then, if the *labor force* L, and in consequence also N, grows at 1%, the labor productivity A at 2%, then output should grow at 3%. In economic reality, structural changes, other production factors (e.g. capital) etc. play a non-negligible role.

8.2 Growth of money and inflation

BLANCHARD closes his medium-run model, which contains a Phillips curve in a debatable variant in differences

$$\pi_t - \pi_{t-1} = -\alpha(u_t - u_n) \quad , \tag{27}$$

are Switzerland, France, the USA, the United Kingdom, and Hungary (each 3–5%). Minor fluctuations of trade shares are mainly due to changes in the exchange rate. Major shifts often have other explanations. For example, from Figure 15, note the drastic fall of the UK share in the 1970s, which may be due to the British switch to the European Community from a common economic area with Austria in the EFTA, and the fall of the Japanese share in the 1990s, when Austria joined the European Union. By contrast, note from Figure 16 that the German trade share is subject to minor fluctuations only.

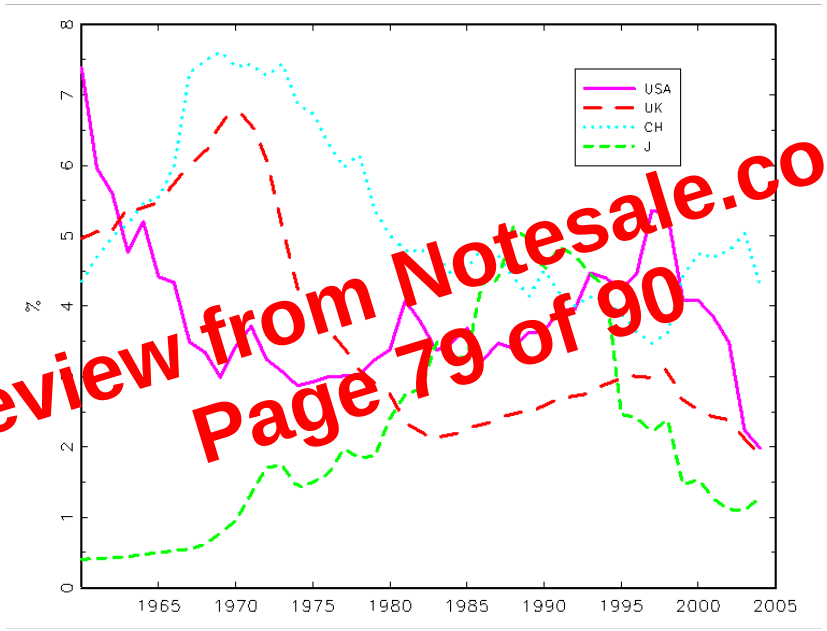

Figure 15: Shares of selected countries in Austrian imports for the time range 1960–2004. Annual data.

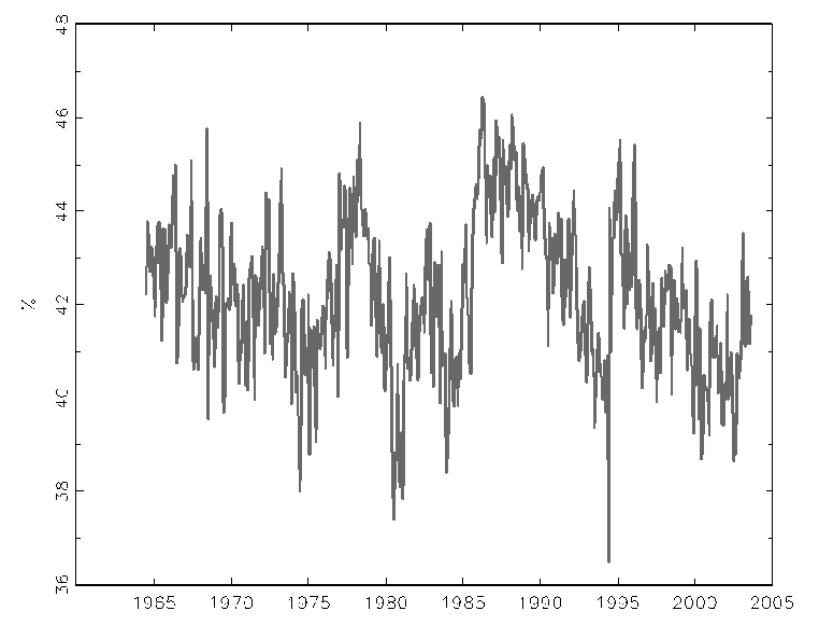

Figure 16: Share of Germany in Austrian imports 1964:2004. Monthly data.

9.2 Nominal and real exchange rates

One currency does not have an exchange rate, this word is always related to *two* currencies, e.g., euro and US dollar. From the viewpoint of the domestic economy (Austria), the **nominal exchange rate** (E) is defined as the quantity of dollars that is paid for one euro. The *larger* this value, the *more* dollars must be paid and the *higher* is the value of the euro and the *lower* is the value of the dollar. [Pure convention; this corresponds to the current official euro rates that are quoted in newspapers. You may remember figures like 12 and 18 from the schilling era, which denoted the amount of schilling that buy one dollar; this is exactly the reverse idea $1/E$. In case you use an older edition of BLANCHARD's book, note that the convention differed in editions #1 to #3.]

The **real exchange rate** (ε) tries to measure the exchange rate fluctu-

9.5 Investment and saving in an open economy

In a closed economy, the simple identities $S_H + T - G = I$ or $S_H + S_P = I$ hold. In an open economy, it follows from the identity

$$Y = C + I + G - \text{Im}/\varepsilon + X$$

after subtraction of $C + T$ on both sides that

$$Y - C - T = S_H = I + G - T - \text{Im}/\varepsilon + X$$

or

$$S_H + S_P - NX = I \quad .$$

Investment equals the sum of 3 positions: household saving, government saving, and the negative trade balance. The third position expresses financing of investment by net imports and therefore by foreign debt.

Conclusion: Countries with a high household-saving rate and budget surplus either have a positive trade balance or invest very much. A higher budget deficit is either compensated by more household saving, less investment, or a deficit in the trade balance.

Even this identity is an *ex post*–identity only and does not describe a behavioral mechanism. For example, it is not recognizable that a depreciation or appreciation *indeed* affect the trade balance, although it seems that NX is defined by $S_H + S_P - I$. The change of ε implies a change in demand and affects both S_H and I.

9.6 The IS-LM–model in the open economy

MUNDELL-FLEMING **model**. The analysis of economic policy in an open economy on the basis of the IS-LM diagram with the cases of flexible and fixed

effects. The intersection of the LM and IS curve does not only determine an equilibrium pair (Y, i), but also an equilibrium exchange rate.

fiscal policy in the open economy. The change in public demand causes a shift of the IS curve at a rigid LM curve. For example, expansionary fiscal policy. Both Y and i rise. The higher interest rate causes an appreciation because of (38), i.e. E increases. In summary, private consumption increases (depends directly on Y), while the behavior of investment is uncertain (higher Y, but also higher i), and net exports fall (MARSHALL-LERNER). In other words, the trade balance deteriorates.

Monetary policy in the open economy. The change in the money supply causes a shift of the LM curve at rigid IS curve. For example, expansionary monetary policy. Y rises, but i falls. The lower interest rate causes a depreciation, E falls. Private consumption, investment and net exports increase. This apparently ideal case includes, of course, the risk of inflation.

Fixed exchange rate. For diverse reasons, e.g. to eliminate exchange rate risk, it may seem attractive to keep the nominal exchange rate E fixed. The UIP determines the interest rate i uniquely, as i^* and E^e are exogenous. Therefore, at a fixed exchange rate there is no independent monetary policy any more, this policy instrument is no more available. Because E and E^e must coincide in the longer run, one sees from the UIP that $i = i^*$ must hold, i.e. there is only one 'international' interest rate. The advantages of a fixed exchange rate, such as easing of border-crossing trade with its welfare-increasing effect, must be gauged against the disadvantage of abandoning monetary policy as an instrument of economic policy.

Narrow-sense model cases of MUNDELL-FLEMING. While in the BLANCHARD variant with flexible exchange rate, the expected exchange rate E^e is exogenous and fixed, which entails certain logical problems, MUNDELL-