



Economics: Introductory Course to Economic Analysis

Pascal da Costa

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Pascal da Costa. Economics: Introductory Course to Economic Analysis. Licence. Economics course of the CentralSupélec engineering curriculum - University Paris-Saclay, FRANCE., Ecole Centrale-Supélec - University Paris-Saclay, FRANCE, France. 2021, pp.166. hal-03526060

HAL Id: hal-03526060

<https://hal.science/hal-03526060>

Submitted on 14 Jan 2022

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Economics

Introductory Course to Economic Analysis

Pascal DA COSTA¹

École CentraleSupélec, Université Paris-Saclay: Engineering Degree
September 2, 2021

My warm thanks to the teaching team for its precious help in the development of the course, to Mehdi Senouci and Yannick Perez.

All comments welcome: pascal.da-costa@centralesupelec.fr or on the forum
<https://centralesupelec.edunao.com/course/view.php?id=4209>

¹Professor at CentraleSupélec, campus Paris-Saclay / Département SHS / Laboratoire génie industriel : Équipe économie durable : <https://cv.archives-ouvertes.fr/pascal-da-costa/>

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How to Use this Textbook?

This textbook is a complementary tool to the lectures, the tutorials and the website (on Edunao <https://centralesupelec.edunao.com/my/>).

The primary purpose of this textbook is to review the economic issues raised in the lectures and to discuss the economic facts and the controversies between the various explanatory theories (first part of the textbook, entitled "The Course"). Compared to the lectures or the tutorials (you can find the exercises and texts to be commented on in the second part of the textbook), all equations may be found in the boxes.

On the economics course website, I will post regularly detailed corrections of tutorial exercises, as well as comments on texts and news articles from the media. **You will also find in this textbook, before the first tutorial, a methodological guide (my recommendations) for the Reflection Questions you will be asked during the exams.**

As for the slides and handouts of the amphitheatre lectures (on which figures and graphical analysis, statistics or equations describe the economic theories), they will also be available on the course website after each session (or even the day before, if I deem the version satisfactory).

Please note that I will add other documents (news articles, exercises, websites) to the course website regularly. **The forum can also be an exciting tool for collaborative work: you will start discussions, ask questions... I and pedagogical team or even other students will be able to answer your questions.**

Finally, I recommend the following manuals (all available in the library - in English for the most part) to deepen certain parts/chapters of the course:

- Begg et al. (2002a) *Macroéconomie*, Dunod.
- Begg et al. (2002b) *Microéconomie*, Dunod.
- Blanchard & Cohen (2002) *Macroéconomie*, Pearson Education.
- Burda & Wyplosz (1998) *Macroéconomie: une perspective européenne*, De Boeck.
- da Costa (2013) *Etats-Unis, Europe, Chine : des Etats au cœur des crises économiques et financières mondiales*, l'Harmattan.
- Mucchielli & Mayer (2005) *Economie internationale*, Dalloz.
- Picard (1992) *Eléments de microéconomie*, Montchrestien.
- Stiglitz (2000) *Principes d'économie moderne*, De Boeck.
- Varian (1995) *Analyse microéconomique*, De Boeck.

Part I

Course Chapters

Chapter 1

Introduction

That all students at École CentraleSupélec study economics is necessary for several reasons. We are in a university open to the world and it is for this reason that, from the very beginning of your schooling, you have been confronted with social issues through projects and teaching in which there is often a hidden or clearly affirmed economic dimension. Moreover, you have probably already read the economic press/journals and heard about economic variables and concepts: the engines of growth, the inflation-unemployment relationship, the types of competition, the European Central Bank and other economic institutions, and so on. It is now time to clearly define all this and finally grasp the economic debates in all their complexity. In doing so, you will all, at least once in your schooling, come across the views of economists on the major problems and debates running through our society. It is a good bet that you will come across economic issues in your future professional life that we will have tackled together: mastering them will enable you to better understand the economic environment of your company or your job and, more broadly, to better understand your own environment as a citizen.

In this course, we will study economics like any other scientific discipline, that is to say, by learning its basic protocol. But it is not about making you economists: this course is a fairly complete introduction, but still... an introduction! The main objective is to make economic sense, but not to master in detail all the tools of economists.

Now, before going any further, let us stop for a moment on this first questioning: we have just implied that economics is a scientific discipline like any other, isn't it? We wrote: "In this course, we are going to study economics like any other scientific discipline, that is to say, by learning its basic protocol". But is it really the case? Can we say that economics is a Science?

1.1 Is Economics a Science?

Assuming that there are at least two main reasons why we may have doubts about the scientificity of economic analysis. First, we notice that there is a very progressive and slow progress in the knowledge of economics or the understanding of economic mechanisms (we will briefly discuss at the end of this first chapter a History of Economic Thought), but without being able to speak of real discoveries, in the sense that we would find something that was hidden or totally unknown. You may have also heard of the criterion of scientificity according to Popper (1953) which stipulates that a proposal is scientific when it can be refuted by observation; yet experimentation is a rare phenomenon in economics. Indeed, economic phenomena very rarely repeat themselves identically. And it is difficult to carry out controlled experiments, i.e. experiments that allow phenomena to be isolated and set certain variables to "measure" the effects of others. In fact, we have to be satisfied with unique and very real experiments (for example the famous subprime crisis of 2008) to find THE explanatory theory (why this crisis? What new mechanisms are at play?). But economic policies or economic reforms can provide natural experiments to test hypotheses... more on this later.

Breaking the mold of scientificity is not, however, the only defining feature of economics! Indeed, the so-called hard sciences, such as climatology for example, also suffer from this criticism: the global predictions of climate models cannot be empirically tested on a very large scale (not to mention the ineffectiveness of a simple physical laboratory experiment). The interconnections between variables are numerous, complex (e.g. modelling the water cycle with ocean rollers), random (e.g. an isolated volcanic eruption has a major effect on the global climate) and not all of them are yet known or well understood. Economics is in a situation similar to that of climatology: thanks to the development of statistical knowledge, the increase in computing power of computers, and the creation of increasingly accurate and rich databases (see Eurostat, the centre for European statistics, available online), the experimentation in economics is progressing and, for only a few decades now, it has been possible to compare data with models thanks to econometrics (which is the branch of statistics that enables economic data to be processed). These regressions and econometric estimates can then be used to carry out economic policy simulations (testing the multiple effects of a reform, for example).

An economic model (like any model in any other science) is a set of assumptions and laws from which a theoretical representation of the functioning of the economy is derived. A law is intended to give a representation of the links between economic variables, whereas hypotheses are simplified representations of reality. The results of the models therefore

depend only on the assumptions and laws used. This approach makes it possible to formulate understandable and usable theories. If the conclusions appear erroneous, it is because the assumptions must be changed. Economic analysis is therefore largely based on a hypothetico-deductive approach, insofar as theories and models are developed on the basis of assumptions. Finally, theories can also be tested and challenged through the observation of facts in an inductive approach.

However, it must be acknowledged that economic analysis remains highly criticized for its status as a science when it is carried out in a hypothetico-deductive so-called *isolated approach*, this is when models and theories are developed from assumptions without the work of fact-finding and verification being carried out. In an isolated approach, models are considered "valid" because they are mathematically correct. This somewhat odd way of proceeding often occurs when statistical data are missing or imprecise. Therefore, future econometric studies will need to be conducted once the data are available. But sometimes the North Star of mathematics can lead some economists astray and isolate their models from any empirical verification. The model becomes a (beautiful) object for what it is only and without questioning its real utility!

You should know that mathematical formalisation is now omnipresent in economic science and this is why, on this course, we will use mathematics to describe some economic mechanisms¹. Mathematics has the essential virtue of making obvious and rapid reasoning that would otherwise be tedious and allows us to avoid sophistry or erroneous reasoning. Modelling is a simplification process that allows a better understanding of the workings involved. But we will only study rudimentary mathematical techniques, since our objective is to remain focused on economic phenomena and very little on mathematical aspects (you already master the latter but not the former). Sometimes, you may also be a little shocked by assumptions that seem reductive, but always keep in mind that they could be overcome if we made the models more complex: as this course is an introduction to economics, we will have to stop at mathematical models that are sometimes frustrating, but often rich in meaning.

1.2 What is Economic Analysis?

Economic analysis, or economic science, is based on the observation that human needs are unlimited while available resources are scarce (limited). This observation therefore

¹Other currents of research in economics do not need mathematics, but their field of analysis seems less extensive than that of the neoclassical mainstream thinking, which covers almost all existing issues... we will come back to this later.

requires economic systems, as well as the economic agents that make them up, to make choices in the allocation of resources (there are many trade-offs: study longer or work now, buy or rent an apartment, save or consume, etc.). Each choice implies a renunciation whose value in economics is called the *Opportunity Cost*.

According to Samuelson, the aim of economics is to solve resource allocation problems by answering three questions: *What to produce? How to produce? For whom to produce?* The first question refers to the allocation of resources (the *inputs* necessary for production: capital, labour, energy and natural resources), the second to the study of production (what technology to produce?) and the last to the problem of distribution (and with it the very topical issue of inequalities).

This definition has the advantage of being very comprehensive, but several distinctions need to be made in order to define more precisely what economic analysis is:

Positive Economics versus Normative Economics. Positive economics aims to provide objective and scientific explanations for the functioning of the economy, while normative economics attempts to provide recommendations based on judgments of personal value. For example :

If the gas tax is increased, then gas consumption will go down, all other things being equal.

This is a positive proposition since a statistical study can easily calculate the price elasticity of demand for this good and thus verify that this elasticity is negative and less than one in absolute value (see the box on this concept of price elasticity in the next chapter 2). Now for a second example:

The State must always adopt economic stimulus measures in order to create jobs.

This is, on the contrary, a normative proposal. The terms "always" and "never" should be banned from the positive economy.

The distinction between positive economy and normative economy brings us back to the question of the role of the economist: should he stop at a good understanding of the mechanisms (on the origin of unemployment, for example)? Or should he leave his position as an objective observer to implement the fruits of his observations? It often seems natural that he also gives advice and gives opinions, which at first sight seems to distance him from the scientificity of economic analysis. In this case, it is to be hoped that his recommendations are based on a coherent demonstration whose hypotheses are clearly specified and can be verified or discussed.

Macroeconomics and Microeconomics. As in many other social sciences (economics being a human and social science), economic science is traversed by an opposition between two conceptions: the holistic conception and the individualistic conception. Methodological individualism is the study of phenomena in the belief that they can be explained through the analysis of individual behaviour. Holism, on the other hand, considers that individual behaviours are part of a predetermined global context. This opposition refers to the separation that has long existed between macroeconomics and microeconomics, where, on the one hand, microeconomics studied the behaviour of each group of economic agents (households, firms, the State) separately and, on the other hand, macroeconomics was interested in the economy as a whole, focusing on the measurement of the main economic aggregates (the representative quantities: GDP, unemployment rate, inflation rate, interest rate) and their relationships. This distinction between micro and macroeconomics is a simplification of reality. Fortunately, the lines between the two are blurred today. Indeed, macroeconomic models are now richer and more complex:

- they are micro-founded, i.e. certain macro mechanisms are based on the individual behaviour of agents (e.g. firms' demand for labour is the result of profit-maximising behaviour through the determination of the demand for factors of production, of which labour is a part),
- they incorporate supply mechanisms, i.e. they are capable, for example, of reproducing the consequences of a deterioration in production characteristics (e.g. an increase in the production costs of companies following a rise in oil prices, as in the 1970s, with significant macroeconomic effects, particularly on the labour market, inflation, etc.), whereas the first macro-econometric models were incapable of doing so since they were based solely on the description of demand (private and public consumption and investment which alone determined the level of production of goods and services and where supply - or the volume of production - always adapted to demand!).

Economic Cycles Versus Structural Economy. This distinction amounts to differentiating between the short term and the long term. For example, the question of which economic policy is most likely to boost growth in Europe this year is clearly a cyclical issue (what budget and fiscal policies this year? what monetary policy this quarter?); whereas finding ways to increase growth in a sustainable way, or to make it environmentally friendly in the long run, is a structural issue. Of course, cyclical and structural effects are not always easy to discern in practice: for example, the

cause of oil price volatility may be speculative in the short term, but also lies in the prospect of a long-term decline in oil stocks.

These distinctions are relevant because they will structure this textbook, the plan of which we will see after a brief presentation of the History of currents of thought in Economics.

1.3 Evolutions in the Conception of Economics (or a Brief History of Thought in Economics)

Historically, it is considered that economic science appeared at the same time as economic markets developed at a high rate at the time of the first industrial revolution (late 18th century in Great Britain, and early 19th century for France). Economic thinkers existed, however, long before this period, albeit differing only slightly from philosophers and not exploring economics in a particularly autonomous way: For example, the Physiocrats (at its peak in the mid-18th century), whose economic environment was largely agrarian, were interested in production from the particular angle of the study of the farmlands (the soil and its yields); the Mercantilists (from the 16th century onwards) studied the economic benefits of international trade between old Europe and the New World (trade that developed thanks to the rise of the first financial markets, necessary to finance the construction of large fleets of merchant ships). Physiocrats and mercantilists alike live in a Europe whose internal economic markets remain poorly developed (Malinvaud et al. (1972)).

With the works of the English Smith (1776), Ricardo (1817) and the French Say (law of Supply), *from 1776 to 1870*, the *Classical* school of thought is developed and organized around *the theory of the value of labour* : the value of a good is then the quantity of labour incorporated in it. The wealth produced is limited by the amount of labour available, and the authors, led by Smith, develop the concept of division of labour and insist on its importance as a source of increased productivity, and thus of global wealth. For example, Smith describes the organization of work in an English pin factory in which the production of this simple object was divided into 18 separate operations. Such a technical division is a source of considerable productivity gains. Indeed, the skill of workers repeating the same gestures is greatly increased, idle time due to tool or workstation changes is eliminated, and the machinery is easier to set up.

Moreover, you are probably familiar with the image of the famous *invisible hand* which states that the pursuit of individual interests always serves the collective interest²: the classical school is thus a clearly liberal school from the economic point of view.

The end of this first period saw a rupture between economists since, on the one hand, Marxists and Socialists (Sismondi in Italy and Proudhon in France) founded Political Economy with a collectivist and more normative vision of the economy, while, on the other hand, the classics questioned their own doctrine by founding the so-called neoclassical school. *The Neoclassics* developed an innovative approach to value that marks an important progression: the value of a good comes from the utility that is derived from its consumption. To demonstrate this, they developed a so-called margin reasoning (neoclassicals are also called *marginalists*), i.e. the utility provided by the next consumed unit of a good or service must be greater than the price of the good or service in question for the consumer to make the purchase. The equivalent decision process on the side of the firms where the input is purchased as long as the gain in output that its use in the production process generates makes it possible to sell this additional output at a higher price than the price of the unit of additional input incorporated. From French Walras to English Marshall (1920) to Italian Pareto (the concept of social optimum or Pareto's optimum), they all introduce mathematics into economic thinking.

The Keynesian critique, in 1930, marks a very strong break in the history of economic thought: for the first time the analysis is at a macroeconomic level; it highlights the relationships between the major economic variables and demonstrates the existence of a steady equilibrium of underemployment and overproduction, which strongly contradicts the classical and neoclassical precepts on the automatic and simultaneous adjustment of all markets by prices (Walras' general equilibrium). Keynes' steady equilibrium of unemployment allows us to describe in some detail the simultaneous situation of unemployment, overproduction and falling prices that characterized the 1929 crisis (the Great Depression). Keynes then advocated fiscal and monetary stimulus from the States to support economies in crisis (and at the time: it worked!). He explains the positive effects of these measures through the concept of the multiplier (known as Keynesian) which is defined as the ratio between a variation in public spending and the subsequent variation in overall income. For example, 100 euros spent by the State gives rise to an order of the same amount that will increase the income of the beneficiary; income that will, in turn, be partly used in expenditure; this sum will partly (the part that will not be saved) also be used by its new beneficiary; and so on until the effect is exhausted (the sums redistributed at each stage diminishing towards zero).

²This invisible hand is present on the markets: it organizes its adjustment process by the price between individual supplies and demands, and allows this coincidence of individual and collective interests.

From 1940 to 1970, from the Englishman Hicks (1937) (who worked on the equation, through the IS-LM model, of Keynes' theories) to the American Samuelson, economists incorporated Keynesian analysis into the neoclassical corpus. The glorious period of growth of the 30 glorious years (1950-1973) that the West was experiencing at the time was largely based on Keynesian ideas. This *neoclassical synthesis* (i.e. Keynesian macroeconomics + neoclassical microeconomics) lasted about forty years (!) then collapsed when, with the first oil shock, the simultaneous appearance of inflation and unemployment undermined Keynesian recovery policies. The latter only aggravated the initial price increase.

During the seventies, strong criticism was therefore levelled at the then dominant Keynesian model. First of all, the *monetarists*, under the aegis of the American economist Friedman, rejected the Philips curve (we will define this concept in the lecture - see my slides) and considered that the injection of liquidity (or money to put it commonly, thanks to the increase in government spendings) led to a rise in prices that was quickly taken into account by agents (i.e. in an adaptive way) who, little by little, reduced their spendings and increased their savings. Fiscal stimulus packages therefore have an effect that becomes weaker and weaker over time, whereas in the medium and long term, inflation remains very high.

The rational expectations developed by Lucas (an American economist) will go even further in the criticism: this theory shows that if agents know the model of the economy, they can then instantly anticipate its movements. In other words, they anticipate the future increase in taxes when the state stimulates the economy with a budget deficit, and start saving immediately. Stimulus policy no longer has any effect, even in the short term, since the liquidity injected never returns to the productive system.

Currently, two currents dominate the debate in economics. These are the two neo-classical currents: on the one hand, the *New Keynesians*, with the American economists Stiglitz and Akerlof; on the other hand, the *New Classics*, with the American economists (!) Barro and Sargent. In the end, these two schools oppose each other on the role of the State. For the New Keynesians, the fluctuations reflect large-scale market failures. State intervention is necessary and can be effective in improving, or countering, market failures (which will be defined in the next chapter). The research of these economists involves working on the theoretical justifications for market imperfections. In this respect, the 2008 winner of the Nobel Prize in Economics is the neo-Keynesian economist Paul Krugman ³.

For the new classics, on the contrary, individuals are rational and markets are always in equilibrium: economic fluctuations (of which crises are the quintessence!) are natural

³Cf. the complete list of Nobel Prize in Economics winners on the course website.

and efficient responses of the economy. New classical economists are working on the links between economic fluctuations and technological shocks. In this context, state intervention cannot be effective, and for some more radical ones, it is even harmful. The 2011 Nobel Prize in Economics is thus awarded to the new classic Thomas Sargent.

Of course, there are also other oppositions that structure currents of thought in economics. One can notably oppose the so-called orthodox economists (neo-classical economics, monetarism, neo-Keynesian economics, new classical economics, the Austrian school, etc.) to heterodox ones (institutional economics, Marxist economics, ecological economics, etc.): the former considering economic agents as separate, rational and calculating beings evolving on markets; the latter placing their thinking within the framework of social sciences or political philosophy.

Knowing these different currents of thought is important for a better understanding of the political responses that will be given to the "protean crisis" that we are experiencing today, as the daily Le Monde titled it (more than 10 years ago!) in April 2008: "Six crises that are shaking up the world economic order": financial, monetary, energy, economic, ecological and food crises. The objective of this course is therefore to provide you with elements of answers through the use of thought structures and their models that will allow us (this is the course's wager!) to trace a logical path through the contradictory information we may hear in the media. Looking back over the history of previous events and crises will allow us to take a welcome step back to analyse the current situation.

National Accounting - Course Elements for Tutorial 1 (TD1)

The objective of this first box is to address concepts that cut across the different chapters of the course, relating to the most common "economic aggregates", such as Gross Domestic Product or GDP, consumption, investment, etc., and price indices.

The best known (and probably the most criticized) national accounts indicator is therefore GDP. GDP is a measure of an economy's output. Its calculation is quite complex and its measurement is based on a powerful information system that should provide an accurate picture of the state of the economy.

Historically, during the Great Depression of 1929, political and economic leaders realized that they had no measure of macroeconomic activity and its evolution. We realized that we were in a Great Depression several years after it began, when we saw unemployment rise very high, especially in the United States. At the request of the American Congress in 1932, Simon Kuznets (1971 Nobel Prize in Economics) created a national accounting

system in the United States, and invented the gross domestic product in 1934, in order to measure the effect of the Great Depression on the economy.

After the Second World War, all developed countries therefore set up information systems on the level of production and its growth. National accounts have been carried out in France by INSEE since 1948: the French National Institute of Statistics and Economic Studies. Its aim is to measure all the accounting relationships between economic agents.

What are these accounting relationships? In order to do this, it is necessary to define economic circuits, which can be broken down into three main categories (or 3 components): 1. groups of **agents** characterized by a specific function; 2. **markets** (of goods, factors of production, money market, etc.); 3. **trade flows** (real/physical or monetary/financial) which pass through markets (previous point 2) and which go from one group of agents to another (previous point 1).

Among the economic agents, there are 5 **residents** institutional sectors: 1. Non-financial corporations : i.e. companies or firms ; 2. Households ; 3. Government ; 4. Non-profit institutions serving households (NPISHs) ; 5. Financial corporations.

Let's go back one by one to these five areas. **Non-financial corporations or firms** produce (non-financial) goods and services for profit, i.e. they are traded on markets. The various operations of the companies are separate from those of their owners. Their resources are mainly derived from the sale of goods and services.

As for **households**, they consume (this is their main function), save, provide firms with factors of production (labour, capital), receive remuneration in return (wages, interest, dividends, rents), receive transfers from general government (pensions, various allowances, etc.), pay compulsory levies (taxes, social contributions) and may possibly produce (for sole proprietorships and family businesses only) and then receive the proceeds of their sales. In their function as consumers, households are individuals or groups of individuals living under the same roof (traditional households, long-term prisoners, members of religious orders, elderly persons living in retirement homes). In their production function, we find sole proprietorships whose assets and economic decisions are closely intertwined (farmers, bakers, etc. they must not have the legal form of a company).

Public administrations provide goods and services on a non-profit basis. They also provide non-market services which consist of giving away, free of charge or at an economically insignificant price (less than 50% of production costs) (keeping civil registers, providing education, dispensing justice, organising public security or national defence). They also carry out operations to redistribute national wealth. Their main resources come from compulsory levies (taxes and social contributions). The public administrations are : Central public administrations (state, universities, etc.); Local public administrations (municipalities, departments, regions, chambers of commerce and industry); Social security administrations (social insurance schemes, public hospitals).

The **non-profit institutions serving households (NPISHs) (ISBLSM in French)** produce non-market services for the benefit of households. Their main resources come from voluntary contributions in cash or in kind made by households, payments from government, and property income. NPISHs are : Associations (sports, musical, medical); Trade unions (non employers); Religious denominations; Political parties; Historical, hunting and fishing societies, etc.

Financial corporations produce financial intermediation services (banks) and insurance services and/or carry out auxiliary financial activities (portfolio management, foreign exchange). The main resources are commissions collected and net funds (i.e. funds raised from financial intermediation or financial activity - see Chapter 3). It can already be said at this stage that bank intermediation consists in collecting savings from agents with financing capacity and distributing credit to agents with financing needs. Financial auxiliaries provide investment advice (collective investment schemes).

Insurance companies charge insurance premiums and provide compensation: it is said that individual risks are then transformed into collective risks.

Finally, the *rest of the world* includes all agents residing abroad and maintaining relations with the national economy. The rest of the world is a fictitious agent that is used to take into account all economic exchanges with the outside world (European Union, third countries, overseas territories, international organisations) (see Chapter 5).

Now, let's turn to the most famous indicator: **GDP**. There are several methods of calculation or "accounting approaches": below is the **calculation of GDP by expenditure (or destination or employment)**. You intuitively understand that all production is at the same time a purchase.

Indeed, the goods and services produced have four possible outlets: Household consumption; Government consumption; Investment; and Exports net of imports (or balance of trade: denoted $X - M$).

Consumption (C) includes expenditure on food, clothing, energy, durable goods (car), health, leisure, etc. and housing: rents for tenants. Consumption does not include Housing purchases (it is an investment). General government consumption includes goods purchased by the government. Business investment is the purchase of machinery, equipment, infrastructure for the State (or fixed capital, such as roads). Investment is also called Gross Fixed Capital Formation or $GFCF$: gross, in the sense that it does not take into account wear and tear on fixed capital). $GFCF$ is $GFCF$ minus changes in inventories (S : goods in process, finished goods that are not sold during the reporting period). And GDP is: **$GDP = C + GFCF + S + (X-M)$**

GDP in volume and GDP in value? GDP includes all goods and services produced, which are by nature very different. How do you add up strawberries with airline tickets or books? By using prices to convert volumes into monetary values. But using prices poses a problem because prices fluctuate! They tend to increase over time: this is inflation. The GDP can then very well increase from one year to the next, without the

volumes traded increasing. So how can we distinguish, in the evolution of GDP, what comes from the price effect and what comes from the quantity effect? To do this, it is necessary to adjust GDP according to the general price level:

GDP before adjustment is called: GDP in value terms = nominal GDP = GDP at current prices. GDP after adjustment is called: GDP in volume terms = real GDP = GDP at constant prices; It is adjusted for inflation.

The Consumer Price Index. If the prices of all goods increased by the same amount, for example 2% in one year, the inflation rate would be easily measurable and would be worth 2%. But in reality, not all prices increase at the same rate, some prices may even decrease. So you have to calculate the average price increase. How do you calculate the average price increase? How do average price increases? The problem is that some goods weigh more than others in the budget of the typical consumer, so you have to take into account their **relative shares in the budget (or budget coefficients)**. For example, an increase in fuel prices will have a greater impact on the typical consumer than an increase in the price of pens. To calculate the average increase in consumer prices, therefore, it is not necessary to make a simple average of the price increases, but an average weighted by the budget coefficients, i.e. by the share of expenditure on each good in the total expenditure of the typical household. We will see and apply in the Tutorial 1, the two methods of calculating price indices, using the Paasche and Laspeyres indices (Tuto. 1).

Limits of GDP. GDP is often used to compare the quality of life between countries. Your impression may be that production creates wealth that improves well-being. But this is not always self-evident: for example, road accidents increase GDP through high spending on car repairs, without this increase being linked to increased well-being! GDP therefore overestimates well-being because it incorporates **negative externalities**. A negative externality is an economic activity that negatively influences one or more other agents without any monetary compensation (a notion that will be developed in chapter 2). Physical or social damage linked to production or consumption is therefore not removed from the measurement of GDP! GDP also integrates *defensive* activities that do not (directly) contribute to the well-being of citizens: expenditure on repairing or preventing damage, military expenditure, etc.

Conversely, GDP underestimates well-being because it poorly integrates certain activities (underground economy, non-market production of public administrations - evaluated at their production cost) or does not include activities that nevertheless contribute to well-being, such as voluntary, domestic activities (for example: a mother or father who looks after his child is not counted in GDP; but if it is a maternal assistant: yes!).

The GDP says nothing about **the distribution of wealth**. Its increase can go hand in hand with amplification of inequalities, calling into question social cohesion (e.g., growth may only benefit the richest 10%...). It says nothing specific about health, education, working conditions, the quality of the economy's environment.

Economic growth is the evolution of the wealth produced on the territory between two years or between two quarters. In fact, the rate of growth of a country is the main criterion used to measure the dynamism of its economy. The GDP growth rate represents the percentage change in GDP between two dates (*cf.* TD1).

There are now numerous other indicators of wealth. **The Human Development Index** (HDI), officially recognised by the United Nations Development Programme (UNDP) in 1990 and initiated by the work of economist Amartya Sen (Nobel Prize in Economics 1998), is an average of three indicators in Health, Education and Income.

The **human poverty** indicators known as IPH1 for developing countries, IPH2 for developed countries, which integrate other dimensions such as the share of the population below the poverty line or exclusion criteria. *NB:* There are sometimes large differences between HDI and HPI, especially in developing countries (DCs, such as Venezuela, Thailand, Algeria, Egypt, etc.). There are other indicators such as the Genuine Progress Indicator (James Tobin and William Norhaus - Nobel 1981 and 2018 respectively), the Social Health Indicator (unemployment, health, education, poverty...), the Barometer of Inequality and Poverty (BIP 40) in France, etc.

Finally, indicators integrating **environmental criteria**: such as the Green GDP and the Indicator of Sustainable Economic Well-Being (IBED), the Ecological Footprint (from the WWF), the Happy planet index (from the New Economics Foundation and Friends of the Earth), the Environmental performance index (from Yale and Columbia Universities), etc.

Points to remember: 1. there are differences between Production Growth, Development and Social Progress; 2. GDP growth is a necessary but not sufficient condition for development; 3. its growth may be concomitant with the rise in social inequalities and the precarious nature of living, health and employment conditions, as well as a deterioration in environmental quality (see the last chapter of this Textbook).

Finally, in 2008, the main recommendations of the Report of the so-called (J. E.) Stiglitz Commission (Nobel Prize 2001) ("Commission on the Measurement of Economic Performance and Social Progress" for the French government) are as follows: Refer to income and consumption rather than production; Take into account wealth at the same time as income and consumption; Emphasize the household perspective; Give more importance to the distribution of income, consumption and wealth; Extend income indicators to non-market activities; Establish indicators related to environmental externalities (pollutant emissions, effects on biodiversity, health).

All these points will be revisited in this course.

1.4 Textbook Plan

Six thematic chapters will form the body of the course, as well as this textbook. This introduction was the first chapter. Chapter 2 will deal with the different market structures and the available modes of regulation. We will use the European Commission's policy in this area to illustrate this chapter ⁴.

Chapter 3 will describe the financing of the economy and the role of money. Contemporary financial crises will, of course, be discussed in this third chapter.

Chapter 4 will analyze economic cycles and policies. Here we will return to unemployment policies, as well as the monetary policy of the European Central Bank and the limited room for manoeuvre of European governments in budgetary matters. We will also assess the effectiveness of the stimulus policies and then fiscal restraint policies that have followed one another around the world since 2008, first to counter the economic crisis and then to manage public deficits. We will also address the current health crisis and its unusual economic consequences.

Chapter 5 will study the international economy and the phenomenon of globalisation. We will then attempt to measure the gains and losses caused by economic globalization for the different areas of the world.

In the general conclusion, chapter 6, we will come back to the engines of growth: education and innovation, and make the link with environmental economics. The European innovation gap will be presented briefly, as will the solutions proposed at the scale of our continent to increase its potential growth, and their expected effects for Sustainable Development.

Of course, the topics we will address here do not cover all the economic issues (one immediately thinks of the theoretical notion of utility function, which this too short a course deliberately overlooks, or the very empirical question of the reform of pension systems, which has been on the table of French politicians for more than 20 years). If, nonetheless, you are interested in further pursuing these and other issues, towards better understanding these economists' analyses the methods and protocols presented in my course will prove highly useful.

⁴...which will be presented here in a complementary - i.e. quite different - way from the Amphitheatre and its TDs - as indeed are all the chapters in this textbook.

Chapter 2

Markets and Regulation

The construction of a large competitive market in Europe, which has required (continues to require) major adaptation efforts by its Member States and other economic actors, leaves the impression that it was THE European priority and that all the other aspects of European construction (diplomatic, social, constitutional, European defence-related aspects, etc.) were placed on hold. But why did things shake down this way? Was it out of pure liberal ideology, as some denounce? If not, what advantages does a competitive market offer?

We will see in this chapter that the competitive market is very effective in allowing a correct adjustment of supply and demand. In a market economy, the volume of supply and the volume of demand are adjusted by changes in the price level. In other words, the equalisation of supply and demand requires the preservation of markets and competition. However, competition is not necessarily self-evident: in some markets or for some sectors, the introduction of a competitive regime is neither natural nor automatic (in this case we speak of a natural monopoly). Moreover, as companies are profit-seeking: some may be tempted to resort to anti-competitive practices, such as cartel or dumping. We shall see (in detail) that this most often goes against the interests of consumers by depriving them of the best value for money in the acquisition of goods and services. In order to protect consumers, it is then a matter of organising, supporting and monitoring these markets. This is the main purpose of economic regulation, generally carried out by public or independent authorities (Conseil de la Concurrence in France). In practice, what form should this regulation take? What should its intensity be? How does it ensure that the market functions as efficiently as possible?

2.1 The Market and its Failures

This "good regulation" is a very complex exercise in that there are also *market failures*, i.e. situations in which perfect competition does not deliver the most effective solution. The pure and simple pursuit of competition in all markets does not bring only gains! For example, perfect competition does not spontaneously solve environmental pollution problems or achieve a sufficient level of innovation. According to the inter-war economist Schumpeter, sectors where companies have a certain degree of monopoly are the most likely to innovate, because the prospect of future monopoly rents provides an incentive for companies to invest in innovation. And it is therefore mainly to promote innovation that market regulation policy in the United States of America is often considered more flexible against monopolies (when they justify their innovation activity) than that conducted by the European Union.

Finally, it should be noted that the strict regulatory policy pursued by Brussels may complicate the task of large European companies that are placed on a competitive world market: indeed, the development strategy of these companies generally consists in acquiring a sufficient size to benefit from economies of scale and thus reduce their costs; but this strategy risks distorting the competitive game if the company becomes too omnipresent in its sector in Europe (tending towards a quasi monopoly), which the European competition authorities will not fail to denounce.

Determining the best regulatory policy is therefore a delicate exercise that does not only consist in tracking down collusive agreements between companies, but also requires the intervention of States when competition cannot be applied in a market that suffers from "flaws": the presence of sectors in a situation of so-called natural monopoly, the presence of asymmetric information, but also externalities, including pollution; these are all points that will be addressed after defining what a market of perfect competition is.

2.1.1 Perfect Competition

The economist Pareto has shown that (in the absence of a public good and therefore of an external effect, which we will study later) the equilibrium of a market in pure and perfect competition is a *Pareto's Optimum*, i.e. a state in which one cannot improve the economic well-being of one individual without deteriorating that of at least one other. In practice, this efficient allocation of resources is quite rare since, as traditional microeconomics shows, a market with highly specific characteristics is needed:

Atomicity of participants: There are enough buyers and sellers so that none of them can influence the price. The volume of transactions for each of them is negligible in relation to the overall volume of trade and, therefore, the action of one of the participants has no impact on the equilibrium quantities and price. Economic agents are said to be price-takers: for them, the market price is a necessary input (exogenous input).

Homogeneity of goods: Each good is homogeneous so that buyers are indifferent to the identity of sellers. Only the price is a decision criterion.

Free entry and exit to the market: Suppliers and demanders are free to enter and exit the market, without any institutional barriers. No player may engage in collusive behaviour that prevents a competitor from entering or operating on the market.

Perfect information: All the protagonists have perfect information about the goods.

Once one of these conditions is not verified (or, again, in the presence of externality), letting the market do its work no longer leads to an efficient allocation of resources. State intervention then appears necessary to restore the missing "good characteristic(s)".

Obviously, none of these conditions is perfectly verified in reality. For example, the quality of a product is not perfectly observable and this lack of information can disrupt the functioning of the market. More generally, the perfect competition model should be understood rather as the reference model from which to develop the more realistic models of imperfect competition that we will examine later.

Pure and Perfect Competition

Profit is the difference between a company's revenue and cost of production incurred, thus:

$$\pi(Q) = pQ - TC(Q)$$

where $p.Q$ are the revenues with Q units of goods sold at p ; and $TC(Q)$ the total cost of production that increases with the quantity produced. The company's objective is to maximize profit.

In pure and perfect competition, the firm has too little weight to influence the market equilibrium price (atomicity hypothesis seen above) and thus considers the price as a given (the firm is called a price taker).

Profit maximization is therefore the determination of the optimal quantity to be produced and the first-order condition is written: $d\pi(Q)/dQ = 0$, i.e. $p = C_m(Q)$ with C_m the marginal cost of production, i.e. the first derivative of the total cost in relation to Q . This first-order condition tells us that the firm produces until its marginal cost equals the market price.

Now let's calculate the average profit:

$$\frac{\pi(Q)}{Q} = p - AC(Q)$$

This is the profit per unit produced, which is equal to the difference between the market price and the average cost of the company. As long as the market price is higher than the company's average cost, the company makes profit.

In a market with pure and perfect competition, these profits attract new entrants (free entry assumption), which has the effect of increasing the total quantity supplied on the market and thus lowering the price, at constant demand. The profits of the companies in this market will therefore be reduced in the long run. The number of firms established becomes so large that the market price equals the average cost of each of these firms: in pure and perfect competition, profits are therefore zero in the long term.

Zero profit does not mean that the company is not viable. The company simply does not make excess profits, and it can remunerate all the inputs (or the factors of production, with wages, dividend distribution and interest repayment).

2.1.2 Market Failures

By clearly explaining the set of assumptions that guarantee market efficiency, we can explore situations where this rule is not valid. These situations in which the market does not work well are usually referred to as market failures.

For perfect competition to lead to a Pareto optimum, economic goods (consumer goods, services, etc.) must be **private consumer goods**: the same physical unit of a good cannot be consumed simultaneously by two individuals. This is not the case for public goods that can be consumed by several individuals at the same time (street lightings, a motorway, a bridge, etc.).

It is also necessary that there are no external effects. **An externality or external effect exists when the consumption or production action of one individual affects the well-being of another without this interaction being subject to an economic transaction.** We shall return to the concept of externality later in a dedicated section (2.3).

Other market failures may arise when the conditions of perfect competition are not met. We will then focus on four particular situations in which market failures arise:

- The emergence of *market power* in a player that changes the very structure of the market. When the number of players is small, strategic behaviours, likely to manipulate prices, may appear; and we then speak of imperfect competition, up to the extreme case of monopoly (a single seller).
- Acceptance of *natural monopoly*: when increasing returns to scale do not allow firms in competition with each other to be profitable.
- The presence of *externality* (positive or negative) in a market that leads to non-optimal quantities traded (too much of the good that generates pollution, for example).
- The existence of *information asymmetries* between actors: this flaw will modify the level of prices of exchanges in favour of the agent who possesses the information. We will end this chapter precisely on the issue of information asymmetry and, at this stage, we will have a fairly broad view of the problems linked to economic markets.

Monopoly

When a company is facing demand alone, it is logically impossible to consider that it cannot influence the market price. The monopoly knows that its decisions on the quantity produced affect the selling price. Thus, it knows the demand function addressed to it (demand/price relationship: $p(Q)$) and integrates it into its profit maximisation programme:

$$\pi(Q) = p(Q)Q - TC(Q).$$

The condition of the first order is written: $d\pi(Q)/dQ = 0$ i.e

$$\frac{dp(Q)}{dQ}Q + p(Q) = C_m(Q).$$

This last equation becomes $R_m(Q) = C_m(Q)$ with R_m the marginal revenue. Thus, the monopoly firm in a market no longer equals its marginal cost to the market price, but to its marginal revenue: in a monopoly, Marginal revenue = Marginal cost.

The marginal revenue can be rewritten as : $R_m(Q) = (\frac{1}{\epsilon} + 1).p(Q)$ where $\epsilon \leq -1$ is the price elasticity of demand. It can also be shown that the monopoly price is strictly higher than the marginal cost and therefore the competitive price (see box on pure and perfect competition above):

$$p(Q) = \frac{C_m(Q)}{(\frac{1}{\epsilon} + 1)} > C_m(Q)$$

Finally, the ratio between price and marginal cost is called the mark-up, and the less elastic the demand is, the lower the mark-up (ϵ tends towards -1), the higher the monopoly margin.

2.2 Power of Actors and Market Structures

When looking at market structures where the number of players is small, firms can have an effect on price: they know the demand function addressed to them (or inverse demand function noted as $p(Q)$, where p is the price and Q is the quantity of products) and take into account how the price reacts to the quantities supplied.

2.2.1 Market Structures

The number of players on the market and the nature of the product (homogeneous versus differentiated products) together determine the structure of the market or sector. In highly competitive markets, prices are driven towards marginal costs. Only a very small number of markets, however, are perfectly competitive. Competition is said to be monopolistic when even similar products are sufficiently differentiated to benefit from a local monopoly position. In this case, perfect competition does not apply because *goods are not perfectly homogeneous*. In a situation of monopolistic competition, producers each have market power in a particular segment of the product since consumers perceive the products as differentiated. A firm thus has a niche of consumers who prefer its goods to other goods, even if they are similar. The firm in question can thus charge a price above marginal cost.

The conditions of perfect competition are also not satisfied when the number of players in the market is too small. *In this case, the hypothesis of atomicity of the protagonists is not verified*. For example, when there is a single seller in a market, we speak of monopoly; a single buyer: a monopsony; while a market with two firms is a duopoly market. Duopoly (two-firms) markets have been much studied in traditional microeconomics because they make it relatively easy to describe strategic interactions between firms.

Oligopolistic Competition

In oligopolistic markets, only a few companies compete with each other. Each firm knows that its behaviour has an impact on the market, and strategic interactions occur between firms (e.g. the market for operating systems for personal computers).

We will then distinguish two quite distinct situations. Firms may have symmetrical roles, when they are of comparable size or weight. In this case the competitive game is simultaneous (Cournot or Bertrand equilibrium, see below). They can also have asymmetrical roles. In this case, one of them is dominant and the game becomes sequential (Stackelberg equilibrium).

We will only study here non-cooperative games between firms (firms compete with each other in the market), leaving cooperative games to the lectures, and to the texts of tutorials 2 and 3.

A distinction is made between different cases of duopoly depending on the nature of the competition between the two companies: competition is either in quantity, in which

case it is qualified as competition by *Cournot Duopoly* ; or the competition is about price and this is a *Bertrand Duopoly*.

Cournot Duopoly

We consider two firms $i = 1, 2$ that produce a homogeneous good in quantity q_i with a production cost $C_i(q_i) = c_i q_i$. Thus, the total quantity of goods available is written $Q = q_1 + q_2$. Firms know the demand addressed to them, thanks to the inverse-demand function $p(Q) = A - Q$. Firms can strategically decide their level of production. In other words, each competitor seeks to maximize its profit given the other firm's decision.

Firm 1 chooses the quantity q_1 that maximizes its profit $\pi_1 = p(Q)q_1 - C_1(q_1)$, knowing that the price at which it can sell its quantity q_1 depends on its decision q_1 and the decision of its competitor q_2 . This price is written $p(q_1 + q_2)$ (i.e. p function of Q). Symmetrically, firm 2 chooses the quantity q_2 that maximizes its profit $\pi_2 = p(Q)q_2 - C_2(q_2)$ knowing that the price at which it can sell its quantity q_2 depends on its decision q_2 and the decision of its competitor q_1 . Each firm takes into account its effect on the final price, given its competitor's decision.

The first-order conditions are as follows: for firm 1, $\frac{d\pi_1}{dq_1} = 0$, which gives, knowing that hypothetically $C_1(q_1) = c_1 \cdot q_1$:

$$q_1 = \frac{A - c_1}{2} - \frac{q_2}{2}$$

Symmetrically, for firm 2, $\frac{d\pi_2}{dq_2} = 0$, that goes with $C_2(q_2) = c_2 \cdot q_2$:

$$q_2 = \frac{A - c_2}{2} - \frac{q_1}{2}$$

These relations $q_1(q_2)$ and $q_2(q_1)$, which give each firm's decision based on its competitor's decision, are called *market-reaction functions*. They express, for each firm, the optimal output as a function of the competitor's expectations of production choices. In other words, these functions are better-response functions to the quantity produced by the competitor.

Cournot's equilibrium is the equilibrium situation where: the quantities produced by each firm are such that no firm has an incentive to deviate from this decision unilaterally. No firm can improve its profit by producing a quantity different from the equilibrium quantity, given the quantity produced by its competitor. To find this equilibrium, one need only solve the system formed by the two equations of behaviour of the two firms. We finally find:

$$\begin{aligned} q_1^* &= \frac{A - 2c_1 + c_2}{3} \\ q_2^* &= \frac{A - 2c_2 + c_1}{3} \end{aligned}$$

The price that emerges from this balance is written:

$$p^* = \frac{A + c_1 + c_2}{3}$$

and the profits $\pi_i = \frac{(A-2c_i+c_j)^2}{9}$. In practice, how is this balance achieved? It is a process of trial and error: a company announces a quantity to be supplied for the first period, its competitor reacts by making a supply that is the best response to its competitor's supply, and so on... until the final balance is stable.

Bertrand Duopoly

We have seen that the Cournot Duopoly was a simultaneous game between two competing companies that were competing in quantity. In the Bertrand Duopoly, competition is said to be in price (for example, this is the case for car rental with the companies Avis and Hertz). In this case, the firm sets its price and demand determines the quantities traded at that price. The demand addressed to each firm obviously depends on the price level decided by the other firm. If one firm charges a higher price than its competitor then the demand for its product is zero! If both firms decide on the same price, then they share the market equally.

The distribution of demand is therefore as follows:

1. $D_1 = D(p_1)$ and $D_2 = 0$ if $p_1 < p_2$;
2. $D_1 = D_2 = D(p_1)/2$ if $p_1 = p_2$;
3. $D_1 = 0$ and $D_2 = D(p_2)$ if $p_1 > p_2$.

where D_1 et D_2 are the demands addressed to the first and second company respectively.

It is assumed that the cost functions of the companies are identical and that the average cost is constant, $C(q_1) = c.q_1$ where c represents average and marginal cost. Given its competitor's price, each firm chooses its own price: p_2 , the price of firm 2, firm 1 has a profit:

1. if it sets $p_1 > p_2$, firm 1 has no market share, its profit is zero;
2. if it sets $p_1 = p_2$, it has half the market, its profit is $\frac{(p_2-c)D(p_2)}{2}$;
3. if it sets $p_1 = p_2 - \epsilon$, it's hogging the entire market, and its profit is $(p_2 - \epsilon - c)D(p_2 - \epsilon) \simeq (p_2 - c)D(p_2)$ and slightly higher than $\frac{(p_2-c)D(p_2)}{2}$.

As long as its competitor's price is higher than the marginal cost of production, it is in the interest of each firm to lower its price just below that of its competitor in order to recover the entire market! The only equilibrium in this situation, i.e. the only price such that none of the firms has an interest in deviating unilaterally by proposing another price, is when $p_1 = p_2 = c$. It is the same equilibrium as that established in a market in pure and perfect competition. This is a stable situation.

One of the two companies may have an advantage over its competitor, in which case it is an asymmetrical duopoly. This is the case when decisions are taken sequentially and not simultaneously. The *Duopoly of Stackelberg* is an example: one of the companies has an advantage (it is the *leader*) over the other and makes its decisions knowing the reaction of its competitor (the *follower*).

Stackelberg Duopoly

The dynamics of industrial sectors often lead to the emergence of dominant firms that either have a higher market share than their competitors or behave in an "innovative" manner. The Stackelberg model assumes that one firm is a leader and the other a follower. The follower firm simply takes the output of the dominant firm as a given. In Stackelberg's duopoly equilibrium, each firm decides the volume of output that maximizes its profit, but one of the two firms (the leader) determines its sales strategy by taking into account the information about its the reaction function of its competitor (the follower).

The steps are as follows:

- The leading company chooses to put a quantity q_1 on the market, anticipating the $q_2(q_1)$ reaction function of the follower.
- The follower company chooses the quantity q_2 it puts on the market, given q_1 .

It is said to be a two-step game, which is solved by "backward induction", i.e. starting with step 2 and taking the result of step 1 as given. First, the maximization program of the follower company is determined, knowing the inverse demand function $p(Q)$ and the quantity q_1 already put on the market by the leader.

We use the initial notations and assumptions of the Cournot model relating to the cost functions of companies, i.e. the following program for the follower company:

$$\max_{q_2} \pi_2 = p(q_1 + q_2) \cdot q_2 - C_2(q_2)$$

The firm's 2 reaction function (the follower) is then written:

$$q_2 = R_2(q_1) = \frac{A - c_2}{2} - \frac{q_1}{2}$$

We now return to stage 1 of the game: the maximization program of the leading firm takes into account the fact that its choice of quantity determines the reaction of the follower: the reaction function of the follower firm is known to the dominant firm. It therefore chooses q_1 which maximizes:

$$\max_{q_1} \pi_1 = p(q_1 + R_2(q_1)) \cdot q_1 - C_1(q_1)$$

Firm 1 therefore takes into account the inverse demand function $p(q_1 + q_2)$ AND the reaction function of its competitor $q_2 = R_2(q_1) = \frac{A - c_2}{2} - \frac{q_1}{2}$.

The condition of the first order is written:

$$q_1 = \frac{A - 2c_1 + c_2}{2}$$

Stackelberg's equilibrium then gives us $p = \frac{A + 2c_1 + c_2}{4}$ et $\pi_1 = \frac{(A - 2c_1 + c_2)^2}{8}$.

The leader's profit is therefore higher than Cournot's profit. It is clear why it is in the company's interest to be leader in a market.

Of course, the structure of a market is not unalterable! For example, when a new sector emerges as a result of a product innovation (a new good or service), a single firm (monopoly) or only a few companies (oligopoly) usually compete with each other. If there is free entry into this market, the possibility of making profits will then attract more and more competitors (the new entrants), which will tend to increase the overall supply and thus pull prices towards marginal costs. When profits become too low (or theoretically zero), market entry ceases.

2.2.2 Price Discrimination

We have thus far considered all consumers for a product purchase the unit of the good in question at a single price. In practice, a company may try to adapt its price to the customer: for example, a lower entrance fee to a nightclub for women, or a lower train ticket for young people and senior citizens.

This price differentiation allows the user to recover any surplus (see the box below: "Consumer Surplus"), by charging everyone the maximum he or she is willing to pay for the good or service. In order to be able to discriminate by price, firms must have

market power, consumers must have different willingness to pay, and firms must be able to identify them, directly or indirectly.

There are three types of price discrimination:

First degree discrimination, or perfect discrimination. Each unit of good is sold to the consumer who assigns it the highest value and the maximum price that agent is willing to pay for that unit.

This assumes that the seller has perfect information on the willingness to pay of each of his customers.

For the monopoly, this amounts to monopolizing the entire consumer surplus since it is able to sell at different prices (equal to the willingness to pay) to each consumer.

Third-degree discrimination consists of segmentation on the basis of observable criteria. In this case, the monopoly is able to charge different prices depending on whether consumers belong to a category. Each unit of goods is sold at the same price within a group of consumers, and the lower the price elasticity of demand, the higher the price. One immediately thinks of prices according to age or gender categories.

This discrimination makes it possible to reach new consumers, even if it means making the more "captive" population (those with low price elasticity) pay more. Thus youth cards and senior cards allow the transport sector to charge lower prices for these populations who would take the train less easily at the single fare.

Second-degree discrimination. Prices differ according to the quantities purchased (no longer according to the buyers). Pricing is then non-linear (non-constant unit price). This is the system of discounts for bulk purchases, but also the special SNCF (La Société nationale des chemins de fer français: French Railways) fares, which have two distinct parts.

These three forms of discrimination require a certain level of information, decreasing as 1st degree > 3rd degree > 2nd degree.

Elasticities

Price elasticity of demand

This concept has already been mentioned and is precisely defined now. Price elasticity measures the sensitivity of demand $Q(p)$ to a change in price p . Thus, the price elasticity of demand is written as $\epsilon = \frac{dQ}{dp} \frac{p}{Q}$.

This elasticity always has a negative sign since the slope of the demand function is always negative. This is why its sign is generally omitted, since it goes without saying that when the price increases, the quantity demanded decreases: in this course, the absolute value of the price elasticities of demand will be used.

When the price elasticity is greater than 1 (in absolute value, i.e. ϵ between $-\infty$ and -1), demand is said to be elastic because it reacts strongly to price changes. And when it is less than 1, it is said to be weakly elastic. Finally, when the price elasticity is zero, demand is said to be inelastic.

Price elasticity allows an assessment of the market power of a firm, for example a monopoly firm, because the less price-sensitive demand is, the more the monopoly can raise its price without a significant penalty to its sales.

But this price elasticity of demand can also change over time: for example, in the case of tobacco, the impact of a price increase of a packet of cigarettes is initially strong (a 1% increase in price leads to a decrease in consumption of 0.5%), but this is often due to the repercussions of massive purchases made just before the government announced its price increase. Then, at the end of a six-month period, the fall in consumption is smaller (0.2%). In the long term, the drop in consumption is slightly higher (to 0.3%). In the end, the drop is often more the result of discouragement of potential smokers, such as young people.

Cross-price elasticity of demand

Cross-price elasticity of demand is another very important concept in economics: it is calculated as follows: $\epsilon_{ij} = \frac{dQ_i}{dp_j} \frac{p_j}{Q_i}$ where i and j are two goods.

It captures how demand for one good will react to changes in the price of another good. The two goods in question are rather substitutable when this elasticity is positive, otherwise they are rather complementary.

Income elasticity of demand

The income elasticity of demand provides an understanding of how the demand for a good changes with consumer income: $\epsilon_R = \frac{dQ}{dR} \frac{R}{Q}$.

If the income elasticity is greater than 1 then the good is a luxury good (jewellery, spirits, etc.). In this first case, when income increases, consumption increases more than proportionally.

If it is negative then the good is said to be inferior (potatoes), consumption of this good decreases when income increases.

Consumer Surplus

The quantity demanded by a consumer with the satisfaction function v , when the price is p , is the quantity $q(p)$ that maximizes $v(q) - pq$; it is so solution of the equation in q : $v'(q) = p$, i.e. $q(p) = (v')^{-1}(p)$, where $(v')^{-1}$ is simply the reverse function of v' . The $q(p)$ function is the individual demand function.

The demand function $q(p)$ gives an estimate of the benefit realized by a consumer when the price is p^* . This benefit, $W(p^*)$, called Surplus, is simply equal to the value of $v(q) - p^*q$ when $q = q(p^*)$. It can be rewritten:

$$\begin{aligned} W(p^*) &= \int_0^{q(p^*)} v'(q) dq - p^* q(p^*) \\ &= \int_0^{q(p^*)} p(q) dq - p^* q(p^*) \end{aligned}$$

using that $v'(q) = p(q)$ is the inverse-demand function, so $W(p^*)$ is the hatched area in the figure 2.1 below.

The consumer surplus is thus interpreted as the difference between the expenditure incurred by the consumer when paying the market price and the expenditure that he was prepared to incur when buying the quantities one by one (he is prepared to pay more for the first unit than for the last, according to the decrease in the inverse demand function) up to the market price. This potential expense is the willingness to pay.

It can be seen on this figure that any increase in price or reduction in quantity consumed (the case in a monopoly market) reduces the hatched area: the consumer surplus is reduced.

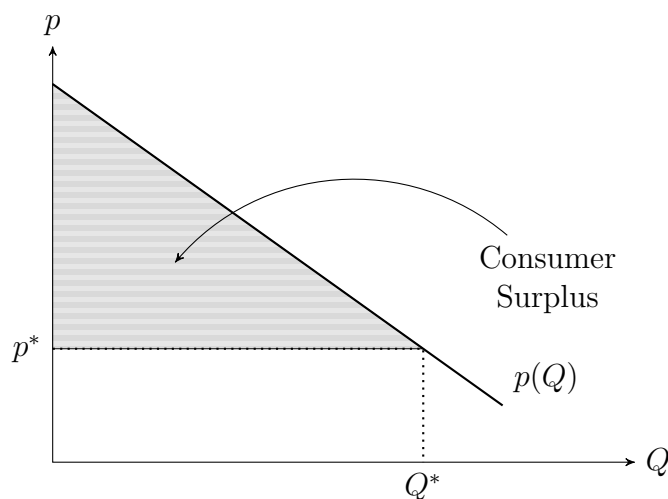


Figure 2.1: Consumer Surplus

Another interpretation of surplus would be, assuming consumers are different, the inverse-demand function $p(q)$ can be interpreted as a ranking of consumers according

to their decreasing willingness to pay for a unit of the good, where the highest point of $p(Q)$ represents the consumer who is willing to pay the highest price to buy a unit of the good, followed by consumers who are willing to pay a little less, down to the last consumer whose willingness to pay sets the market price p^* . Since all these consumers pay the same price for the good (at the single market price), there is indeed a satisfaction in paying a lower price than its availability. The sum of these differences is the total consumer surplus.

Similarly, the producer surplus is the area above the supply function up to the equilibrium price. It is the difference between the sum of the prices at which producers would be willing to sell the good and the price obtained (the equilibrium price). The sum of the consumer surplus and the producer profit gives the total surplus for society.

2.3 Positive and Negative Externalities

An externality exists when the consumption or production activity of one agent influences the welfare of another, without this interaction being the subject of an economic transaction. This influence can be negative or positive. This concept goes back to Alfred Marshall (an economist from the early 20th century) who saw the general development of scientific and technical knowledge as an example of a positive external effect for firms: the development of technical knowledge is likely to improve the productivity of all firms or to help them in their research and development programme.

On the contrary, a nuisance or pollution (pollution of rivers and oceans, air pollution, etc.) due to an act of production or consumption is a negative externality when it affects the satisfaction of a third-party agent not concerned by the exchange or production. Environmental economics focuses on the study of externalities and the possibility of "internalising" their negative effects through an appropriate policy (environmental standards, eco-taxes, etc.).

Before developing the two generic examples of externalities (i.e. innovation and pollution), we define the notions of rivalry and exclusivity.

The characteristic of rivalry. A good is said to be rival when several economic agents cannot use it simultaneously. This is the case for all private good. There are public goods which do not satisfy this characteristic of rivalry: the same unit can be used simultaneously (or almost simultaneously) by two different individuals. Justice and security are the most immediate examples. Clearly, for these goods, the investment

required far exceeds the individual value that one user derives from them, and its profitability is only assured because it benefits many.

The exclusion characteristic. Good is said to be exclusive when you can only dispose of it by paying the price for it.

Thus, traditional private consumption goods and services are both exclusive and rival goods. For example: if I eat an apple, it is because I bought it (exclusivity) and you cannot (unless you steal it from me first!) eat the same apple (principle of rivalry in consumption).

Collective consumer goods or public goods (defence, lighthouse at the entrance to a port) correspond on the contrary to goods that several consumers can enjoy at the same time, without "buying" them. They are non-rivalrous and non-exclusive goods. Most public goods are also indivisible, i.e. the use of this good by one agent does not affect the use of the same good by other agents (street lighting). Nevertheless, there may be public goods with congestion phenomena (a free road may be congested).

There may also be goods that are non-rivalrous in their use but may be price-excludable. This is the case of an encrypted television programme: you have to pay for access to the free-to-air channel, but watching it does not prevent other subscribed users from doing the same.

Some goods are non-exclusive but compete with each other in their consumption. For example, an area with fish in non-territorial waters: fishermen of all nationalities can come and cast their nets. This natural resource (the fish stock) is not subject to a market because one does not pay to come and fish (non-excludable goods). On the other hand, fish are rival goods: two fishermen cannot catch the same fish. This market, without States' intervention, is inefficient for the allocation of the good in question: if fishermen exploit this resource too intensively, it risks disappearing. They have no incentive to save the resource because it is priceless. Therefore they have no incentive to reduce their fishing because competitors will fish the resource for them if they do not (this is Hardin's "tragedy of the commons").

2.3.1 Innovation: a Positive Externality

A good that is not totally exclusive does not allow its owner to derive all possible benefits from its ownership or production. Profits are then said to be dispersed and cannot be fully recovered by the owners. This phenomenon is referred to as a positive externality (or positive external effect), meaning that the good is not produced in sufficient quantities

by the market. This is the case, for example, with knowledge, which is the result of private research carried out by companies. We will now describe more precisely what the dispersion of benefits in terms of innovation and knowledge is.

Firms can capture knowledge produced by their competitors that is useful for the development of some of their goods (or some of their services), without having to invest in research and development! It is the very nature of knowledge that makes this possible: knowledge is a non-exclusive and non-rival good. As knowledge spreads, it is not only the company that updates the knowledge that benefits from it. The issue of knowledge diffusion is therefore a highly important economic problem, since if no company can fully appropriate the results of its own research, then no company will have the incentive to embark on costly R&D programmes. Even if some dare to do so, the total amount of private research will be too small (lower than what would be optimal for society). It is clear that this can be detrimental to the country's scientific and technical development and often restrict its economic development (we will see at the end of this course that technical progress is a determining factor in long-term economic growth).

The patent system partly solves this problem. The company files a patent and in return obtains the exclusive right to use its new technical knowledge, its new product, or its new production process, for a limited period of time (usually 20 years). The company is now said to have temporary market power: this allows it to depreciate the initial fixed cost of the R&D programme it has financed. The patent has a second essential characteristic: it allows the dissemination of scientific and technical information. By filing the patent, the company describes its invention precisely. Thus, future inventors can use this data to help their own research. In the end, the patent has two contradictory dynamic effects: on the one hand, it improves the dynamic efficiency of the economy, by stimulating technical progress through the possibility of making profits from one's own inventions; on the other hand, it temporarily reduces static efficiency in the sense that the patent confers a temporary monopoly right, i.e. a situation without competition.

However, faced with the development of new technologies (e.g. on genes) or new products (software), the patent, as an economic tool, is an increasingly unsatisfactory solution, since goods, which are increasingly-complex goods, require the filing of several patents. Not being able to market a good because it requires the use of a patent held by another company is a real barrier to entry into the sector. This barrier can lead to a significant reduction in competition in a market.

Secondly, the patent system is not always the most efficient from a company's point of view. In the example of software, a set of sequential innovations is vital and does not

necessarily lead to as many patent applications: often the protection by simple copyright of software programs can be more effective (balance between protection and innovation). Indeed, a patent can stifle innovation when it has a complementary character, i.e. when innovations are necessary for other innovations.

2.3.2 Pollution: a Negative Externality

The use of the environment is generally free of charge. However, the environment is both a receptacle for production-related waste and a resource whose quality influences production and environmental services (e.g. for recreational activities: mountain hiking, etc.). Production actions that deteriorate the quality of the environment give rise to negative externalities: the deterioration of the environment damages the quality of the environment and the quality of recreational activities, without anyone being compensated for this damage.

We have already seen that it is because the environment is free (and there is no market in which environmental quality is traded) that economic agents have incorporated, in their consumption and production choices, ignorant of their harmful effects on the quality of the environment. For example, a factory that pollutes a river avoids the costly reprocessing process, but this reduces the usefulness of riverside residents who used the river's environmental services (for fishing or swimming). Despite the pollution, the latter are not compensated for the loss of utility because the river does not belong to them (see the work of the economist Coase). Thus, goods whose production causes pollution are, from the social point of view, produced in excessive quantities.

In this context, public intervention is necessary. The State can set up a tax that makes it possible to internalise the negative external effects (put more simply, the polluter bears the environmental costs that he risks inflicting on local residents, which then often reduces the quantities of pollutants emitted). A market for tradable emission permits (also known as a market for pollution rights or tradable allowances) is the dual instrument of a environmental tax, insofar as, when a market is set up, it is not a price that is determined but an overall quantity of allowances (or quotas) that is set (the price of an emission right or quota is then determined by the equilibrium of the market where the quotas are traded: a firm that decides to pollute more than its quotas allow must find another firm on this market that decides to pollute less, and then is willing to sell its saved quotas to the highest bidder).

According to Pigou (1920) (theory of internalisation determined as early as the 1910s!), externalities reflect a divergence between marginal social damage caused by pollution

(riparian residents are deprived of clean river water) and the marginal private cost of reducing pollution (the cost of avoided reprocessing): the appropriate tax leads to the internalisation of external effects, it increases the polluter's marginal private cost by taxing him until his marginal private cost is equal to the marginal social damage; he then produces the optimal quantity of the good (lower overall quantity), and generates less pollution.

Environmental taxes of this type exist in several countries around the world, notably in Sweden and the Netherlands, where the amount of additional environmental taxes has been compensated by a reduction in existing taxes on labour, so that the tax has been introduced at a constant budget for the State. Why have labour taxes been lowered? Economists believe that the most distorting tax, i.e. the one with the greatest cost to society, is the tax on labour, especially on low-wage earners. The implicit wager is to achieve an improvement in the labour market, while reducing overall pollution (win-win effect).

The 1997 Kyoto Protocol (the first-ever global protocol on greenhouse gas emissions) provided for the use of a market system of international pollution rights (quotas). In this market, the country that eventually emits more CO₂ than its quotas allow, must pay for additional quotas at the market price. It is the heterogeneity of countries, through their different capacity to reduce their emissions, that makes such a market necessary. Once trading has taken place, the marginal pollution reduction costs of all actors (countries) are equal (and equal to the market price of an allowance). This equalisation of marginal costs is therefore achieved through different levels of pollution emission reductions in different countries. Emissions are reduced where it is least costly: the objective is then achieved at the lowest cost.

I will return to pollution issues in Chapter Six.

2.4 Natural Monopoly

A monopoly structure is more efficient than a perfect competition structure when *fixed costs are extremely high and returns to scale increasing*. This is what we will now see with the concept of natural monopoly.

There are many examples of natural monopolies: the network industries, such as telecommunications, transport, gas and electricity distribution. The fixed costs are very high and the returns to scale are generally increasing. In such cases, it is more efficient not to duplicate the network: the natural structure of these sectors is monopoly. But

there are still surpluses inherent in the monopoly position which are detrimental to the general interest and consumer welfare. What solution has been chosen to address this problem?

In France, after the Second World War, the State decided to set up institutional monopolies whose aim was to provide as many people as possible with services at affordable prices, while safeguarding the profitability of companies: The price set by law was not equal to the marginal cost of perfect competition (see previous boxes on competition), but to the average cost, thus allowing fixed costs to be depreciated while supplying the service to the greatest number of people. Average cost pricing, known as *Ramsey Box pricing*, amounted to the establishment of an integrated public monopoly: the same company was in charge of the network and the provision of the service. In this configuration, the State had two distinct roles for the company: (i) owner, it is the sole shareholder of the monopoly and (ii) regulator, it is the guarantor of the general interest. These two objectives are achieved through average cost pricing!

Today, the European Union (EU) wants its Member States to move to a new system, a system of providing the same services but in a competitive situation, which amounts to "destroying the institutional monopoly system". More specifically, the principle of increasing competition defended by the Commission and the EU involves introducing competition for the provision of services, but maintaining a monopoly for infrastructure management ¹. Europe and its consumers may indeed have an interest in setting up a truly competitive market in network industries. We will see why in a moment.

In the case of the United Kingdom, the application of this principle has meant dismantling the historical monopoly in favour of several competing companies (privatisation of operators), while at the same time setting up independent regulatory agencies with the aim of promoting competition. The EU, including France, has been more oriented towards preserving historical monopolies while at the same time bringing in new competitors. In the case of telecoms in France, new competitors have entered the market initially wholly owned by France Telecom, and at the same time the State has set up the telecoms regulatory authority. On the other hand, nothing is advocated by the EU regarding the role of the state as a minority or majority shareholder: privatisation is not necessarily desired by the EU. It is the Member States of the Union that decide independently.

What are the benefits to be expected from opening up to competition? Competition, if properly implemented, can stimulate companies in a sector and lead them to improve

¹In France, we have seen the separation of the industry between upstream, i.e. infrastructure management, and downstream, i.e. the provision of the service, in the case of rail transport, for example. So today we have SNCF and RFF (Réseau ferré de France), which is in charge of maintaining the rail lines. We can imagine that in a few years private companies will be making train journeys on profitable lines.

the quality of the service they provide, or to lower their production costs, leading to an increase in consumer surplus. But competition can also destabilise an entire sector. The main risk is that the competitive market will withdraw from the least profitable segments (particular geographical areas or areas with low purchasing power, sparsely populated areas). Incumbent companies (monopolies) expecting massive entry of competitors into their market may also restrict or delay essential investments (as in the energy sector) in order to restrict the size of the market and thus the number of potential competitors. In this case, it is up to the State to accompany the opening up to competition by developing production capacity, which it finances itself or whose programme it arranges for all the companies to finance under clearly established contracts.

Let us now turn to the study of an important phenomenon that leads to market failures.

2.5 Information Asymmetries

We have seen that the perfectly competitive market was based on certain assumptions, including perfect information. In reality, there are information asymmetries in many markets. Since the work of the American economist Akerlof (1970), models capable of describing the effects of these information asymmetries on the level and price of trade in a market have been constructed.

In these models, we distinguish at least two types of actors: the first, who has the information rent and who wishes to use this advantage, and the second, who seeks to know the information and tries to get the first agent to reveal this information through incentive mechanisms. These incentive mechanisms are contracts capable of inducing the first agent who holds the information to act in the interest of the second.

Information asymmetry defines relationships where one agent holds information that another does not. This is often described through agency relationships where the principal instructs an agent to act on its behalf. As a result, the agent holding more information may be tempted to act in one's own interest and not in the interest of the principal. Asymmetric information can lead to two phenomena: adverse selection, when the principal does not observe the agent's characteristics, and moral hazard, when the principal does not observe the agent's action.

Adverse Selection occurs when the principal ignores the characteristics of the agent, even though these characteristics have an effect on the outcome of the agreement between the two actors. This is the situation encountered by the insurer who supplies his client (i.e. the agent) an insurance contract when he cannot distinguish between the good and bad behaviour of the latter with regard to the risk. If the insurance company cannot know who has a high or low risk of accident (e.g. good or bad drivers), the price of the policy will be average and those who know they have a low risk (good drivers) will not insure themselves with this insurer, the insurance will be loss-making, because only bad clients will have been selected by the insurance contract. The insurer (the principal) can improve its information about the client by supplying a two-part contract that will force the agent to self select and reveal his quality.

Moral Hazard occurs when the agent has to perform an action on behalf of the principal who is missing information. The asymmetry of information no longer concerns the type of agent, as in the case of adverse selection, but external information possessed by the agent and not possessed by the principal. Also in the insurance field, this can manifest itself by hiding a risk from the insurer (for example: the insured may take more risk once he is insured or even declare a claim not covered by a contract). These models with asymmetric information are not discussed in detail here, but the concept of asymmetric information will be mentioned in many chapters of this textbook, since it is a central phenomenon in the relations between economic agents and in the development of their strategies.

2.6 Competition and Innovation

We now return to Schumpeter (1942), whom we quoted in the introduction to this chapter: for this economist, the most appropriate market structure for innovation is monopoly. Indeed, only the monopoly (or the large firm) can generate sufficient profits to be able to finance highly expensive research and development programmes. This argument therefore provides a justification for monopoly power when it provides the conditions for innovations to emerge.

However, this idea was challenged by Arrow (1962) which invoked the replacement effect argument: an existing monopoly has less incentive to innovate again than a firm in a competitive situation. The intuition is that the firm that innovates in competition

obtains a higher profit differential (its profit, before innovation, is zero), if the innovation allows it to become a monopoly.

Gilbert & Newbery (1982) develops the efficiency effect argument which, under certain conditions, makes it possible to explain the persistence of the monopoly. This has had the effect of reviving the Schumpeterian vision. When the entry of a potential competitor threatens a monopoly, it has an incentive to innovate in order to maintain its monopoly. In this case, a monopoly's willingness to invest is the value that would cancel out the potential competitor's discounted future profits (expressed in current values). This behaviour is close to the patent proliferation strategies developed by Intel, Microsoft or Xerox.

More recent research on the link between competition and innovation now makes it possible to better explain the empirical evidence, such as the fact that many biotech and IT start-ups are responsible for many innovations even though they live in a fairly competitive environment. Old theories cannot explain such phenomena since they state that only monopolies or duopolies are able to innovate.

Boone (2000) and Aghion et al. (2001) show that the relationship between the degree of competition and the incentive to innovate is not monotonous. They establish an inverted U-shaped relationship between the intensity of competition and the intensity of innovation: with a low level of competition in the sector, the intensity to innovate is low; but increased competition has a positive effect on innovation activity, up to a threshold beyond which excess competition reduces profits and thus limits the possibility of financing R&D. The results show that the relationship between the degree of competition and the incentive to innovate is not monotonous.

Chapter 3

Financing the Economy and the Role of Money

What is the purpose of the currency exchange (dollars, euros, etc.) ? How is its value determined and who guarantees it? Does the amount of money in circulation affect the real economy? These are questions that economists have long been opposed to and to which I will try to provide some answers in this chapter. I can now answer the following questions: What is a financing requirement? And how is it satisfied?

Typically, agents finance their needs from their own resources. But when these resources are insufficient (referred to as a *financing need*, as opposed to a *financing capacity*), it becomes necessary to resort to either the credit system or the financial system. This is the distinction made by Hicks (1974) between a *debt economy* and a *financial market economy*.

At the macroeconomic level, it is interesting to note that households manage to save part of their income in various forms and that, structurally, this creates a financing capacity. Overall, firms have also had a financing capacity since the mid-1980s in France, which was generally not the case before that period.

At the microeconomic level, commercial banks finance the economy by granting credit to households or businesses. But they also increase the amount of money in circulation in the economy by supplying immediate liquidity against a promise of future repayment. Without an authority that controls these credits, this financing system can therefore become excessively inflationary. Such a controlling authority is embodied by the *Central Bank*, which is the guarantor of the value of money and has as its main objective the fight against inflation. But borrowed resources do not only have negative economic effects! They can also be favourable for the economy since they lead to an increase in global

demand (with an increase in consumption and investment) and therefore growth. It is this economic growth (which is accompanied by an increase in income) that will make it possible to repay the loans granted to agents.

On the other hand, if growth slows, stagnates or even declines in real terms, incomes may no longer be sufficient to repay the debts incurred. What can agents do in this case? Often, they have to take on new debts in order to repay the old debts! This is a vicious circle that quickly leads to *over-indebtedness*. Thus, financing an economy with credit can ultimately lead to two economic risks: over-indebtedness and inflation.

Financial markets are the other means by which the real economy is financed. Companies can go directly to these markets to meet the suppliers of capital, without going through the banks. You may have observed certain practices in the financial markets can be dangerous for the financial system and the real economy. Indeed, the resources available on these markets (savings) can be directed towards projects without any productive investment purpose, i.e. pure speculation: in the long term, this phenomenon leads to the formation of *speculative bubbles*, i.e. an evolution of the financial markets independent of the real economy.

The origin of the *Subprime* crisis of 2007 or 2008 is even more complex (da Costa, 2013). The fact that the subprime crisis turned into a global financial crisis and then into an international economic crisis in a few years illustrates the great confusion caused by the intertwining of the debt and financial market economy systems. This crisis plunged the USA (which had already been coming to the end of a long growth cycle) into recession, and strongly affected other areas of the world. Even France was affected, even though it did not practice subprime mortgage credit, and its banks had full treasuries and were making high profits (20 billion euros in 2006). The crisis was all the more challenging to predict because most players in the US financial world praised the quality of innovations in mortgage credit and other sophisticated stock market products (including securitization) which, it must be acknowledged, have been highly effective in the past years in promoting economic activity and wealth creation. Let's go back in more detail to the origin of this crisis.

Initially, the subprime crisis concerned insolvent American households that had taken on debt to buy real estate with so-called mortgage-backed loans, i.e. loans secured on the value of the house, and at variable rates. This fall in US house prices, coupled with the rise in interest rates, sparked off the crisis. It should be pointed out that these loans had been securitised, i.e. they were bundled together and converted into securities placed on the financial markets (the famous intermingling of debt and financial market economies); securities that were bought by many operators as well as other banks for

their own clients. Theoretically, , the primary idea was to reduce the risk borne by the bank in lending money to a borrower, by creating portfolios built especially for this purpose, which were then sold to other financial players: since the banks could no longer theoretically bear the risk, they in fact loosened their grip on the collateral required from potential borrowers, to the point, for some, of granting large loans to households that they already knew were insolvent! As a result, many American households with incomes that were too low became homeowners during the first half of the 2000s. Over this period, the USA experienced a real sectoral boom which finally ended in the bursting of a speculative bubble with the fall in prices on the housing market. The combination of insolvent households and a real estate crisis led to the bankruptcy of a large number of banks and financial market operators within a few months, holding *doubtful receivables*. Immediately, credit conditions tightened in response to this massive insolvency, leading to a lack of liquidity in the money market as companies found it difficult to borrow for investment. The consequences of the crisis were then compounded tenfold.

In September 2008, the crisis took the form of a crisis of confidence on the financial markets following the collapse of the major bank of the USA: Lehman Brothers. The fear of systemic risk was at its highest at the time: like a domino cascade, a large number of banks would face the risk of failure caused by the disappearance of just a few banks. Faced with these fears, the American (FED) and European (ECB) Central banks cut their rates, and governments in the same areas recapitalised weakened banks. In the USA, the Paulson Plan (November 2008), endowed with more than 700 billion, was designed to finance the purchase of "bad debts" held by American banks, as well as to recapitalize American banks if necessary (capital increase). In the case of this plan, therefore, it was not a fiscal stimulus (next chapter 4), its primary purpose being to avoid the failure of some USA banks in order to avoid *systemic risk* (or the complete collapse of the financial system) (da Costa, 2013).

Where is Europe today in term of the financial crisis? Although the old continent is in a rather different financial and economic situation, it was finally hit in 2009 by the American crisis, which spread quite rapidly, showing us that the economic system is globally integrated, much more so than previously assumed. What were the reactions of European governments? First of all, eurozone governments put in place a concerted response to reinject liquidity into banks (interbank relations that we will define in this chapter), recapitalise banks that needed it (in exchange for these banks agreeing to comply with new management rules) and publicly guarantee individual deposits (in the form of insurance policies that French banks take out with the government). Chapter 4 looks back at the various stimulus plans that were subsequently adopted in many countries,

as Europe was not spared these Keynesian-inspired measures, particularly to combat the rise in cyclical unemployment.

To prevent the recurrence of such financial risks, the American and European Central banks have moved since 18 June 2009, with the "Plan to overhaul US financial regulation", towards the establishment of independent authorities responsible for macro-prudential policy (the new "European Systemic Risk Board" in Europe). At the international level, regulatory institutions, such as the famous International Monetary Fund (IMF), are reforming to meet the global challenges of the crisis (but we will see this in chapter 5).

To better understand why financial markets have become so crucial in today's economies, this third chapter also examines the changes in the financing of the economy that have taken place in the past two decades. It will be necessary to understand why the way an economy is financed has changed over time. It will also be necessary to analyse :

- the reasons why the fight against inflation has become the priority objective of monetary policy (growth? employment?), and what have been its repercussions on the financing of the economy and the functioning of firms;
- the effect of the current financing system on the economic policy of the government, which also uses debt for investment and spending.

The Monetary Aggregates

These are groupings of homogeneous sets of monetary or non-monetary assets. The aggregates are then classified in descending order of liquidity.

Thus $M1$ includes currency (notes) and demand deposits. Demand deposits are deposits that can be withdrawn without notice and instantaneously: these deposits form is known as *book money*.

Then $M2$ is the sum of $M1$ and less liquid deposits such as term deposits. Term deposits can be converted into cash before an agreed fixed term at the price of a total or partial revision of the agreed remuneration (Home Savings Plan, etc.). Savings deposits of the Livret A or Livret Jeune type in France have a character of conditional transferability generally equal to three months.

Finally, $M3$ includes $M2$ to which are added the negotiable liabilities of monetary financial institutions (MFIs) such as repurchase agreements, money market fund shares/units (*OPCVM* in France), money market instruments, etc. Repurchase agreements are all cash received in return for securities sold at a specified price and on a specified date. Money market fund shares/units are units subscribed by non-financial agents and issued by open-ended investment companies (*SICAVs*) and other mutual

funds (*FCPs*) which invest in money market paper. Finally, money market instruments or MFIs are short-term securities issued by MFIs which are negotiable: typically they are certificates of deposit.

3.1 The Transition from a Debt-Based Economy to a Financial-Market Economy

At the end of the Second World War, the French State itself provided the financing of the economy, as savings were insufficient, and the investments to be made were so large. The Central bank (Banque de France) and all deposit banks were nationalised. The State grants them advances so that they can grant loans at reduced rates. Until the 1960s, growth was strong and prices rose rapidly. During the 1970s, the French economy entered a long phase of weak growth while inflation remained high. Initially, inflation caused households to take on more debt, but the slowdown in growth reduced their resources, which were intended in particular for the repayment of loans. The rise in interest rates would have increased the financial burden on agents and plunged them into a situation of over-indebtedness. The State, which had financed the modernisation of its economy on credit, would have then suffered a similar fate. Until then, budget balances had been more or less respected because economic growth was generating substantial tax revenues. But from the mid-1970s onwards, the budget deficit grew cumulatively, as the State was forced to go back into debt to finance its deficits!

3.1.1 The Fight Against Inflation

The fight against inflation requires an increase in real interest rates with the aim of reducing the rate at which loans are granted. The government, like companies, is then forced to raise resources on the capital markets. Savings on these markets remain relatively low; it is therefore primarily the State that benefits from the available capital, to the detriment of companies (this is known as the *crowding out effect* of private investment by public investment).

More specifically, a distinction must be made between two types of capital market: the money market and the financial market. Short-term capital is traded on the money market (maturities of less than seven years), with the interbank market on one side and the market for negotiable debt securities on the other. On the interbank market, only

credit institutions, the Treasury and the Banque de France are involved: they trade for very short periods of time in the Central bank money market. As for the negotiable debt securities market, it is open to banks, the Treasury, but also to companies. The securities used to finance them are bank certificates of deposit, negotiable treasury bills and corporate commercial paper. Companies can thus finance themselves in the short term through the market without having recourse to bank credit.

In the financial market, supply and demand for long-term capital meet. Firms and governments intervene in this market to meet their financing needs, while other agents such as households and other firms intervene to provide financing capacity. In the financial market, there are two categories of securities traded: shares and bonds. Shares make their holders owners of part of the company and ensure the payment of dividends (which depend on the profits made by the company). Bonds are similar to long-term loans, for which an interest rate is determined (in periods of rising interest rates, bonds are more attractive than shares since rates and bond prices are inversely related). A distinction must also be made between the *primary market*, on which new securities are issued, and the *secondary market*, where securities already held are exchanged.

Changes in interest rates, such as changes in securities prices, can generate significant losses for agents and represent a well-known risk in these markets. To protect themselves against these risks, agents operating on these markets have created markets that allow them to carry out forward transactions at a predetermined price with MONEP (Paris negotiable transaction market) or at a predetermined rate with MATIF (French international futures market). Quite quickly, these markets became places dedicated almost exclusively to speculation.

3.1.2 Towards the Capital-Market Economy

The nineties were decisive for France as for many other European countries. Transactions in equities and bonds increased tenfold and thirtyfold respectively! At the same time, household and corporate deposits in banks fell sharply, because these economic agents wanted to tap the capital market directly. However, it is only the strongest companies that financed themselves directly on the market, leaving the banks with only those companies with the greatest risk of insolvency. Does this make banks less profitable?

In fact, banks would also become the intermediaries between savings and capital seekers on the financial markets, thanks to the OPCM in French (or Undertakings for Collective Investment in Transferable Securities) of which they held 80 %. The demand for capital is subject to the phenomenon of *disintermediation* (i.e. large firms and the

government directly address savings in capital markets), whereas savings were largely intermediated by banks (i.e. banks were said to have relevant information about savers – an issue of information asymmetry seen in chapter 2).

3.1.3 Financial Globalisation and its Risks

Capital movements between countries, from one continent to another, contribute to the spread of price fluctuations, and sometimes crises (as recent events have shown us). Financial globalisation is generally defined by three concomitant phenomena, which have occurred since the 1980s:

- the deregulation that allowed the movement of capital between countries;
- the disintermediation, which leads to more participants in capital markets ;
- the decompartmentalization of capital markets so that all forms of savings can meet all financing needs worldwide (decompartmentalization of capital markets means no longer separating short-term and long-term markets).

The economic interest of a global capital market is theoretically obvious: countries with surplus savings will be able to contribute to the financing of countries with structural financing needs. It even enables the balance of payments of certain countries to be balanced: thus the deficit in the US current account balance (due to imports from China for example) is made up by an inflow of capital (notably Chinese: thus, its current account surplus, i.e. exports minus imports of goods and services plus unilateral transfers, reached a record level of around 14 % of its GDP in 2007, against 8 in 2016) which is invested in US public securities. This mechanism boosts world growth since US consumption and Chinese growth are strongly stimulated.

The global capital market also makes it possible for companies of different nationalities to merge. For example, the arrival of foreign funds in the capital of French companies has led to a profound transformation in the relations between shareholders and company managers; this is clearly the implementation of a new governance which is not always favourable to employment. This phenomenon is simple to explain: the new shareholders demand greater transparency in the management of companies, but also very high short-term rates of return that managers must abide by. In particular, the obligation to reduce wage costs usually leads to redundancies. But the effect is also negative on the long-term investments of companies and their strategies for the future: the short-term focus of new shareholders and their demand for huge returns explain this (the fact that the *Bear*

Stearns Companies had a return for its shareholders almost four times higher than the industry average in 2006 also suggests that very significant risk-taking has taken place and can lead to large-scale bankruptcies as we have seen in recent months).

Let us now look at the different functions of money and ask ourselves whether or not money affects the real sphere of the economy.

3.2 The Role of Currency/Money

3.2.1 The Functions of Money

The three main functions of money are the exchange intermediation function, the unit-of-account function and the value reserve function:

The function of exchange intermediary. Historically, as the division of labour has developed in our economies, there have been more and more transactions, rendering barter practices inefficient (in a barter-based economy, agents' needs must match exactly, both in terms of products and desired quantities; in other words, there must be a double coincidence of needs, which takes a long time to happen). It was therefore necessary to define an intermediary between the exchanges: money.

The unit-of-account function. In an economy without money, the value of goods is therefore expressed in relative terms, i.e. the value of any good exchanged in this economy must be expressed in relation to the value of all other goods that can be exchanged. With money, on the other hand, the value of each good can be expressed in absolute terms and in a single unit: the price system is thus greatly simplified.

The value reserve function. Money has the advantage of allowing the storage of purchasing power over time: it is a link between the present and the future since it retains purchasing power at its value, barring inflation.

3.2.2 The Demand for Cash or Demand for Money

Classical and neoclassical authors consider that there is a disconnection between the *real sphere* (the set of markets in which goods and services are physically exchanged) and the *monetary sphere* (including the valuation of these exchanges) of the economy: money is *neutral*. The quantitative equation for money in these authors assumes that an increase in the quantity of money in circulation leads to an equivalent increase in the general

price level, provided that the volume of transactions is assumed to be unchanged and the velocity of money circulation constant (which Friedman's work suggests is the case in the long run, but not in the short run):

$$Mv = pT$$

where M is the money supply in circulation, v is the velocity of circulation of money (how many times the same unit of currency is used in the time interval considered), p is the general price level and T is the volume of transactions.

On the contrary, the Keynesian critique, which questions the neutrality of money, is based on a more refined description of the demand for money. Keynes' reasoning is based on an arbitrage made by agents between, on the one hand, holding cash and, on the other hand, holding bond-type assets (fixed-income securities). For Keynes, it is clear that agents have a preference for liquidity, i.e. means of payment and investments that are easily convertible into money (money being in fact the most liquid asset). But they may also desire money for money's sake, and not simply for the possibilities it offers to carry out transactions. Keynes therefore relies on the three functions of money and specifies the reserve function of value: the motive for transactions, the precautionary motive and the speculative motive.

Agents want cash in hand to make their purchases (first reason for transactions). In this case, the demand for money increases with the level of production in the economy, or equivalently, at the aggregate level, the sum of current income. Agents may also want to hold cash balances in order to face certain risks (second precautionary reason). This is a departure from the traditional perception of the role of money. However, one of the contributions of Keynesian thought consists in introducing a demand for money for the purpose of speculation. Indeed, for Keynes, although agents have a preference for liquidity, they may agree to give up holding money in order to invest in fixed-income securities, i.e. risk-free securities (such as bonds).

The volume of demand for cash for speculative purposes will therefore depend on the interest rate that pays for these securities; the interest rate is the price of giving up liquidity. The value of fixed-income securities such as bonds moves inversely with the value of the interest rate. Agents buy securities when interest rates are high, with the goal of selling them when rates fall. The demand for money supply therefore depends partly on the level of interest rates. Keynesian analysis thus calls into question the dichotomy between the real and monetary spheres that was at the heart of classical and neoclassical analysis.

Money Demand in a Simplified-Keynesian Economy

Money is a measure of the value of goods and services and plays two major roles, that are distinct:

- It is a means of payment in economic exchanges. There is therefore a demand for "liquid" money to carry out these exchanges. The higher the level of trade, the greater the "need" for liquidity: the demand for money increases. This demand for money corresponds to a demand for the purpose of economic transactions. It depends on the level of economic activity.
- It is a for savings, a particular asset, called a monetary asset, which allows the transfer of purchasing power from the present to the future; in the absence of inflationary pressures, it is risk-free but has a zero return. In order to realise future projects or to keep the value of its stock of savings constant, the demand for money can vary according to the return on money (relative to other financial assets). This demand for money is referred to as speculative demand for money and therefore depends on the relative performance of money. Thus, holding money is equivalent to refusing to hold financial assets.

The Issue of Speculation

The goal of any speculator is to realize capital gains, to buy real assets (real estate for example) or financial assets cheaply and sell them when their price has increased; if the price of these assets is deemed high and a decrease is expected, one stops buying and sells: one prefers currency. If the price of these assets is considered high and a fall is expected, one stops buying and sells: one prefers money. When one does the opposite, it is because one prefers non-monetary assets: speculation therefore consists of an incessant arbitrage between money on the one hand and non-monetary assets on the other. Speculation can obviously concern buildings, land, apartments, raw materials, listed securities, shares (whose owners, the shareholders, receive dividends, variable with the profits received by the companies) or bonds (fixed-income securities, the owners receive an interest, determined at the time of issue).

Arbitrage Between Bonds and Currency: the Role of the Interest Rate

In the Keynesian representation of the economy, there are only two forms of value reserve: monetary assets and financial assets (shares, bonds, receivables, etc.). Keynesian analysis favours bonds because these assets provide a simple relationship between the price of these securities and the interest rate: the price of the bond is decreasing with the interest rate. Indeed, in a fixed-rate bond, the coupon C (i.e., the annuity or annual interest) is a fixed percentage r of the face value of the security P_F (issue value). The price of a P_B bond at a date t is then determined by the present value of all payments that can be expected from that security :

$$P_B = \sum_{k=1}^T \frac{C}{(1+i)^k} + \frac{P_F}{(1+i)^T}$$

with $C = rP_F$, i the market interest rate and T the maturity or resale date of the bond. The discount rate is i , it reflects a (fictitious) opportunity cost of not having invested the savings at the market interest rate.

Thus, if the interest rate rises, the price of the security falls: the demand for securities increases (mechanically, the demand for money falls). In order to realize a capital gain, the security is sold when its price increases, i.e. when the interest rate decreases (since r and P_F are constant). In this case, the demand for money is rising.

From the 1970s onwards, the economist Friedman, leader of the monetarists, strongly opposed Keynes' conclusions. For Friedman, the demand for money is largely determined by permanent income (and to a greater extent than the interest rate and the inflation rate): permanent income is the sum of the expected income from human and material assets ("professions, training and skills" for human assets, versus "financial and real estate assets, etc."). The permanent income is the sum of the expected income from human and material assets ("occupations, training and skills" for human assets, versus "financial and real estate assets, etc." for material assets) over the agent's lifetime. Since permanent income is less sensitive to short-term fluctuations and is the key determinant of money demand, money demand is then considered stable. In Keynes, on the contrary, it is current income that mattered.

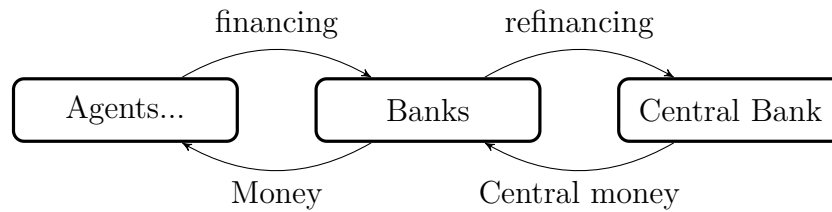
If the money supply increases, with the monetarist vision, agents will modify the structure of their portfolio by using excess money to buy securities and goods, which increases prices: the increase in the money supply thus leads to a rise in prices without any effect on the real sphere! The conclusions here are identical to the classical and neoclassical precepts: the money supply must evolve in a stable manner because it causes inflation and has no effect on the real economy. Faced with these strongly opposing theories, what role can the Central bank choose?

3.3 The Role of the Central Bank

The banking system is a highly hierarchical system: only the Central bank (or first-tier bank) has the power to issue banknotes; commercial banks (or second-tier banks) create money when they distribute credit to non-financial agents (or when they subscribe to securities issues, or buy real assets). It is the commercial banks that participate in the bulk of money creation through the granting of credit.

In return, commercial banks must comply with the regulatory requirement to hold reserves with the Central bank. To do so, they must refinance themselves in order to

Figure 3.1: Financing and Refinancing



obtain the necessary amount of "Central bank money". This refinancing is done in two ways: through bond issues on the financial market or on the money market (interbank market, negotiable debt securities market).

Only the Central bank issues Central bank money, and can thus control money creation by reducing the amount of Central bank money it makes available to commercial banks. The link between central money and the power of commercial banks to create money by granting credit has been the subject of two different theoretical formulations:

- The first is of monetarist origin and believes that money creation resulting from credit is entirely controlled by the Central bank which, by providing more or less central money, induces an increase or a slowdown in money creation: this is *credit multiplier* view.
- The second theoretical formulation claims, on the contrary, that it is the banks that hold the initiative as to the credits they grant: they determine the amount of credits granted according to the needs of the economic activity they support; this is the viewpoint of *credit division*.

In practice, the Central bank can also intervene in the interbank market by determining the *key interest rate*; it periodically sets the interest rate and thus the quantity of money it wishes to inject in relation to the banks' financing needs. Banks can also take the initiative when they are in urgent need of refinancing: the Central bank then intervenes by granting advances of Central bank money against the taking into account of securities that will have to be repaid at maturity. These two forms of intervention determine the key interest rate. More precisely, when it is the Central bank that has the initiative, it plays on the lowest interest rate, or *floor rate*; and when it is the banks that have the initiative, it is the highest rate, or *ceiling rate*, which is modified. These two rates will drive the interbank market rates that must be within the range so defined.

There is a final form of Central bank intervention called the *open market* policy. This involves the Central bank buying or selling securities, mainly treasury bills (short-term

securities issued by the government): by acquiring these securities, the Central bank injects money into the market by increasing the supply of capital, which will lower rates. Conversely, any sale of securities is tantamount to withdrawing liquidity from the market or reducing the supply of capital, thus causing rates to rise.

Chapter 4

Economic Cycles and Policies

The economic institutes (INSEE and OFCE - for National Institute of Statistics and Economic Studies, and French Economic Observatory, in France), the economic departments of the major banks, the Forecasting Directorate of the Ministry of the Economy and Finance and the Banque de France all have their own forecasts of the growth rate of France's gross domestic product (GDP). All these institutions use models (generally macroeconometric) that make forecasts based on assumptions about the general economic and financial environment: oil prices, interest rate levels, the health of the world and US economies, the euro-dollar exchange rate, etc. their forecasts, however, are not necessarily identical since they depend on the specific characteristics of the model used (the behavioural functions of agents, estimated econometrically, may differ from one model to another) and the assumptions made (such as the expected evolution of the oil price). Forecasters also wonder how to spread this growth over the quarters of a given year...

French Business Climate Note - INSEE - August 2020

Source: <https://insee.fr/fr/statistiques/4630554?sommaire=4473296/>)

Abstract: According to information of 8 July, the loss of economic activity in June would be around 12% compared to a normal situation, after -22% in May and -30% in April. Almost two months after the gradual release of the containment, losses of economic activity would be almost three times less than those estimated at the start of containment. According to the responses of the French companies to the survey "Acemo-Covid" led by the Dares (Research, Studies and Statistics Directorate, at the Department of Labor) in connection with the INSEE on the anticipated pace of the the recovery in activity, economic activity is picking up at the end of the year, and would still be a little bit in below its pre-crisis level. According to these expectations

established in June and based on the developments known and anticipated on that date, health and economic conditions scenario would lead to a decrease in GDP over the whole year 2020 around -9%, the deepest recession since inception of the French national accounts in 1948.

Almost two months after the release of the confidence, economic activity would continue to recover although remain degraded. Estimates of business losses in the past few months have been slightly revised due to the publication of the economic activity indicators for this period: index of industrial and services production in particular. However, the order of magnitude of loss of activity during containment continues to remain around 30% for a whole month of containment.

For the month of June, and taking into account the information and data available of 8 July, the activity would continue to recover: the loss would be limited to 12% of a situation "normal", after an average of -22% in May... and 30% in April. Faster containment that anticipated by the epidemic, the relatively good recovery in household consumption and the gradual return to work would contribute to this relatively rapid recovery.

The resumption of activity would materialize in all branches of the economy. This continued recovery in activity is observed in all of the branches in which the activity was authorised. The loss of economic activity would include half of construction compared in to April (-31% in June compared to -61% in April); table 1) reflecting the recovery of the construction sites.

In the industry, the loss of business would be "only" by 14%, half as much as in the heart of the crisis in April. This upturn is benefiting return to work and recovery of household consumption (fact sheet consumption), but industrial production would still be affected, in particular by a international demand still anemic and large inventories to sell.

It would be in the case of the automotive industry, whose recent recovery in vehicle registrations to their pre-crisis levels could be satisfied by the disposal of stocks.

In market services, loss of activity would be broadly the same as the economic level than in the industry. If closures and activity limitations have affected production of services until mid-June, the new regulatory relaxations have brought up rapidly at the end of June the economic activity of certain branches particularly affected by the crisis. In particular, the supervised reopening of restaurants would have led to a strong recovery of the segment's activity: loss of business is estimated to be around 20% in June, four times less than in April. In total, on a quarterly basis, the activity would have decreased by 17% in the second quarter (after -5.3% in the first)...

Rail and road freight traffic are gradually approaching their pre-crisis levels. Daily freight traffic information railways transiting on the SNCF's network in relation to a reference situation, known as the "normal" data provide an estimate of the loss of

activity of the freight transport branches railroad. A similar indicator is now mobilized to estimate the activity of the transport of road freight: the heavy goods vehicle traffic indicator in France calculated by CEREMA from the traffic data from more than 1200 network-wide metering national road haulage company not licensed. Beyond that, these indicators may also reflect the loss of overall activity, since transport of goods by rail or road is correlated to the volume of goods traded in the economy as a whole. Within two weeks of the implementation of the containment, the movement of rail freight had declined very rapidly to an average of 65% of trains in circulation in April than the usual number.

Similarly, the road traffic of vehicles had contracted to a level of about 60 percent compared to "normal". In May, somewhat anticipating the start of deconfinement of the population, the traffic has gradually increased adjusted to average 75% for the railroad and 86% in the trucking industry. In June, road traffic has picked up strongly and it is now close to its pre-crisis level, while rail freight remains around 85 percent of his "normal" level...

At the end of 2020, economic activity would remain slightly below its pre-crisis level. The "Acemo-Covid1" survey makes it possible, among other things, to know the pace anticipated by companies to resume their activity at a normal level. By projecting their aggregated responses to the economic activity estimates of the latter months, it is possible to establish a set of scenarios - low, high or central - for the recovery of activity until the end of the year.

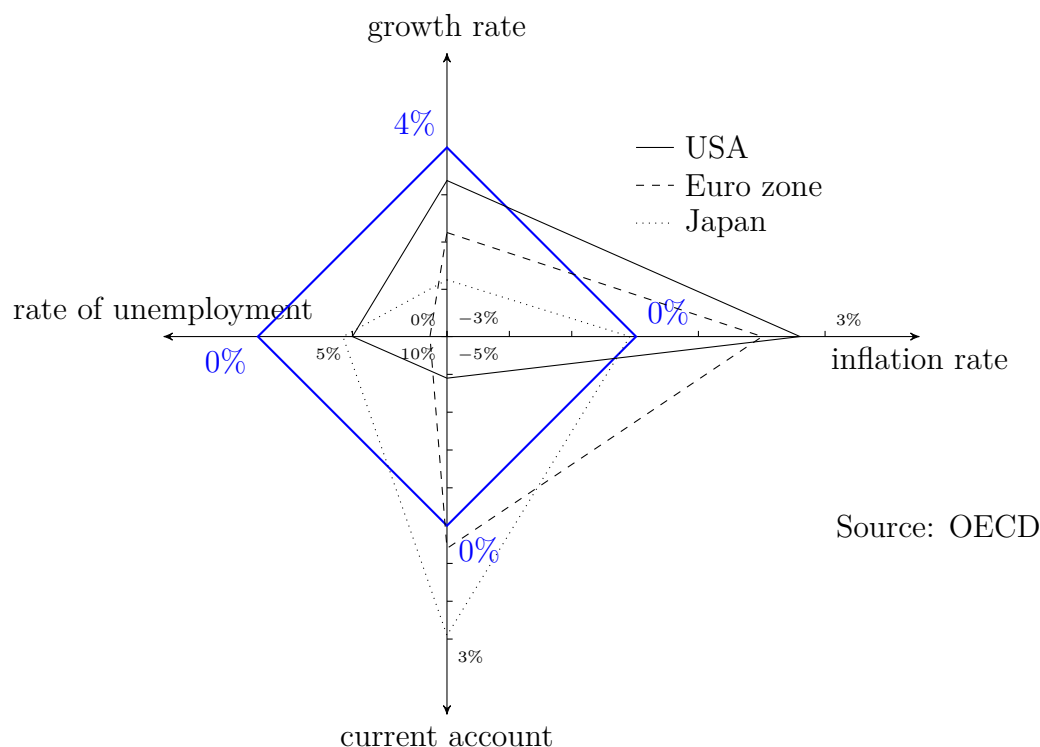
At the end of 2020, economic activity would remain a little below its pre-crisis level: between -6% and -1% in December 2020, according to the different scenarios, which is -4% on average. By sector, the pace of recovery would be heterogeneous. Regulatory difficulties (authorized or unauthorized activity) or health, the potential supply problems, the lack of job opportunities or personnel, lead to an allocation of business losses differentiated according to branches - construction has, for example, been more affected than the agri-food industry. But they condition also, depending on their intensity and frequency, the anticipated pace of recovery by companies. Thus, losses in economic activity in the market services would be in the range of 2% at the end of the year, while they would remain around 5% in the industry, and up to 8% in construction.

In a context of huge economic and health uncertainty, these forecasts should be considered in conjunction with caution. If such scenarios were to materialize, after a 17% decline in the second quarter, compared with the first quarter, French GDP would recover by about 19% in the third quarter, and then by 3% in the fourth.

Over the year 2020 as a whole, it would decline in this case by 9% over 2019, which is the largest annual contraction since the creation of the national accounts in 1948.

The macroeconomic approach of this chapter is partly based on Keynes' analysis and the *neoclassical synthesis*. The aim of this synthesis has been to construct relatively simple mathematical models to provide a first approximation to the questions that interest us

Figure 4.1: "Magic square": euro area, United States and Japan, average from 1996 to 2006



Source: OECD

here. We will therefore study these models (known as *IS-LM*) which will allow us to look at fluctuations in GDP, but also at its results in terms of unemployment and inflation.

Indeed, macroeconomic analysis is based on several aggregates that the economist Kaldor has proposed to represent and link using the "magic square" (see the following figure). Thus, a country's economic situation is deemed all the more satisfactory the closer the area of the quadrilateral is to the ideal situation defined in the plan: growth rate, inflation rate (on an inverted scale), unemployment rate (on an inverted scale) and current account balance (in GDP points). The most enviable situation is therefore one in which there is neither unemployment nor inflation, with strong growth and a large external surplus, all at the same time. These are in fact the four main objectives of macroeconomic policy. We will look at the first three and leave the last current account aggregate for the next chapter 5 on the international economy and globalisation.

The magic square in Figure 4.1 shows that European growth is relatively weak and the trade-off between unemployment and inflation seems to be in favour of "controlled" inflation.

During the glorious thirty years (1945-1973), the economic policy of European countries was in fact simpler than it is today: it was perfectly in line with the Keynesian framework of thought, since in the case of recession and high unemployment, the economy that also had low inflation was stimulated by expansionary fiscal and monetary policies; on the contrary, in the case of strong growth, which led to inflationary pressures in a framework of low unemployment, the economy had to be slowed down using restrictive fiscal or monetary policies. This was the era of the so-called STOP AND GO policy, which was marked by a possible trade-off between inflation and unemployment. The economic representation of this phenomenon is called the *curve of Phillips (1958)*: a decreasing curve between inflation and unemployment.

From the 1970s onwards, the appearance of *stagflation* (growing unemployment in an inflationary environment) greatly complicated economic policy and led to criticism from the monetarist movement and then from the new classics. Rapidly, two theoretical visions then clash in terms of economic policy: for neo-Keynesian economists, fluctuations are a large-scale indicator of market failure (chapter 2), both in the goods and labour markets. The existence of rigidity in the market prevents adjustments through prices (or labour market wages). The state must then intervene to regulate the market. On the other hand, the new classics consider that fluctuations are natural responses of the market (situations mostly due to technological changes in the framework of the so-called real cycle school of thought); State intervention is not necessary, or even harmful. Who should we believe? Which school of thought should be trusted?

Since the second half of the eighties, in Europe, the fight against inflation has been the main objective of economic policies: at that time, there was talk of the "competitive disinflation policy" which made it possible to curb the high inflation of the early eighties. Inflation, which was considered too high, weighed on the purchasing power of employees and on business activity. At that time, this policy was based on a restrictive view of monetary policy. Although inflation was therefore halted and brought under control in the 1990s, this restrictive policy was then pursued in Europe for three main reasons:

- because of German reunification, which represented an inflationary risk (since reunification had to be massively financed) ;
- but also because of the implementation of monetary union (the euro) which was to achieve the objective of a strong currency (a German prerequisite whose population had difficulty in abandoning the Mark, a strong currency);

- and finally, because of the now major objective of reducing the public deficit which has recently imposed itself on the European country (European sovereign debt crisis of 2010).

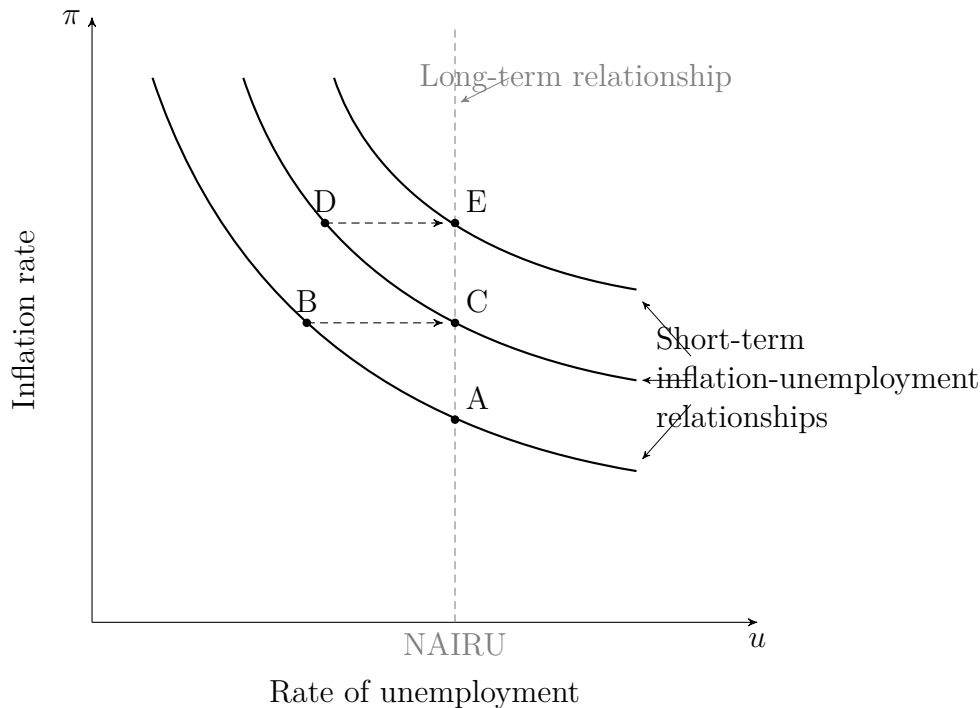
This is why the very possibility of an expansionary fiscal policy in Europe could legitimately be questioned... before the 2009 crisis occurred. Indeed, this economic crisis changed the situation somewhat, since, in order to prevent the economic system and especially employment from paying too heavy a price, expansionary policies were implemented in Europe, as in the rest of the world, both in fiscal and monetary terms (with a very sharp fall in interest rates by the European Central Bank – ECB – to the point where rates became zero or negative in real terms). You will notice that government budgetary support has diminished since 2012, insofar as it was necessary not to create new bubbles and, above all, because sovereign (i.e. state) debts were judged by the markets in 2010 to be too strong, too high.

Furthermore, it should be recalled here that the ECB is independent of political power and has always had the primary objective of fighting inflation. Let us examine the reasons why European governments have assigned this objective to it; and let us see why it provides, when necessary, significant support to the European growth rate (which is quite exceptional and rather punctual in view of the history of the ECB), which it tries to stimulate by means of a so-called accommodative monetary policy.

4.1 Monetary Policy

Since the introduction of the euro (the single European currency), France has lost its national monetary sovereignty to the European Central Bank located in Frankfurt (Germany); like the US Central bank (the FED) which is independent of the federal government. We saw in the chapter 3 that the essential objective of monetary policy was to adjust the quantity of money in circulation to the real needs of the economy. When this regulation is carried out by the political power, for electioneering reasons, it has an interest in increasing the quantity of money in circulation to boost the purchasing power of its own voters! As these abuses lead to inflation, it is logical that the central bank should be independent of the government. Monetary policy is, however, an integral part of economic policy. It must be conducted in the interest of the nation (which we have represented through Kaldor's magic square). The special feature of monetary policy is that it sets targets for the growth of a monetary aggregate, an interest rate, an exchange rate.

Figure 4.2: The Phillips Curves



Thus, for Friedman, the objective is price stability, and the attainable intermediate objective he adopts is to control the evolution of a monetary aggregate. When the monetary aggregate rises, economic agents are victims of a monetary illusion, which consists in having the impression of an increase in their purchasing power: all this has the effect of rising prices. These agents therefore end up with the same level of real cash (the ratio of the money supply to the general price level). In other words, purchasing power is gradually eroded by inflation. The critique of the Phillips curve (which consisted in demonstrating a decreasing relationship between the unemployment rate and the growth rate of nominal wages, cf. the decreasing curves in Figure 4.2) has been called into question on several occasions, thanks to new econometric estimates, notably by the monetarist Friedman. For the latter, the Phillips curve becomes vertical in the long run, so the choice can no longer be between inflation and unemployment but between unemployment today and unemployment tomorrow.

By using the rational expectations hypothesis, the new classics will surpass Friedman in their criticism of expansionary monetary policies: they are as inefficient in the short term as they are in the long term, since employees rationally anticipate price rises and will immediately demand an increase in nominal wages in order to maintain their purchasing power (real wages, i.e. nominal wages divided by prices), which will have the effect of

leaving firms' demand for labour unchanged. The new classical school thus invalidates the existence of a Phillips curve in both the short and long term. Thus, the rule to be followed by the monetary authorities, from the point of view of this school of thought, is to establish a credible rule and to abide by it. It is necessary to convince all agents that the rule is intangible and that no other objective can be taken into account.¹ This behaviour, which is generally referred to as monetary orthodoxy, is the term often used to describe the European Central Bank.

It is, however, a credibility that is difficult to implement. This has been the case, for example, with the Banque de France. As early as 1983, the real interest rate, which was then still zero or even negative a few years earlier, was raised to 7 %, which had the effect of limiting monetary creation and consequently restricting inflation. For the Banque de France it was a question of achieving the same reputation of credibility as the Bundesbank, of importing its credibility, by maintaining the parity of the franc vis-à-vis the Deutsche Mark. The relative fall in the prices of imported products, as a consequence of the rise in the exchange rate, causes imported disinflation and makes it possible to reduce price rises. French companies, which until then had built their advantage over international competition thanks to the price factor (usually helped by the devaluation of the franc), will then lose this advantage, which will force them to better control production costs and improve product quality. These efforts were not rewarded until the mid-1990s, when the external balance turned positive and inflation was finally brought under control. The de-indexation of the wage level to the price level which was decided at the beginning of the 1980s also made it possible to achieve wage stability, which also contributed to inflation control. The next oil price shock led to a fall in commodity prices, which also helped to control inflation.

The monetary construction in Europe during the 1990s (in 1991, it was decided to implement the single currency from 1999) forced the partners to harmonise the "European Monetary Area". The convergence criteria are thus defined and represent the objectives to be achieved before the candidate countries can participate in the euro. The objectives linked to the convergence criterion thus entail the continuation of efforts to combat inflation and ensure exchange rate stability:

¹This is why we have seen central banks that have based their reputation on that of another central bank of a neighbouring country that had a strong and already long reputation in monetary matters : This was the case of the Banque de France in the 1980s, which followed the policy of the German Bundesbank, which involved setting up a parity of the national currency with that of Germany, whose monetary policy one wished to follow. More recently, in Latin America and Asia, countries have been backing their monetary policy to that of the Fed by guaranteeing the parity of their national currencies against the US dollar.

- The inflation rate should not exceed by more than 1.5 % the average of the rates of the three best performing member countries of the Union;
- The currency must have remained in the monetary system for at least two years;
- The medium and long-term interest rate should not exceed the rates of the three least inflationary member countries by more than 2 %.

Other criteria even point to a strong constraint in the use of government fiscal policies: public deficit not exceeding 3 % of GDP and public debt not exceeding 60 % of GDP.

These are all constraints that are now being overridden to allow States to react to the crisis. For example, France saw its deficit exceed 7 % of GDP as early as 2009 due to the financing of the French recovery plan and, also, to the drop in tax revenues concomitant with the increase in social spending (unemployment benefits); and if the second recovery plan (announced by President Sarkozy in June 2009) reaches the very high amounts circulating in the economic press, we can expect public debt to reach 80 to 100 % of GDP in the years to come. Let us close the parenthesis here and reopen it a little later when it comes to assessing the consequences of exceeding the constraints of the Stability Pact. In addition, we will also see in the next chapter that opening economies to the circulation of global capital considerably modifies the effectiveness of monetary policies (IS–LM–BP).

The rule of Taylor (1993) proposes to determine the evolution of short-term interest rates as a function of the level of the inflation rate relative to the target inflation rate, but also — important point — as a function of the growth rate and, more specifically, as a function of its level relative to the potential growth rate. The monetary authorities thus incorporate objectives beyond monitoring inflation, ensuring a temporal consistency that agents can incorporate into their expectations. This active rule therefore has the advantage that it can change the stance of monetary policy almost automatically.

For the economist Mundell (1970s), only two of the following three objectives can be achieved simultaneously: exchange rate stability, freedom of capital movements and national independence of monetary policies: this is known as the *Triangle of incompatibilities*. Today, the freedom of capital movements has been achieved. In 1992 and 1993, European countries had left the existing monetary system because of the difficulty of maintaining exchange rate stability while interest rates had remained relatively high (mainly due to German reunification). Thus, the lira and the pound exited the European Monetary System (EMS) and France was able to remain in the system in 1993, at the cost of an extension of the permitted fluctuation margins between currencies.

Since the euro has been the single European currency, monetary policy has not set itself an objective of external stability of the euro vis-à-vis other currencies: fluctuations in the dollar do not prompt a reaction from the European authorities, which always give priority to controlling domestic inflation. The European Central Bank takes its monetary decisions through its Governing Council of the central banks of the various euro area member countries. It is therefore often difficult to conduct a single monetary policy in an area that is far from being homogeneous: there are indeed structural differences, for example in levels of development, and, in terms of the economic cycle, the growth levels achieved by European countries can vary greatly. Exchange rate devaluation is now impossible between European countries (since they have a single currency), whereas in the past it made it possible to reduce the differences between countries' economic health.

Thus, according to Mundell's definition, Europe is not an *Optimum Currency Area*, i.e. it cannot benefit optimally from its single, common currency. An MUA is possible if and only if :

- There is a low degree of asymmetry between the shocks experienced by the regions of the zone;
- There is a significant mobility of production factors, so as to allow rebalancing in the event of a shock. For example, the displacement of workers from areas of high unemployment to areas of high activity, making it possible to solve employment problems and avoid inflation in countries with very high growth rates.

These two conditions have not yet been met for Europe. The mobility of employees in Europe is low and the economies are still fairly specialised so that, for example, the international financial crisis of American origin (an exogenous shock for Europe) is not felt in the same way in all European countries (Ireland, England and Spain, more affected than France or Germany).

Finally, the recent Greek crisis (spring 2010) is a perfect illustration of the fact that Europe is not an Optimum Currency Area: for Mundell, a currency area that is not optimal can only get by if the rich countries economically support the weaker countries that are more strongly affected by the asymmetric shock. These substantial budget transfers never really took place to Greece.

4.2 Budgetary and Fiscal Policy

In the *IS–LM* model... (which will be presented in a lecture and you will see applications in a tutorial), fiscal policy is, along with monetary policy, one of the main levers of government economic policy. Thus, fiscal policy means using government spending and taxes to influence economic cycles. As we have seen, in Europe, the only instrument available to deal with one-off shocks was national fiscal policy. It has also been seen that fiscal policy is constrained by the constraints set by the Maastricht Treaty, for example, or the Stability and Growth Pact, which may represent a negative aspect to government reactions in response to a sudden drop in economic activity.

These constraints were nevertheless intended to prevent a country from passing on the negative effects of its own fiscal policy to its neighbours. The increasing deficits create inflation and a rise in interest rates and the exchange rate of the euro.

The IS–LM Model

It's the equation of Keynesian thought by Hicks (1974). The *IS–LM* model results from the joint analysis of the money market and the goods market. Prices are assumed to be fixed, which means that this model is a short-term representation of macroeconomic equilibrium.

The level of production in the economy (gross domestic product or GDP denoted Y) is determined by the sum of expenditures (in a closed economy, without taking into account imports and exports: consumption C , private investment I and public investment G): thus $Y = C + I + G$, an equation called *Resource-Employment Balance*. C and I will be specified, i.e. functions will allow to understand the determinants and the evolution of these variables. On the other hand, G will remain exogenous, i.e. determined autonomously by the State without the other variables of the economy explicitly interacting.

Household consumption increases with their disposable after-tax income, but decreases with the level of the interest rate r since a rise in rates encourages them to save and thus reduce their consumption. Investment measures the gross expenditure of companies to increase their capital stock: it is a current expenditure that provides a better production capacity for the future.

The I investment function increases with the level of current sales (if Y increases sales, then I also increases sales, which provides an incentive to invest to increase production capacity) and decreases with the interest rate at which firms take on debt (the rate of return on capital must be higher than the interest rate for the firm to take on debt in order to invest in capital).

The IS curve is therefore determined from the Resource-Employment Equilibrium in which the behavioural functions of private consumption and investment are specified.

On this curve are represented the (Y, r) pairs such that equilibrium on the market for goods and services is assured. In the (Y, r) plane, IS is a decreasing curve.

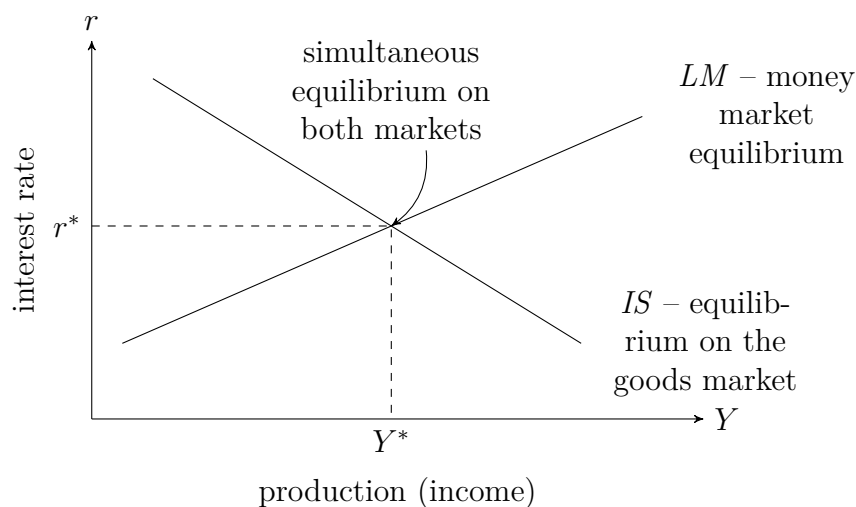


Figure 4.3: IS-LM Equilibrium

The LM curve represents the money demand equation. The demand for money is increasing with Y and decreasing with r . An increase in income increases the demand for money. On the other hand, a rise in the interest rate will reduce the demand for money because of speculation: for Keynes, agents who have a preference for liquidity can give up holding money to invest in fixed-income securities such as risk-free securities like bonds. Thus, the interest rate is the price of giving up liquidity. In the end, the LM curve is increasing in the (Y, r) plane and represents the (Y, r) pairs such that the money market is in equilibrium.

The only point at which the two markets (or the real and financial spheres) are simultaneously in equilibrium is the equilibrium point in the $IS-LM$ model.

We will now consider two cases of economic policies: first, a restrictive fiscal policy and second, an expansionary monetary policy. In reality, fiscal and monetary policies are used together in what is called the policy-mix.

Restrictive Budgetary Policy

If a government's objective is to reduce its public deficits, it may resort to raising taxes or reducing public spending. Raising taxes will reduce households' disposable income and thus their consumption, and through the multiplier effect, total output will fall.

The same effect is expected from a reduction in investment or public spending that reduces total output. Graphically, the IS curve moves downwards.

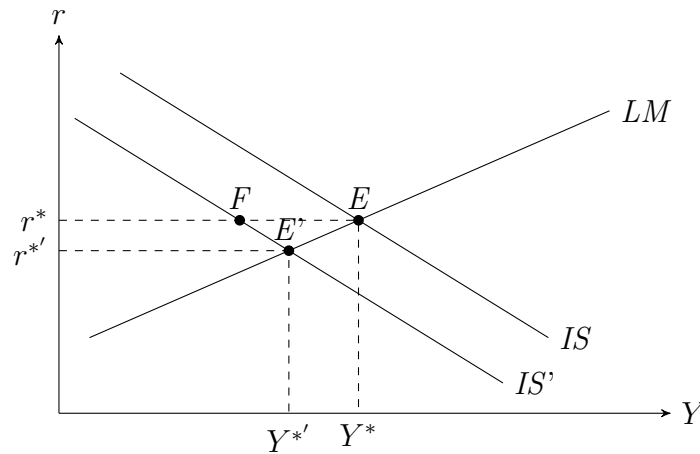
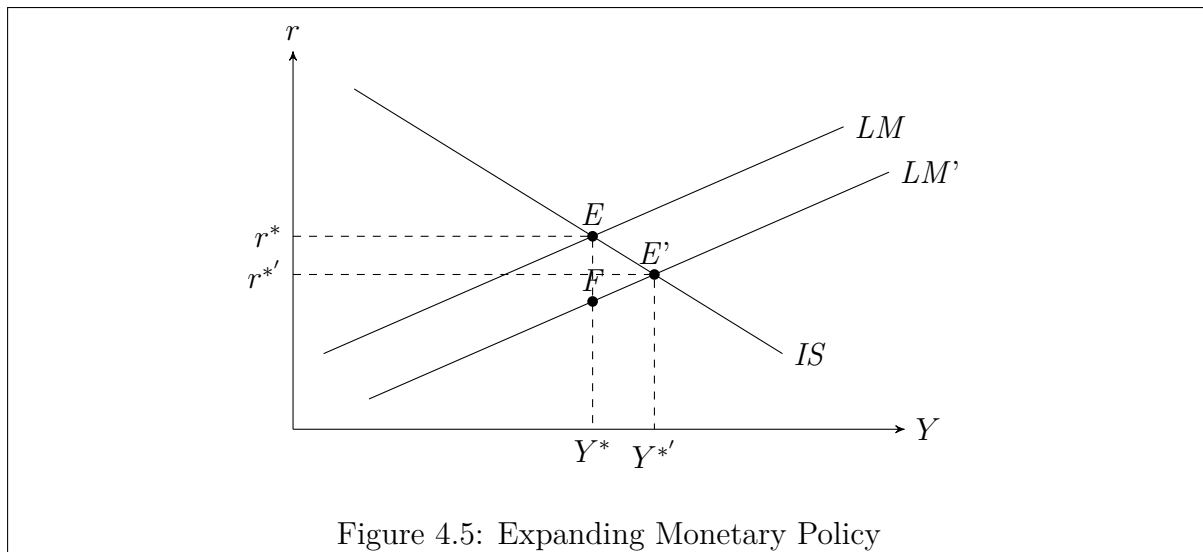


Figure 4.4: Restrictive Budgetary Policy

On the financial market, the LM curve remains unchanged since the drop in production, and therefore in revenues, has reduced the demand for money, which has led to a drop in the interest rate. However, this drop in the interest rate favours private investment, which allows us to say that without this r drop, the negative shock on production would have been even greater. But we cannot say that, in the end (taking into account all the effects), private investment is favoured by this policy, since the Y decrease works against private investment. In the end, everything will depend on the empirically estimated I function.

Expanding Monetary Policy

For example, if the central bank buys large amounts of Treasury Assimilable Bonds (OATs), it injects liquidity into the economy and increases the amount of money in circulation. In order to ensure equilibrium on the money market, the interest rate must decrease (in fact, Y is unchanged while M increases, so r must decrease to ensure equality between supply and demand for money). The consequence of the fall in the interest rate on the real sphere is immediate: private investment increases which, thanks to the multiplier effect, makes Y production grow. The new equilibrium shown in the graph below therefore characterizes an economy whose income has increased with lower interest rates.



Europe's situation, at the turn of the century, therefore marks a general lack of room for manoeuvre, i.e. strong constraints on both monetary and budgetary economic policy, which no longer allow the application of Keynesian precepts.

Thus, it is said that discretionary economic policy, i.e. in the hands of the State and its goodwill, was disappearing in favour of so-called rule-based policies such as the Stability Pact or the monetary policy currently conducted by the ECB. This was a significant change in our economic history. It can even be said that, from a certain point of view, it was a step backwards, a return to the pre-Keynesian situation, when in the 1930s, the volume of State expenditure was considered to have no effect on the level of economic activity. Before the subprime crisis, it was more the rise in government borrowing and interest rates (due to the additional demand on the capital markets) that is criticised and considered to be an important limitation of fiscal policy. This increase in rates discourages some consumer purchases when financed by borrowing, and also reduces business investment. At the international level, as economies are open, expansionary fiscal policies have weaker effects at the national level since they benefit more foreign producers. Finally, the more indebted the government is, the higher the debt burden: the government has to repay at ever higher rates.

Next, a distinction must be made between proactive fiscal policies and fiscal policies that spontaneously exert a counter-cyclical effect on economic activity. The latter spontaneous action amounts to mitigating the vagaries of the economic situation using public spending and public taxation, which are mechanically linked to the economic cycle and adapt to it automatically. For example, the case of expenditure on unemployment compensation and means-tested social benefits that evolve with economic activity. State expenditure will tend to accelerate while economic activity slows down and tax

revenues automatically decrease. The budget balance deteriorates almost automatically when activity deteriorates. All of this mitigates the impact of economic downturns on the economy as a whole. Government revenues and expenditures are said to work as *automatic stabilizers*.

On the contrary, proactive fiscal policy is about supporting economic activity in the short term, using the Keynesian multiplier. The aim is to voluntarily compensate for low private spending by increasing government spending. The increase in public spending will generate additional income that will be partly consumed, which will feed domestic demand to companies, which will then increase their employment and investment. It is said that there is a cumulative effect of the public expenditure initially injected. This phenomenon works all the more so as incomes are little saved, little taxed and the additional consumer demand is directed to domestic companies (otherwise there is crowding out by the outside world, by our own imports). When this policy stimulates demand and makes it possible to bring actual production closer to full employment, then the unemployment resulting from the lack of outlets (*Keynesian unemployment*) can decrease. Finally, Keynesian revival can also take the form of a reduction in the tax burden, which will increase the disposable income of private economic agents and stimulate economic activity.

We have just discussed the effects of a stimulus on employment. Let us now clarify the theories that explain the origin of unemployment.

4.2.1 Unemployment

According to Keynes, unemployment is the result of a lack of opportunities that firms anticipate. He therefore proposes to stimulate demand rather than lowering wages, which on the contrary can only aggravate the situation since it reduces the purchasing power of employees.

Firms are constrained in the goods market: according to the *short side rule* of the market, which states that one can only force someone to buy a good if he wants to at the market price, there is an outlet constraint, i.e. insufficient demand for goods which leads to lower demand for employment by firms (they demand work in just enough quantity to produce the quantity of goods addressed to them). It is said that there is a shift from the goods market imbalance to the labour market.

In contrast, so-called *classical* unemployment is also characterized by a double imbalance. Here, however, it is supply that is lower than demand in the goods market, as

entrepreneurs reduce their supplies because of excessively high production costs. On the labour market, supply is greater than demand: firms' demand for labour is reduced due to excessively high labour costs. There is here a double rationing of households both on the goods market and on the labour market. If price flexibility were possible, lower labour costs would reduce the demand for goods while increasing the demand for labour. How can price rigidity in the labour market be explained?

Recent labour market theories seek to explain the real wage rigidity that is at the root of unemployment persistence. First, pressure from the unions, which has the effect of setting wages at a level not desired by firms, may explain this. But the firm itself may itself be led to pay wages above the equilibrium wage on the labour market, and does so in order to motivate employees. These two theories are derived from the so-called *wage bargaining* and *efficiency wage* models.

The efficiency wage theory is therefore based on the principle of information asymmetry between an employee and the hiring firm. It does not know the worker's productivity and whether he or she will be a dedicated employee or a shirker. On the employee's side, he gives up leisure time to supply work, so he has a certain disutility at work. So the way for the company to encourage employees to make the maximum effort is to pay a higher salary than can be found in other companies. And if the employee is surprised not to work, he will lose his job and therefore with him the salary supplement he had compared to other employees. In the end, he will therefore make an effort that the company wants him to make. Now, if many companies act in this way, the equilibrium wage that will result will be higher than the wage that equals labour supply and demand, and involuntary unemployment appears, i.e. agents who want to work for a lower wage are unable to find a job. In the end, the informational pension of the employee allows him/her to obtain a paid job at a higher wage, but this is to the detriment of employment in general.

From wage bargaining theory, it is assumed that employment contracts are nowadays mostly negotiated between representative institutions, such as trade unions and employers during collective agreements (thus 85 % of employment contracts in France result from collective agreements negotiated at branch level). The interest for employees in the action of a trade union is clear when the latter aims to raise wages above the equilibrium wage level observed on the labour market. But in the end, however, firms retain the power to determine the amount of work they use. Wage bargaining theory shows that while union action is beneficial for the workers in the firms (the so-called *insiders*), it is always to the detriment of the unemployed (the *outsiders*).

Statistical studies of the European labour market show that insufficient jobs are being created and that unemployment is not due to too rapid a growth in the active population.

Moreover, women's labour supply is only slightly increasing with real wages, and men's labour supply is not significantly related to real wages. Thus, there is a very low elasticity of labour supply with respect to wages.

Approximately 15 % of jobs disappear each year and as many are created at the same time: 10 000 jobs disappear and about 10 000 jobs are created every day in France. If we take into account the phenomenon of replacement on the same job, the movement of manpower is even stronger, since 30 000 people leave their jobs and 30 000 find new ones. On average the company that creates one job, hires three workers and separates from two others.

It should also be noted that 70 % of the hirings are done on fixed-term contracts ("contrats à durée déterminée", CDD, in French) and only one third are transformed into stable jobs.

Moreover, employment allocations are mainly made between companies that belong to the same sector. Thus, with a breakdown of the productive system into many sectors (600 to be exact), employment movements between sectors account for only 20 % of total reallocations.

Finally, the increase in the unemployment rate of the least qualified workers is also due to a change in the structure of jobs. In France, the unemployment rate of blue-collar and white-collar workers rose from less than 2 % in 1968 to 13 % in 1992, while unemployment among managers and intellectual professions rose from 1 % to 3 % over the same period. Industrial activities that used to employ low-skilled labour have tended to disappear so that the population of skilled workers has grown.

For several years now, European employment policies have tended to stimulate the demand for labour from companies and to encourage the supply of labour from employees. These are mainly fiscal measures aimed at lowering the cost of labour and providing incentives to work, but will only have an average effect in the long term. This is why we will discuss them only very briefly in this chapter on cyclical policies. However, it should be borne in mind that when unemployment is compensated at levels close to the working wage, the incentive to look for work is likely to be weak and the duration of unemployment can become very long. Historically, unemployment benefits had been developed when unemployment was still low, so compensation schemes could be quite generous. Therefore, in recent years, compensation schemes have become more selective, mainly for financial reasons. The question that should be central here (beyond the accounting aspects related to the balance of unemployment insurance schemes) is the link between unemployment compensation and disincentives to work. In fact, the empirical studies do not allow for a

clear conclusion. Only job-search assistance and sanctions on unemployment rights when the search is insufficient seem to be effective.

We will end this section on unemployment with social minima and the phenomenon of the *poverty trap*. Most countries have set up minimum income systems which of course have a strong social justification. This system can, however, represent what is called a poverty trap when the resumption of work results in the loss of the benefit of the public allowance (minimum income), the beneficiary of the minimum insertion income (RMI in French) may not be encouraged to get out of this precariousness. Since 2001, France has had an employment bonus that should encourage people to return to work at the lowest wages. At the same time, a 1000 euro bonus has been introduced to encourage the long-term unemployed and recipients of minimum social benefits to return to work. This system in France concerns a very large number of beneficiaries, so it is not sufficiently targeted and has too little incentive effect. This is why the RMI has been replaced by the RSA or active solidarity income (created under the Labour, Employment and Purchasing Power Act, TEPA of 21 August 2007) with the central objective of organising a return to employment through incentives that guarantee former RMI recipients (and single parent allowance recipients as well) that their net income will increase when they find a job again².

4.2.2 Government Debt

The *Stability and Growth Pact*, concluded in Amsterdam in 1997, was made more flexible in 2005 allowing governments to deal in particular with situations of economic crisis (unknowingly anticipating the 2008 crisis). This relaxation is made possible on the condition that these same governments manage to obtain healthy public finances during periods of growth. We have already seen that the deficit of public administrations, i.e. the State, local authorities and social security bodies, is deemed excessive above a threshold of 3 % of gross domestic product. Since 2005, it can therefore be exceeded "to the extent that it is acceptable" when serious recessions occur (as was the case recently). However, even before the economic crisis of 2008, the government's revenues were almost never sufficient to finance all its expenditures, as the budget balance was negative at the time. The government is therefore in need of financing, which means that it has to go into debt. In 2003, 98 % of the State's debt was made up of securities traded on financial markets, of which 60 % was in the form of fungible Treasury bonds (long-term debt) and 21 % in the form of Treasury bills (short- and medium-term debt). And government debt has been

²In 2008, the RSA was being tested in 34 departments, where 8000 contracts of this type were signed. Its generalisation took place on 1 June 2009.

increasing very sharply for several decades: it rose from 662 billion euros in 1995 to 1,145 in 2005 and 1,717 in 2011 (consolidated government debt: i.e. government debt plus debt contracted by local and regional authorities, social security administrations and other central government bodies - source: Eurostat). In fact, the French-government budget has been in deficit every year since 1975!

The government debt-to-GDP ratio is an essential criterion for checking whether government debt is sustainable. In absolute terms, government debt can grow but must be reduced relative to GDP: high inflation devalues government debt in real terms; the rate of GDP growth can be sustained. France's debt rose from 55.5 % of GDP in 1995 to 85.8 % of GDP in 2011. At the same time, debt interest charges have risen from less than 5 % to more than 15 % today! We are therefore exceeding the ceiling set by the Maastricht criteria — 60 % — although we are close to the average of the EU countries.

However, these figures must be put into perspective, even in the current period of public accounts crisis, because they do not give a global and sufficiently accurate view of the assets and liabilities of the State and public administrations. Indeed, the State's assets include holdings in public enterprises and the value of other assets such as works of art, buildings, etc.; all of which in fact potentially reduce France's debt.

On the other hand, these figures are also worrying and therefore difficult to put into perspective, insofar as they do not take into account future debts in the area of public pay-as-you-go pension schemes, which are expected to weigh very heavily on public finances in the future. Indeed, as the retired population grows (the famous post-war baby boomers), it is likely to see its pensions shrink, as the current system does not provide the necessary resources on the side of the active population, whose relative size is falling sharply.

Where is France currently in terms of debt? Public debt figures was flirting with 100 % of GDP, before the COVID19 health crisis. With the current health crisis, debt is expected to reach 120 % and more. Faced with this, how is France reacting?

For several years now, France has been carrying out a dual programme in terms of its budget, having financed several large loans at the same time as a plan to reduce its spending in certain areas. In the end, the purpose of the loans was to finance activities that would generate economic growth in the future, such as investment in new technologies, training and education expenditure (including our new Paris-Saclay University, for example!) and the financing of research and development: it can therefore be said that

this long-term debt is worthwhile, especially as France seems to be lagging behind in these areas (see the conclusion of this textbook on these specific points).

Chapter 5

International Economics and Globalization

International trade in goods and services, as well as the movement of capital, have boomed since the end of the Second World War. Globalisation of trade and increased competition from emerging countries (Brazil, India, China) have consistently been raising fears for some time in the West (both in terms of the inequalities within the nations that they may lead to, and in terms of the lack of robustness of the international monetary and financial system (Stiglitz (2007)). This has led to strong reticence in the face of economic globalisation. The financial flows that pass through the foreign exchange market every day amount to USD 1,500 billion, equivalent to the Italian GDP: the high volatility of these flows is worrying because it weakens the international monetary and financial system. However the essential element lies elsewhere.

Exchange rate movements have an impact on the competitiveness of nations and thus on the real economy. Despite the dollar's fall against the yen since 2008, it has not yet collapsed. However, the "twin deficits" in the USA, i.e. the trade deficit and the government deficit, could one day lead to a sharp fall in the greenback. These twin deficits can exist without the dollar falling, in particular because China uses part of its trade surpluses to finance US debt, which supports the currency and US growth, and thus Chinese exports in return! This mechanism of mutual interest could be called into question, especially if the USA were to enter into a long recession: the resulting fall in the dollar would certainly lead to a major world crisis! Indeed, if the US economy were to turn around, US imports would come to a sharp halt and Chinese growth, based on exports to the USA, would also be undermined. China's smaller trade surpluses would no

longer allow the financing of the US public deficit through the purchase of US government bonds, which would lead to a further fall in the dollar.

The greenback's slide has since stabilized at around 1 € per 1.19\$ (on August 28, 2020), after hitting a record high since the euro's inception of 1 € per 1.6\$ on April 22, 2008. Such a decline in the US currency had not been recorded since the 1970s (in May 1975, the dollar had fallen to 3.97 francs, equivalent to 1 € per 1.65\$). In addition, many other currencies around the world have experienced such appreciations against the dollar, except the yuan (the Chinese currency) which escaped a brutal revaluation thanks to the very tight control of the Chinese authorities. Most Gulf currencies are pegged to the dollar and are therefore not subject to such sharp appreciations.

It is clear that the excessive weakness of the dollar and of the American economy in general show the limits of the financing of the twin deficits of the USA mainly by China thanks to its reserves¹. However, the globalization that has been taking place over the last few decades, and which is still accelerating, is not a new phenomenon. It is even the second wave of globalisation after the boom in trade flows in the middle of the XIXth century, which took place thanks to the reduction in transport costs with the development of the railways and maritime transport. Thus, until the First World War, world trade was multiplied by 12! Two World Wars and the crisis of the 1930s thus stopped the globalisation that was then taking place. The second wave is a little different, particularly in terms of the nature of the goods traded and the actors. In the first wave, the rich countries in the North exported manufactured goods and imported agricultural goods and raw materials from the countries of the South. Today, most of world trade is now intra-industrial trade between northern countries.

For this fifth chapter, it will be necessary to distinguish between the theories of international trade that study the real flows of goods and services on the one hand, and the theories of international finance that analyse financial flows on the other. These theories will enable us to better understand the stakes of the current negotiations within the World Trade Organization (WTO), but also the effects of globalization on inequalities, which it reduces or worsens, depending on whether countries benefit from it or not. Over the last hundred years, it has been noted that industrialized countries, in Southeast Asia

¹The temptation is therefore great to give other currencies than the dollar, in particular the euro or the yuan in the longer term, an increased role in international trade. However, it is not so easy to switch from one reference currency to another, as this notion is based on economic, financial and political power. Thus, the dollar was present in 84 % of foreign exchange transactions in the world in 2016, compared to 35 % for the euro and 4 % for the yuan. The US currency thus remains the most traded currency, but its share is declining steadily but slowly. That of the euro remains stable. On the other hand, the pound sterling, the Swiss franc, the Australian dollar and the currencies of the emerging countries are seeing their share increase.

for example, have succeeded in catching up economically thanks to international trade, while the countries of Sub-Saharan Africa have seen their development totally blocked even though they export raw materials and agricultural goods. Inequalities therefore seem to be increasing between countries and between areas, but this is also the case within the industrialized countries where two categories of population stand out: skilled individuals who benefit from globalization and less skilled individuals who are subject to competition from developing countries in labour-intensive sectors. The study of international finance will then enable us to refine the economic mechanisms we encountered in the third chapter on financing the economy by taking into account the openness of economies. For example, in the case of France, the intermediation rate in the narrow sense, i.e. the credits distributed by resident financial institutions within the overall envelope of financing granted to resident agents, has risen from 70 % in 1978 to a little over 40 % since 2004 (stable since). It is typically this kind of phenomenon that we will be able to explain here. We will also study the reforms that are currently taking place in the regulatory apparatus (such as at the International Monetary Fund), world finance and its effects on real economies.

5.1 International Trade

Trade in goods and services between countries accounts for a large share of countries' activity. Tables 5.1 and 5.2 show us that the increase in trade is very important for developed countries and some developing countries. We also see that smaller countries trade more than larger countries. In a large country, resources are more varied and production is more diverse, which makes it more independent.

Table 5.2 allows us to say that trade and capital flows have grown faster than global revenues.

The period 1996-2000 was marked by a boom in foreign direct investment. FDI is part of strategies of offshoring to countries with low labour costs: this is the strategy known as the international decomposition of the production process according to the comparative or fiscal advantages of different countries. We have already said that it is the fall in transport costs that makes it possible to relocate certain subsets of goods or services to countries with low labour costs. Then, on table 5.2, we see that the post-war period was marked by an increase in world trade and strong global growth. It is the steady fall in customs duties, thanks to international negotiations within the framework of the GATT, that explains this sustained increase in trade: for example, the average customs duties of

	PIB			International Trade			Foreign Direct Investment Flows		
	billions of \$ current			exports+imports in % of GDP			net inflows % of GDP		
<i>Countries</i>	1970	1990	2001	1970	1990	2001	1970	1990	2001
USA	1026	5751	10065	11	21	18	0,12	0,84	1,43
Japan	206	052	4141	20	20	20	0,05	0,06	0,15
France	147	1216	1310	30	43	54	0,42	1,28	4,21
Germany	-	1689	1846	39	54	68	-	0,18	1,84
China	92	355	1159	4	32	49	0	0,98	4,04
Brazill	42	465	509	14	15	27	0,93	0,21	4,41
Mexico	36	263	624	17	38	57	0,91	1	4,06
Tunisia	1	12	20	47	94	99	1,11	0,73	2,43

Sources: World bank and Cnuccd (2003)

Table 5.1: Growth in international trade and direct investment

<i>growth rate evolution</i>	1986-1990	1991-1995	1996-2000
GDP	15,6	5,6	1,3
Exports of goods and services	15,6	5,4	3,4
inward FDI	23,1	21,1	40,2
outward FDI	25,7	16,5	35,7

Sources: Word Investment Report 2003

Table 5.2: International Trade and Foreign Direct Investment (FDI)

the industrialized countries (OECD) on invoiced prices rose from 40 % in 1947 to 3.19 % in 2012 (compared to 6.8 % at the world level in 2012) (2012: most recent figures).

It should also be noted that the largest share of world trade is now made up of so-called intra-industrial trade between northern countries (cf. table 5.3): goods traded between countries generally belong to the same industries. We shall see that the theories based on comparative advantages, but also on differences in the endowment of factors of production, are incapable of describing, and therefore of explaining, this type of trade, which has become the current norm. It is for this reason that the new theories of international trade have worked on the issues of horizontal differentiation (creation of new products) and imperfect competition.

It can also be noted (table 5.4) that the share of world trade that takes place within a given zone is increasingly high. Regional free trade agreements within the EU have made it possible to increase trade between European countries to a third of world trade!

It is now time to understand what types of international agreements have led us to the current situation, which we have just described using these few descriptive statistics.

<i>en %</i>	1910		2000	
	Exports	Imports	Exports	Imports
USA	47,5	40,7	83,2	79,6
Germany	74,5	24,4	83,4	68
France	59,2	25,3	82,9	79
Japan	80,8	38,3	93,8	56
UK	75,4	24,5	80,7	80,8

Sources: Kuznets 1967 and WTO 2003

Table 5.3: Share of manufactured goods in trade

	Date of entry	Shares of intraregional trade in total exports (%)			
	in effect	average 1967-76	av. 1977-86	av. 1987-96	av. 1997-2006
UE	1957	58,1	58,1	66,3	66,2
MERCOSUR	1991	8,4	8,6	15,5	18,7
ALENA	1994	39,3	38,2	41,4	36,7
ANASE	1992	15,1	17,7	18,3	21

Sources: Chelem-CEPII 2009

UE : Union européenne, MERCOSUR : Marché Commun d'Amérique du Sud, ALENA : Association de Libre-Echange Nord-Américain, ANASE (ou ASEAN) : Associations des Nations de l'Asie du Sud-Est

Table 5.4: Share of intraregional exports

5.1.1 World Trade Regulation

In Geneva, in 1947, the world's main trading partners, 23 countries in all, drew up a code of good conduct within the framework of the GATT (General Agreements on Tariffs and Trade). This code was based on the main principles of multilateralism and liberalism. The aim was then to achieve free trade, i.e. trade without obstacles such as customs barriers (during the 1930s, the then increased customs duties had aggravated the crisis by spreading it through a very sharp reduction in international trade flows). Multilateral negotiations take place, within negotiating rounds, to discuss and define agreements in the customs area related to trade in goods. Let us look more specifically at the organisation of the world trade regulator.

Firstly, three principles are strongly binding on GATT member countries:

Principle of non-discrimination: any tariff advantage granted to one member must be extended to all members;

Principle of reciprocity: a member country cannot benefit from the concessions of its partners without granting concessions itself;

Principle of transparency: Non-tariff trade barriers such as quotas must be converted into customs duties so that their real impact is transparent.

Secondly, two bans complement these three principles: a ban on *dumping* and a ban on subsidies when they keep prices artificially low. Finally, three exceptions are provided for:

- Exceptions to the principle, with the authorisation of free trade agreements and customs unions in violation of the most-favoured-nation principle ;
- Exceptions for developing countries, where quantitative restrictions are allowed in the event of serious balance of payments problems (to be defined in this chapter);
- The practical exception, which concerns agriculture and textiles.

In the end, the GATT negotiations led to a considerable reduction in customs duties among its member countries. In April 1994, the Final Act of the Uruguay Round (which began in 1986 in Punta del Este and was signed in Marrakesh in 1994) identified four main themes in this final agreement:

- Developed country tariffs on manufactured goods are falling by 38 %;
- Developing countries are now taking part in the negotiations;
- New discussion points are emerging around services and intellectual property rights.
- The creation of the WTO is decided.

In 1995, the GATT was transformed into the World Trade Organization (WTO) during the *Uruguay round* which extended the agreements to services (known as the GATS agreements) and intellectual property (TRIPS). Another important innovation linked to the creation of the WTO is that states, who consider that the rules of international trade are not being respected, can now refer a dispute to the Dispute Settlement Body (DSB). This possibility has led to many disputes between the USA and EU on agricultural issues or in the aeronautics sector being referred to the ORB. Agriculture, which is a sector

that is very largely protected by the United States and Europe (which are not prepared to make concessions on this point to other WTO members), is a central and permanent point of disagreement. On the other hand, the WTO has made significant progress in other areas, mainly for public health, thanks to the Trips agreement, which solves the problem of generic drugs by making molecules, which are nevertheless subject to property protection in the North, available to the countries of the South in the event of a pandemic.

Let us now look at the main economic theories in the field of international trade and try to answer the following questions: When is it in the interest of two countries to trade with each other? And why would two similar countries trade with each other?

5.1.2 Theories of International Trade

Smith's *absolute advantage* theory states that absolute advantage is gained in international trade by the nation that produces and sells a good at a lower price than competing nations. It is therefore in the interest of each country to specialize in those productions in which it has an absolute advantage over other nations, and to procure, at the lowest cost, those productions in which it has no advantage over other nations.

Ricardo's *comparative advantage* theory shows that each nation, when it specializes in the production for which it has the highest or lowest productivity compared to its partners, increases its national wealth. This is the production for which it has a "comparative advantage". In the end, global wealth produced is increased. This theory remains one of the major arguments in favour of openness to international trade, because it demonstrates the possibility of having beneficial trade even for an economy that has no absolute advantage.

[16:15] Divya Madhavan Brochier

The inter-war period revealed the question of production-factor endowment to be taken into account in gauging the advantages of nations to be exchanged between them. The Swedish economists Heckscher and Ohlin, then the American Samuelson, defined the theory that bears their initials (*HOS theory*) and which states that "Nations specialize in manufactures that incorporate the factor of production that they possess in abundance". Developed countries export goods that require a large amount of capital for manufacturing, while developing countries export products that incorporate a large amount of labour. This theory thus leads to an international division of labour in terms of complementarity between countries, consistent with the principles of Ricardo's theory of comparative advantage. These two theories complement each other and form the basis of the traditional theory of international trade. There is, however, an important limitation

to this framework of analysis in that it does not describe the exchange of similar goods among developed countries: North-North trade.

Imperfect competition models have been applied to international trade only since the early 1980s, when the focus was on the existence of increasing returns to scale that lead to the concentration of the production of a good in one place, in one country. These models succeed in explaining the stylised facts (i.e. the well-known empirical facts) that comparative advantages cannot explain, such as: the importance of trade between similar countries, the importance of intra-industry flows (i.e. cross trade in similar products), the growing role of multinational firms and, finally, the effects of open borders. Thus, when borders are opened, the rents of producers with increasing returns to scale attract foreign producers who wish to take advantage of the available rents as well.

All these theories help to define an economic doctrine of free trade, the objective of which is to limit barriers to the movement of goods, services and capital between national economies. Protectionism, on the other hand, is the economic doctrine that aims to restrict access to national markets for foreign competitors. Protectionism is based on the intuition that free trade is not a source of increasing wealth in space and time. International trade is seen as an obstacle to development and a factor in increasing inequality. For some economists, the protection of national economies from foreign competition, through the implementation of tariff measures (customs duties) or non-tariff measures (standards and quotas), is desirable. Moreover, for these same economists, the large multinational firms lead to international exploitation of the developing countries by the developed countries: they obtain productivity gains from the developing countries thanks to the low cost of their labour, which they then spend on lowering the prices of the products they export to the developed countries.

However, in an attempt to provide a balanced overview of the opposing theories on this subject, it should also be pointed out that protectionism can also lead to an increase in global inequality when it promotes the exports of domestic producers through subsidies that allow them to sell their product even if the production cost is higher than the world price: this is typically the case for agricultural subsidies in Europe and the USA.

We can now move on to the analysis and description of international finance.

5.2 International Finance

The accounting document called the "balance of payments" records the country's transactions with the rest of the world, i.e. all trade in goods and services, but also financial

trade. The balance of payments makes it possible to judge the extent of trade and imbalances when they occur. It is a useful indicator for a country, which also makes it possible to measure global activity. Imbalances in the balance of payments are affected by the characteristics of the international monetary and financial system, for example: what is the global reference currency? What is the type of exchange rate regime? All of these have an impact on the balance of payments, and all of these elements have changed significantly since the end of the Second World War. Before describing the different architectures of the international financial system that have historically succeeded each other, we must at least define the foreign exchange market and how it works, and then describe the balance of payments in more detail.

5.2.1 Exchange Rates

Foreign exchange is the intermediary that allows the passage from one currency to another. It is determined by the confrontation of supply and demand for a currency on the foreign exchange market. The nominal exchange rate is the price of one currency expressed in other currencies; it is the number of monetary units that can be obtained in exchange for one unit of the other currency. There are two types of quotations for the exchange rate:

- The uncertain quotation, for example \$1 equals €0.84 when the foreign currency is expressed in domestic currency;
- The quotation to the certain, for example €1 is equal to \$1.19, this time the domestic currency is expressed in units of foreign currency.

But in this definition, it is important to underline the fact that no reference is made to the differences in purchasing power that may exist between countries! In order to take into account these differences in purchasing power, a goods price index is needed for each of the countries that allows a comparison of purchasing power: p is the price index in the euro zone and p_e is the index of foreign prices; the real exchange rate at the uncertain is therefore written $e_r = e_n(p_e/p)$, with e_n the nominal exchange rate.

The effective exchange rate can also be calculated as the average exchange rate of a currency with a set of currencies: it is a weighted average of the different bilateral exchange rates, whose weights are constituted by the respective weights of each country in the foreign trade flows of the country concerned.

It will be seen later that these exchange rates depend on the international monetary system chosen by the global players: the exchange rate can be fixed or flexible. If it

is fixed, the exchange rate is fixed in advance, for example by international agreement, against a standard, which may be gold or another currency or a basket of currencies. When a currency reaches a new, lower reference rate, then it is said to be devalued or a devaluation of that currency occurs. The exchange rate can also be flexible (i.e. floating): it then moves freely in the foreign exchange market according to the supply and demand for that currency, without central banks intervening to defend the parity of their currency in order to maintain a constant exchange rate against other currencies. In a floating exchange rate, when the currency moves downwards, there is *depreciation* (*appreciation* when it does not).

Purchasing Power Parities, or PPPs, are relative prices or, in other words, price ratios in national currencies of the same good or service in different countries. The Economist's BigMac Index is a well-known example of a single product comparison (A hamburger available in virtually every country in the world!): the BigMac PPP is the conversion rate that would allow the cost of the hamburger to be the same in the USA as it would be outside the USA. It is said that the bilateral exchange rate tends to ensure equality of purchasing power between two currencies. The absolute version of the PPP theory therefore states that an economic agent should be able to purchase the same basket of goods and services inside and outside the euro area once its euros have been converted. Finally, in the relative version of the PPP theory, it is the variations that are studied: with inflation, the purchasing power of a currency deteriorates; and when there is an inflation differential between two zones, the value of the currency of the zone whose purchasing power decreases will depreciate in order to maintain purchasing power parity between the two monetary zones.

Thus, it is the meeting that takes place on the foreign exchange market, between the supply and demand of foreign currencies, which leads to the fixing of the price of foreign currencies in terms of exchange rates. Participants in the foreign exchange market are usually intermediaries such as banks and brokers representing businesses and individuals. But some large firms have their own trading rooms. The central banks of the different currency areas also intervene to regulate fluctuations in the exchange rate of their currencies. More specifically, the spot and futures markets coexist: the delivery of foreign currency is made immediately on the spot market, i.e. by account transfer within two working days of trading, whereas delivery is made at a pre-agreed price on the futures market. What is the purpose of the futures market?

Economic agents who use the futures market can hedge against exchange rate risk and also speculate. Indeed, speculation and hedging against exchange rate risks are two

related phenomena because hedging requires a counterparty who accepts to take the risk, and this counterparty is usually a speculator.

5.2.2 Balance of Payments

The balance of payments records the flows of real, financial and monetary assets between residents of a country and non-residents during a given period. A resident is a natural person whose principal place of residence is in the area under consideration. The consequence of this definition is that trade between parents and subsidiaries of multinational firms is included as international transactions (which is reflected in the balance of payments).

The balance of payments is a credit and debit account in accordance with the principles of double-entry accounting. Thus, the transaction between the reporting country and the rest of the world always gives rise to two entries of amounts with opposite signs. One entry reflects the economic nature of the transaction: for example, exports of goods; while the other entry reflects the method of settlement of the transaction. In addition, the flow from a resident to a non-resident is recorded as a credit and the flow from a non-resident to a resident is recorded as a debit. Thus, the credit value reflects an increase in external liabilities. We should also specify that the balance of payments is a flow account and not a stock account.

The balance of payments can be unbalanced. In this case, the imbalance in the current balance is exactly compensated by capital movements between residents and non-residents: for example, the country's rising debt enables it to pay for the import surplus over exports. When the balance is out of balance, the country has to resort to monetary financing of these imbalances. If there is a surplus both in its current account balance and in capital flows, the country then accumulates foreign currency, which increases its money supply. On the contrary, there is a reduction in the country's money supply as a result of the decline in reserves used to cover the deficit in the overall balance.

We have assumed here that foreign exchange market adjustments are smoothed by quantities, but if the exchange rate regime is a floating exchange rate regime, then the adjustment will be through prices. Currently, the exchange rate regime is floating, so if the European overall balance were in deficit, for example, excessive demand for dollars would cause the euro to fall.

We have seen that the type of international monetary and financial system affects the movements and balance of payments. Let us now look at the characteristics of these different systems and their histories.

CREDIT	DEBIT	BALANCE
Current Transactions Account		
- Exportations of goods	- Importations of goods	- Trade balance
- Exportations of services	- Importations of services	- Services balance
- Employees' incomes and investments received	- Employees' incomes and investments paid	and services
- Current transfers received	- Current transfers paid	- Transaction balances current
Capital Account		
- Capital transfers received	- Current transfers received	
- Sale of patents	- Purchase of patents	- Current account balance and the capital account
Financial Account		
- inward FDI	- outward FDI	- Balance to be financed
- Portfolio investments incoming	- Portfolio investments	
- Other incoming investments	- Other outgoing investments	
- Divestment by residents	- Divestment by non-residents	- Overall balance
- Reduction of reserve assets of monetary authorities	- Increase in reserve assets of monetary authorities	- Variation de la position of rest of the worlds monetary authorities
Net Errors and Omissions		

Table 5.5: The different accounts and balances of the balance of payments

5.2.3 International Monetary and Financial System

The international monetary system is the set of rules and institutions for organizing international monetary exchanges. From now on, the free movement of capital is total and exchange rates are floating. Thus the balance of payments is almost automatically rebalanced thanks to exchange rate fluctuations. But this system is also a factor of instability for many monetary zones: the recent and numerous monetary crises have been suffered by developing countries or countries emerging over the last 10 years such as Thailand, Russia, Mexico, Brazil and Argentina. Is the floating exchange rate system responsible for these crises? Or, in contrast, does the lack of regulation of the system cause these crises?

Contrary to the current situation, in 1944 the Bretton-Woods international monetary and financial system was built to guarantee the fixity of exchange rates between them. The aim was to avoid the monetary abuses and instabilities at world level that had occurred between the two wars. At the Bretton Woods conferences in New Hampshire, USA, Great Britain was represented by the economist Keynes, who wanted this summit and defined its main objectives. The Bretton Woods agreements provide for the

billion €	CREDIT	DEBIT	BALANCE
Current Transactions Account	521,8	498	23,8
Goods	324,6	320,6	4
Services	89,5	69,7	19,8
Incomes	88,6	72,1	16,5
Current Transfers	19,1	36,6	-17,5
Capital Account	1,2	1,5	-0,3
Financial Account	4117,1	4144,6	-27,5
Direct investment	78,1	111,8	-33,7
Portfolio investments	3984	3963	21
Other Invest.	45,5	68,7	-23,3
Financial derivatives	2,8	-	-
Reserve assets	6,8	1,1	5,7
Net Errors and Omissions	4	-	4
TOTAL	4644 ,1	4644 ,1	0

Table 5.6: The balance of payments for France in 2001

establishment of the International Monetary Fund (IMF), which will be the institution guaranteeing the stability of the international monetary and financial system. The Gold Exchange Standard is defined: each country ensures the parity of its currency either in dollars or gold. The parity between the two standards is set at 35\$ per ounce of gold (one ounce equals 28.349 grams). This is how the greenback definitively replaced the pound sterling as the international currency². This regime lasted from 1944 to 1971 and was based on interventions by the central banks of the acceding countries, which had to intervene when their currencies deviated by more or less 10% from the fixed parity against the dollar. Under this system, countries had to seek IMF approval for exchange rate changes above 10%. The IMF had resources financed by members and could thus intervene to support countries that had difficulty balancing their balance of payments. But this fine edifice suffered from technical weaknesses from the outset:

- Firstly, it gives the United States the privilege of being able to finance its deficits since that country was exempt from sanctions in the event of a trend towards an imbalance in its balance of payments!

² The system was introduced in a very special situation at the end of the war, when the United States dominated the world. It should also be pointed out that as early as 1931, the pound sterling definitively lost the confidence of financial players when it was announced that its gold parity would end. The financial markets then turned to the dollar, but its convertibility into gold did not last either: it was cancelled as early as 1933 because of the 1929 crisis in the USA. The dollar was subsequently devalued sharply.

- Thus the other participating countries were subject to the monetary policy of the United States.
- Finally, the boom in capital movements and financial integration eventually undermined the exchange rate fixity, which is the basis of the agreement.

Subsequently, the ratio between the quantity of dollars in circulation and the world gold stock changed very sharply (more dollars than gold!), causing the loss of the Bretton-Woods system: in 1971, President Nixon unilaterally decided to suspend the convertibility of the two standards in view of the risk of demands for conversion of dollars into gold. It was not until 1976, and the Jamaican agreements, that the end of fixed exchange rates was ratified, and the exchange rate system became flexible.

In the new floating exchange rate system, short-term currency exchange rate variations are very large! These fluctuations lead to exchange rate risks and additional costs for agents who wish to hedge against this risk. Over the past 30 years, the dollar has fluctuated widely and, although it is no longer the benchmark of the Bretton Woods fixed exchange rate system, it remains the main reserve currency of central banks and is used as the reference currency in international trade. Figure 5.1 shows, with the points that symbolise them, the moments of coordinated interventions by the G7 countries to revalue the dollar or, on the contrary, to lower its rate.

Second, there is a set of factors that you have already heard about that has added to the instability of the current international monetary and financial system:

- Speculation on a global scale, including powerful pension funds that can destabilise certain economies depending on investors' assessments of the potential of certain emerging economies;
- The twin US deficits that we have already talked about, which in the early 1970s laconically led Treasury Secretary Nixon to say, "The dollar is our currency, but your problem";
- Alternative management or *hedge funds*, which provoked massive recourse to derivatives, leverage and investments in emerging countries.

Foreign exchange crises in some countries then lead to investor trade-offs in favour of liquidity and security, resulting in rapid and large-scale capital movements that can destabilise financial centres, including countries that are not affected by the origin of the crisis. For example, in 1994, the Mexican December crisis spilled over to neighbouring

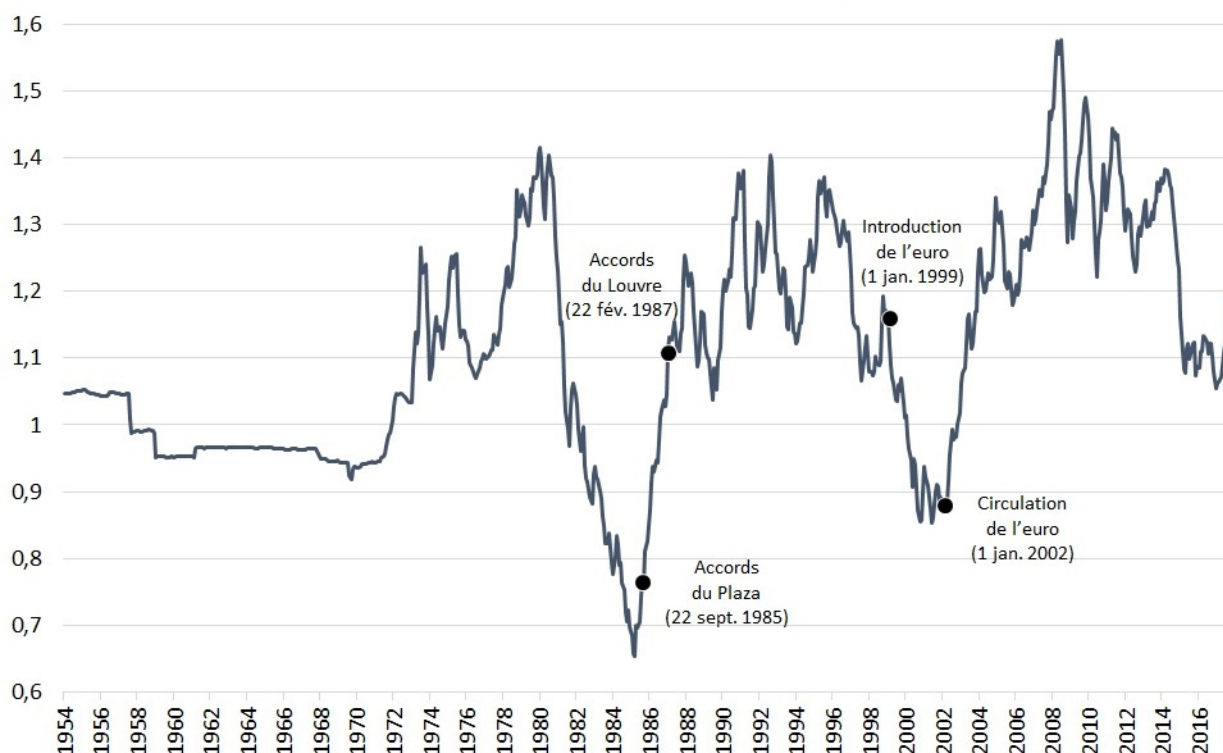


Figure 5.1: *Evolution of the dollar/euro exchange rate (1 EUR = x USD)*

countries after a few months; as did the 1999 Brazilian crisis, which also destabilised nearby economies.

As for the positive effects of current capital movements, we have already seen that they allow the financing of the deficits of States without credit and therefore without monetary creation; they also allow the global rebalancing of savings and contribute to the financing of developing countries. On this point, a sixfold increase in private flows to developing countries was noted between 1990 and 1997. But the distribution is still very uneven, since only 2 % of private international capital goes to sub-Saharan Africa ³.

To conclude this chapter on international trade and the international monetary and financial system, it should be added that Europe, and France in particular, are increasingly competitive on the world market and have yet to gain a foothold in promising markets in the future. This will involve refocusing the euro-area production on high value-added and high-technology products, products in which emerging countries are still lagging behind

³For some economists, all is not lost for sub-Saharan Africa: economic development is still weak there, compared to other areas of the world which will eventually stabilize at a lower growth rate, so there will be greater gains to be made in Africa for global investors.

because of the need for skilled labour to make these products, but in which other more advanced areas (USA) already have a certain lead.

These objectives (which have been clearly stated by Europe) require, in order to be achieved, an economic policy that favours investment in research and development by private companies. This is what is at stake in the Lisbon Strategy of 2000 decided by the EU, the consequences of which in terms of growth, but also in terms of environmental protection, could open up new and interesting prospects (see next chapter).

The Model *IS-LM-BP*

The Mundell-Flemming model is an extension of the *IS-LM* model to the open economy that was built in the 1960s. This model now takes into account foreign trade (exports and imports) and their effects on the markets for money, goods and services, and finally foreign exchange. In this way, the effects on trade balances and capital movements of government fiscal and monetary policies can be described.

In the (Y, r) plane of the *IS-LM* model seen in the previous chapter, we now add the *BP* curve for the balance-of-payments equilibrium, which is the sum of the trade balance and the capital balance.

It is said that $BP=0$ when this balance is in equilibrium (see graph below). Thus, in the zone located above the right *BP*, the balance of payments is in surplus since the rise in the interest rate leads to a capital inflow in the national economy (under *BP*, it is thus the opposite effect with a capital outflow).

If the economy has a trade surplus (positive trade balance with more exports than imports) then in order to balance the balance of payments, the capital balance must become in deficit through a capital outflow: this is achieved through a fall in the interest rate.

Let us now distinguish several situations according to the fixity or not of the exchange rate and the perfect or imperfect mobility of capital. To understand the first distinction: under a fixed exchange rate regime, the Central Bank undertakes to maintain a fixed parity with other currencies. It can no longer determine the quantity of money in circulation as it wishes and thus let exchange rates drift according to the equilibrium of the foreign exchange market. With fixed exchange rates, the *BP* curve does not move as a result of fiscal or monetary policies.

To understand the second distinction: the slope of the *BP* curve is positive in the (Y, r) plan when capital is imperfectly mobile, since a rise in interest rates improves the capital balance, which will be compensated by an increase in (Y) production that increases imports (the trade balance declines).

Let us now look at the effect of different policies according to these distinctions.

Fixed Exchange Rate Regime with Imperfect Capital Mobility

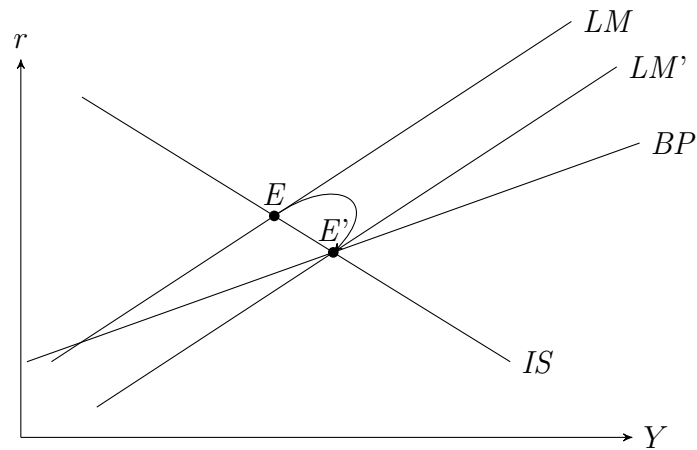


Figure 5.2: Automatic rebalancing through capital inflow

If the balance is initially in surplus (interest rate too high to allow an equilibrium of BP) then capital inflows occur which increase the amount of money in circulation and the line LM automatically moves to the right until the intersection of the three curves.

On dit alors que les mécanismes monétaires rétablissent automatiquement l'équilibre de la balance des paiements.

Fixed Exchange Rate Regime with Perfect Capital Mobility

When capital mobility is perfect, the BP curve is horizontal: the interest rate is the same everywhere, otherwise it would lead to large capital movements as long as this differential exists. When a fiscal stimulus is provided within this framework of fixed exchange rates with perfect capital mobility, the IS curve moves up and to the right. In this situation, BP is in surplus, which induces capital inflows and thus an appreciation of the currency. The central bank must therefore increase its money supply to neutralise the effect of the exchange rate appreciation. LM thus moves to the right to return to an equilibrium $IS-LM$ such that $BP=0$.

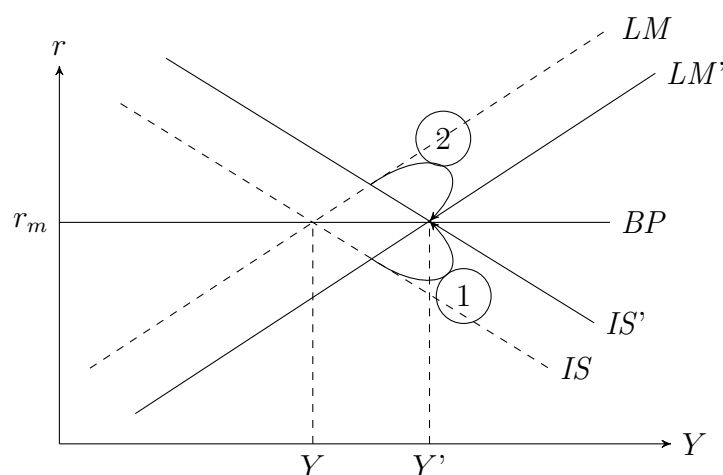


Figure 5.3: Fiscal Policy in Fixed Exchange Rates

Flexible Exchange Rate Regime with Perfect Capital Mobility

In a floating exchange rate regime, the authorities are no longer concerned about maintaining the value of currencies among themselves. On the contrary, currency fluctuations will automatically rebalance the balance of payments. If it is in deficit, the exchange rate will fall so that the country in question regains its price competitiveness vis-à-vis the outside world: it will see its exports increase and its imports fall until its balance of payments is balanced.

What is the effect of an expansionary fiscal policy? We have seen that the new equilibrium $IS-LM$ was achieved with a higher rate and level of production. BP is therefore in surplus, but the increase in the rate leads to an inflow of capital which increases the exchange rate since in order to come and invest their money in this economy, foreign agents must first convert their assets into the currency of the country in question, which causes an increase in the demand for the national currency on the foreign exchange market. As the currency appreciates, companies lose competitiveness and the trade balance falls to the point where the IS curve returns to itself. Fiscal policy is said to be ineffective in a floating exchange rate.

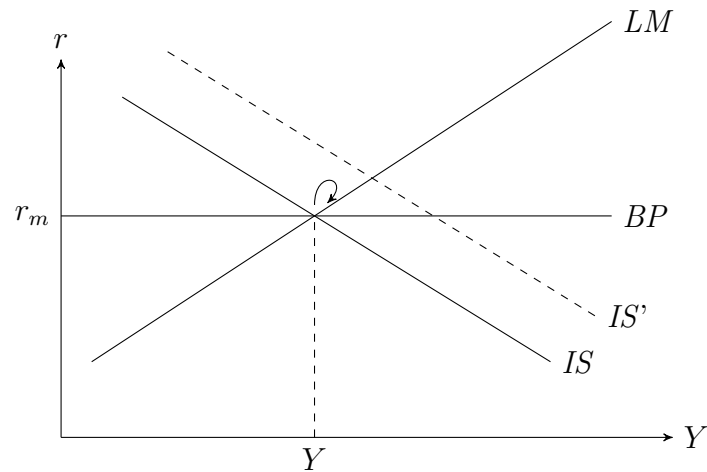


Figure 5.4: Fiscal Policy in a Floating Exchange Rate

Finally, let's ask ourselves, what is the effect of an expansionary monetary policy under a flexible exchange rate? The increase in the supply of money shifts the LM curve to the right and thus the economy ends up with a balance of payments deficit since with an interest rate lower than the world rate there is an outflow of capital. This outflow is accompanied by massive sales of foreign currency on the foreign exchange market, which will increase the competitiveness of domestic companies on the world market. The increase in exports causes the IS curve to shift to the right to the new intersection point of the IS - LM - BP curves.

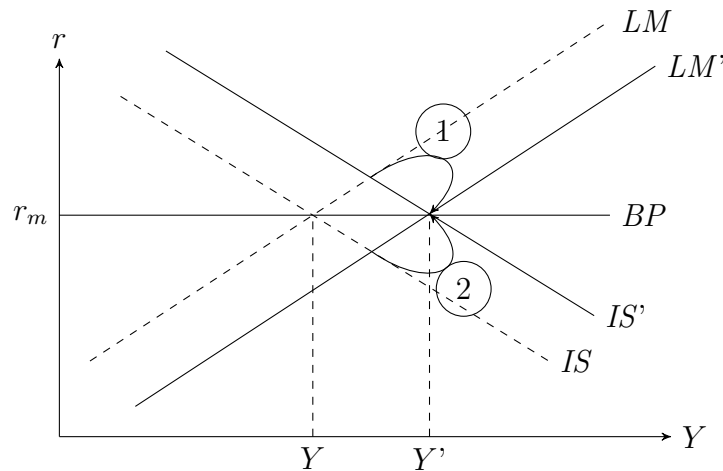


Figure 5.5: Monetary Policy with a Floating Exchange Rate

Monetary policy is fully effective under a floating exchange rate regime as national incomes have risen sharply.

Chapter 6

Conclusion: Growth and the Environment

We conclude this textbook on structural (long-term) considerations, related to Education and Innovation (next section 6.1) and the degradation of the quality of our Environment (section 6.2).

6.1 Education and Innovation, two Engines of Growth

6.1.1 The Knowledge Economy

In Lisbon, at the European Council of March 2000, "the ambitious goal of making the European Union the most competitive and dynamic knowledge-based economy in the world by the end of the decade" was endorsed. Quantified targets were subsequently defined to meet this strategy. Thus, "Strengthening the European area of research and innovation by setting a target for the end of the decade for total public and private expenditure on research and development equal to 3% of GDP", two thirds of which should be financed by private enterprise, is the main quantified objective in the field of innovation. The challenge of innovation, as an engine of growth, is paramount both from a macro-economic point of view (reduction of unemployment, reduction of debt) and from a micro-economic point of view (in certain sectors, companies must be innovative in order to remain the leader on their market or to become the leader on tomorrow's markets). The scientific areas concerned by the Lisbon strategy are mainly related to life sciences and biotechnology, as well as information and communication technologies.

It should be pointed out that this objective attempts to respond to Europe's low GDP growth and productivity levels, which are lower than those of its main economic partners in the world. It can be noted (Table 6.1) that the efforts made by Europe and its companies are lower in the field of technological research than those made in the USA and Japan.

<i>in % of the GDP</i>	USA	EU28	Japan	Sweden
2000	2,62 (1,93)	1,67 (1,08)	2,90 (2,33)	3,91 (3,04)
2005	2,50 (1,73)	1,66 (1,07)	3,18 (2,65)	2,38 (2,55)
2010	2,74 (1,85)	1,83 (1,18)	3,13 (2,59)	3,21 (2,28)
2015	2,78 (2,11)	1,95 (1,31)	3,28 (2,77)	3,28 (2,35)

Gross Domestic Expenditure in R&D and Business Expenditure in Brackets

Sources: OECD 2017

Table 6.1: R&D Expenses

Sweden, which is not part of the euro zone, seems to be an example for its European neighbours to follow: in education, as in research, Sweden has been ambitious. The two tables 6.2 and 6.3 give, for the same countries, the number of researchers in companies and the amount of expenditure on education: between them, they perfectly illustrate the euro zone's dropout rate in innovation and education since 2000, which is still relevant today!

	USA	EU28	Japan	Sweden
2000	7,06	5,22	9,87	10,47
2005	7,65	6,22	10,39	12,65
2010	8,48	7,09	10,02	10,93
2015	9,13	8,02	10,00	13,58

Researchers are specialists in the design and creation of knowledge, products, processes, methods and systems, as well as the management of the corresponding projects.

Sources: OECD 2017

Table 6.2: Number of R&D researchers per 1,000 active employees

Education and innovation are linked. From an economic point of view, the whole issue of education is to raise the level of human capital in Europe in order to be able to supply the qualified population needed by European companies to carry out research and development programmes. The link between education and technical progress lies partly in the fact that the level of education affects long-term growth through an effect on the

	USA	France	Japan	Sweden
Higher education (universities)	27 923	16 194	17 882	23 213
Secondary (middle and high schools)	12 739	11 482	10 272	11 353
Primary (elementary schools, kindergartens)	10 958	7 201	8 747	10 663

Expenditure in 2015 on educational institutions per pupil, in equivalent dollars converted on a PPP basis
– Purchasing Power Parity (PPP)

Sources: OECD 2017

Table 6.3: Educational expenditure of educational institutions public and private by categories

speed of adaptation to technological change: this idea was first put forward by Nelson & Phelps (1966) and is more recently taken up by Benhabib & Spiegel (2005).

6.1.2 Endogenous Growth

Recent models on economic growth, derived from new growth theories (the theoretical corpus of *endogenous growth* that emerged in the early 1990s), have led to a better understanding of growth phenomena and how economic policy can affect long-term growth.

Romer's (Nobel Laureate 2018) Model of Endogenous Growth

An important part of technical progress is the result of the behaviour of private entrepreneurs/innovators who seek profit. In the model of Romer (1986), technical progress results from the production of technical knowledge, or ideas, that make it possible to produce new goods. This model of growth is said to be endogenous because innovation activity is precisely described and drives the dynamics of the economy. Innovation is usually protected by a patent system so that the innovator gains market power and profits. More specifically, technical progress is equated with an increase in the number of intermediate goods. Variety is a source of wealth because it improves the productivity of production factors in the function of the final good.

Assumptions of the model. The idea behind the model is that the marginal productivity of capital can be non-decreasing so that per capita quantities can grow without limit (this is called self-sustained growth). The labour force (population) is assumed to be constant over time.

Then there are N identical firms, all of which have the same production function: $y_{it} = F(K_{it}, A_t L_{it})$ where y_i is the level of production of a firm, K_i its level of capital and L_i the labour power it uses (the index i represents the firm). Variable A is common

to all firms: it represents the level of technology or knowledge in the economy. The production function is at constant returns to scale for each firm i .

The technology level depends on the total capital stock: $A_t = a \sum_{i=1}^N K_{it}$ where a is a strictly positive parameter. The above relationship can be justified by referring either to a learning effect (Arrow) or to the complementarities that exist between firms (specialisation effect); these two phenomena lead to the productivity of a firm being higher the larger the number of firms in the economy (N).

The assumption is that all firms are identical : at equilibrium, they all have the same level of activity. Let $Y_t = \sum_i Y_{it} = NY_{it}$ be the total production level of the economy, $K_t = \sum_i K_{it} = NK_{it}$ be the capital stock of the economy and $L_t = \sum_i L_{it} = NL_{it}$ be the total employment.

Model Resolution. By changing to a per capita variable, the production function can be rewritten as: $y_{it} = f(A_t, k_{it})$. At the level of the economy, there are thus increasing returns resulting from the existence of externalities (the production of a firm depends on its level of capital but also on the level of capital of all firms) since $A_t = aNK_t$.

The level of savings (i.e. $0 < s < 1$ the savings rate) is proportional to income (Y) and equals investment (\dot{K}) so that we can write: $\dot{k}/k = \dot{K}/K - \dot{L}/L = sY/K - \dot{L}/L = sy$ with $y = Y/K$ and $\dot{L}/L = 0$ (L constant by hypothesis). Taking a Cobb-Douglass type function ($K_{it}^{1-\alpha}(A_t L_{it})^\alpha$), we end up with the following expression for the per capita production: $y_t = k_t(aNL)^\alpha$. The rate of growth of the economy is : $g = \frac{\dot{y}_t}{y_t} = \frac{\dot{k}_t}{k_t} = \frac{s y_t}{k_t} = s(aNL)^\alpha$ This depends on the savings rate (s), the parameter relating the capital stock to the technological level of the economy (a), the number of firms in the economy (N) and the size of the population (L).

Model Properties. The hypothesis of strict proportionality between the capital stock and knowledge where technology is the only one that allows for self-sustaining growth in output. This hypothesis is known as the "razor's edge" hypothesis because if this proportionality were not strict then growth would be either zero or explosive.

We note the presence of the population size in the expression of the growth rate so that the higher the population size, the higher the growth rate (scale effect).

The growth rate is said to be endogenous in the sense that parameters specific to the economy (a, L, N) or that can be influenced by economic choices (s) enter into the determination of the growth rate of the economy.

In these new models, the level of the long-term growth rate depends on factors specific to each economy, including research and development policy¹. Moreover, an important

¹In the field of the economic analysis of education, it should be noted that Becker's (1964) theory of human capital shows that agents arbitrate in their educational decisions between, on the one hand, the wage supplement they will receive from their training and, on the other hand, the loss of income, or the opportunity cost, associated with continuing their studies. Education fulfils two functions: the knowledge transmission function, which increases student productivity; and the signal function, presented by Spence

distinction is often made in these models between innovation capacity and imitation capacity: the former enhances long-term growth and the latter allows economic catch-up (temporary stronger growth, like Europe's catching-up with the USA in the post-war period). Reinforcing Europe's growth potential means promoting higher education in order to emerge from an economic development which has thus far overemphasized imitation. In the case of France, this would in fact consist of a strong increase in resources for higher education. Indeed, it can be said that, up to now (and at this very moment!), a major financial effort has been made for primary and secondary education in France, with the aim of reaching the technological frontier. Now that this objective has clearly been achieved (and has been for several decades already!), it would be appropriate to promote our capacity for innovation!

Recent economic models of endogenous growth have therefore been the main theoretical underpinnings of the European strategy for human capital and innovation as set out in Lisbon in 2000. In the final analysis, the results of this strategy are very sad: the RD effort today hardly exceeds 2 % of GDP, on average, in the euro area, due to the lack of a proactive and shared innovation policy in Europe. And the economic crisis that is currently hitting our continent is more likely to last than Europeans have been able to build the engine of its growth.

We are now moving on to environmental issues and the concept of sustainable development. We have just seen that there are many spin-offs from innovation policy, particularly in terms of long-term growth: this is also true in the environmental field.

6.2 Technical Progress and Environment

6.2.1 Growth and Pollution

Since the emergence of industrial societies (and, before that, agricultural societies) human influence on the environment has literally exploded. The most high-profile example is that of greenhouse gases (*greenhouse gases*), in particular CO₂, which has been blamed for global warming. Global warming is only one of the manifestations of the phenomena of *congestion* that our numerous and affluent societies are facing today: the erosion of biological diversity, soil erosion and salinization, air and water pollution and acid rain are proof that our environment is not *infinitely elastic*.

(1973), which shows that the education system also acts as a filter. Firms are unable to observe the innate abilities and talents of individuals (asymmetry of information), so the signal.

The environment is the public good (in the sense of collective) par excellence. But it is also both a *capital* good (i.e. a good that is used to produce others, such as through agriculture or tourism) and a consumer good in itself (a pleasant environment is, in itself, preferable to a degraded environment: we speak of *amenities*, benefits directly provided by the quality of the environment). Environmental policy is therefore necessary, but also subject to economic considerations. This is why we speak of *environmental economic policy*.

Since long before the first industrial revolution, the expansion of some societies has been slowed (or stopped) by environmental constraints. Jared Diamond, in his book *Collapse*², argues that the disappearance of many societies has been caused centrally by environmental constraints. The most famous example is Easter Island. This island in the middle of the Pacific, totally isolated from the outside world, was conquered by man around 800-1000 AD. When it was discovered by the Dutchman Jakob Roggeveen on Easter Sunday 1722, there was a great contrast between the poverty of the (small) population and the splendour of the statues that you all know from past prosperity. Today we know from a whole series of studies that the inhabitants of Easter Island were once far more numerous and richer than when the rest of the world discovered their existence. We also know that the environment was degraded by human activity (through deforestation, loss of wild animals and plants, soil erosion and salinization), with tragic long-term consequences.

However, it is clear that some societies in history have been able to face the challenges posed by their environment. This is the case of societies whose environment is relatively less fragile, but also that of countries that have been able to cope with the fragility of their environment. In this regard, the most often cited example, despite its nuclear setbacks - to say the least - (Fukushima disaster, March 2011), is Japan, which still has 70% of its territory covered by forests - despite a record population density and one of the highest GDP per capita in the world. The industrial revolution itself was a decisive step in the emancipation of humanity from the environmental constraint to which it was subject: that of agriculture (and agriculture itself was an emancipation from the environmental constraint that weighed on pre-agricultural hunter-gatherer societies, etc.).

So what should we think? Is wealth the enemy par excellence of the environment, or on the contrary does wealth provide the means to work for

²Jared Diamond is not an economist but a biologist-physiologist-geographer. He is well known among economists, especially for his book *Guns, germs and steel* [French edition: *De l'inégalité entre les sociétés*], 1997 Pulitzer Prize, which is a brilliant essay on the question: why are some countries rich and others poor? Extremely clear and skilful, its reading is indispensable today for anyone interested in issues of development and growth in the very long term.

the environment? Furthermore, what are the roles played by science and technical progress in the process of sustainable development? Is technology a solution or a problem?

6.2.2 The Kuznets Environmental Curve

In the mid-1990s, several empirical studies showed the existence of an inverted U-shaped curve linking various pollution indices and the level of per capita income.³ Specifically, for Grossman and Krueger, the turning point for SO₂ pollution, i.e., the point at which the income for which SO₂ pollution is most important, occurs for an average per capita income of about \$4,000 to \$5,000 per year (1995 dollars). It is often higher for other pollutants, but is generally around \$8,000 (per capita per year). The hypothesis behind this relationship is that economic growth above a certain level of wealth is accompanied by environmental improvement. The explanation provided by the authors is that initially there are few polluting emissions because of the low level of production. Then the poorly controlled beginnings of industrialization cause more pollution. Finally, the financial resources released by the increase in wealth, the growing weight of services and changes in individual preferences (more inclined towards quality of life as individual income increases) make it possible to reduce polluting emissions.

There are, however, uncertainties about the existence of this curve. Evidence does exist for some resources (forests) or pollutants (water pollution and some gases such as SO₂), but it concerns a small number and the richest regions only. Moreover, it is important to underline the fact that for some economists the existence of this Kuznets environmental curve is conditioned by the implementation of adequate environmental and innovation policies: the decrease in pollution would therefore not be automatic.

6.2.3 Environmental and Climate Policies

This brings us to the concept of Sustainable Development (SD)⁴ which means reconciling the well-being (of which environmental quality is an integral part) of present and future

³These authors called it the "Kuznets environmental curve" because of its similarity to the results of Kuznets (1955)'s work on the links between income growth and social inequality.

⁴Bruntland Report of the World Commission of Environment and Development WCED (1987) finds the definition that will ensure the success of the SD concept: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Today, the UN has broken down the concept into 17 Sustainable Development Goals (SDGs).

generations with the pursuit of economic development. This means making significant changes to our economies to avoid compromising economic development and the well-being of future generations. Indeed, the use of natural resources, which can generate pollution (e.g. fossil resources and CO₂ emissions), leads to three types of potential limits for growth and well-being:

- The depletion of non-renewable resources (which are necessary for the production of goods and services) will make it impossible to produce them in the absence of substitutes (if substitutes exist but are more expensive, then output will decline).
- Too intensive use of the services provided by renewable resources prevents their regeneration (e.g. intensive fishing that threatens stocks). This would impose a maximum rate of use of these resources which would limit the downstream production of goods using these environmental services.
- If environmental quality is included in the measure of well-being (e.g. through the effect of the environment on health) then environmental degradation itself reduces the possibility of achieving higher well-being for future generations.

What are the main theoretical conditions for implementing sustainable development? There are four of them:

- Capital (both physical and human) must be a good substitute for the non-renewable resource (which is being depleted) or the renewable resource (which is being over-exploited).
- Household savings, which enable capital investment, must be sufficiently high (otherwise: not enough capital).
- The population is not growing too fast (otherwise production cannot keep up).
- Technical progress is sufficient. The role of technical progress is crucial. Let us develop this last point.

Models from the new growth theories, which we have already discussed in this conclusion, show that growth, when based on an increase in the quality of goods, allows production to remain constant in terms of material unit (unchanged quantity of natural resources used). Research and development that increases this quality can therefore help to decouple economic development from environmental degradation. But there is nothing automatic about this decoupling. As RD and innovations are increasingly financed by

competitive markets, future environmental and climate needs, for example, which are not clearly identified in a market today, may not be taken into account. Fortunately, innovation and technological progress can be influenced by certain economic policy instruments: for example, the development of markets for tradable emission permits (or tradable allowances) and taxes on polluting emissions, which have already been discussed in chapter 2, provide incentives both to reduce emissions today and to invest in alternatives (see box below). But let's look at the first instrument in more detail: the tradable emission permit or tradable quota (next page).

Impact of Energy Prices on Energy Efficiency Innovation

In his article "Induced Innovation and Energy Price" (American Economic Review, 2002), David Popp examines the influence of energy prices on innovation in energy efficiency technologies.

The main issues addressed in this paper are therefore as follows:

- In general: What factors favour creative activity in terms of innovation?
- Popp tries to answer this with a more focused question: What is the impact of energy price changes on the activity and spending of *R&D* on energy efficiency?

To answer these questions, the economist had to do extensive econometric analysis:

- With an analysis (detailed below) of patent filings in 11 sub-sectors between 1970 and 1994;
- Also drawing on the stock of knowledge and the concept of "positive spillover" or knowledge externalities between *RD* sectors (the *R&D* efforts of one sector can benefit the *R&D* of another);
- With the inclusion of energy prices (of course); with a measure of the impact of those prices on innovation with a time lag of 1 and 2 years...

It must be recognized here that patents remain an imperfect measure of innovation. It is also difficult to define the value of a patent and some may have a greater impact on the market than others. For this reason, they must be weighted to take into account their difference in value (which in this case is to reduce greenhouse gas emissions appreciably). How does Popp do it? By calculating the number of citations of a patent!

Two key results emerge from his study:

- There is a significant effect of energy prices on innovation;

- The stock of initial knowledge must be taken into account for the results to be significant, which (stock of knowledge) favours future innovations, as we know, and, through a network effect in particular, benefits certain sectors more than others.

To conclude, it can be said that innovation-creating activity accelerates when: 1) the stock of knowledge is sufficiently large and thus allows inventors to rely on a common knowledge base; 2) the conditions for the existence of a market for more energy-efficient and less GHG-emitting products and goods (or even a market for renewables) are in place thanks to the rising price of hydrocarbons.

Theoretically, the competitive functioning of the market for "tradable emission permits" makes it possible to achieve emission reduction objectives at a lower cost and favours an optimal distribution of clean-up efforts between polluting sources (technically: due to the equalisation of their marginal clean-up costs... we will come back to this point later). A permits market results from the setting of a quantified emission reduction target, corresponding to the total amount of permits initially distributed to the different polluting sources. The possibility that these sources collectively meet the total emission target is ensured by permit trading, resulting from the heterogeneity of firms' costs in reducing pollution (if firms are different – small, medium and large – then they will incur different costs to reduce their emissions).

Tradable permits appear preferable to administrative regulations that impose rigid emission standards, because permit trading allows firms to choose their pollution levels in accordance with their own abatement costs. In this way, the permit market verifies the conditions of environmental efficiency (the definition of the best possible allocation allowing the emission reduction objective to be achieved) and economic efficiency (the optimal distribution of emission reduction efforts at minimum cost). In the end, after permit trading on the market, the marginal abatement costs of all firms are equalized: trading stops when the cost of reducing an additional unit of pollutant is the same for all firms and equals the equilibrium price of the permit market.

Thus, the 1997 Kyoto Protocol established an emission reduction target for six greenhouse gases (GHGs) through the establishment of an international market for tradable permits. Collectively, the so-called Annex 1 countries (representing 38 OECD countries and Eastern European countries in transition) have committed to reducing their GHG emissions by an average of 5.2% compared to their 1990 level by the period 2008-2012. The distribution of targets among countries is as follows: EU (-8%), USA (-7%), Canada (-6%), Japan (-6%), Russia (0%), Ukraine (0%), New Zealand (+1%), Australia (+8%)

(the targets are different between countries in order to take into account the different costs of reducing GHG emissions. What matters in the end is the equalisation of the marginal costs of reducing GHG emissions between countries, which is theoretically allowed by the international market system of tradable permits). The exit of the USA from the Protocol in 2000 greatly reduced the credibility and compromised the success of Kyoto, which continued even without the world's largest CO₂ emitter at the time (China having recently replaced the USA in first place).

As early as March 2008, Europe had already established the modalities for the operation of its own market for tradable permits for the post-Kyoto period, when the protocol ended in 2012. Still not knowing whether a second credible global agreement to reduce GHGs will take place (nothing very positive on the horizon!), Europe has nevertheless set itself a record reduction of 20% by 2020 (target raised to 30% if a global agreement finally takes place) (target of 40% reduction by 2030) by making extensive use of a permit market, for which it will therefore distribute even fewer allowances than it did under Kyoto. Despite the difficulties linked to the exit and then the recent return of the USA (Trump administration vs. Biden administration) from the Paris climate agreement signed in December 2015 (COP21), Europe wants to show that it is a leader in this field, from both a political and economic point of view, with the challenge of providing the rest of the world with cutting-edge green technologies.

The Kaya Identity

In his internationally acclaimed book, Tim Jackson (Prosperity without Growth, 2009) uses the identity of Kaya (1989) (named after its author, Yoichi Kaya, currently president of the Research Institute of Innovative Technology for the Earth – RITE – in Japan) to show that solving the climate problem is impossible and that only by restricting economic growth and sharing income on a global scale will it be possible to achieve the CO₂ emission targets set by climate scientists.

What is the Kaya identity (Kaya (1989))? And what does Jackson demonstrate (Jackson (2009))?

The Kaya identity or IPAT equation describes the contribution of population (P), wealth (A) and technology (T) to environmental impact (I), as follows :

$$\text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology} = P \times A \times T$$

Applied to climate change, environmental impact (I) refers to CO₂ emissions, population (P) refers to the size of the world's human population, affluence (A) refers to per capita income, and technology (T) refers to CO₂ emissions relative to GDP or CO₂

emissions intensity, i.e. :

$$CO2 = \frac{CO2}{GDP} \times \frac{GDP}{Population} \times Population$$

Here is the demonstration (NB: these are personal calculations, da Costa & Attias (2018)): If we refer to the work of the Intergovernmental Panel on Climate Change (IPCC), it is necessary to reduce CO2 emissions by a little less than 70% by 2050 (compared to 2010) in order to maintain the average temperature increase of 2°C (450 ppm of atmospheric concentration of greenhouse gases in the atmosphere). That is to say an annual decrease of 3%. The world's population will increase by 30% by 2050 and will therefore experience an annual growth of about 0.7% in the coming years. If we refer to the forecasting work of the Centre d'études prospectives et d'informations internationales (CEPII), per capita income would increase by 160% over the same period (NB: this is a fairly average scenario, even low compared to other studies in the field), i.e. an annual increase of about 2.5%.

Using the previous equation, we can therefore estimate the necessary reduction in the economy's pollution intensity ($CO2/GDP$) to ensure equality:

$$-3\% - 2.5\% - 0.7\% = \mathbf{-6.2\%}$$

-6.2%: this is the annual percentage reduction in global pollutant intensity that satisfies the IPAT identity under the assumptions mentioned above (climate disruption limited to +2°C, population and growth scenarios).

CO2 emission intensity can be considered a good indicator of technology development. However, in reality, the intensity of CO2 emissions in the world increased from 740g/dollar to 440g/dollar over the period 1971-2010, an average annual rate of -1.3%. This rate was -1.9% in OECD countries and -0.7% in non-OECD countries.

For Jackson, it is therefore completely illusory to consider that the rate of -6.2% can be achieved... without major changes.

Part II

Tutorials (TD)

My recommendations on Reflection Questions in the Exams

One of the objectives of the course is to introduce you to economic argumentation, so each tutorial - or TD in French - as well as the intermediate and final exams, all include a reflection question to address a major economic issue. The purpose of the reflection question is first to make good use of the knowledge you have acquired in the course, knowledge that can be theoretical and/or factual.

I advise you, in this order, to: **1. Define and illustrate the terms of the question. 2. Find an issue: through one or more questions that clarify and guide the reflection. 3. Cite and discuss the explanatory theories.**

To find out if your answer is relevant, first ask yourself this question: Does my answer give a good view of the ins and outs of the issue?... Or does my answer reflect well why this is an important and non-trivial issue?

If you give your personal opinion, which is possible, it must be argued (again, by theories or by facts). Don't make a statement that is not supported by arguments. This applies even if you quote other authors. For example, it is not good to write "it is likely that the wave of financial deregulation of the 1980-1990's sowed the seeds of the 2008-2009 financial crisis"; on the other hand, "the financial deregulation of the 1980-1990's led to a 30-year micro era of strong credit and public debt growth in Western countries, a micro era that led to the 2008-2009 financial crisis" is more accurate.

Do not judge the theoretical explanations you are discussing. If there are areas of uncertainty for you ("several causes of increased inequality in recent years have been put forward by economists..."), do not feel obliged to give your opinion on a debate that is not resolved.

Finally, do not hesitate to supplement your comments with figures, tables, and statistics from the course. It is not forbidden to draw a profit curve by hand, to show the areas

of increasing and decreasing returns, etc.

Now an example of a reflection question:

Based on what you've seen in Economics, answer the following question:

To what extent does economic growth promote sustainable development?

Remember to be clear about the economic concepts being invoked. Concise and clear drafting will be particularly appreciated. Write your answer on one page.

The key elements of your answer I propose to you are:

1. Define and illustrate the terms of the question:

Economic growth refers to the positive change in the production of goods and services in an economy over a given period of time. In practice, the indicator most commonly used to measure it is Gross Domestic Product (GDP).

Cite the main growth issues: increase in per capita income and jobs creation, etc.

Sustainable Development (SD) is the idea that human societies must live and meet their needs without compromising the ability of future generations to meet their own needs. The first "official" definition of SD can be found in the 1987 Bruntland (UN) Report.

Cite the SD issues at stake: climate change and loss of biological diversity, both of which are anthropogenic phenomena.

2. Find a problem/issue: one or more questions that clarify and guide the reflection

Here is an example of a problem that clarifies the initial question (i.e. "To what extent does economic growth promote SD?"): Are GDP growth and SD compatible, even though growth has tended until now to favour the consumption of natural resources and pollution?

New questions then arise: Is growth really the only cause of pollution? What are the other explanatory factors? Under what economic conditions could growth be accompanied by a reduction in pollution?

3. Quote and discuss explanatory theories:

The neoclassical micro-economic approach: in all applications seen in tutorials, the company's programme consists in maximising its profit, without taking into account negative externalities (e.g. environmental damages). With this logic, it is possible to have GDP growth (approximately the sum of value added) while deteriorating "natural capital".

The identity of Kaya (1980'): is about the other factors at the origin of polluting emissions, i.e. population growth, polluting intensity.

Kuznets' environmental curve (1990') is about the correlation between per capita income and pollutant emissions. Beware that correlation is not causality. There is statistically a bell-shaped distribution between countries represented by their income and their emissions of certain pollutants. There is not necessarily temporal causality between the two. This curve does not necessarily mean that reduction is automatic. For some economists, this reduction is linked rather to new, more restrictive regulations against pollution and not to income growth in a direct way.

The environmental incentive tax (Pigou, 1920'): give the principles of this tool and its limits ("for a fair carbon tax, not just a carbon tax").

PS : I'm sending you back to this textbook for all those theories.

TD 1: National Accounts, GDP, Price Index...

The Gross Domestic Product (or GDP) is probably the most widely used macroeconomic indicator and its evolution is the most scrutinized. What is GDP? How are different transactions recorded in it? Why do we want to have a measure of real GDP, and not just of nominal GDP? How is real GDP calculated?

Exercise 1: Course Question

1. Explain the following accounting identities in a closed economy (reminder: Y refers to GDP, C to private consumption, I to private investment, G to government spending, T to taxes and S to savings):

- $Y = C + I + G$.

- $Y - T = C + S$.

2. What relationship exists between I, S, G, T ? What happens to this relationship when $G = T = 0$ (no government)? Interpret the second, then the first.

Exercise 2: Accounting Identities

What happens to the various French macroeconomic aggregates when:

1. buy a computer (produced in France) for €100 and install it at home to play;
2. I buy a computer (produced in France) for €100 and install it in my company to work;
3. Repeat the first two questions with a computer produced in China;
4. I buy an apartment for €200 000 in a building built 10 years ago;

5. I buy an apartment for €200 000 in a new building;
6. I buy a cleaning product for €5 and I clean my house;
7. A cleaning company buys a cleaning product for €5 and cleans my house, I pay the cleaning company €15;
8. A cleaning company buys a cleaning product for €5 and cleans at Google, Google pays the cleaning company € 15, and Google also sells a mobile phone for €100;
9. The government hires a teacher residing in France and pays him €100 to teach a course;
10. The government hires a teacher residing in Spain and pays him €100 to teach a course;
11. A private school hires a teacher residing in France and pays him €100 to teach a course, HEC collects €10 000 of tuition fees;
12. I import a machine from Germany for €1 000 that I install in my company, I produce flour and sell it for €2 000 to French consumers;
13. I import an engine from Germany for €1 000 that I install in a new car that I sell €10 000 to a Frenchman for his personal use.

Exercise 3: Limits of GDP as a Measure of the Use Value Created

1. Cite examples of situations where use value is created without translating into a monetary value in GDP.
2. Cite examples of situations where a monetary value appears in GDP without a use value being created.

Exercise 4: Price and Quantity Indices, Real GDP

1. U.S. (nominal) GDP was \$526 billion in 1960 and \$14 256 billion in 2009. The price of 33 cl of Coca Cola has gone from \$0.10 to \$0.75.

- a) What was the average annual growth rate of US nominal GDP?
- b) It is assumed that the change in the price of Coca Cola is representative of the change in all goods. What was the average annual growth rate of US real GDP during this period ? Average annual inflation ?

2. The production of an economy is given by this table:

	wine		cheese	
	quantiy	price	quantity	price
2017	50	0,50	100	1
2018	45	2	150	1,20

Table 1: An economy with two goods...

- a) Explain why real GDP is not defined unambiguously.
- b) Calculate the real GDP growth rate using the Laspeyres index approach.
- c) Calculate the real GDP growth rate using the Paasche index approach.
- d) Why do we say that the Laspeyres index tends to overestimate inflation, while the Paasche index tends to underestimate it?

Exercise 5: Bonus Question

Cite other problems in estimating real GDP in practice (i.e. from the perspective of statistical institutions).

Documents:

Figure 1 represents the shares of private investment and private consumption in GDP (I/Y and C/Y with the usual notations) since 1947 in the USA. Fig. 2 represents the growth rate of the private investment price index, the private consumption price index and the GDP price index. Fig. 3 represents the evolution of the ratio of real private investment to real private consumption. On all graphs, the shaded areas represent recession quarters.

1. What do you notice in the graphs below?

2. Why is it that the growth rate of the private investment price index is lower than that of consumption from 1980-82 onwards?
3. What can be the consequences of a decline in the relative price of investment goods compared to consumer goods?

Figure 1: Evolution of the share of nominal private investment in nominal GDP (dotted lines) and of the share of private consumption in nominal GDP (solid line), USA 1947–2019.

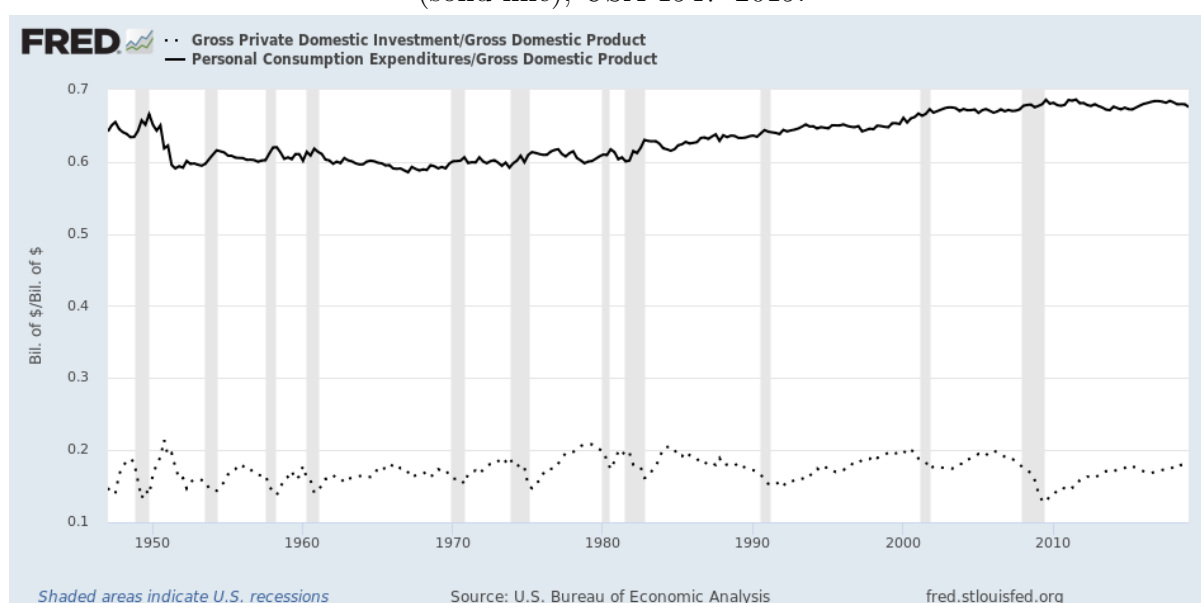


Fig. 2: Annual growth rates of deflators of private consumption (solid line), private investment (dotted line) and GDP (grey dotted line), USA 1948-2019.

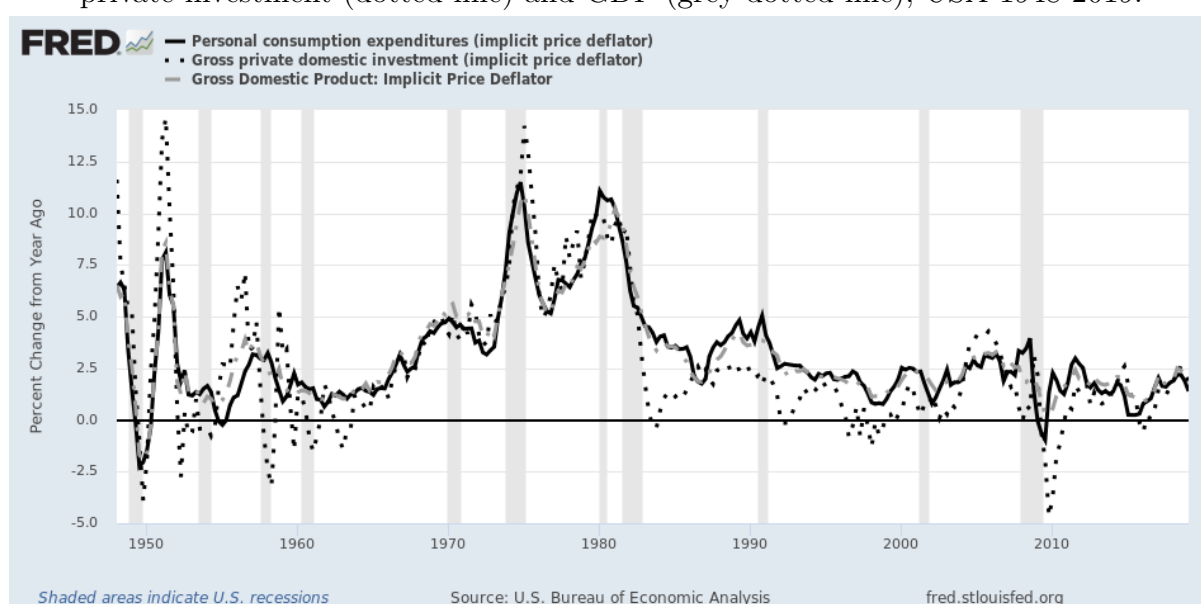
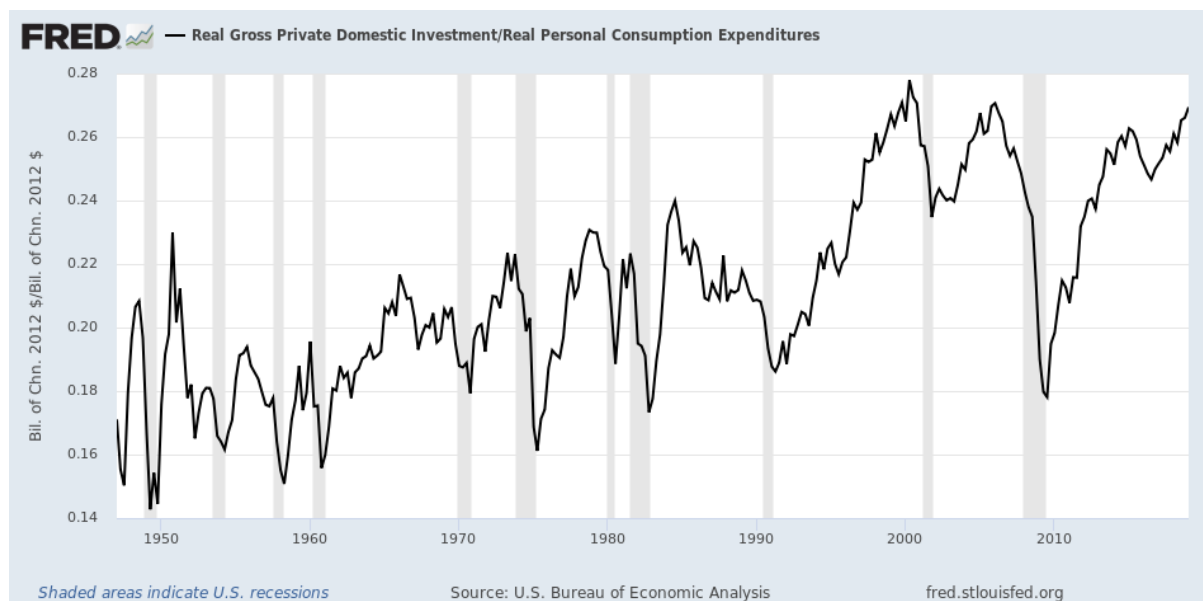


Fig. 3: The ratio (real private investment)/(real private consumption),
USA 1947–2019.



TD2: Competition and Monopoly

Course Reminder:

Neoclassical analysis of markets:

- Supply : maximization of *profit* by firms;
- Demand : *function of demand* decreasing with price (reflects consumer choice).

The representation of gains from trade in partial equilibrium:

- *Business Profits*;
- *Consumers Surplus*.

The determination of equilibrium depends on the market structure:

- Polar Case 1 : hypothesis of *perfect markets* and *pure and perfect competition*;
- Polar Case 2 : hypothesis of *pure monopoly*;
- Intermediate Cases: model of *imperfect competition* (duopoly of Cournot, Bertrand... oligopolistic competition).

Exercise: Oligopolistic Competition

The company LAUREL is the only insurer on the domestic market for optional fire insurance. This market is protected from foreign competition by a law that prevents consumers from taking out insurance with a foreign company. The total production cost of the company LAUREL is: $CT_L = 10Q_L$. The insurance request to the company LAUREL is represented by the following relationship: $P = 110 - 0,5Q$ where Q represents thousands of insured.

1. The company LAUREL has a monopoly position on the domestic market. Determine the price offered by the firm LAUREL and the number of insured people.

- (a) Calculate and represent the company's profit and the surplus of the insured people.
 - (b) Deduce the level of well-being of the society.
2. It is now assumed that several companies similar to LAUREL are in pure and perfect competition on the domestic market.
 - (a) Remind the assumptions of pure and perfect competition.
 - (b) Determine the number of insured and the market price obtained in competition.
 - (c) Calculate the profit obtained by companies and the surplus of insured persons.
 - (d) What is the impact on the collective well-being of this opening up of the insurance market to competition?
3. We return to the case of question 1, and a second company HARDY now wishes to enter the insurance market and practices a non-cooperative strategy by adapting to the number of agents insured by the company LAUREL. The company HARDY bears a total cost of $CT_H = 20Q_H$ for a production Q_H . The timing is as follows: LAUREL chooses how much Q_L to produce, then HARDY (which observes the strategy of LAUREL) in turn chooses how much Q_H to produce. As a result, the company HARDY is considered a follower while the company LAUREL remains a leader in the insurance market.
 - (a) What is the nature of this market equilibrium?
 - (b) Determine the number of insured people by each company and the market price using the backward induction method.
 - (c) Calculate the profits made by the company LAUREL and by the company HARDY at equilibrium as well as the consumer's surplus.
 - (d) How does the well-being of society now compares to the one obtained in question 1?
4. Thanks to its commercial espionage activities, the company HARDY finally succeeded in appropriating its competitor's marketing secret. As a result, there is no longer any information asymmetry between the two insurance companies such that the company LAUREL and the company HARDY now offer their insurance contract simultaneously. The cost functions remain unchanged.
 - (a) What is the new nature of this market equilibrium?

- (b) Determine the number of insured by each company and the market price.
- (c) Calculate the profits obtained by each company as well as the surplus of the insured people.
5. The company HARDY can now operate on the market with a total cost identical to that of the company LAUREL. The two insurers thus have a similar cost function : $CT_L = 10Q_L$ for LAUREL and $CT_H = 10Q_H$ for HARDY .Following a study on the risk that potential customers face, the company LAUREL now considers it appropriate to approach its rival HARDY with an offer to reach an agreement in order to monopolize the market for insurance. It has also been established that the agreement LAUREL-HARDY faces different types of risks related to two distinct demands from men and women. Thus the request of men is written: $Q_h = 120 - 1,2P$; and that of women : $Q_f = 100 - 0,8P$, where Q_h and Q_f represent thousands of insured people. The cartel LAUREL-HARDY knows the demand of each category of insured as it is able to discriminate against them according to their degree of risk exposure.
- (a) What kind of discrimination is this? Explain the principle of this discrimination thus applied by the cartel LAUREL-HARDY.
- (b) Calculate the equilibrium prices on this market, the number of insured persons per category as well as the profit obtained by the cartel LAUREL-HARDY.
- (c) Determine the surplus for each category of insured persons.
- (d) Compare the price(s) offered to insurance for men and women with the single monopoly price charged by LAUREL (obtained in question 1).

Documents:

Text 1: "The Competition Council wants more severity and speed" – Lesechos.fr – July 09, 2007

The independent administrative authority imposed €105 million in financial penalties in the first half of 2007, compared with €128.2 million last year as a whole.

Severity and speed. These are the wishes expressed by the Competition Council on the occasion of the presentation to the press of the balance sheet of the fines imposed. "The offender must not think that because the case is being handled in Paris and not in Brussels, it should be less punished," warned Bruno Lasserre, President of the Competition Council. "The first half of 2007 confirms the trend of severity," he said. In fact,

some 105 million euros in sanctions were imposed in the first six months of the year, compared with 128.2 million euros for 2006 as a whole.

As the independent administrative authority responsible for ensuring compliance with competition in France, the Conseil de la concurrence has considerably increased its fines for unfair business-to-consumer practices since the new Economic Regulation Act (NRE) of 2001. The latter allows it to impose a fine of up to 10% of its worldwide turnover on a company that is at fault, compared to 5% of its national turnover previously. A record fine of €534 million was imposed at the end of 2005 on the three mobile operators (Orange, SFR and Bouygues Telecom) for illegal cartel. In the first half of 2007, the biggest deal concerned an agreement to renovate high schools in the Ile-de-France region. Construction companies, including the top three in the sector, Bouygues, Vinci and Eiffage, divided up the markets for seven years before calls for tenders. These companies were fined a total of €47.3 million. The construction sector was also pinpointed in the second biggest case of the semester. The cement companies Lafarge and Vicat were ordered to pay 25 million euros in fines between them, for an agreement with the main Corsican cement distributors. But while construction, distribution and telecommunications have long been the main bad pupils of the competition, since 2006 new sectors have been targeted, notably luxury or health, but also the press and publishing due to a concentration of operators.

Success of the denunciation. To break cartels and other agreements, the Competition Council has put in place new procedures, such as the "commitment", whereby the company itself proposes solutions to competition problems, or "leniency". Very common in the United States, leniency is a denunciation practice designed to thank a company that denounces a cartel in which it has participated.

"About thirty companies have come forward since 2001 (for leniency, editor's note). The success of this procedure is growing. Yet many people doubted that it could be applied in France, believing that it is not in culture," Bruno Lasserre pointed out. He pointed out that French companies were increasingly turning to this procedure, whereas at the beginning they were American or British shareholding companies.

Founded in 1986, the Competition Council has been very active since Bruno Lasserre took over its management in 2004, when he decided to reduce the decision-making period to 15 months, compared with an average of 38 months in 2000.

Text 2: "Abuse of a dominant position : a concept" – Journal La Libre Belgique, 2/20/2006.

"We are announcing today that we will (...) issue licenses for the Windows source code itself," said Brad Smith, Microsoft's general counsel on January 25. This is the IT giant's response to the threat of a new fine of €2 million per day raised by the European Commission for failing to provide documentation to facilitate interoperability between its operating system and its competitors' software. Microsoft has been under sentence for a year and a half for "abuse of a dominant position". It had to pay a record fine of €497 million. It was also forced to offer a version of the Windows operating system without its multimedia software.

This threat to make Microsoft pay again only makes sense if the original conviction was justified. However, it seems to us that the concept on which the indictment against Microsoft is based, the abuse of a dominant position, is wrong. According to the Competition Commissioner, Neelie Kroes, a dominant firm with "substantial market power", in her own words, can harm consumers, in particular by imposing excessively high prices. And this could not simply be the result of competition constrained by legal restrictions. Since last June, the version without multimedia software of Windows is available for sale. According to the European Commission, the integration of the software into all versions of the operating system was harmful to consumers. By offering only an integrated Windows, Microsoft would have taken advantage of its dominant position in the operating system market to extend it to the multimedia software market, disregarding the interests of consumers. By allowing them to buy a Windows without a Media Player, consumers had to choose this version and complete their platform with competing media consoles. However, the version without a multimedia player of Windows is a resounding flop. At Fnac des 3 Champs-Élysées in Paris, it is stated that "sales are currently nil". Some computer manufacturers have even decided not to offer it: "We conducted a study with our sales representatives to find out if customers wanted Windows N. Conclusion : the consumer does not want it, so we do not offer it," says Dell France. It seems that Microsoft is being forced to manufacture products that no one wants, which is a waste of resources. Not in the least shaken by a finding that undermines its thesis of abuse of a dominant position, at least for the Media Player part of the case, the Commission persists and condemns once again. However, the very principle of "substantial market power", which opens the door to abuse, is problematic.

In the "pure and perfect competition" model used as a reference for antitrust policies, everything is going well for the consumer in a free market situation, provided that each firm has only an insignificant market share. They then have no "market power", i.e. they have no control over the price they can charge for their product. This price is "fixed" by the market. On the contrary, once a firm succeeds in 'dominating' with a significant market share, it has the power to influence the price upwards or to alter the quality of products, to the detriment of consumers. In fact, this distinction, which is essential for the definition of an abuse of a dominant position, is wrong. In the free market, each actor has absolute control over his person and his products. Each person then has absolute control over the prices they try to obtain for their products but has no control over the price at which the exchange ultimately takes place, as it depends on the consent of a buyer, by definition necessary for the transaction to take place. Attempting to identify abuses of dominance based on any pricing power is absurd in this context. Prices are mutual phenomena. Each actor participates in their training. There is therefore no situation in which a firm has no influence on the price. However small a firm's market share may be at any given time, the decision to offer its products for sale is part of the determination of the total offer of the property and therefore of the market price. Therefore, the supposedly idyllic situation of pure and perfect competition is strictly impossible. It cannot therefore be used as a reference point for diagnosing anomalies such as "substantial market power". Thus, the *raison d'être* of the legislation against abuse of dominant position disappears with this erroneous notion.

The significant distinction, largely ignored by the European Commission, is unrelated to any market power. This is the criterion for entry, free or not. The only way to ensure that prices and product quality comply as closely as possible with what is required by consumer preferences is to give everyone the right to try their hand in the market. Thus, attempts to set too high a price can be thwarted, as producers who are able to make profits at a lower price are then free to seize the profit opportunities thus offered by the candidate monopolist. In this context, significant market shares for a firm can only result from consumer support. As soon as market entry is hindered by regulatory measures aimed at something other than respect for the physical integrity of people and their property, the firms present are protected from the permanent challenge of competition and obtain leeway to set their prices at higher levels. If there are dominant positions that are harmful to consumers, they are the result of political power, not any market power. Only the abolition of texts hindering competition is an appropriate response. Antitrust legislation, far from defending consumers, reduces their ability to decide on the ability of firms to serve them by deciding for them who deserves their support or not. Microsoft is now the victim of a policy that destroys competition in the name of competition.

Text 3: "Microsoft competes with Google on Apple's iPhone" – Le Figaro.fr, 1/21/2010.

While relations between Apple and Google seem to be deteriorating, the apple company could replace Google's search engine with Bing, Microsoft's, to equip its smartphones.

Apple1 against Google2: the rivalry continues. After the fierce competition between the two American giants in the mobile market, the search engine market could be their new playground. But this time, Google's competitor would not be Apple, but Microsoft. Indeed, according to BusinessWeek magazine, the apple company is in discussions with the software giant to suggest that Bing, its search engine, replace Google on Apple's iPhone multifunction phone. While some may believe that relations between Apple and Microsoft are warming, there is indeed talk of a deterioration in relations between Apple and Google, which began in 2007 but peaked last year when Apple rejected the Google Voice application (which allows several phones to be redirected to a single number and offers a service similar to Skype). Google CEO Eric Schmidt3 eventually left the Apple board of directors in early August. Apple refers to "growing "conflicts of interest", especially with "Android", Google's operating system for phones. The coup de grace came on January 5 with the presentation of the Nexus One, a new Android phone built by HTC but for the first time sold directly by Google. Objective ? Compete with Apple's iPhone.

Apple would consider creating its own search engine, but for Apple, making an agreement with Microsoft may only be to save time. Indeed, BusinessWeek reports that discussions between Apple and Microsoft, which have been ongoing for several weeks, are not yet ready to be concluded. The American business magazine adds that Apple is indeed looking to develop its own search engine. In December, Google represented 65.7% of the American search engine market, compared to only 10.7% for

Bing, according to the specialized firm ComScore.

Text 4: "Microsoft targets Apple with its new Surface Pro 3 tablet" – Challenges.fr, on 05/21/2014.

Microsoft, which has some catching up to do in mobile, is putting its hopes in an even bigger tablet and betting on the ability to also replace laptops, starting with Apple's, openly targeted. The screen of the new Surface Pro 3 has a diagonal measurement of 12 inches (30.5 centimetres), compared to 10.6 (26.9 cm) for the previous version, Surface Pro 2, which was already one of the largest on the market. By way of comparison, the classic iPad from market leader Apple is only 9.7 inches (24.6 centimeters) long, with a "mini" version to suit the popularity of smaller (7-8 inches) and cheaper tablets. By further enlarging the Surface, Microsoft is contradicting the expectations of some observers, who were betting on a smaller version.

"We want products and technologies that allow people to dream and do things," said Satya Nadella, the new general manager of the American IT group, during the presentation of the device in New York. Since replacing Steve Ballmer at the beginning of February, Satya Nadella has been hammering that he wants to put "motive first". He also insisted on Tuesday on the willingness to do so by allowing "productivity". A device to work and create. Microsoft highlights the possibility of also using the device to work with office automation or creative software, as well as performing two tasks at the same time on each half of the screen. It also emphasizes accessories such as a suitable pen for "writing" on the Surface screen, or the cover with an integrated keyboard, which is one of the device's specific features and makes it the equivalent of a laptop computer. On the latter, the touchpad, which replaces the mouse, has been improved, as has the attachment mechanism that stabilizes the tablet when used on your lap. Replace the iPad AND laptop computer. Microsoft openly posed as Apple's rival, comparing on a scale the weight of its new tablet with that of a laptop computer of the apple group. Surface Pro 3, refined to 9.1 millimetres thick, weighs only 800 grams.

Microsoft also argues that 96% of iPad users need to have a laptop for certain tasks, and that the new Surface can replace both. Satya Nadella, on the other hand, refuted fears of a deterioration in the group's relations with device manufacturers, to whom it traditionally only supplied software. "We are not interested in competing with our manufacturers," he said, saying instead that he wants to "create new product categories" to increase demand "for the whole ecosystem. Microsoft had only entered the tablet market late in 2012 and has difficulty imposing both the Surface and its Windows operating system on Apple and devices using Google's Android software. A market that is running out of steam. Its latest efforts come at a time when growth seems to be slowing in the market: global tablet sales increased by a meagre 3.9% year-on-year in the first quarter, compared to 28.2% in the fourth quarter of 2013, according to the research firm IDC. And the Surface has only small market shares, despite revenues up more than 50% year-on-year to \$500 million in the first quarter. Surface Pro 3 is available as a pre-order with an announced price for the United States of \$799 with the

adapted pen, but without the keyboard cover for which \$129.99 will have to be added. It will arrive in stores from June 20 in the USA and Canada, and "end of August" in 26 additional countries, mainly in Europe and Asia, including France, Belgium and Switzerland.

TD 3: Imperfect Competition

Exercise: Dominant Position and Competitive Fringe

The global market for IT equipment consists of a large company called HAL and 10 small companies. These 10 companies constitute the "competitive fringe"

All the players know the link between the quantity demanded by the market (Q_D) and the p price of the product: $Q_D = 60\,000 - 120p$. This relationship reflects consumer demand.

Competition is in quantities, according to the following timing ::

- first, HAL decides how much q_{HAL} to produce;
- then, companies $i \in \{1, \dots, 10\}$ simultaneously choose which quantities q_i to produce;
- finally, HAL and the companies of the competitive fringe simultaneously supply their production on the world market.

It is assumed that the companies on the competitive fringe are small enough, so the influence of the isolated behaviour of each of them on the market price is negligible. These 10 companies constitute the "competitive fringe".

The average cost of each small business (PE) of the competitive fringe and that of the dominant firm (HAL) are rewritten respectively: $CM_{PE} = (1/40)q + 300$ and $CM_{\text{HAL}} = (3/2)(1/320)q + 250$.

1. Why does HAL have a triple advantage over companies of the competitive fringe?
2. Analysis of the characteristics of the companies involved.
 - (a) Determine for each of the firms its total cost.
 - (b) Do production processes have increasing or decreasing returns to scale ? What does this property imply?

- (c) Does the dominant company HAL have a cost advantage over its competitors ? Of what kind ? How can this be explained ?
3. In the short term, the number of firms from the competitive fringe is fixed (the branch is said to be closed). The game is solved by the backward induction method:
- (a) Suppose that a company from the competitive fringe anticipates that the final market price will be p . How many will it choose to produce? In particular, specify the minimum price below which it will not produce.
 - (b) What is the value of the total supply of the competitive fringe as a function of the market price p ?
 - (c) HAL anticipates the behaviour of companies on the competitive fringe. Write the problem of HAL in a closed form, i.e. by integrating the reaction of companies from the competitive fringe.
 - (d) Determine the quantity of computers produced by HAL and their unit price. Compute its profit.
 - (e) Deduce the quantity sold by the competitive fringe as a whole, then by each of its firms. Calculate their individual and aggregate profits.
 - (f) First calculate the respective market shares of HAL and the competitive fringe. Then calculate their respective shares of the industry's overall profit. Does this confirm HAL's qualification as a dominant firm?

4. Bonus Question: Comparison with the monopoly situation

- (a) If HAL was a monopoly, with an unchanged cost function, how much would be sold? At what price? For what profit?
- (b) What is the preferred market structure for consumers (specify by what criterion)? Why is this?

Documents

Text 1: "Luxury, a perfume of scandal... and agreement" – Press release from the Competition Council dated March 14, 2006.

The Competition Council sanctions 13 companies operating luxury perfumes and cosmetics brands, as well as 3 national distribution chains, for a total of 46.2 million euros.

The Competition Council, which has taken action on its own initiative in this case, has just issued a decision, by which it sanctions 13 companies operating luxury perfume and cosmetics brands for having reached an agreement with their distributors on selling prices to consumers. For the same facts, it imposed fines on three national distribution channels (...). The fines amount to €46.2 million (...). Between 1997 and 2000, the companies operating the above-mentioned luxury perfumes and cosmetics brands reached agreements with the distributors in their network, and in particular the national chains Marionnaud, Nocibe and Sephora (...). Each supplier of perfumes or cosmetics set its distributors the "target public price", as well as the maximum discount rate they were allowed to apply (...). Each agreement organised by the supplier was accompanied by the implementation of a "price policy" consisting of price controls, pressure and threats of commercial reprisals against distributors (...). The price records used during the investigation showed that the cartel was effective : the prices applied significantly respected the prices agreed within the cartels (...). In assessing the extent of the damage to the economy caused by the practices, the Council took into account the duration of the practices (years 1997 to 2000) and the size of the affected market (€814.5 million for brands that have been subject to sanctions).

Text 2: "Perfumers convicted of commercial conspiracy" – Journal Le Figaro, 3/15/2006.

Thirteen major brands and three chain stores were fined 46.2 million euros.

The Competition Council has had its nose in. The institution, which last year imposed a fine of €534 million on Orange, SFR and Bouygues Telecom, yesterday sanctioned thirteen perfume and cosmetics brands and three of their distributors, Marionnaud, Nocibe and Sephora. For agreeing on prices between 1997 and 2000, these big names in luxury goods were fined 46.2 million euros.

The most severely affected is the global giant LVMH. Owner of the Sephora stores as well as the perfumes Christian Dior, Guerlain, Kenzo and Givenchy, the French group alone is fined €14.45 million. Marionnaud will have to pay 12.8 million euros. For lack of evidence, Douglas perfumers, Azzaro and Sisley perfumes among others, fell through the cracks. As for the company Procter Gamble France (Rochas, Patou, Lacoste...), it has been exonerated. In this case, the Competition Council had referred the matter to itself in 1998. In its kind, it's not a first. In December, Philips, Sony and Panasonic were fined €34.4 million for agreeing with their French distributors on the retail selling prices of

their products. The investigation required more than 4,000 price quotes throughout the country to reach this conclusion : the thirteen perfume manufacturers involved did not simply set wholesale prices for their distributors. They agreed with them on the retail resale price, so as to standardize them "up- wards". In four years, their practices would have unduly inflated prices by "at least" 3%, or 72 million euros... to the detriment, of course, of the consumer. The mechanics were well established. A "price policy" set up by the manufacturers controlled shelf prices. All means of pressure were good so that distributors would not deviate from it by selling at a lower price than agreed : commercial reprisals, threats of dereliction... Only small independent networks would have complained about these methods. The others played the game because, basically, the system guaranteed everyone's margins.

LVMH, Chanel and Nocibe appeal : LVMH and Chanel announced yesterday that they would appeal. According to the first, the Council "refused to take into consideration the requirements and specificities of luxury goods distribution". The other manufacturers have not wished to react for the time being, some reserving the possibility of appeal. "The facts go back ten years, a period during which there has been an unprecedented concentration of distribution," explains Alain Grange-Cabane, president of the French Federation of Perfumery Industries. All this would be impossible today in a market that has become much more competitive. However, the Competition Council claims that it is not certain that these practices have ceased since then. As for distributors, Marionnaud was very brief yesterday. "We have not yet received the notification. It is still too early to comment," said a spokeswoman. Unless there is no surprise, the group should appeal. At Nocibe, which has just been acquired by the Charterhouse Capital Partners fund, the decision has been made. "We will of course appeal," says Xavier Dura, President of Nocibe. There is no evidence against Nocibe in the file. We are victims of an amalgam. Being at the same price as your competitor does not mean that there is a price agreement. We dispute the amount of the fine itself, calculated on the basis of the 2004 turnover, even though the alleged acts took place between 1997 and 2000. Never seen before! »

Sanctions, in millions euros

Suppliers	
L'oréal produits de luxe France	4,1
Chanel	3
Parfums Christian Dior	3,2
Yves Saint Laurent parfums	1,8
Guerlain	1,7
Elco (Clinique et Estée Lauder)	1,6
Beauté prestige international (Jean Paul Gautier et Issey Miyake)	0,81
Thierry Mugler parfums	0,64
Kenzo parfums	0,6
Parfums Givenchy	0,55
Comptoir nouveau de la parfumerie	0,41
Distributors	
Marionnaud	12,8
Sephora	9,4
Nocibé	6,2

"Perpetual harassment on prices".

Pressures, threats, reprisals... The Competition Council's investigation file sometimes resembles a detective novel. Chanel thus acknowledges that it requires the application of a "coefficient défini by the brand of 1.99" (to determine the public price). One of the company's documents even states : "0% discount requested". "I apply the price list," says the manager of a Lyon-based perfumery. I can sell above, but not below. Dior has prohibited any discount on J'adore. » At Thierry Mugler's, a note clearly indicates : "We set the price of the bottle at 590 francs public price. Reminder ! This price being unofficial, it should never be recorded on any document. » Beware of claimants ! In an internal memo, Hermes asks his troops for a "very firm reaction towards the perfumer" Marie-Jeanne Godard. The most common retaliatory measure is the threat of cutting off deliveries. In a fax, Lancôme, a subsidiary of L'Oreal, congratulates itself : "I sent up Frydman", the former owner of Marionnaud. Its shop managers did not hesitate to denounce their competitors. Montauban's wrote to Hermes to alert him to the practices of the Beauty Success brand : "In the interest of everyone, you should put yourself at the right price. I thank you in advance for taking the necessary steps with M.P." A frank shooter, in charge of an O'Dylia perfumery, complains to Yves Saint Laurent about his "perpetual harassment regarding prizes"... "This situation leads to an illegal agreement, he writes. I have expressed my disagreement with you regarding the alignment with the prices charged by our competitors."

Questions on texts:

1. Is competition between perfumes part of horizontal or vertical differentiation? Is competition Bertrand or Cournot style?
2. What could be the interest of perfumers in setting up a fixed price at distributors?
3. After briefly presenting what the prisoner's dilemma in game theory is, show how this theoretical framework is relevant to understanding perfumers' decision to implement a "price policy".
4. In general, what are the factors and practices that can facilitate the establishment of collusion?

TD 4: Cyclical Policies (1)

Exercise: Support of Demand by Fiscal and Monetary Policies

We consider an economy whose functions characterizing the behaviour of economic agents are as follows:

$$Y = C + I + G \quad (\text{TD4-1})$$

$$C = 0,7Y + 35 \quad (\text{TD4-2})$$

$$I = 200 - 1500r \quad (\text{TD4-3})$$

$$(M_d/p) = 0,3Y - 800r \quad (\text{TD5-4})$$

where C represents household consumption; Y the volume of GDP; I the volume of private investment; r the interest rate; M_d the demand for money; p the general price level; M_s and G are respectively the money supply and the amount of public expenditure.

1. Comment on the equations. What are the endogenous variables and the exogenous variables?
2. The determination of the macroeconomic equilibrium:
 - (a) Determine the equation of equilibrium on the goods market. What is the name given to the curve thus obtained?
 - (b) Give the expression of the elementary (or simple) multiplier of public expenditure.
 - (c) Determine the equation of equilibrium on the money market. What is the name given to the curve thus obtained?
 - (d) Determine by solving the model, income and equilibrium interest rate depending on the exogenous elements of the model. Solve the model for $G = 80$, $M = 200$ and $p = 1$. What is the value of the multiplier of public spending now ? How does it compare to the previous one ?
 - (e) What is the impact on endogenous variables of the model of an expansionary fiscal policy that increases G by 20 units ? Explain precisely the mechanisms involved. How can the impact of this policy be increased?

The following ‘supply block’ is now added to the model:

$$Y_s = 200 + (15/2)N - (1/32)N^2 \quad (\text{TD4-5})$$

$$N_s = 72 + 8(w/p) \quad (\text{TD4-6})$$

$$N_d = 120 - 16(w/p) \quad (\text{TD4-7})$$

where Y_s is the supply of goods by firm; N the amount of labour used; N_d the demand for labour from firms; N_s the supply of labour from households; w the nominal wage rate.

3. The labour market:

- (a) Show that the firms’ demand for labour is derived from their production function.
- (b) Write the equation for labour market equilibrium. Determine the real wage level that balances the labour market: $(w/p)^*$. What is the equilibrium employment level? In this case, the level of supply of goods?
- (c) It is assumed that nominal wages are now set at: $w = 5$ and $p = 2$; while public spending and money supply remain fixed at: $G = 80$ et $M = 200$. Calculate the labour supply and demand for labour. How much labour is exchanged?

4. The supply function of firms and unemployment:

- (a) Deduce from this the supply function of companies: how much can companies supply?
- (b) Calculate the demand for goods and compare its level with that of the supply. What will then be the quantity of goods actually produced by the firms?
- (c) Determine the corresponding level of employment. Explain the reasoning behind the company’s profit maximization that allows you to choose between the two roots of the equation. What are the levels of unemployment and the unemployment rate? What is the nature of unemployment?

5. Economic policies : prices remain set at $p = 2$.

- (a) The government decides to reduce the salary to $w = 4$. What is the effect on the level of production? What is the effect on the level of demand for goods? Please comment. Has unemployment decreased? Why?
- (b) What is the variation in public spending needed to eliminate unemployment when $w = 4$? Please comment. What are the mechanisms involved?
- (c) What monetary policy should be implemented to achieve the same result (with $w = 4$)?

Documents:

Text 1: "Cancelling the debt always means shifting the burden to others." LeMonde.fr 16-05-2020 à 00h30 - French economist Jean Pisani-Ferry

From Jean-Luc Mélenchon to Alain Minc (NB : from the left to the right of the French political spectrum), many are those who advocate the outright cancellation of the European debt. However, tomorrow, it will have to be paid for, warns the economist in his chronic.

So far, the economic response to the health crisis has been swift and strong. Fiscal rules have been suspended, the monitoring of public aid to businesses has been eased and, with the support of the European Central Bank (ECB), governments have been able to play their role as firefighters. France has taken effective advantage of this. This was only the beginning. More needs to be done: immediately to help businesses get back on their feet and to preserve jobs as much as possible; in a few months to restore household confidence, support transitions stimulate investment, strengthen the health service, accelerate the pace of decarbonisation, relaunching industrial policy. It will also be necessary to abandon tax and social security receivables, and recognize losses on credit guarantees. The government forecasts that by the end of the year the public debt will reach 115% of the gross domestic product. It will certainly be more and, failing an unlikely the virus disappeared, even more so a year later. It would not be surprising if the five-year period results in an additional 30 - or so - points of debt. We have to take this risk because the greatest threats are the collapse of our productive system, the return of mass unemployment and, consequently, the contraction of tax and social security revenues. This is not the time to rush the return to budgetary orthodoxy.

But many go further and draw from the famous presidential "whatever it costs" the conclusion that the budgetary constraint is imaginary. Mobilizing hundreds of billion would be a matter of political will...

Money magic trick. It's forgetting that we were lucky that this crisis occurred in an extremely low interest rate environment, where the cost of debt is zero. It would be much harder to act with the same force if it was at the level of ten years ago, or twenty years. It also ignores the fact that the lesson of this crisis is a German one: to not have to skimp on Keynesianism in the face of financial, health or social, or ecological shocks, it is better to have room for manoeuvre. The European Commission predicts that in 2020 Germany will issue 430 billion euros of debt, but Italy only 180, and Greece nothing. Europe risks a new vicious circle in the fragile states weaken their economies, and thus their tax base.

Never mind! we hear more and more: let's cancel the debts! From Jean-Luc Mélenchon to Alain Minc, many are those who advocate either crossing out with a stroke of the ECB's share of the public bonds held by the ECB; that is, the same, to convert them into a perpetual non-interest-bearing debt, which is either not much different, to exchange them for 50-year zero rate securities. This, it is said, would allow the debt burden to be reduced without incurring a heavy burden. The subject should not be taboo. In financial jargon, cancellation is called "restructuring", and many countries have resolved to do so because they are unable to honour their commitments deadlines. The operation is not fatal, but it's usually painful, because it impoverishes savers, destroys banks and damages reputations of the country's finances. That is why it is a last resort. But that's not what the annulment lawyers are advocating. They're presenting the case like a monetary magic trick that wouldn't cost anyone anything.

It's a hoax. Suppose the ECB, which today holds more than 2,000 billion of government bonds, decides to exchange them for a non-interest-bearing perpetual bond. The States, which are also its shareholders through their central banks, would be relieved of a debt but also, and for the same amount, of the flow of future dividends accruing to them today by central banks. They would be neither richer nor poorer. Because the ECB, which belongs to them, would still be indebted to the holders of monetary assets. Public sector debt (States + ECB) would remain the same ("Monetisation: Do Not Panic", [article by] Olivier Blanchard and Jean Pisani-Ferry, Vox EU, 10 April 2020).

A social choice. Debt relief for real would mean devaluing these monetary assets. And there is a well-known (though somewhat forgotten) way to do this: inflation. If the ECB were to commit not to raise interest rates on the distant day when inflation returns, then it would, indeed, reduce the debt burden. This is called monetization and it is simply another form of restructuring, surreptitious but more unfair because it reaches small savers.

Perhaps tomorrow we will have to choose between restructuring and monetization. Or perhaps we will prefer to expropriate life insurance holders through taxation. Or we will opt for financial repression, forcing households to hold underpaid savings. These are just alternative technologies for impecunious states. None of them are painless, but they do not charge exactly the same.

Cancelling debt always means shifting the burden to others. It is a social choice. You can't swear, in the face of a crisis like the one we're facing, that we're not gonna have to deal with it. Today, we're going into debt because we have to. The ECB is doing

its job and blocking speculative crises. For the rest, we'll see when we defeat the virus. Announcing today our conversion to the voodoo economy would sharply increase the cost of public debt. The effect would be counterproductive.

Tomorrow we'll have to pay for it. Because interest rates are likely to remain low, it won't be very expensive. But it is neither serious nor democratically honest to pretend that it will be free.

Text 2 (Interview): "This crisis is a litmus test for romantic collapsologists." 25/04/2020 à 14:00 | Le Point.fr - Gaël Giraud

In this unprecedented crisis, dogmas are falling one by one. Some of them, like European budgetary rules, have already collapsed. Gaël Giraud is not afraid to do more to get out of this economic cataclysm, triggered by the pandemic of the new coronavirus. This economist, with an atypical profile - a Jesuit priest, he has worked in finance before becoming head of the Agency French Development Agency (2015-19) -, widely consulted by the institutions and by governments, proposes to cancel purely and simply the public debts bought back by the ECB to get interest rates down. Director of research at the CNRS, this specialist in interactions between economics and ecology, a professor, calls on governments to fund massively the ecological transition. But don't make him a collapsologist or a descendant, the "post-growth" economic system he calls for is something else entirely (...)

Le Point : The crisis we're going through today shows that we weren't prepared for such a pandemic. Was it unpredictable? Gaël Giraud: It was perfectly predictable and we are unforgivable for not having done it. It has been very well planned and anticipated by a number of countries, in particular in the Far East (Taiwan, South Korea, Vietnam and, to a lesser extent, Singapore, Hong Kong and Japan), but also Iceland and Malta, in Europe. The World Health Organization (WHO) had warned for years that wildlife markets in Wuhan and Beijing could lead to new coronavirus pandemics, which were already experienced in 2002 with the Sras and in 2012-2013 (Seas). In France, after avian flu and H5N1, we took intelligent measures with the creation of the EPRUS (Establishment for preparedness and response to health emergencies) in 2007, but we then divided its budget by ten...

It is therefore a failure of the States... It is a defeat of the ideology that the less state you have, the better off you are. In France, decentralisation has been emptied of its substance: we have taken away from the local authorities the responsibility for health and the means to ensure it, while at the same time ... giving away skills that became inoperative as a result. Today, the unbelievable messes around the production of masks and enzymes for testing reflect this. Our veterinary labs warned very early on that they were able to do the testing, but our administration has lost a long, long time before they're allowed to do so. It is the failure of a state that has had its wings

clipped, not because there are too many states in France. We need to rethink effective and responsible decentralisation.

Why is it that with such high health spending, France is unable to cope with the health crisis as well as other countries, such as Germany? In Germany, an important part of the care system is carried out by a sector private not-for-profit organization, for which the government provides policy direction and which is not recorded in the public sector. An efficient "private sector" in Germany cannot therefore be contrasted with an inefficient "public" sector in France, where two-thirds of public spending on health goes to the private sector. Moreover, according to the OECD, the contribution of German health expenditure to GDP amounts to 5.2%. It has been stable (slightly increasing) for about 40 years. The same is true in France, where it's around 6%... It would be nice if we stopped circulating bogus numbers on this. Private as well as public, the French health system did not have the means to fulfill its mission.

What vulnerabilities of our economic system does this crisis reveal? Difficulties in the supply of medical equipment and medicines illustrate our very strong reliance on international value chains built up since lean years to maximize short-term profit. This makes the overall our highly vulnerable economies to the disruption of these channels and reveals the need to relocate at least part of what makes us live in such a way as to be able to absorb shocks like this pandemic, and there will be more. Renewing the ancient world, it would be an insult to our youth and the future of France.

How do we relocate? Won't we go back to the situation before once the crisis is over? It's all about choice. The number of deaths, in the end, will be far less than the hundreds of thousands initially envisaged by some epidemiologists in the event that of inaction: between 30,000 and 40,000? Even if each death is one death too many, this may give the impression that the health crisis was not so serious after all. The The number of additional unemployed will be considerable: at least 1 million. The risk will then be to return to business as usual to recreate jobs very quickly. This would be a mistake and a foul. We must begin the ecological reconstruction of our country, which will create more jobs than our world's thermo-industrial economy from yesterday. Let's take an example: agroecology. So that all agriculture to become environmentally friendly, at least 1 million people are needed in the fields. These are jobs that require qualifications. The real obstacle to job creation is vocational training. The State must commit itself to creating the apprenticeship channels we need so that the French people whose trades are destined to disappear can reorient themselves towards the jobs of the future. Another example is the thermal renovation of buildings. It is a job-creating project that will revitalize all our buildings and reduce our dependence on oil, improve our environmental performance, and balance of trade, etc. We are currently short of skilled workers for the lead nationally. So let's start the renovation on a scale of one or two regions, create apprenticeship paths, extend the programme to all of France in two years.

According to a recent article in Nature, climate inaction will cost us the equivalent of the coronavirus crisis every year. With this crisis, the public debt-to-GDP ratio is going to jump to at least 115%. This can be resolved by canceling public debt... held by the

European Central Bank (ECB), which would give us the freedom to commit massive spending to save our economy.

Fiscal austerity, which, as Greece has shown, does not reduce the ratio spending on GDP, is worse than evil. Major works must be launched, in the manner of Roosevelt in the 1930s in the USA, but environmentally friendly (...)

You propose that the ECB should cancel the public debts it holds. Are we not already in the process of massive monetisation of public debt in order to allow States to go into debt almost for free? The ECB's repurchase programmes do not relieve any country from the yoke of the debt. This benefits private banks in particular: they buy the public debt from the the time of its adjudication by the States, knowing that they will immediately the resell in Frankfurt. So they take no risks. By the way, they take yet a small margin. As for the States, they continue to go into debt... I'm talking about to simply cancel their stocks of debts that are already in the accounts. of the ECB. For France, this amounts to recovering 400 billion euros, which is what we would free us for a long time from the austere obsession.

You believe in magic money! You can't massively create money like that, can you? This could create massive inflation... Any banker knows that "magic money" is something we create every day! When private banks grant credit, they create money. It is their function. And, when someone repays a loan, he destroys money. The Central Bank is merely creating central bank money, the basis money, which never leaves the interbank market. You and I have never seen the color of that money. This central bank money can't produce inflation, since it doesn't circulate in the real economy. What can be inflationary is the money created every day by private banks. If this money is injected into the wrong place, it creates bubbles, as happened before 2008 with the bubbles real estate in Ireland or Andalusia. It's happening again with the huge bubble financial today and the real estate bubble in our cities. By cancelling the the ECB, we would not create a penny: we would prevent that this currency already in circulation should not be destroyed by the repayment of debts. Finally, since 2010, we have been in a situation of near-deflation that is still going to continue, worsen with the economic depression of the coming years, because of the containment. There is no risk of inflation for the next few years, unless there is a break of supply of essential goods.

Why was it not done before, then, if it is so easy to cancel State debts held by Central Banks? We are prevented from doing so apparently because of a technical side debate. The question is whether the ECB can make losses and have own funds negative on its balance sheet. The answer is: Yes! A report from the Bank for International Settlements the central bank of central banks in Basel, points out that one bank in the world, the power plant may very well operate with negative equity capital, unlike the private banks. The important thing is that the money created by the central bank should be accepted by everyone in the economy. The legitimacy of the euro as a currency does not depend on the ECB's own funds in Frankfurt: the proof is that they are around 80 billion, which is very low. The credibility of the euro depends, on the contrary, of our ability to rebuild Europe.

But the ECB should be recapitalised! The European Treaties do not oblige States to recapitalise the ECB. The real obstacle to this solution is actually political. By cancelling the debts, are we not going to encourage States to believe that anything goes, since all debts can be eventually cancelled? This is the great fear of the Dutch "falcons", of some falcons in Germany and Bercy (NB: the place of the French ministry of finance). Who can deliver them? They must understand that the macroeconomics that they have in mind is totally wrong. They reason as if the management of a state was similar to that of a good head of household who manages his family's budget. A household that spends more than it earns is in trouble. But, for a country, that has nothing to do with it. When the government spends money, someone earns it in the private sector. So public spending is good for the economy.

In your opinion, should governments have taken on more debt in order to spend more after the 2008 crisis? That's right. In fact, this is what China has done by launching in 2009 the largest ever Keynesian revival of the entire history of mankind. Back to the "falcons", they also need to understand that the division of labour they have imposed in the euro area is deadly. It stimulates the industrialisation of the north while the south is rapidly de-industrializing, including France. So far, it is only because the southern euro area countries have managed to maintain their relatively high wage levels that they have been able to absorb the products of industry in the north. If the southern euro area had emulated German wage deflation to gain competitiveness, the German surpluses would have nothing to do with what they are today, since 70% of these surpluses come from the rest of the euro area. If southern Europe collapses, Germany will collapse with it.

(...)

With this crisis, France is currently experiencing a kind of "decline". forced". Should we be happy about this? We can see what this does to the economy and social... I'm not happy about it, and it's a litmus test for collapsed doctors... romantics and "degrowthists", which I've never been a part of. The social cost, and especially the unemployment one, is going to be colossal. A post-growth economy like the one I'm calling for, along with other economists and many NGOs, is not consent with a smile to the tragedy we're living through today. It's about getting organized by giving political and economic objectives no longer driven by growth of GDP. Today, the only quantitative criterion proposed to Members of Parliament to assess an budget is its impact on GDP. In order to be able to orient our public policies, it is essential to use other criteria. These include the Human Development Index (HDI), a version of which takes into account income per capita, but also Inequalities in income, Educational attainment, and Healthy life expectancy. This is still unsatisfactory, but already less frugal than GDP alone. It must also take into account the carbon and material footprint of our economy, the ecological damage we inflict on our ecosystems, and thus the colossal ecological debt we've contracted. The difficulty is not in finding alternatives to GDP, but to agree on which we want to focus on. It is still a matter of political choice (...)

Listening to you, we need to boost economic activity with the increased of public spending. But you also point out that we're going to have a huge skills problem in the workforce and that there is a need to relocate some of the

industries in Europe. All of this put together would be very inflationary! We've been sliding down a deflationary slope for the last ten years and containment is not making than to accentuate the slope. If all of the construction sites in the reconstruction (renovation of buildings, green mobility, rail freight, redevelopment of territories in favour of short agro-ecological circuits, relocation of part of industry...), we will have rising labour costs and possibly higher inflation in five years.

On the one hand, it is not certain, on the other hand, it would be a lesser evil. The phobia of inflationary system was invented from scratch in the late 1970s, whereas it's a relatively positive phenomenon when it doesn't get out of hand. Inflation redistributes wealth from creditors and annuitants to the less fortunate who are the most indebted. Provided the salaries follow, of course. This option is highly preferable to the deflationary depression that nobody knows how to get out of.

We keep in mind the superinflation of the Weimar Republic at the beginning of the 1920s. The German hyperinflation of 1923 is partly due to German public debt inherited from the war and which the allies of 1919 did not want to undo. All the more reason to cancel some of Europe's public debts today! But, in 1923, it was mainly due to the fact that the Central Bank had authorized German firms to create their own money to pay their wages. The Minister Schacht has put an end to the price boom in six months by prohibiting manufacturers from thinking they are banks. It is worth recalling that we have already had inflation, including at double digits, during the Glorious Thirty (i.e. the period 1950-1970). And it never degenerated into hyperinflation (...)

TD 5: Cyclical Policies (2)

Exercise: Supply-side Determinants and the Fight Against Unemployment

This time we take into account the vision of another economist who thinks on the contrary that the TD-4 economy is better modeled thanks to the following system of equations:

$$Y = C + I + G \quad (\text{TD5-1})$$

$$S = 180 + 500r \quad (\text{TD5-2})$$

$$I = 200 - 1500r \quad (\text{TD5-3})$$

$$Y_s = (1222/3) + (25/3)N - (1/24)N^2 \quad (\text{TD5-4})$$

$$N_s = 60 + 8(w/p) \quad (\text{TD5-5})$$

$$N_d = 100 - 12(w/p) \quad (\text{TD5-6})$$

$$M_d/p = Y/4 \quad (\text{TD5-7})$$

$$M_s = M \quad (\text{TD5-8})$$

where S is household savings. We keep the same ratings as before (TD 4).

1. To which theoretical school does the model thus constituted belong?
2. What is the value of the speed of circulation of currency?
3. The determination of the macroeconomic balance:
 - (a) Show that the real wage level $(w/p)^*$ that balances the labour market is the same as before.
 - (b) What assumption do you have to use to arrive at the equilibrium level of GDP? Calculate this level Y^* .
 - (c) Write the equation for equilibrium in the market for aggregate goods and services. Calculate the equilibrium price level P^* knowing that $M = 200$ and $G = 80$. Find w^* .
4. The effects of economic policies:

- (a) Government spending is assumed to increase to the $G = 100$ level. How is the macroeconomic equilibrium affected (calculate the new equilibrium values)? Is this an effective way to increase activity? On what assumptions does this result depend?
- (b) Same questions in the case of a monetary policy with $M = 220$, while G remains fixed at 80. Draw the appropriate conclusions.

5. The unemployment:

- (a) It is assumed that there are labour market rigidities that set the level of real wages at $(w/p) = 2.5$. What is employment worth in this case? What is the nature of this type of unemployment?
- (b) Calculate the values taken by all variables in the model for $G = 80$ and $M = 200$.
- (c) Can unemployment be reduced by increasing government spending to $G = 100$ or the money supply to $M = 220$? Why? What is the only possible policy?

Documents:

Text 1: "For the first time in 30 years, the human development index could decline in 2020". LeMonde.fr, 22 mai 2020

According to a report by the United Nations Development Programme, the Covid-19 crisis is deepening inequalities and reversing the development curve in the world.

The Covid-19 is a bottom blade. To the health, political and social crisis must be added that of human development, warn the experts of the United Nations Development Programme (UNDP) in their report, made public on Wednesday 20 May. Created in 1990, the Human Development Index (HDI) jointly measures access to education, health and standard of living. It is experiencing an "unprecedented and rapid decline" due to the coronavirus crisis, the authors note.

"The world has experienced many critical situations over the past 30 years, including the international financial crisis of 2007-2009. Each has had a severe impact on human development, but overall, development gains have improved year on year" says Achim Steiner, Administrator of the United Nations Development Programme (UNDP). But for the first time in 30 years, the development curve could be reversed under the combined

effects of a health crisis of historic proportions, which has brought entire sectors of the world economy and the education system to a standstill and revealed the fragility of health services, including in developed countries.

The downward trend in the Human Development Index is such that it "reverses all the progress made over the past six years," the researchers write. In education, current conditions are equivalent "to levels last seen in the mid-1980s" they are alarmed. These estimates do not take into account the indirect effects of the crisis on women and girls, who are harder hit in terms of precarious pay and schooling, access to health care and domestic violence.

Out-of-school kids. "We were expecting slower figures, but not at this level" says Heriberto Tapia, a researcher with the UNDP Human Development Report Office. The speed with which trends have reversed underscores the depth of the crisis: "In January 2020, the IMF [International Monetary Fund] estimated an increase in per capita income in 160 countries. Three months later, in mid-April, the Fund revised its forecast: 170 countries will experience a decline in per capita income. "As a result, the report's authors estimate that world per capita income is expected to fall by 4 percent in 2020. If this figure is confirmed, it would constitute "the worst plunge in economic activity since the Great Depression" of 1929.

The most vulnerable countries will be the most affected by this economic crisis. According to IMF projections, the number of people living in extreme poverty is expected to increase by 40-60 million and the world could have between 14 and 80 million more undernourished people. But the long-term effects of the crisis will be felt by economies as a whole. The 2008 financial crisis is instructive in this regard. More than a decade later, national GDPs are still below the projections that preceded this global financial shock. Sustainable Development Goals have also been lastingly affected by the economic downturn.

In the immediate term, the Covid-19 crisis is particularly acute in the field of Education, which is experiencing the strongest reversal in its history. As of mid-April, 1.7 billion young people between the ages of 5 and 17 in 147 countries no longer had access to school, and inequalities are growing due to the lack of equitable access to the Internet. While 86% of young people in poor countries are out of school, only 20% of them in rich countries are out of school. But the authors try to remain optimistic: "If conditions of access to school were restored, educational capacity would rebound immediately."

Consequences on maternal and child mortality. On health issues, the decline is clear: according to figures updated in mid-May 2020, Covid-19 causes more deaths every day than malaria, AIDS, suicides and road accidents. In rich countries at the epicentre of the epidemic, deaths due to coronavirus could exceed those from cancer or heart disease. UNDP experts are alarmed at the cascading effects on maternal and child mortality in low- and middle-income countries. They estimate that 6,000 children are at risk of death every day and over the next six months, in part due to the slowdown in immunization programmes.

In addition, the report expresses concern about the indirect and often overlooked effects of crises, to which Covid-19 should be no exception. For example, the impact of the

Ebola virus - which had hit West Africa hard in 2014 and 2018 - on the Human Development Index has been largely underestimated, according to UN experts, for whom "the epidemic has claimed more victims through indirect channels than through the Ebola virus itself".

Ending the digital divide. The authors of the report highlight the particular context in which this crisis has struck: a world "richer than ever, but facing deep divides in human development" that are likely to widen further. While the impact of Covid-19 is global, the decline in human development worldwide "will be felt much more severely in developing countries, which will find it harder than rich countries to cope with the social and economic fallout". To mitigate the effects, UNDP recommends the implementation of equity-focused approaches. For example, reducing disparities in Internet access for low- and middle-income countries.

According to a US study based on the geolocation of mobile phones, residents of affluent neighbourhoods have been quicker to adopt the teleworking reflex. In poorer neighbourhoods, the confinement was later and very partial, due to the lack of a professional activity allowing telework, but sometimes also due to the lack of Internet access. Ending the digital divide would reduce inequalities in education, health and income by facilitating digital schooling, telemedicine and telework. In the area of education, Internet access for all would reduce by two thirds the number of children out of school due to school closures.

This solution is "feasible", the researchers estimate, but would require an investment of about \$100 billion (92 billion euros) - or 1% of the budget plans that have been decided to boost post-Covid economies. Experts believe that with this measure, the decline in the HDI could be halved. There is still a lot of uncertainty about the future and lasting impact of this crisis" says Mr Tapia, one of the authors of the document. But this report should launch the debate and enable the least developed countries to anticipate future crises, and the richest countries to work towards better international cooperation.

Text 2: "Why the European Recovery Plan is a revolution". LeMonde.fr, 21 juillet 2020

The Franco-German joint loan project was adopted on Monday night by the Twenty-Seven, after four days and four nights at the Summit.

To achieve this, it took a summit that will also remain "historic" because of its exceptional duration. The European Heads of State and Government finally agreed on Tuesday 21 July on the recovery plan to help them face the devastating consequences of the Covid-19 pandemic. Faced with the scale of the damage caused by the virus, which has caused more than 200,000 deaths on the Old Continent and plunged the European economy into an unprecedented recession, the 27 Member States adopted an unprecedented plan, which outlines the contours of a more federal, more united and more integrated Europe.

Admittedly, the mechanism is temporary, but its supporters hope that it will prove its worth and thus become part of the landscape of possibilities for the future. "History

shows that when a political step is taken, there is no turning back" said a French diplomat.

First revolution: in order to obtain the 750 billion euros it plans to allocate to the recovery, the Commission (to which the triple-A rating by financial rating agencies ensures very attractive financing conditions) will go into debt on behalf of all member countries. The Community executive has already issued debt, but its incursions into the markets have always remained limited. Indeed, the treaties oblige the Union to present a balanced budget. That said, if the 27 Member States so wish, and if their Parliaments follow them, the Union can evade this rule and thus acquire a degree of budgetary autonomy.

The second revolution is that this common debt will first of all be a tool of solidarity, taking Europe a new step towards a Union of transfers, the principle of which was long rejected by Germany. Indeed, out of the 750 billion euros allocated to the recovery plan, 360 billion will be lent to Member States that wish to do so - they will find the means to get into debt on better terms than by going to the markets alone, but they will have to repay these sums - and 390 billion will be transferred to them between now and 2023, in the form of subsidies that will be repaid by the 27 Member States.

The money, which will be added to the EU budget (a total of 1 074 billion over the period 2021-2027), is intended to help as a priority the countries most affected by the crisis, such as Italy, Spain and, to a lesser extent, France, and will be distributed according to a distribution key that takes account of the structural elements of these economies and the scale of the recession that will be experienced. France will be able to dispose of 40 billion euros of subsidies, announced Tuesday the Minister of the Economy, Bruno Le Maire. This sum will enable it to partially finance its own 100 billion euro recovery plan, which will be presented on 24 August, according to Le Maire. Spain will be entitled to around 60 billion and Italy to some 70 billion.

Pledge to the north. In order to give guarantees to the countries of northern Europe - including Germany - that they do not want this money, which they will help to repay, to be squandered, it is planned that the countries benefiting from the plan will first present a programme of reforms and investments up to 2023. This will have to be compatible with the Union's priorities (climate and digital transitions) and include structural reforms. It will also have to be validated by the Commission and the Member States by a qualified majority.

Aid will be granted in instalments and must be approved by the Commission on each occasion. The EU-27 will be consulted, and if a country feels that the money is being misused, it can take the matter to the European Council. It will not, however, be able to veto a disbursement, as the Netherlands wanted.

If you borrow money, you have to pay it back. From this point of view, the 27 have left the construction site on hold, knowing that the deadline is far away. As things stand at present, either their national contribution will have to be increased or European expenditure will have to be reduced. Unless they decide to allocate "own resources" to Europe. In other words, the Commission would raise taxes - it already does so in a few

rare cases, and for very small amounts - and part of the Community budget would no longer depend on the capitals.

Today, apart from the introduction of a levy on non-reusable plastics by 2021, nothing is in the pipes. Many countries, starting with Germany, do not wish to go much further in this direction. It is therefore planned that the Commission will work on two hypotheses - the introduction of a digital tax and the creation of a carbon adjustment mechanism at the borders for goods imported from outside the Union whose carbon footprint does not correspond to Community standards.

Text 3: "Italy finally accesses the European recovery plan" - Les Echos, August 13, 2021

The country is the main beneficiary of the Next Generation EU. It received a first instalment of 25 billion euros on Friday, of which it will spend more than half by the end of the year.

A wind of euphoria is blowing through the Italian economy. The business confidence index reached its highest level in July since statistics began in March 2005. Italy's GDP grew by 2.7% in the second quarter, more than the 2% initially announced by the government, which now expects growth of more than 5% by the end of the year. These forecasts include the effect of the measures of its National Recovery and Resilience Plan (PNRR), approved on 22 June by the European Commission, the national version of the European recovery plan.

On Friday, the Italian Treasury received the first instalment of this vast investment plan: 24.9 billion euros, or, as required by the rule established by the 27, 13% of the total expected. Italy will receive a total of 191.5 billion euros, broken down into 68.9 billion in grants and 122.6 billion in loans. In addition, a national fund of 30 billion euros will be added to the 221.5 billion euro Italian recovery plan. The Peninsula, where the recession was the most severe with a decline of almost 9% of its GDP, is the main beneficiary of the Next Generation EU.

105 projects immediately launched. What will Italy do with all this money? Some 15.7 billion euros will be invested over the next five months in 105 projects, in particular to encourage the digital transition of companies and their internationalisation, but also infrastructure projects linked to the TGV. Italy has made a commitment to Brussels to spend the resources granted to it quickly but above all well. Mario Draghi has vouched for this. He wants to convince President Ursula Van der Leyen and her European partners, essentially the northern countries, that the Peninsula is not a country of waste and bureaucratic slowness. In order for this money to allow the transalpine economy to return to structural growth, the NRP is divided into 6 missions: "digitisation, innovation, competitiveness and culture" will benefit from 21% of the resources, while 30% will go to the "green revolution and ecological transition", 13% respectively to "infrastructures for sustainable mobility" and to "inclusion and cohesion". 14% will go to "education and research" and finally 9% to "health".

A programme under strict surveillance. But if these billions of euros are to be used to improve the energy efficiency of buildings, the infrastructure and technological equipment of hospitals or to double high-speed rail traffic, the management of the NRP will have to be rigorous. It is based on three administrative levels, the main one being the office of the President of the Council, Palazzo Chigi, which oversees the implementation of the various projects. They will be controlled by the Budget Directorate of the Ministry of Finance, while their implementation will be entrusted to the competent ministries, most often headed by technical personalities. Every six months, a report will be submitted to the Parliament and the Court of Audit.

Structural reforms are also promised. From the modernisation of justice to that of public administration, some fifty legislative texts are planned. "We are gambling with our future and our credibility," insists Mario Draghi. Brussels did not say anything else on Friday: "The Commission will authorise the payments on the basis of the implementation of the investments and reforms described in the Italian plan."

TD 6: International Finance

Exercise: The 1994 Mexican Monetary Crisis

In 1994, the Mexican fixed exchange rate regime suffered a speculative crisis : anticipating a devaluation of the peso, markets reduced their holdings of the peso to invest in foreign currencies. The Mexican central bank has intervened massively in the foreign exchange market to counter this speculation. At the end of the year, however, the fixed parity had to be abandoned and Mexico switched to a flexible exchange rate regime.

1. Comment on the four graphs below.
2. Write the balance of payments equation for a small open country with imperfect capital mobility. From this, derive the equation from the BP curve of the Mundell-Fleming model (i.e., the combinations of income and interest rates consistent with the balance of payments equilibrium, for a given level of foreign interest rates, exchange rates and official intervention).
3. At the beginning of the 1990s, Mexico was a small country open under a fixed exchange rate regime with imperfect capital mobility. Using a Mundell-Fleming diagram, show the impact of a rise in the US interest rate on Mexican interest rates and income. Explain the evolution of the exchange rate and foreign exchange reserves.
4. Mexico is now assumed to be in a flexible exchange rate regime. Same questions.
5. Are your answers to questions 2 and 3 consistent with the graphs ? Interpret the 1994 crisis.

Figure. 1 : Interest rates on 3-month Treasury bills in the United States of America.



Fig. 2 : Foreign exchange reserves of the Bank of Mexico (billions of dollars).

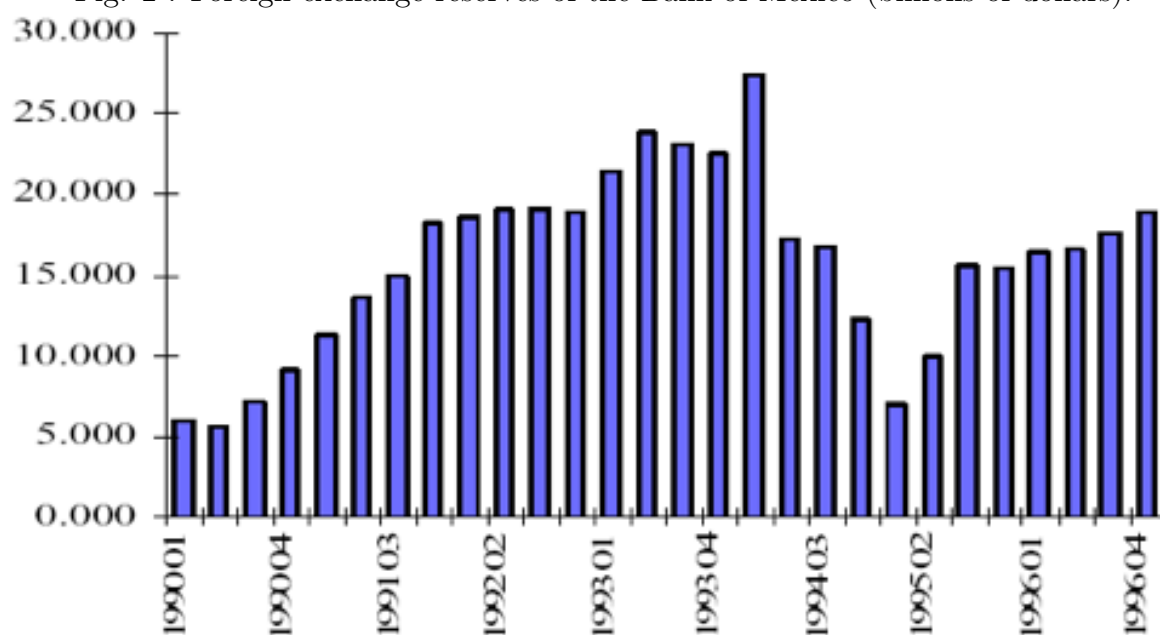


Fig. 3 : Mexican peso/dollar exchange rate, 1993-97.

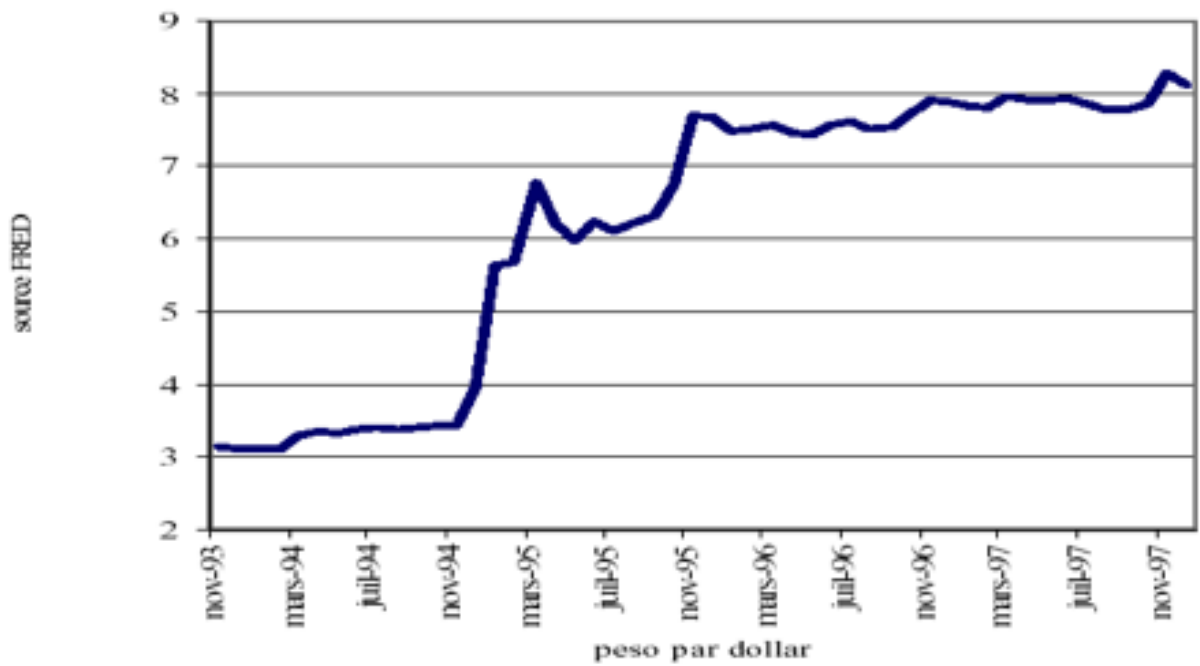
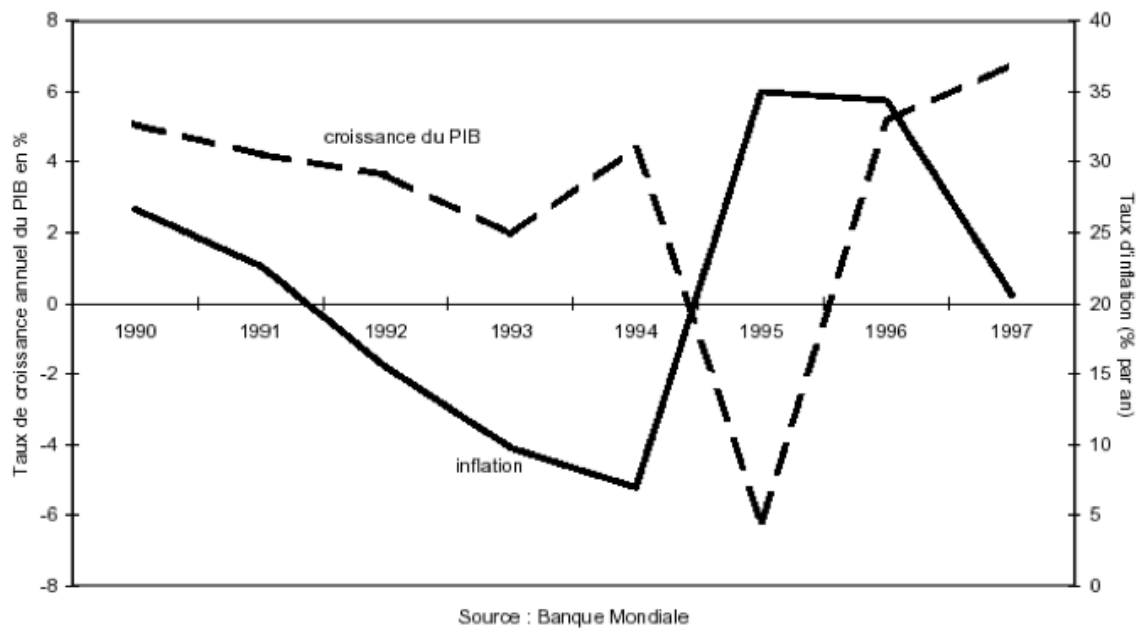


Fig. 4 : GDP growth rate and inflation rate in Mexico.



Documents:

A little econometrics to finish this sixth tutorial... it's up to you to write a commentary based on the three figures below.

Sources:

<https://voxeu.org/article/external-imbalances-within-eurozone-dutch-disease-explanation>

Figure 5: Pre-introduction of the single currency (1980-98) -
Real interest rate (x) vs. credit growth rate (y)
for 11 euro area member countries, average over different periods.

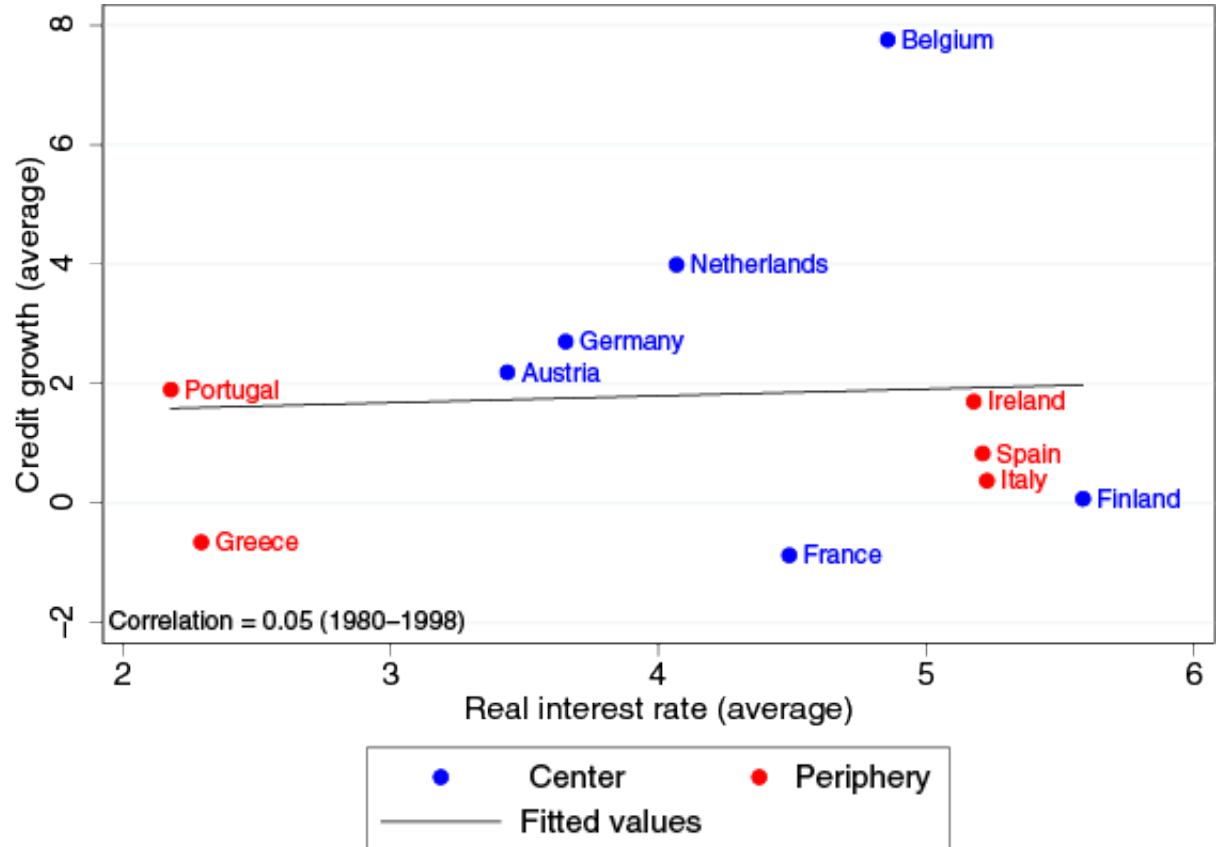


Fig. 6 :Post-introduction of the single currency (1998-2010) -
 Real interest rate (x) vs. credit growth rate (y)
 for 11 euro area mem- ber countries, average over different periods.

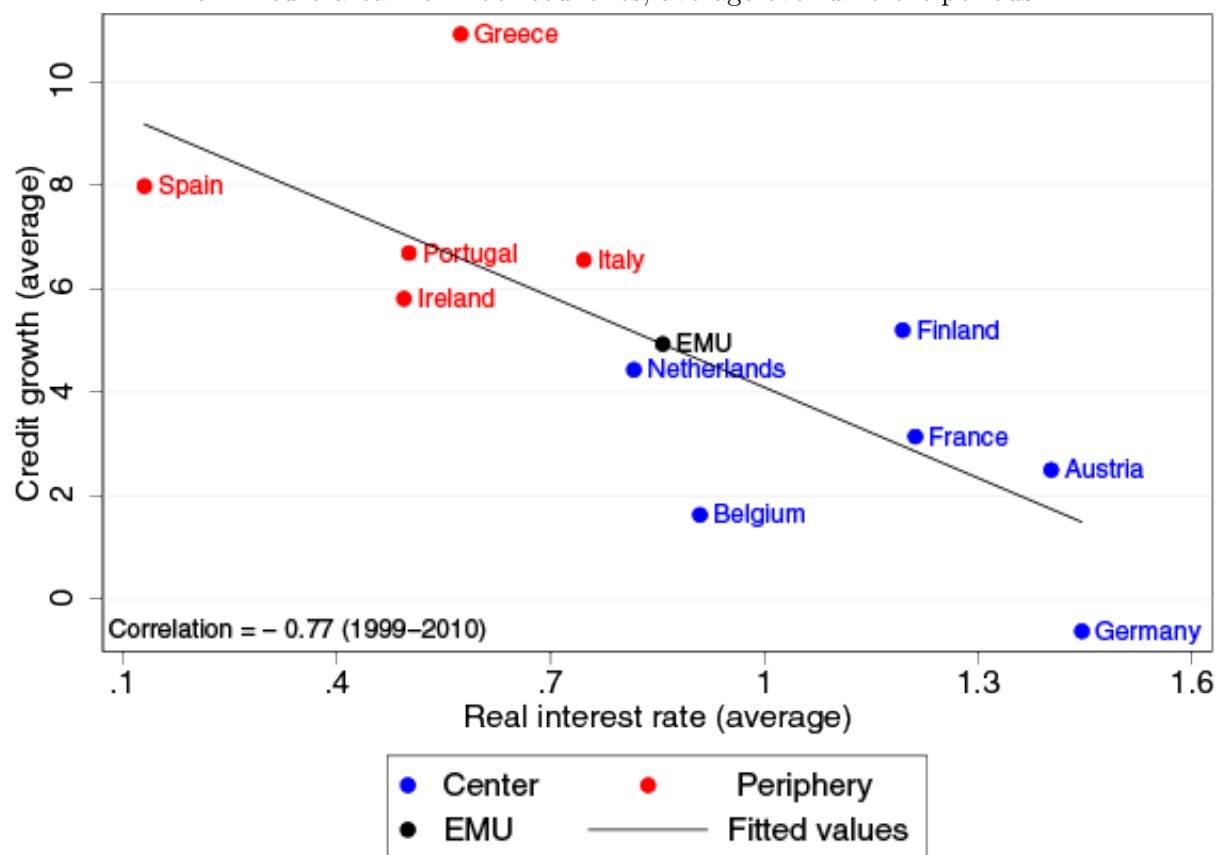
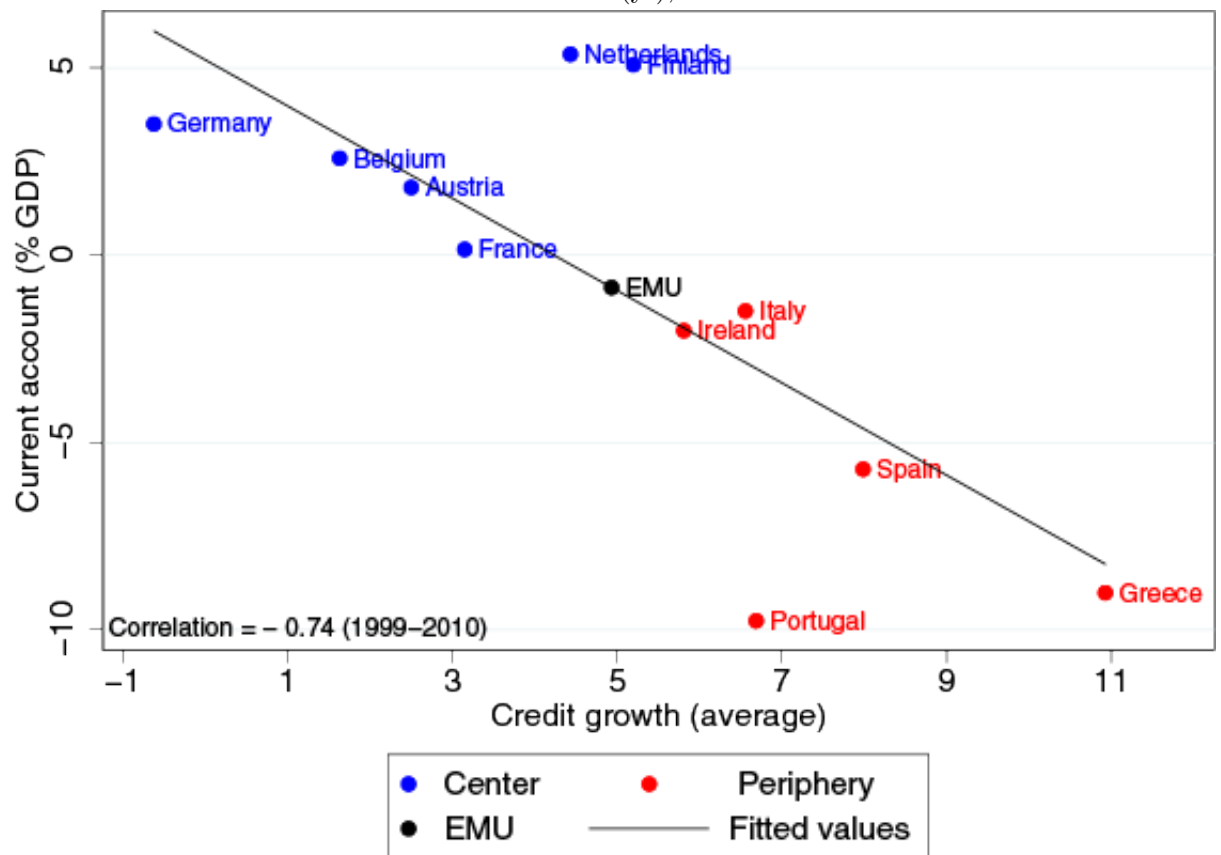


Fig. 7 : Credit growth rate (x) vs. current account surplus
as in % of GDP (y), 1999-2010.



TD 7: Externalities

Exercise 1:

A chemical company pollutes an estuary and affects the production costs of a fishing industry. To simplify, it is assumed that two levels of pollution are possible: 0 ou $q > 0$.

- 1) What kind of externalities are these?
- 2) The reduction in fishing profits due to chemical pollution q is 150 000 euros per year. The upstream company has the possibility to eliminate pollution at a cost of 100 000 euros per year. What is the socially optimal level of pollution?
- 3) Show that whatever the allocation of property rights in the estuary, a negotiation between the two industries can lead to this socially optimal level of pollution. Two cases can be distinguished : the case where the chemical company has the right to pollute as much as it wishes ; the case where the fishing industry has the right to a totally pure water.
- 4) Now suppose that the total cost of removing pollution is 200 000 euros per year. What is the socially optimal level of pollution?
- 5) What will be the outcome of the negotiation depending on the allocation of property rights ? You must distinguish between the two cases of allocation of rights.
- 6) What reasons could possibly justify the fact that negotiation is costly?

Exercise 2:

A farmer owns an apple orchard with a total area of H hectares that must be fully pollinated. This farmer's neighbour is a beekeeper. This is a very practical situation for the farmer since bees pollinate apple trees: a hive pollinates h hectares of orchard. Unfortunately, there are not enough bees to pollinate the entire orchard, and the cost per hectare of artificial pollination required is c .

The use and maintenance of n hives results in a total cost to the beekeeper of $C(n) = n^2 + \gamma_1 n + \gamma_0$. The honey production from a hive is sold at a price of p . We note R the farmer's receipts, independent of the number of hives. It is assumed in the following that $p > \gamma_1$ et $H/h > (p - \gamma_1)/2$.

- 1) Give the expression of the beekeeper's profit. How many hives would he maintain if he operated independently of the farmer? We will note this number n^* .

2) Write the farmer's profit by showing the externality generated by the presence of hives. What is the social number optimal hive size n^{s*} , i.e. taking into account pollination of a part of the apple trees?

3) We denote by T the amount paid by the farmer to the beekeeper in order to increase its operation from n^* to n^{s*} hives. In the absence of transaction costs, which values of T can we expect to arise for a negotiation between the beekeeper and the farmer ?

[Indication : Determine $\Delta\pi^{agri}$ and $\Delta\pi^{api}$, the difference of profits between the situations $n = n^*$ and $n = n^{s*}$, for the farmer and the beekeeper respectively, then give a coaching on T for which the beekeeper agrees to increase the size of his apiary.]

4) What should be the level of total transaction costs to cancel any gain resulting from the negotiation between the farmer and the beekeeper?

Exercise 3:

We assume that a competitive industrial sector emits one unit of pollution per unit of good produced.

The reverse demand function for this good is $p = 12 - q$ with q the quantity requested when consumers pay a unit price of p .

The private marginal cost of producing the good is $C_m^{prod}(q) = 6 + q$ and the external marginal cost is $C_m^e(q) = q$. We do not specify who is the recipient of the externality.

1) Give the expression of the marginal social cost $C_m^s(q)$ and give the sign of externality. Suggest an example.

2) Represent the inverse demand curve and marginal cost curves in a space (quantities, prices).

3) Calculate the socially optimal value q^* of production. What price p^* should consumers pay for this quantity to be traded at a competitive equilibrium ?

4) Calculate the value of q at the competitive equilibrium: q^c ; and compare it with q^* .

5) Calculate the price at a competitive equilibrium: p^c . Show on the graph drawn in question 1) the values: q^* , p^* , q^c , p^c .

6) How do we measure the social loss associated with the presence of externalities ? Give its value and represent it on the graph of the question 1).

7) Suppose that the government imposes a unit tax of t per unit of pollution emitted. This tax is paid by producers. What value of t should be set for the industry to be incentivized to produce the socially optimal quantity at a competitive equilibrium ?

Documents:

Text 1: "CO2 emissions: the state will find it difficult to make car manufacturers pay for it" - *L'Express*, September 22 2016

Diesel vehicles emit more CO2 than manufacturers claim. A reality that would have deprived the (French) State of part of the revenue linked to the bonus-malus. So the government wants to make the manufacturers pay.

The government wants to go on a crusade against car manufacturers. During a hearing on Wednesday at the National Assembly, the Secretary of State for the Budget Christian Eckert said he wants to obtain compensation for the "loss of tax revenue" resulting from a possible deception on CO2 emissions from vehicles, similar to what Volkswagen is accused of for nitrogen oxide (NOx) emissions.

"The legal taxpayer is the owner of the car, whereas the guilty party is the manufacturer, the State Secretary for the Budget explained. There will be no complacency, no particular severity, but the application of a fair return to the responsibility of manufacturers."

Less revenue for the government. Clearly, the government suspects that the bonus-malus and all taxes based on CO2 emissions from vehicles – such as the annual malus or the tax on company cars – says, have been penalized by the practices of car manufacturers. To be homologated, vehicles undergo laboratory tests. However, the commission set up by Ségolène Royal after the Volkswagen scandal was revealed a clear discrepancy between theory and reality.

Out of 47 vehicles tested, 39 showed discrepancies of 20% to 40% in terms of CO2 emissions compared to what was declared on their sheets, *Le Monde* recalled. As a result, the owners of polluting vehicles paid a lower price than that which should have applied with regard to the bonus-malus. Or even simply escape the malus, like the drivers of Renault's Talisman, says *Les Echos*.

"It's an open secret". If we follow this reasoning, the government has been cut by the same amount of revenue: "It is not impossible that the bonus-malus deficit until 2014 is linked to these practices" confirms Mireille Chiroleu-Assouline, a professor at the University Panthéon-Sorbonne. Hence the desire to make manufacturers pay.

However, according to specialists, the discrepancy between the results of CO2 emissions in the test phase and in real conditions is nothing new: "It's an open secret, mocks economist Bernard Jullien, a specialist in the automotive industry. The State, like the manufacturers, has long known that bonuses and maluses are distributed on the basis of truncated information !"

Tests recognized by the European Union. "I doubt that this case will hold up legally" adds Jacques Le Cacheux, a researcher at the OFCE. The tests behind the vehicle sheets have been officially recognised by the European Union and governments for years. All the performances

displayed on the vehicle sheets underestimate fuel consumption, of course, but there is no cheating. To hope to recover a penny, the government would have to be able to prove that there was fraud at the time of certification, for example by installing fake software!

This justifies the government's caution, which is "of course" waiting for the conclusions of the fraud investigation (DGCCRF) before initiating proceedings. "We no longer have the impression of an announcement effect in the context of the presidential campaign" says Jacques Le Cacheux. It may also be a way of passing the pill off as drivers, who will experience a tightening of the car malus scale on the most polluting vehicles in 2017.

Text 2: "In Germany, the automobile is becoming a political issue" - *Le Monde*, August 21 2017.

It's one of those flip-flops Angela Merkel has a secret about. In an interview with the newspaper SUPERillu on Monday 14 August, the German Chancellor said that an exit from the combustion engine was "the right direction to take".

If Angela Merkel did not specify the date of this disappearance, the turnaround is significant. Until now, this kind of announcement has been made by a few environmental activists. And just a few months ago, in a speech for the Saarland regional election, Merkel was still extolling the merits of the diesel vehicle.

The day before, on Sunday, 13 August, it was her Social Democrat opponent, Martin Schulz, who "threw a paving stone into the pond" by putting forward the idea of a compulsory quota for electric cars, which has since been rejected by the Chancellor. "Millions of paid car managers have missed out on the technology of the future, and it is the Germans who have to foot the bill," he said in an interview with the ZDF television channel, in a rare violent outburst from an SPD (i.e. The Social Democratic Party of Germany) leader.

The automobile, the sacred cow of the German economy, made a resounding entry into the election campaign. The events of the last few weeks have made the subject a major issue: millions of Germans who own a diesel car are threatened with a collapse in the value of their vehicle.

A disastrous summer. More seriously, the country's leading industry, suffering from the "too big to fail" syndrome, is now a dinosaur, as it seems to have given up, through fraud and the neutralisation of competition, on producing the most efficient vehicles that respect the environment and health. So much so that most politicians have adopted a critical discourse towards industrialists.

For the car industry bosses, the summer has been disastrous. The July 21 revelation by Der Spiegel magazine of the existence of a cartel between Volkswagen, Audi, Porsche, BMW and Daimler since the 1990s plunged them into an unprecedented crisis of credibility.

According to the weekly, the five manufacturers have agreed on many technologies, shattering the myth of "healthy competition" between German brands. The fine could amount to several billion euros. The cartel on the size of a central device in the diesel engine emission control system, the AdBlue liquid tank, is particularly embarrassing. This urea-based liquid, which is injected into exhaust gases, neutralises a large proportion of nitrogen oxides, the toxic gases produced in large quantities by diesel engines. However, the vehicle still needs to spray enough of it.

Delicate context. However, under pressure from marketing departments, the five manufacturers apparently agreed to limit the capacity of AdBlue tanks to only 8 litres. To avoid customers having to fill their AdBlue tanks too often, Audi and Volkswagen used misleading software. In the absence of a test situation, the AdBlue solution is simply sprayed in smaller quantities.

Have other manufacturers also used this type of device? The question has been on the minds of the country for months. On 27 July, to everyone's surprise, the Ministry of Transport ordered the mandatory recall of 22,000 Porsche Cayenne cars. The reason: the presence of misleading software in the diesel engines. This is the first time that the pearl of the German automobile industry has been sentenced to such a humiliating punishment. On 24 July, Daimler, already under investigation by the Stuttgart court, implicitly recognised a problem with its diesel engines and recalled 3 million vehicles from Europe for an overhaul of their emission control systems. Daimler and BMW, however, continue to deny having resorted to manipulation.

All this is taking place in an extremely delicate context: in Stuttgart, the administrative judge in late July rejected the air pollution reduction plan proposed by the authorities, which was based on the manufacturers' repairing vehicles to reduce their emissions. A ban on the use of diesel engines in the event of heavy pollution is almost unavoidable and could be extended to all major German cities, where trials are under way for regularly exceeding pollution limits.

Time bomb. With five weeks to go before the election, the threat of traffic bans is a ticking time bomb. Diesel sales are plummeting. Consumers fear they will no longer be able to use their cars. The "Diesel Summit", organised by the government on 2 August to avoid the bans, has forced manufacturers to update the software in the diesel engines of 5 million vehicles.

The VDA, the powerful car lobby, claims that this measure will reduce nitrogen oxide emissions in cities by between 10 percent and 14 percent. But environmental groups say it will have a very limited effect. In the longer term, the penalty could be even more severe. The "diesel summit" has not lifted the malaise that has taken hold in Germany. The country of the automobile, for too long stuck on diesel, has neither the (charging) infrastructure nor a sufficiently attractive supply of electric vehicles to allow its rapid emergence. If the end of the combustion engine is scheduled, the German delay on electric vehicles is obvious. A breach into which Chinese and Californian competition could rush.

Text 3: "Brussels proposes to ban diesel and petrol cars from 2035" - *Les Echos*, July 14 2021.

The European Commission wants to reduce CO2 emissions from new cars to 55% in 2030 and 100% in 2035, signalling the end of combustion engines by that date. It also wants to require states to install public charging stations.

In the car industry, the measures proposed by Brussels on 14 July will cause a real earthquake. As expected, as part of the major climate package announced on Wednesday, the European Commission has decided to put an end to combustion engines from 2035: it will require that CO2 emissions from new cars be reduced by 10% by that date.

In other words, only new 100 percent electric or hydrogen-powered vehicles that emit no greenhouse gases while driving can be sold after 2035.

France, which argued in favour of maintaining plug-in hybrids for a transitional period beyond this date, was not successful at this stage. For the intermediate stage of 2030, the Commission

raised the CO2 reduction targets to 55% compared to 2021 for cars, and to 50% for light commercial vehicles. This objective was previously set at -37.5%.

Recharging infrastructure. In addition, the derogation that allowed small manufacturers (selling less than 10,000 cars per year) to get out of the constraints on polluting emissions will be abolished in 2030. Manufacturers of luxury sports cars such as Ferrari, Bentley and Lamborghini, previously reluctant to go electric, will have to step up the pace considerably.

To support this radical shift, Brussels also intends to require member states to provide sufficient recharging infrastructure on major roads. Estimating that 30 million electric cars will be on Europe's roads in 2030, it will require at least two public fast-charging stations (at least one with a capacity of 150 kW) every 60 kilometres from 2025, and twice as many by 2030. This will bring the network of public charging points to 1 million in 2025 and around 3.5 million in 2030, compared to 225,000 at the end of 2020.

NGOs have widely welcomed these announcements - which still have to go through the Council, where the Member States sit, and the European Parliament to be ratified. "The transition to 100% sales of fully electric vehicles is a crucial step towards achieving carbon neutrality by the middle of the century," said Transport Environment.

Radical shift. Even if manufacturers have largely anticipated this revolution, the shift will nonetheless disrupt the sector. According to IHS Markit, in order to achieve -55% of CO2 emissions in 2030, the share of purely electric cars in the mix would have to rise to 55% of sales in 2030.

This is still a long way off: it only reached 5.1% in 2020 (538,000 sales) according to the official statistics of the European Automobile Manufacturers' Association and 8.2% in Western Europe (483,000 sales) in the first half of 2021, according to the first estimates of German analyst Matthias Schmidt.

"The manufacturers, who are behemoths with a certain capacity to adapt, will be ready. But the subcontractors, many of whom only make one component for combustion vehicles, will have more difficulty," insisted Luc Chatel, the president of the automobile platform (PFA), which represents the industry in France. This is evidenced by the jobs already lost in France in foundries, or in companies like Bosch in Rodez.

"This is an industrial revolution of historic proportions," ACEA warned in an open letter to Brussels, pointing out that the automotive industry accounts for 8.5% of industrial jobs in Europe. The manufacturers' lobby in Brussels was quick to react, believing that banning a technology was not rational and reiterating its call for binding targets for charging infrastructure.

Darwinian evolution. The positions of the various manufacturers (and the member states from which they come) are not necessarily aligned, however. The transition will be easier for German manufacturers, who are well established outside Europe and likely to finance the transition by continuing to sell thermal vehicles, than for French manufacturers, who are more dependent on the Old Continent. Carlos Tavares, the boss of Stellantis (PSA-Fiat Chrysler) likes to remind us that the revolution in the sector will be Darwinian.

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