Booklet #1

Booklet Series "Be in charge of your life cycle"

WELL PREPARED FOR YOUR FUTURE: ECONOMIC CHOICES OVER THE LIFE CYCLE

ANGLE

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This booklet is number one in a series of five booklets that aim at improving economic and financial literacy of young people. Economic and Financial Literacy is basic knowledge possibly to be acquired early in life to make individual financial decisions better informed and more effective. This applies particularly to decisions that have long-term consequences and require thinking in terms of the individuals' complete life cycle. Although the five booklets are connected and refer to each other, each of them can be read independently of the others.

The first booklet (this booklet) in the series provides a general introduction on the concepts needed to make financial decisions over the life cycle. The other four booklets cover the most important economic decisions relevant at various stages of the life cycle. The second booklet is about educational choices, such as the decision when to leave school and enter the labour market or how much effort to invest in studying. Booklet 3 deals with the economics of saving and borrowing and what to do with money that is saved. Booklet 4 discusses many aspects of what is often one of the most important financial decisions in people's lives: the purchase and financing of their own house. Finally, Booklet 5 is about pensions and financial security after retirement.

The five booklets are part of the project "A network game for lifecycle education" (ANGLE), funded by the Erasmus+ programme of the EU. This project aims at promoting and enhancing Europe's younger generations' financial and economic literacy. It adopts a life-cycle perspective to help the young to consider a long-time horizon and to think about the future consequences of their decisions. In addition to the booklets, ANGLE focuses on creating a board game that helps the young to improve their financial and economic skills through active involvement and participation. Reading the booklets is an excellent preparation for playing the game. Also for readers who do not play the game, however, they help to make people more conscious and skilled in making important economic and financial decisions.

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Booklet 1

WELL PREPARED FOR YOUR FUTURE
Economic choices over the life cycle

Look at her! How self-confidently she walks around and speaks, as if she had realized most of her aspirations! Of course, it's rather easy to have a successful life when you are born into a privileged family and don't have to worry about making ends meet every month.

"Anything worth doing, is worth doing right", Hunter S. Thompson.

1. Childhood: Not only puppies and sunshine

Maria indeed appears to be an accomplished woman in her mid-60s, irrespective of the fact that she is getting older and just retired. She was a university lecturer in modern literature for more than 30 years and is now enjoying her retirement, with adequate resources for travelling, visiting museums, and a stimulating cultural life.

We see her returning home after a morning at the public library for some research and a detour to the local supermarket, carrying a grocery bag with the ingredients her husband, Peter, asked for in the morning to prepare a nice dinner for them and their son. She needs to hurry, since they have a family video call planned in a few minutes with her daughter, who lives abroad with her partner.

'Lucky lady', most people would think. Well, if they knew better, they would know that it was not merely a matter of luck, but also a matter of wise and farsighted decisions made at the right moments. Maria is not from a wealthy family. Indeed, lower-middle class would be a better description of her family's social background. Her father, a rather strict man of principles, attached to traditions, and, as the family's breadwinner, very prudent with money and financial matters, had

worked in a small shoe shop. Her mother, turning 90 soon, like mostwomen in the 1960s, had always been a stay-at- home mom who devoted her time to family chores, except for little jobs as a seamstress – paid off the books – for friends and acquaintances.

INCOME AND WEALTH

Income is revenues within a specific time span, such as a month, a year, or even a lifetime, received in exchange for working, payroll taxes, or providing services through financial (interests) or real capital (rents).

Examples: Wages, interest on bonds

Wealth is the amount of financial and/or real assets held by an individual/family/firm at a given point in time.

Examples: Bank account balance, house, non-residential buildings, car, bonds

Given her family background, Maria's childhood had not been 'all puppies and sunshine', because the family could count only on a rather small, although steady, **income**. She had, however, grown up in a family atmosphere that paid attention to money, which gave her some practical financial guidelines since childhood.

From the pocket money Maria's parents gave her every month in exchange for small family chores, she had learned that money can be saved to avoid being cash-strapped when wanting to buy something. Not thatshe was a compulsive consumer: ice creams insummer and hot chocolate in winter would beindulged in only occasionally, as well as to avoid embarrassment when confronted by her father as to how much she had been able to put into the bank account he had opened for her. Moreover, even without being a scrooge, Maria enjoyed seeing her sum of money grow beyond her small monthly deposits and had asked her dad to explain the role of the **interest rate** to her, which had been quite mysterious at the time!

INTEREST RATE

The interest rate is the proportion of a loan that is charged as interest to the borrower, typically expressed as an annual percentage of the outstanding loan (see Booklet 3).

An example is a bank deposit, considered money "loaned" to the bank, which, in return, recognizes an interest rate.

Example: €10,000 deposited into a bank account that recognizes a 2% yearly interest rate.

Interest = principal x interest rate = 10.000 x 2% =

= (10.000 x 2)/100 = €200

2. Education versus work

HUMAN CAPITAL/WEALTH

Human capital is an intangible asset that represents the stock of knowledge, experience, good habits, and social and personal attributes (including creativity) embodied in the ability to perform labor in order to produce economic value.

Example: Applied to a working context, it is represented by a worker's experience and skills, including assets such as education and training.

To this little financial knowledge spurred by Maria's dad, Maria's mother had added a fundamental piece: knowledge could also be 'accumulated' to build a different kind of capital, no less important than the financial kind. It was Maria's mother who insisted on saying that she had to 'invest in her **human capital**'. She did not use these exact words, which were more sophisticated than her education would allow, but that was the underlying idea: 'Just as your father and I invested our small savings to buy this house, additional years of studying will, up to a point, provide you with additional competences and increase your career opportunities and expected earnings.'

It puzzled Maria to think of education as a process similar to saving and depositing money into a bank account. The intuition, however, had been very useful when she had to decide whether to continue school or to look for a job after compulsory education. Indeed, she had little doubt, because she liked to study and was convinced that, with more education, she would be able to achieve a better position in the job market – just as having more money deposited in a bank would allow her to buy more things in the future than what she could afford today.

A scholarship was then essential for Maria, because she did not want to burden her parents, who already would have to forgo the little income she could provide to her family had she chosen to work instead (finding a job was not so much of a problem in those days, very different from the situation today for young people in many countries). She knew, however, that to be awarded a scholarship she had to study hard: 'Sacrifices today for a better tomorrow' was a clear principle for her, since she often had to say 'no, thank you' to friends' invitations in order to focus on her study.

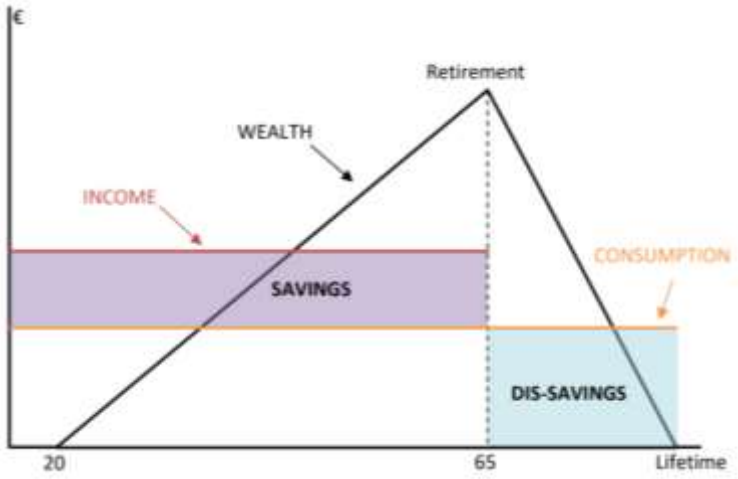
Maria felt bad on those occasions, but she knew she would be rewarded in terms of higher chances of reaching her objective: a university degree, the first member of her family to reach that goal. She reached that goal some years later, a degree in literature, followed a few years later by a PhD, since,

more than being attracted to teaching, she wanted to engage in research. Thus, more study and more sacrifices today, but hopefully a more satisfactory life in the future.

Modigliani's life-cycle model

In the early 1950s, Franco Modigliani, later a Nobel laureate in economics, and Richard Brumberg developed an economic model that describes how individuals plan (or should plan) their consumption and savings paths over their whole life, taking into account resources available in the present as well as in the future. The underlying assumption is that sensible individuals would like to maintain stable lifestyles in periods when they face varying economic conditions (e.g. different incomes or required expenditures). The only way to achieve a (more or less) constant consumption level in retirement, when people no longer work and do not earn an income, is to accumulate wealth during the working period (i.e. spend less than what you earn) and dissave after retirement (i.e. spend more than what income alone would allow). A fall in consumption due to retirement can thus be prevented.

As all theoretical models, Modigliani's model does not perfectly overlap with reality (neither income nor consumption expenditures are truly constant over time, e.g. family considerations must be taken into account). Still, this model provides a useful insight into the importance of evaluating present choices according to their long-lasting foreseeable effects.



After having obtained her PhD in modern literature, Maria was determined to get a position in a good university. Meanwhile, she had to look for a job, possibly as a schoolteacher, because she wanted to be economically independent and because this gave her time to pursue her research activity while she waited for a postdoc position in a university. So, this is what she did, at the beginning merely as a substitute teacher, but eventually gaining tenure. Some years later, with a couple of research papers published in renowned journals, she was awarded the position of associate professor at a good university, with a more than decent salary, nice colleagues, and interested students. She had to sacrifice more leisure time, but it was worth it!

Maria did what her parents had not had the chance to do. Both her father and mother had left school after compulsory education to start working and to help in the house. Even if education had been a priority, their budget constraints were too strict: they simply could not have afforded it. The priority was food and heating and being able to have enough money until the next meagre pay arrived. To make ends meet, even a modest salary earned by the youngest in the family was helpful.

Maria's mother was continuously supportive: 'You have to study. I never had the opportunity of a proper education. We girls were raised to become housewives and mothers. You have more chances. Do not waste them.' Maria has always been grateful to her mother for insisting on 'enlarging the set of options in life'. It was her intuition of the notion of **opportunity cost**, a potential benefit that you miss out on when choosing one alternative over another.

OPPORTUNITY COST

Opportunity costs are the potential benefits an individual, investor, or business forgo if they choose one alternative over another.

Example: When someone decides to put all his/her money into a bank account, he or she foregoes the opportunity to invest part of it in more profitable investments.

Maria did not want to lose out on the best opportunities. After graduation, she thus sent her CV to check her potential in the labour market and to see how she could finance progressing her education. When a few job offers arrived, she pondered the pros and cons of the choices and tried to estimate the likely returns (i.e. the income received from an investment) of each choice.

Of course, a better education would allow her to get a better job, but that would mean, for example, not being able to help the family in buying a new car (the old one was almost unusable) or in repairing the roof. Would 'following her dream' be a sufficient reason to renounce an immediate, far from negligible income? Furthermore, as her father was always saying, starting to work at a younger age would provide 'fuel' for her future pension, allowing her to retire earlier (her father was very concerned about his own pension benefits).

COST–BENEFIT ANALYSIS

On the other hand, to continue studying would involve various types of material and immaterial costs: university fees, to begin with, to be paid for several years, which, in her case, made it almost imperative to obtain a scholarship instead of resorting to student loans (see Booklet 2), and then also time and commitment and, again, having to give up leisure time. And then there was the risk of dropping out, which would mean she would have wasted preciousyears. Maria devoted many evenings to considering all these possibilities in a sort of **cost–benefit analysis**, which always had too many elements for her to tackle.

> A cost–benefit analysis is a process for evaluating the expected profitability of an investment or a decision.
>
> It is computed by adding up the benefits and subtracting the costs – all in present value (see Booklet 2) – associated with the decision/investment, in terms of both tangibles and intangibles. More advanced analysis can also consider opportunity costs.
>
> **Example:** A business that wants to expand and open a new subsidiary.

All this process, however, was worth better 'career opportunities and expected earnings', as her mother said to her. Maria was surprised when she used the word expected. Neither her mother nor she had the mathematical notions to understand it properly, but it gave the idea that you could engage in something and obtain a return not just in terms of personal satisfaction, but also in terms of money, like investing money.

In the end, Maria never regretted the decision to continue her studies to the point of earning a PhD. She learned later, talking to colleagues in economic departments, that she had taken the right approach to the problem. Indeed, she had acted on the basis of a sound basic financial education, even if nobody had formally taught her the main concepts. Behind all those numbers that are sometimes difficult to interpret, economics and finance are much closer to our life than one might think, in the present, as well as in the future.

3. Saving versus indebtedness

Despite her love for literature and the humanities, Maria had always been a practical person. Her parents may have not received an extensive education, but they had taught her some good principles for managing money. Of course, it was a different time back then, but some of their advice still applies today.

Her parents had always considered thrift as a virtue and, conversely, taking on debt – except to buy a house – as a kind of sin. Their economic decisions had as much a moral as a rational economic foundation. Maria is less categorical, but she still made good use of this imprint. Through the pocket money she already received at a young age, she learned to make a budget to better manage her money. Moreover, comparing the budget plan and the actual cash flow, she could check how much she had departed from her original intentions and for what reasons.

On the rare occasions when Maria found herself facing shortfalls, that is, when her expenses were higher than her income, budgeting had proved to be particularly useful. She understood that, at the beginning, her problem was that she only considered *recurring expenses*, while, in many months, there are also unexpected expenses too, such as a pizza with friends. In this case, saving can help handling *unforeseen expenditures* ('saving for a rainy day', her mother would call it, far before economists considered this concept in their models), a kind of self-insurance against unexpected indispensable outlays. Much later, both Maria and her husband, Peter, had been shocked to learn how many households could not even handle an unexpected expenditure such as $5,000. Not having any precautionary savings would be a source of misery to her.

Maria knew, however, that saving was also strategic in carrying out planned expenditures. She learned to set SMART goals, an acronym that a friend once mentioned and that she immediately loved, because it mirrored her way of dealing with decisions to be made: having *Specific, Measurable, Assignable, Realistic,* and *Time-bound* objectives. For example, when Maria and Peter moved into their new house, she made a plan of what was immediately needed and what could wait, such as some of the more out-dated appliances, particularly an old washing machine that was neither energy efficient nor environmentally friendly. Maria did not want to drain her buffer funds –

i.e. a little reserve she had accumulated for precaution - so she preferred creating a plan that would allow her to save a little bit of money each month and to accumulate the amount required over a longer period.

The situation was different when Maria and Peter considered buying a car. Their first ideawas to buy a new economy car, but they had (again) to cope with their still strict budget constraints. Certainly, they could have paid in instalments, but that would mean earmarking another fraction of their monthly income. Maria had a kind of golden rule, which, again, she owed to her mother's (indirect) education: debt was allowed only to buy a house or for unexpected, unavoidable expenses, not for leisure, such as financing holidays. As for buying a car on debt, her mother would have at least frowned.

RECESSION

A recession is a period of significant decline in general economic activity. In macroeconomic terms, it is defined as two consecutive quarters of economic decline, usually associated with a rise in the unemployment rate, lower productivity, and a lower consumption level.

The most recent (and infamous) recession was the *Great Recession*, which started as a financial crisis in the United States in 2007 and then spread all over the world.

Although Maria was inclined to follow her mother's conduct – always save a bit, possibly for specific purposes (precaution being one of them), and be very prudent about going into debt – she was both more pragmatic and flexible. She had the habit of considering the pros and cons of a decision and did not consider saving always good nor debt always bad. At school, she had had the occasion to read a macroeconomic textbook that explained that more savings in the aggregate could harm the economy to the point of causing a **recession** and increase unemployment! This made Maria more at ease with financing to buy durable consumption goods by instalments. In any case, she was more educated than her parents and knew that things are always more complicated than they appear at first sight. Sometimes she even thought that by going into some debt this she could actually help the economy!

As for their savings (Peter had gladly left their financial decisions up to her), although not used to approaching financial markets, she was aware of a generational effect: she would not limit herself to depositing her savings in a bank or savings account, as her parents had always done. She knew that things had changed and that keeping money in a safe, although it could appear to be the more cautious choice, but not the best for her finances. Unlike in the old days, bank accounts and similar deposits grant interest rates close to zero, and the costs can even outweigh the interest. This means

that it is wise to consider different types of assets, such as bonds (both government and corporate), mutual funds, pension funds, and even stocks (see Booklets 3 and 5).

Maria knew the old saying, 'don't put all your eggs in one basket' (indeed, as a child, she had often laughed at the idea of someone breaking all the eggs in a basket!) and was ready to accept some risk in just a portion of their portfolio in exchange for a higher return. The rest had to be safe, for the down payment for the house they intended to buy – the family was getting larger! – as well as for their old age. Their financial wealth was therefore largely made up of government bonds, of different maturities, and the accumulated value of the contributions to their professional pension funds.

The other part of their wealth had been invested – when they were younger and could be confident they would still have a long working life – in riskier assets, according to what had been explained to her as **portfolio diversification**. With such diversification, even if an investment turned out to be bad, there were still other investments to balance out the loss and guarantee an overall positive result. Indeed, irrespective of her childhood amusement at the broken eggs, Maria likes to think that investing is like grocery shopping for a quiche: put half of the eggs in one bag and half in the other. Then, even if one of the bags happens to break, there will still be eggs for dinner. Hoping that an omelette will do just as well.

DIVERSIFICATION

Diversification is a risk management technique that mixes a wide variety of investments, since a portfolio composed of different kinds of investments will, on average, yield safer returns than any individual investment fund within the portfolio.

Compounding

Compounding is a process whereby the value of the accrued interest of an investment is added to the total capital to generate additional interest.

Bonds, like any other financial asset, have an interest rate that corresponds to the gains the owner makes as a percentage of the amount invested. This is called 'simple interest', but you can earn even more by making time 'work' for you. Instead of withdrawing the interest accrued each year, you can reinvest it and buy other assets. This process is called compounding, and it allows your profit to increase significantly in the long term. This is the reason why the earlier you start investing, the earlier money will start growing 'by itself'.

Example: Both Amy and Bruce have invested €10,000 in financial bonds that yield a yearly return of 5%, paid at the end of each year. Bruce reinvests the profits in other identical bonds, while Amy immediately spends her annual return.

Let's see how much their investments will yield in time.

	Alice		Bruce

	Interest	Consumption	Assets	Interest	Consumption	Assets
YEAR 1	10,000 x 5% = 500	500	10,000	10,000 x 5% = 500	0	10,500
YEAR 2	10,000 x 5% = 500	500	10,000	10,500 x 5% = 525	0	11,025
YEAR 3	10,000 x 5% = 500	500	10,000	11,025 x 5% = 551.25	0	11,576.25
YEAR 4	10,000 x 5% = 500	500	10,000	11,576.25 x 5% = 578.81	0	12,155.06
YEAR 5	10,000 x 5% = 500	500	10,000	12,155.06 x 5% = 607.75	0	12,762.81
YEAR 6	10,000 x 5% = 500	500	10,000	12,762.81 x 5% = 638.14	0	13,400.95
YEAR 7	10,000 x 5% = 500	500	10,000	13,400.95 x 5% = 670.05	0	14,071
YEAR 8	10,000 x 5% = 500	500	10,000	14,071 x 5% = 703,55	0	14,774.55
YEAR 9	10,000 x 5% = 500	500	10,000	14,775.55 x 5% = 738.73	0	15,513.28
YEAR 10	10,000 x 5% = 500	500	10,000	15,513.28 x 5% = 775.66	0	16,288.94
		5.000			0	
	TOTAL = 10,000 + 5,000 = 15,000			TOTAL = 16,288.94 + 0 = 16,288.94		

Reinvesting annual returns allows one to take advantage of compounding, leading to a more total capital. The longer the period considered, the greater the gain. In the example above, if we extend our observation to 40 years, Amy's total amount will be €30,000 (of which €20,000 is consumption, at €500 per year), while Bruce would have a total amount of €70,400.

4. Housing choices

When Maria started university, she had to leave her parents' home and find a place closer to the school. She contacted the university office designated to help students find affordable accommodations and was thus able to rent a room in a university residence using part of her scholarship. That proved to be a good solution. After earning her PhD in modern literature, through much hard work but also with great personal satisfaction, Maria faced the prospect of entering the job market. She wanted to engage in research but again had to provide for herself. She thus got a teaching qualification and entered regional competitions until she managed to become a substitute teacher.

She was assigned to a school about an hour away from her family's home. However, apart from the nuisance of commuting every day and her desire for her own independence, Maria soon learned that the cost of renting would be much higher than that of a transport membership card. At home, furthermore, she could enjoy free meals and services, like laundry. With some frustration, Maria concluded that the wisest choice was to move back to her parents' home, where she was determined to contribute to part of the expenses.

Liquidity is the ease with which an asset or security can be converted into money.

Examples: Cash and bank accounts have the highest liquidity (with virtually no time needed to access the money), while financial investments, such as bonds or stocks, are less liquid.

Even tangible assets usually have low liquidity (selling a house or a piece of art can take much time).

The situation changed, however, when Maria met Peter, the man who would become her husband within a year. When they decided to move in together, she had just become a tenured high school teacher, which allowed her financial independence, while he worked as a junior geologist specialized in water resources management. Now, the two had to choose whether to buy a home or just rent one big enough for both of them.

Peter leaned toward the latter, saying that renting would allow more flexibility and the chance to easily move whenever they wanted or if they had to because of their jobs. Moreover, homeownership is a large investment with very low **liquidity**, which you might need if you do not have enough cash on hand or money in the bank. And owning a home also means paying property taxes! On the other hand, Maria argued that her mother used to say that renting is like 'throwing money out the window', while buying a home is an investment for the future.

Before making their final choice, they asked a financial advisor (they spent some time selecting one) about the down payment, mortgage possibilities and costs, repayments schedules, the distinction between fixed and variable interest rates, fixed expenses (e.g. stipulation and management fees), tax deductibility, and various other aspects. They considered all the information very seriously and, after having carefully considered their current and expected financial situations, they agreed on buying a house large enough for possible 'small newcomers'. Indeed, a year later, their daughter Emma joined the family, followed by little Tom when Emma was four.

A mortgage is a debt instrument, secured by the collateral of a specified real estate property, that the borrower is obliged to pay back with a predetermined set of payments.

The main two types of contracts are fixed-rate mortgages (FRMs) and adjustable-rate mortgages (ARMs). In the former, the monthly payment remains constant throughout the whole life of the mortgage; in the latter, the interest rate varies according to some financial market index. This means that ARMs can represent an advantageous offer under specific conditions (which are not always foreseeable), while FRMs are usually safer, since the payment amount is the same whatever the financial market's trend (for more, see Booklet 4).

In any case, be sure to have an adequate income remaining after the monthly payment to avoid having to ask for further loans and accumulate debts on top of debts (with the consequence of high interest costs).

Maria, however, never left her job as a teacher. Indeed, she found the time for conducting and publishing some research, which later allowed her to get a position as a lecturer at the university. Again, the choice was not easy: move the family or commute. She did not want her children to be distanced from their school, friends, and activities. Her husband would be obliged to commute, and they would have to enter into another **mortgage** while they were still paying for their current home. The most convenient option, then, was to rent a small place just for Maria, so that she could stay there when her presence was needed for teaching and exams and stay with her family the rest of the year, to continue her research activities and carry out her share of the family duties. Life is made of choices, and compromises have to be made.

5. Retirement choices

After more than 30 years of teaching, Maria is now in her late 60s. She is satisfied with what she has accomplished in her life, as well as with her retirement. Even this, however, had not been an easy choice. She had loved her job. Teaching and doing research, without the pressure of having to publish in top journals, she had been able to place some of her essays in refereed journals, and her two books had experienced moderate success, more than she had expected, in any case.

It was almost like Mark Twain, one of her favourite authors, had once said: '*Find a job you enjoy doing, and you will never have to work a day in your life*.' That is why Maria had postponed retirement for as long as she could (she knew she was lucky in this respect), and, indeed, she even continued to work in retirement. It was unpaid work, such as conferences and citizenship activities, mainly teaching English and other topics to immigrants, but it was satisfying.

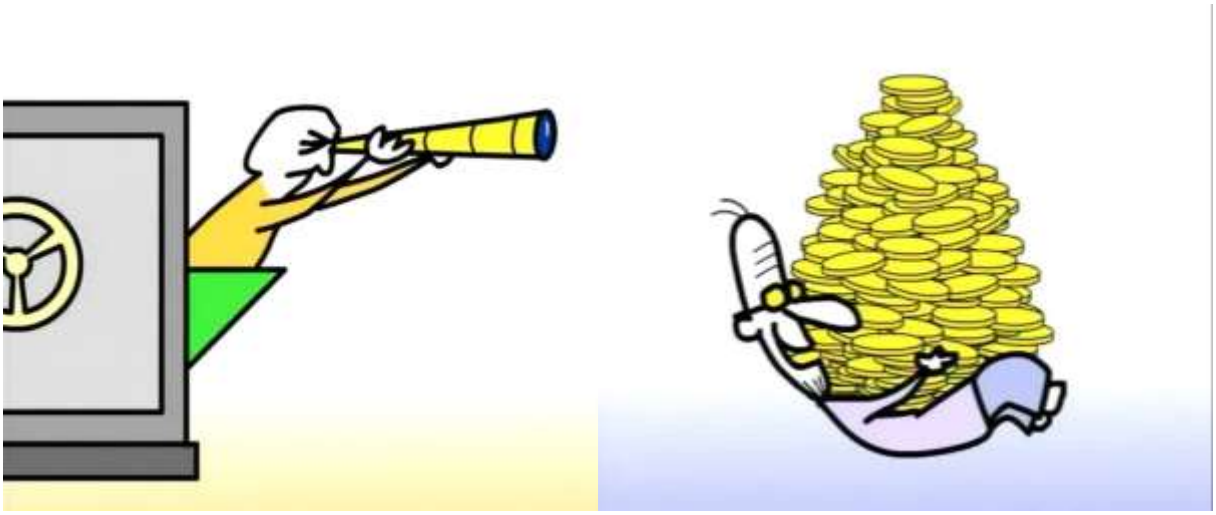
Beyond a positive feeling of accomplishment, Maria knew this would be economically convenient, given that, by continuing working, she could raise the ratio of her pension benefits to her earnings (now a bit higher than 70%). People at the university pension office had clearly explained to her the mechanics of the so-called **defined contributions** formula: every euro that you put in counts for your pension and for a given amount of 'pension wealth'; if you retire at a later age, you receive a higher benefit.

DEFINED CONTRIBUTIONS PENSION SCHEME

A defined contributions pension scheme is a plan where part of the labor income is systematically deducted as contributions that go to form the future pension. Early contributions are more valuable, thanks to compounding, so one would think that the best choice is to start work as soon as possible. However, investing in human capital and having a proper education can help increase one's expected income and thus the amount devoted to contributions and overall benefits in the long term.

Individuals must be aware of the fact that pension contributions essentially transfer current income into future income. Having a steady and sufficiently long working career is an essential requirement for building an adequate pension, since every month without a job means fewer contributions and hence a lower pension. In this case, saving becomes even more important in order to create retirement funds for old age. To avoid unpleasant situations, it is fundamental to have a proper retirement plan and, if necessary, to think of other solutions to compensate for an insufficient public pension (for more on this, see Booklet 5).

Maria had learnt early that it is never too soon to care about old age financial security. She tried to stay informed by watching the news and talk shows, reading newspapers, and browsing the Internet, especially consulting reliable sources and checking for possible fake news. As a public employee, she had been compulsorily enrolled in the public pension scheme. At the administration office, they had explained to her how this system was financed (a so-called pay-as-you-go scheme), and she had understood that there was a 'safe' into which workers would put their contributions (rather than a small fraction of their salaries) and from which retirees would draw their pensions, so that the safe was always empty! This was an intergenerational contract, they had explained, and not a bad one as long as both the younger generations and their salaries were increasing at a good rate. So she was financing her mother's survivor benefits, while her children would finance Peter's and her own!



This contract was sometimes made quite generous by political measures, but it was perhaps not so considerate with respect to younger and future generations. Maria had come to confront the question of the sustainability of social security and had learnt that, even in the domain of public pensions, overly generous promises can threaten the financial stability of these schemes. That is why there had been reforms, strengthening the system by raising the retirement age (having people work longer) and reducing the generosity of pension benefits.

More proof that risk is everywhere and not just in financial assets, is that both Peter and Maria had made voluntary contributions by participating in their occupational pension funds, to increase their public pension. There is no **intergenerational contract** here: that pension derives from the accumulated value of contributions and interests in the money box, so the risk is financial. Just as for their other financial assets, Maria had acted here with prudent diversification, allowing for a fraction of stocks in their portfolio when they were young and could take on a bit of risk. Luckily, they had not lost (overall) and had later moved back to safer assets, such as government bonds.

INTERGENERATIONAL CONTRACT

In a pay-as-you-go system, retirees receive their pensions thanks to contributions paid by current workers, who contribute under the assumption that future generations will also pay and thus indirectly finance their own pensions.

In an intergenerational contract, the state is also supposed to represent the interests of future generations, who obviously cannot participate directly in the deal

So, their retirement had been provided for, particularly considering that the National Health Service

Private pension funds (financial accumulation)

Public pension based on pay-as-you-go system

was a good one. Maria and her husband could look to their (true) old age with enough confidence and even set something aside as a bequest for their children.

Maria's mother, however, was worried. Now almost 90 and living alone in the home she once shared with her husband, who passed away many years ago, she has no intention of leaving her home, at least 'as long as I can manage', she says. The problem is that she is becoming increasingly frail, also from a financial point of view, as expenses for care services – long-term care services and some medical treatments not paid for by the National Health Service – are constantly increasing. Being proud, she lives on her survivor pension and, occasionally, on her savings account, now almost drained.

Maria had considered the possibility of a reverse mortgage (see Booklet 4), a financial product that would allow liquidity to be extracted from the house to live without financial anxiety. Her mother, however, stubbornly refuses the idea, so that Maria must rely on cash advances to the caregiver to support her mother. Maria is determined, however, to look into these new products that allow money to be extracted from an illiquid asset such as a house.

Returning home with her groceries, Maria feels that this is another reason to look to the future with some degree of serendipity (she had recently seen a film with this title and rather liked it). With her good endowment of family affection, social networks, books, savings, material wealth, and basic financial knowledge, she can look at her retirement – a period where time is no longer strictly connected to duty and money – as an opportunity to devote her energy and intellect to enjoy herself and care for others.

Booklet #2

Booklet Series "Be in charge of your life cycle"

INVESTING IN YOUR FUTURE: EDUCATIONAL CHOICES

ANGLE

www.angle-cerp.carloalberto.org

This booklet is number two in a series of five booklets that aim at improving economic and financial literacy of young people. Economic and Financial Literacy is basic knowledge possibly to be acquired early in life to make individual financial decisions better informed and more effective. This applies particularly to decisions that have long-term consequences and require thinking in terms of the individuals' complete life cycle. Although the five booklets are connected and refer to each other, each of them can be read independently of the others.

The first booklet in the series provides a general introduction on the concepts needed to make financial decisions over the life cycle. The other four booklets cover the most important economic decisions relevant at various stages of the life cycle. The second booklet (this booklet) is about educational choices, such as the decision when to leave school and enter the labour market or how much effort to invest in studying. Booklet 3 deals with the economics of saving and borrowing and what to do with money that is saved. Booklet 4 discusses many aspects of what is often one of the most important financial decisions in people's lives: the purchase and financing of their own house. Finally, Booklet 5 is about pensions and financial security after retirement.

The five booklets are part of the project "A network game for lifecycle education" (ANGLE), funded by the Erasmus+ programme of the EU. This project aims at promoting and enhancing Europe's younger generations' financial and economic literacy. It adopts a life-cycle perspective to help the young to consider a long-time horizon and to think about the future consequences of their decisions. In addition to the booklets, ANGLE focuses on creating a board game that helps the young to improve their financial and economic skills through active involvement and participation. Reading the booklets is an excellent preparation for playing the game. Also for readers who do not play the game, however, they help to make people more conscious and skilled in making important economic and financial decisions.

The booklet has been realised by Arthur van Soest of **Tilburg University**

Realised with the financial support of the European Union – **Erasmus+** programme

Find more information on: **https://www.carloalberto.org/wwwangle-cerpcarloalberto.org**

Co-funded by the Erasmus+ Programme of the European Union

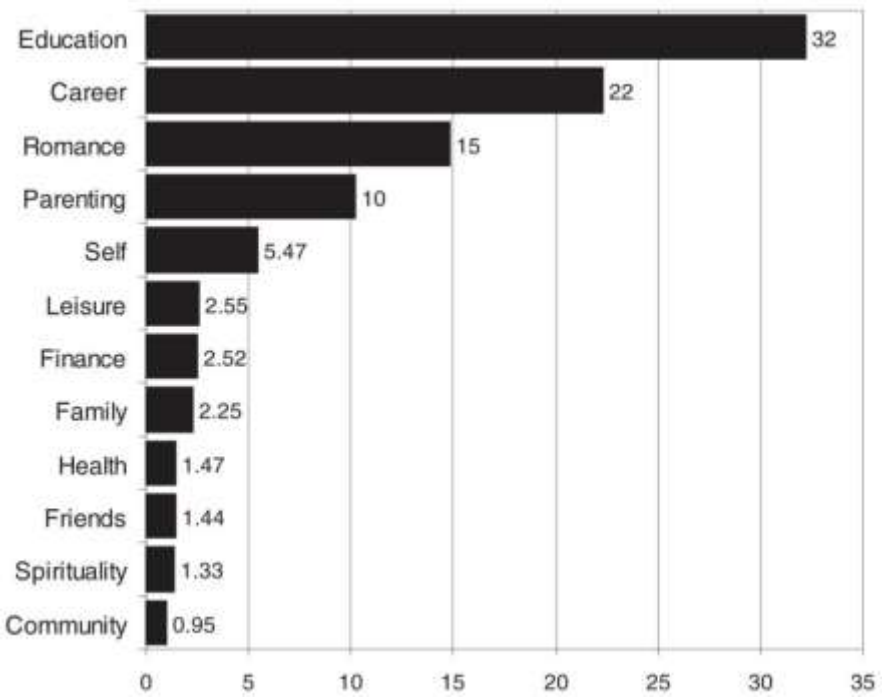
Booklet 2

INVESTING IN YOUR FUTURE
Educational choices

'If only I had worked harder in college…'

Educational choices are important but also difficult. A survey of academic papers shows that 32% of people have regrets about one or more of their past educational choices, a percentage that is higher than for other domains of life (see the figure below).

Figure1 Proportion of Regrets (%)



Source: N. J. Roese and A. Summerville, 'What We Regret Most... and Why.' *Personality and Social Psychology Bulletin,* 2005, 31(9): 1273–1285. https://doi.org/10.1177/0146167205274693.

The purpose of this booklet is to help young people to make rational educational choices at different stages of their educational career. These educational choices have far-reaching consequences, both in the short run and in the longer run. They are among the most important choices people make during

their lives, not only from an economic point of view, but also in relation to their social contacts and networks, the nature of the jobs they will have during their career, their other daily activities, and so on. The central theme is the *life cycle perspective*: Educational choices involve *trade-offs between short-term sacrifices (and gains) and expected gains (or losses) in the future*. Here the future means the complete remaining lifetime, from school and labour market entry to the full working career and even until after retirement. We focus on economic aspects, but the *non-economic aspects are equally important*. Not everyone will be interested in studying business administration or in a labour market career in the financial industry, even though that may offer the best perspective for high future earnings.

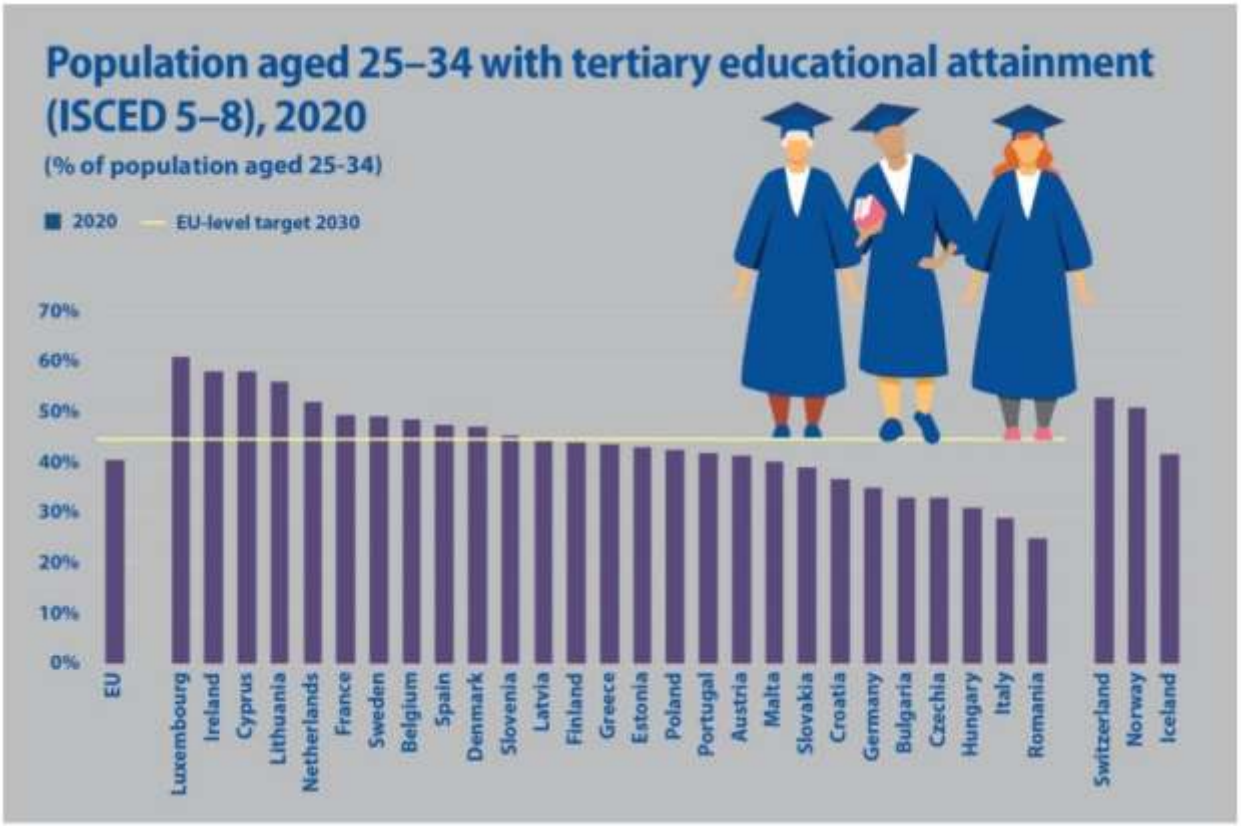
A second important aspect is *uncertainty*. When you decide on the subject you want to study or on how much effort to invest in your studies, you do not know the exact consequences of the decision you make for your study performance or for your future employment chances and future earnings. Instead, if you want to know whether an educational investment is profitable, you will have to work with *probabilities* or *expected outcomes* that depend on the choices that you make.

In this booklet, we follow some young individuals over time and discuss the decision problems they face at several stages of their educational careers. We focus on two decisions. We start in high school, where students must decide how much effort to put into their studies. The second decision is at the end of high school, on whether to continue full-time education and, if so, in which subject and at which level. The next two sections sketch the situation of a student facing a given decision in a specific context. The arguments for and against certain choices will be discussed in some detail. Exercises are used to understand how to make these kinds of trade-offs in stylized (but sometimes already rather complicated) situations.

Many other decisions also need to be made, such as how much effort to put into undergraduate studies or the decision to continue with graduate studies or enter the labour market when finishing undergraduate studies. Since these decisions largely require the same conceptual approach, we do not analyse them in detail. At the end of the booklet, we summarize the most important aspects of the typical decisions individuals face during their educational career. One thing we want to emphasize is that we focus on the **economic aspects of the decisions.** There are also non-economic aspects that may be important in practice, but we do not explicitly consider them here (see also  Booklet 1).

Throughout this booklet, we present figures with stylized facts about education in Europe and in Organisation for Economic Co-operation and Development (OECD) countries.

Figure 2 **Tertiary education**, also referred to as **third-level**, **third-stage,** or **post-secondary education**, is the educational level following the completion of secondary education. The World Bank, for example, defines tertiary education as including universities as well as trade schools and colleges.



Source: Eurostat (2021), Eurostat statistics explained – Educational attainment statistics. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Educational_attainment_statistics

Exercise 1 Use Figure 1 to answer the following questions.

a. What is the fraction of the population aged 25–34 in the European Union (EU) with tertiary education?
b. For the 25–34 age group, which EU country has the **highest** fraction with tertiary education? And the **lowest** fraction?

Answers a. 40% (see the histogram bar to the far left). b. Luxembourg (approximately 60%) and Romania (around 25%)

1. High school students and effort

1.1 Peter's decision problem: To study or not to study

In general, Peter is an industrious high school student, aged 15 and still almost two years from taking his final exams. He does his homework and prepares for tests, but still has time to hang out with friends, play tennis, or enjoy himself with his favourite computer game. He has an English test tomorrow and wants to prepare tonight. However, his best friend invites him to come over and watch an important match of their favourite football team, together with some other friends. Peter is not really into football, but does enjoy watching it with friends. What should he do? Let's assume his parents do not interfere!

OR?

This is a very basic decision problem but already illustrates the trade-off between short-run and longer-run gains and losses. In this case, the short run is tonight. Watching the football match with friends is more fun than studying English (a least in Peter's view). The longer run is tomorrow and beyond. If Peter studies tonight, he will definitely pass the test, but, if he watches the football match instead, he will certainly flunk the test. How bad that is depends on the context. What would *you* choose in each of the following settings?

a. *Work now or feel embarrassed.*

   Flunking the test may reduce his grade average in English, but Peter generally does so well that he will still have a good grade for English at the end of the year. He will feel embarrassed for a few hours, since the teacher will ask him why he flunked the test, and he will also have to

explain this to his parents. They will be unpleasantly surprised, but there will not be any further consequences.

b. *Work now or work in the summer.*

English is not Peter's favourite subject. His test results until now have been rather poor, and there is a good chance that his final grade will be insufficient. Doing well in the current test will probably help avoid this outcome. The rules of Peter's school imply that an insufficient grade at the end of the year means that he will be forced to take a summer course in English, which he would really hate to do, but it is still six months away and he might still get a sufficient grade, even if he flunks the test.

c. *Work now or repeat the whole year.*

English is Peter's least favourite subject. His test results until now have been poor, and there is a good chance that his final grade will be insufficient. Doing well in the current test will probably help to avoid this outcome. An insufficient grade at the end of the year means that Peter will be forced to repeat the whole year, extending his high school period by one year.

If Peter is **short-sighted**, he only cares about today and not at all about the future (starting tomorrow). In that case, he will choose to hang out with his friends, irrespective of the context in each of the three settings, a, b, and c. Essentially, he will not attach any weight to the future consequences of today's decision. Short-sighted behaviour is, of course, a very extreme case. Most people do attach some weight to the consequences of their decisions, particularly if these consequences already matter within a few days. The decision then depends on the *trade-off* between today's gains and the losses in the future. It then matters how large these losses will be.

SHORT-SIGHTED BEHAVIOUR

Short-sighted means not able to clearly see things that are far away or unable to understand or account for the future consequences of current decisions.

In economic terms, it means that zero weight is given to the change in future utility that a current decision can imply. Consequently, the decision is based only upon its immediate consequences.

In **setting a,** the future loss of not studying seems very limited. I think I would take it for granted and flunk the test, but Peter may feel differently about this. In economic terms, setting a is straightforward:

on the one hand, the decision depends on the utility gain, now, from hanging out with friends instead of studying. On the other hand, what matters is the utility loss next week (when Peter learns the result for his test) from flunking the test. The weight of the latter will probably be reduced, since most people care more about today's than about next week's utility. In economic terms, this is called the *time preference,* and the weight is called the **discount factor**.

DISCOUNT FACTOR

The discount factor is a calculation of the present value of future happiness, or, more specifically, it is used to measure how much people will care about a period in the future as compared to today.

In economic terms, it is the weight given to utility at some time in the future. The weight is usually lower the farther away the time considered.

Example: You can choose between attending a party today, with a utility of 50, or a bigger party next week, with a utility of 60. Your one-week discount factor is 0.95.

Since 50 < 0.95 x 60, you will choose to wait for next week's party.

Note the similarity with an interest rate (see Booklet 1): if the weekly interest rate is 5%, then receiving €100 next week is equivalent to receiving 1/(1 + 0.05)100 = €95 now. But when the interest rate is determined in the financial markets, the discount factor says something about individual preferences. The discount rate is high (close to one) for very patient individuals, but lower for impatient individuals, who care much more about today than about the future. For a short-sighted person, the discount factor is zero.

The table below illustrates the decision problem in setting a with the trade-off that Peter needs to make.

	Studying	Not studying
Today	Utility of studying	Utility of hanging out with friends
Future (next week)	Satisfaction of passing the test x Discount factor	Embarrassment of flunking the test x Discount factor

In **setting b**, the loss seems a lot more serious. In this case, Peter must compare one night of fun with a few weeks of extra studying in the summer. The summer is still some months off, but, unless Peter's time preference is very high, the future gains of studying for the test will probably outweigh the loss of not being able to watch the football match with friends. There is an additional complication, however: it is *uncertain* whether the final grade at the end of the year will be sufficient, both in the case of studying for the test and in the case of not studying. In this case, Peter should not only account for the discount factor, but should also weigh the utility or disutility of each possible outcome with the probability of this outcome occurring. In this case, Peter will have to work with the **expected utility** values for each of the two decisions he can make.

Expected utility is the weighted average of the possible utility values, using the probabilities of the outcomes as weights. It is used to attach a utility value to an uncertain outcome.

Example: You can choose between a certain reward with a utility of 50 or a lottery that produces a utility of 30 with probability of 0.6 and a utility of 90 with a probability of 0.4.

Since 50 < 0.6 x 30 + 0.4 x 90 (= 54), you will choose the lottery.

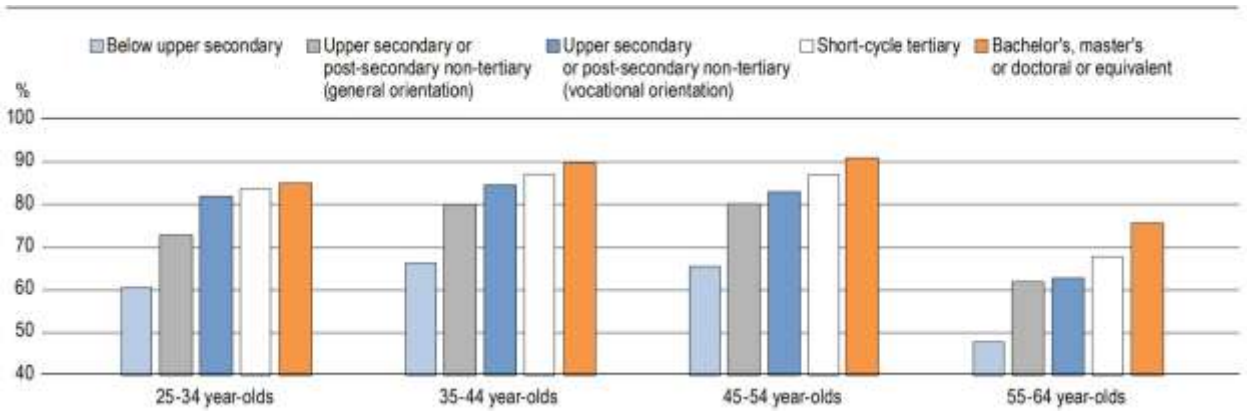
If the probability of an insufficient grade at the end of the year is small anyhow, even if Peter flunks tomorrow's test, and if taking the summer course is not such a terrible thing after all, then it may still be optimal for Peter to flunk tomorrow's test. The decision thus depends on quite a few factors: the utility differences now and in the future, the probabilities of a sufficient grade when flunking and not flunking the test, and the discount factor (see the table below).

	Studying	Not studying
Today	Utility of studying	Utility of hanging out with friends

Expectation for the future (next summer)	Utility of free time in the summer x Probability of a sufficient grade when passing the test x Discount factor + Utility of having to take the summer course x Probability of an insufficient grade when passing the test x Discount factor	Utility of free time in the summer x Probability of a sufficient grade when flunking the test x Discount factor + Utility of having to take the summer course x Probability of an insufficient grade when flunking the test x Discount factor

In **setting c,** the negative long-run consequences can be much more severe than in setting b. The potential utility difference between not repeating and having to repeat a year (studying an extra year, doing everything for a second time, joining a new class without your current schoolmates, etc.) seems very large. Even if the chances of this happening are low, the expected utility difference will outweigh the gain of hanging out with friends for one night. Almost every rational decision maker should try to avoid this outcome and spend the evening studying instead of watching football.

Figure 3 Employment rates by age group, educational attainment, and programme orientation (2019)



Source: OECD (2020), Education at a Glance Database, https://stats.oecd.org/

Exercise 2 Figure 2 shows that employment rates increase with education level. In OECD countries, how much higher is the likelihood of being employed for those aged 25–34 with tertiary education compared to those without secondary education? More than 15 percentage points, 15 percentage points, or less than 15 percentage points?

Answer Among those with tertiary education, more than 80% of the age group 25–34 are employed (white and orange histogram bars), but among those with less than a secondary education, this proportion is only 60% (light blue bar). Therefore, the difference is certainly more than 15 percentage points.

1.2 The general case

In general, high school students must decide how much time and effort to spend on studying. This is a much more difficult decision problem than Peter's problem sketched above, but the main idea is similar. Students will make a trade-off between the short-term cost of studying and not being able to spend time on things that they may enjoy more and the potential long-term benefits of good grades, less work in the near future, or better study and career opportunities in the long run. The future gains of studying are uncertain, and students will have a hard time figuring out their probability distribution. Instead of solving the optimization problem, they will probably use some rule of thumb, such as studying at least on hour per day or not going out the two evenings before an important test.

Parents can have better insight into the long-term benefits of education and may push their children to study more by changing the short-run incentives. For example, they may promise immediate rewards for studying hard or for obtaining a good test grade. This changes the decision problem from making a long-

run trade-off with uncertain future gains to a short-run decision problem where the future gains are concrete and much less uncertain.

Exercise 3 A decision problem under uncertainty faced by Angela

Angela must decide how many hours she wants spend studying for an important test. The result of the test will be known next week. Angela's one-week discount factor is 0.90. She has no idea about the long-term consequences for her final grades or future educational opportunities. Still, she knows that she will feel happier for a while if she passes the test than if she does not.

To make the trade-off, Angela imagines that things will all happen this week. Her unhappiness if flunking the test would certainly outweigh the utility loss of studying for three hours instead of enjoying leisure time, but it would not outweigh the utility loss of studying for five hours. Thinking about this a bit more carefully, she thinks that the disutility of flunking the test is about the same as the utility of four hours of leisure instead of studying. If we set the utility of one hour of leisure to 100, then the utility of passing would be 400 if the test result is known immediately. Discounting with 0.9 for the time difference of one week means that the utility of 400 next week is equivalent to a utility of 0.9 x 400 = 360 this week.

a. Assume that Angela knows for sure that she needs to study four hours to pass the test. Will she study or not? Describe the trade-off in discounted utility terms.

b. Assume Angela's parents want to motivate her studying and promise her a reward if she passes the test. The reward will be given immediately when the test result is known. Its utility is equivalent to the utility of one hour of leisure (100). Will the reward change Angela's decision in a?

c. Now assume that studying less than three hours has a probability zero of passing the test and studying 4 hours has a probability 0.9 of passing (instead of a probability of one in a and b). The reward is still there. Will Angela decide to study (for four hours)?

In reality, the probability of passing the test depends on hours of study as follows:

Hours of study	0	1	2	3	4	5
Probability of passing the test	0	0.2	0.5	0.8	0.9	1

d. How many hours would Angela decide to study without parents' reward? Zero, one, two, three, four, or five hours?

e. Does the reward from her parents change your answer to the previous question?

f. Anne is much more concerned with the present and less with the future and has a discount rate of 0.60 instead of 0.90. How will your answers to the previous question change if the decision is not Angela's but Anne's?

Answers

a. Not studying has a utility of 4 x 100 = 400 now. Studying gives a utility of 400 next week, equivalent to 0.9 x 400 = 360 now. So the decision will be not to study.

b. Not studying has a utility of 4 x 100 = 400 now. Studying gives a utility of 400 + 100 = 500 next week, equivalent to 0.9 x 500 = 450 now. So the decision will be to study. The reward is effective!

c. Not studying gives a utility of 4 x 100 = 400 now. Studying gives an expected utility of 0.9 x (400 +100) = 450 next week, equivalent to 0.9 x 450 = 405 now. So Angela will study.

d. Without the reward, the required calculations are added to the table below:

Hours of studying	0	1	2	3	4	5
Probability of passing the test	0	0.2	0.5	0.8	0.9	1
Utility now (compared to studying 5 hours)	500	400	300	200	100	0
Utility next week (compared to flunking with certainty)	0	80	200	320	360	400
Expected utility next week, discounted	0	72	180	288	324	360
Expected discounted total utility	500	472	480	488	424	360

The highest expected utility is obtained with zero hours of studying.

e. With the reward, the required calculations are as follows:

Hours of studying	0	1	2	3	4	5
Probability of passing the test	0	0.2	0.5	0.8	0.9	1
Utility now (compared to studying 5 hours)	500	400	300	200	100	0
Utility next week (compared to flunking with certainty)	0	100	250	400	450	500
Expected utility next week, discounted	0	90	225	360	405	450
Expected discounted total utility	500	490	525	560	505	450

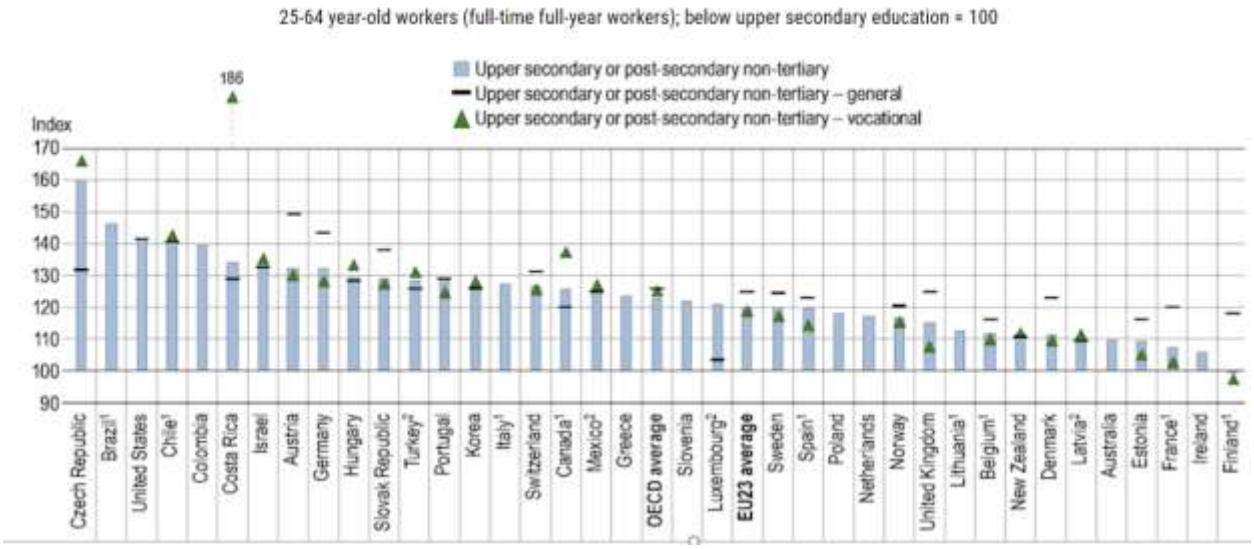
The highest expected utility is now obtained with three hours of studying.

f. For Anne, the calculations are the following (with the reward):

Hours of studying	0	1	2	3	4	5
Probability of passing the test	0	0.2	0.5	0.8	0.9	1
Utility now (compared to studying 5 hours)	500	400	300	200	100	0
Utility next week (compared to flunking with certainty)	0	100	250	400	450	500
Expected utility next week, discounted	0	60	150	240	270	300
Expected discounted total utility	500	460	450	440	370	300

Anne is so short-sighted that she will not study, despite the extra reward.

Figure 4 Relative earnings of adults with higher education compared to the earnings of adults with lower (below upper secondary) education (2018)



Source: OECD, Education at a Glance 2020.

Exercise 4 **Upper secondary education** is the level just below tertiary education. Stylized Facts Figure 3 shows that earnings increase with the education level. In OECD countries, how much higher are the average earnings of full-time employees with at least an upper secondary education compared to the earnings of full-time employees with less than an upper secondary education?

Answer The answer is indicated by the blue histogram bar in the middle of the chart (OECD average). Its height is approximately 125, indicating that the difference is around 25%.

2. What to do after high school?

2.1 Mary's decision: Go to university or find a job?

Mary is in her final year of high school. She is confident that she will pass the final exams with flying colours. She has started thinking about what to do next year after the exams and a well-deserved vacation of two months. She is considering two options. She can find a job and not go to university, or she can go to university. She must also decide which subject she wants to study if she decides to go to the university, but this is a no brainer: her favourite subject is communication sciences.

OR?

Mary understands that her choice will have long-term consequences. In principle, she knows that she has the possibility of reconsidering her decision and, for example, work for one year and then go to university. She also understands, however, that changing her mind after September will be costly, and therefore she does not want to take this possibility into account when making her decision. She knows that spending her time on studying is not necessarily as enjoyable as paid work may be, but she does not have a prior on which of the two is more satisfying. The same applies to differences in job satisfaction during the remainder of her labour market career, depending on the type of job she gets if she does or does not go to university. Mary has therefore decided to ignore all these non-economic aspects and to base her decision exclusively on economic arguments: she will carry out a cost–benefit analysis, comparing the cost of further education with the **discounted** value of future benefits.

If Mary decides not to go to university and to immediately enter the labour market, there are no costs of further education. She is confident that she will immediately find a job and will never be unemployed. The **net present value (NPV)** of this choice will be the sum of the discounted net (after tax) earnings during her labour market career (the next 40 years).

DISCOUNTING

Discounting is determining how much money paid or received at some given time in the future is worth today.

Example: You will receive a payment of €1,000 three years from now. The annual discount factor is 0.95. The present value of the future payment of €1,000 is 0.95^3 x 1,000 = €857.38

NET PRESENT VALUE (NPV)

Net present value (NPV) is the value of all future net incomes over the entire career, discounted to the present.

Example: Assume that after-tax earnings will remain constant at €30,000 per year, starting this year and lasting 40 years. With a discount factor of 0.95, the NPV is

$$NPV = 30{,}000 + 0.95 \times 30{,}000 + 0.95^2 \times 30{,}000 + \cdots + 0.95^{39} \times 30{,}000$$

The first term is this year's net income, which is not discounted because it is paid this year. The final term is the net income 39 years from now, discounted with a factor of 0.9539 = 0.1353, since it is paid only 39 years from now.

For this calculation, it is convenient to use the formula for the sum of a geometric series:

$$1 + r + r^2 + \cdots + r^N = (1 - r^N + 1)/(1 - r), \quad \text{for any number } r \neq 1$$

Taking r = 0.95, this yields

$$\begin{aligned} NPV &= 30{,}000 \times (1 + 0.95 + 0.95^2 + \cdots + 0.95^{39}) = \\ &= 30{,}000 \times (1 - 0.95^{40})/(1 - 0.95) = €522{,}893 \end{aligned}$$

NPV analysis is a form of intrinsic valuation, also used extensively by firms to determine the value of an investment project. In this case, discounting uses the interest rate instead of the discount factor.

Example: An investment project requires spending €1,000 now. In return, it will lead to a profit of €600 in each of the next three years. With an interest rate of 0.05 per year, the NPV of this project is

$$NPV = -1000 + \frac{600}{1.05} + \frac{600}{1.05^2} + \frac{600}{1.05^3} = 634$$

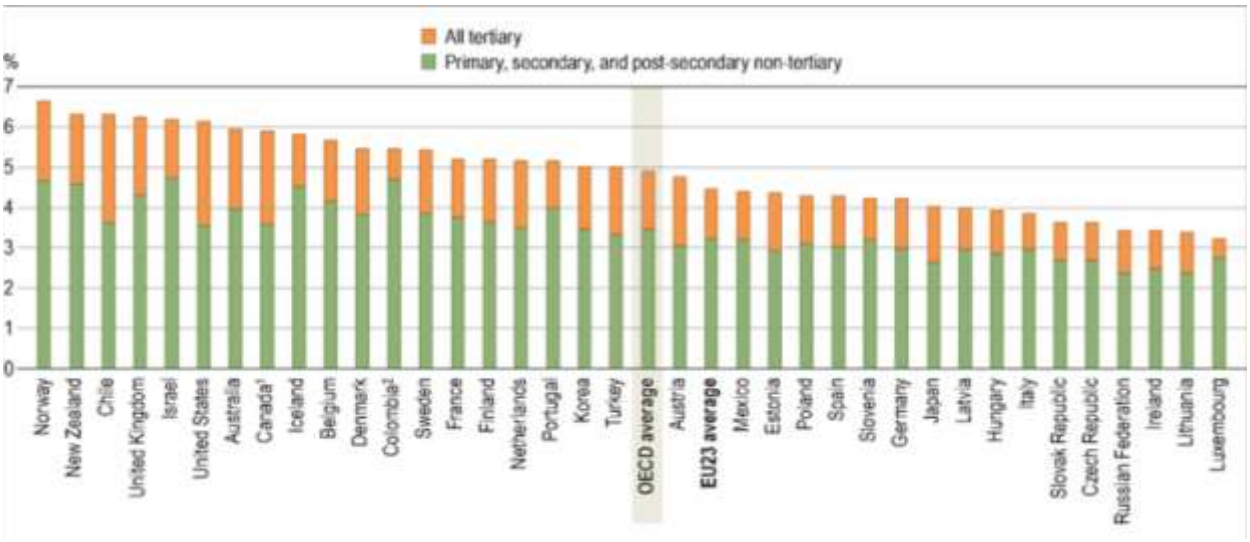
Since the NPV is positive, the project is profitable.

If Mary decides to go to university, she will have to pay tuition fees and will not receive any earnings for the next five years (the time needed for her studies). She will need a study loan to cover these costs and will have to pay it back after she has graduated. On the other hand, her earnings after graduation will no doubt exceed her earnings if she does not go to university.

It seems clear that Mary's decision will depend on several factors. The first is the extra annual earnings if she decides to go to university. This comes back every year of her future labour market career and will therefore be quite important. Even a small earnings difference will matter if it is obtained in each of the next 40 years.

The second factor is the cost of studying and of obtaining a study loan. Tuition fees vary across countries but are typically much lower in the EU than in the United Kingdom or the United States. This helps to motivate adolescents to go to university in the EU. Similarly, many countries offer student loans with low interest rates or grants that do not have to be paid back at all. This reduces the cost of studying and makes it possible for even adolescents from poor families to go to university.

Figure 5 Total expenditures on educational institutions as a percentage of the gross domestic product (GDP – the total value of everything the country produces)



Source: OECD, Education at a Glance, 2020

Exercise 5 Use Figure 4 to answer the following questions.

a. What percentage of GDP was spent on educational institutions, on average, in OECD countries?
b. Which country in the EU spent the **highest** percentage of GDP on educational institutions?
c. Which country in the EU spent the **lowest** percentage of GDP on educational institutions?

Answers

a. 4.9% (see the histogram bar in the middle of the chart). b. Austria. c. Luxembourg.

Exercise 6 **Optional** (for those who are not afraid to do some serious calculations). The calculations use the information in the box on the Net Present Value.

Assume that Mary uses an annual discount factor of 0.95. Studying will take five years (years 1, 2, … , 5). During this period, she can use a study loan to cover the tuition fee (€2,000 per year) and living expenses (€10,000). She will have to pay back the loan after her studies. The payment is €3,000 for 20 years (years 6, 7, …, 25).

If Mary decides not to go to university, her annual earnings will be €25,000 for 50 years (years 1, 2, …, 50, her whole labour market career). If she goes to university, her annual earnings will be €35,000 for 45 years (years 6, 7, …, 50).

a. Without doing any calculations, what do you think is the optimal choice?

b. Calculate the NPV of future income if Mary decides not to go to university.

c. If Mary decides to go to university, what will be her income in the first five years that you can use to compute the NPV? €10,000 or €12,000? Why?

d. Calculate the NPV if Mary decides to go to university.

e. What is the optimal decision? (NB: To make things easier, we did not account for the pension consequences of the decision; see Booklet 5.)

f. Does the conclusion change if the loan comes with substantial interest, implying that Mary has to pay back €4,000 instead of €3,000 each year for 20 years?

Answers

a. Since 45 years is such a long time, my guess would be that the salary gain of €10,000 per year will dominate the costs of studying and the costs of forgone earnings. So I would guess that Mary will choose to go to university.

b. $25{,}000(1 + 0.95 + 0.95^2 + \cdots + 0.95^{49}) = 25{,}000(1 - 0.95^{50})/(1 - 0.95) = €461{,}527$.

c. €10,000, since Mary cannot use the €2,000 herself, since this is immediately used to pay the tuition fee.

d. For the first five years we obtain $€10{,}000(1 + 0.95 + \cdots + 0.95^4) = €45{,}244$. For the next 20 years (years 6 to 25, when the student loan has to be paid back) we have $(€35{,}000 - €3{,}000)(0.95^5 + \cdots + 0.95^{24}) = €32{,}000 \times 0.95^5(1 + \cdots + 0.95^{19}) = €24{,}761\ (1 - 0.95^{20})/(1 - 0.95) = €24{,}761 \times 12.83 = €317{,}691$. For the remaining 25 years (years 26, 27, …, 50) we have $€35{,}000(0.95^{25} + \cdots + 0.95^{49}) = €35{,}000 \times 0.95^{25}(1+ \cdots + 0.95^{24}) = €140{,}311$. So the total is 45,244 + 317,691 + 140,311 = €503,246.

e. Since €503,246 > €461,527, the optimal decision is to go to university.

f. No. There is no need for new calculations, since the difference will be the present value of €1,000 during the years 6, 7, …, 25. This is less than €20,000 (due to discounting), so the present value of going to university will still be higher than that of not going to university.

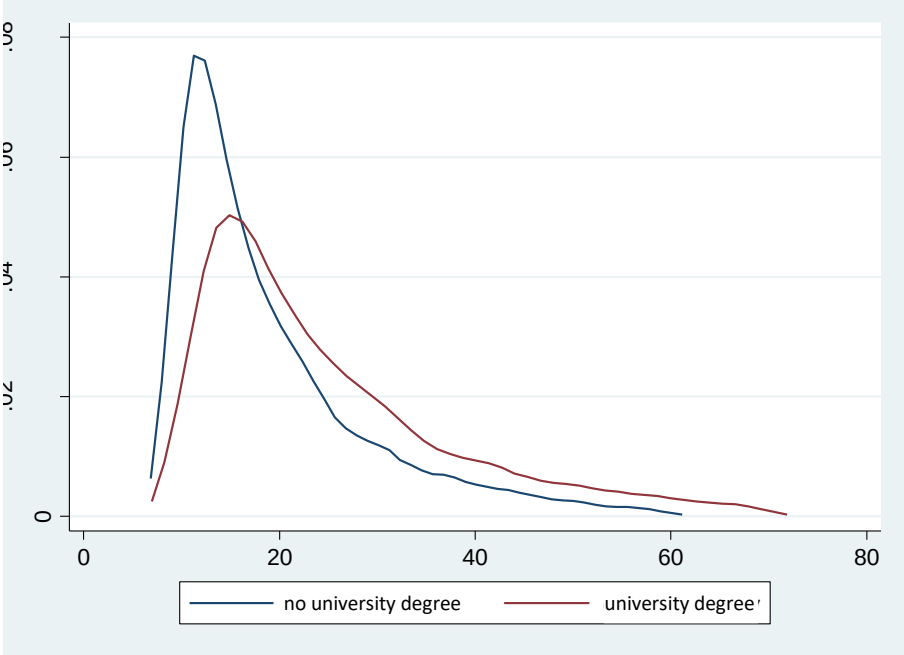
2.2 Uncertainty

In Mary's case, there was no uncertainty at all (or perhaps we should say that Mary ignored the uncertainty). This is almost never realistic: if you decide not to go to university, you must look for a job, and there is no guarantee that you will immediately find one. Once you have a job, there is often a chance that your contract will not be extended, that the company you work for goes bankrupt, or that, for one reason or another, you lose the job and become unemployed. If you become unemployed, you will not know how much time it will take to find a new job. The wage you will earn is also not certain. It can be fixed in the first year once you have found a job, but then it will depend on, for example, being promoted or not in further years. Moreover, if you must look for a new job when becoming unemployed, the wage in that new job is even more uncertain.

If you decide to go to university, you will face the same type of uncertainties concerning unemployment and earnings, but the probabilities will be different. For example, it is a stylized fact that higher education reduces the chances of becoming unemployed and increases the chances of finding a new job once you are unemployed after all. Wages are uncertain, but they likely will be higher than if you had decided not to go to university. To make an adequate trade-off, you will need information on the *distribution* of wages of university graduates and non-university graduates, which you can use to determine your own wage expectations in both cases. This kind of information can be summarized as in the figure below.

This figure illustrates the distributions of wages (in thousands of euros, before tax) of employees without a university degree and of employees who graduated from a university. The figure shows that, for non-graduates, the density is more concentrated among lower wages than for university graduates. Average wages are €21,000 and €28,000 for the two groups (you can figure out for yourself which average is for which group). Among non-university graduates, 50% earn more than €16,000 per year and 10% earn more than €37,000. Among university graduates, 50% earn more than €21.500 and 10% earn more than €50,000. In other words, it is clear that a university graduate typically earns more than a non-graduate (although there is no guarantee, since the distributions overlap).

Figure 6 Wage distribution (in thousands of euros, before tax)



To make her decision, Mary can work with the average wages (€21,000 and €28,000) or, if she remembers what she learned in her statistics classes, with the modal wages (€15,000 and €18,000), that is, the wages for which the densities reach their maximum. If she is a very sophisticated decision maker, she can even take other features of the distribution into account, such as the chances of earning a very high or very low wage. In case she is risk averse, for example, she can attach a lot of importance to the probability of obtaining a wage lower than €10,000.

Another source of uncertainty in the case of choosing to go to university is whether Mary will be successful there. There may be a positive probability that she will fail and not obtain her diploma. In that case, she will have to settle for a fall-back option. Perhaps she can then enter the labour market under similar conditions as when she does not attend university, but she will have lost the earnings and must repay the study loan for the years she spent at university.

To take account of the uncertainty, Mary can use the *expected NPV* of each choice instead of the *NPV*. Similar to the expected utility calculation in the previous section, this means that she will take the weighted average of the possible values of the NPV, using the probabilities as weights.

Exercise 7 Decisions under uncertainty

You have a test tomorrow and must make a trade-off between studying tonight or going to a party. If you study, the chances of passing the test are 0.8; if you go to the party, the chances are 0.2. You compare the expected utilities of studying and not studying tonight, but they are the same – you really cannot say which is better.

a. Then you think what your best friend would do. She has the same chances of passing the test as you have, but she has a smaller discount factor than you. What will she do? Study, go to the party, or, just like you, she cannot say and is indifferent?

b. Now suppose your parents offer you a ticket for a concert of your favourite band next Saturday under the condition that you pass the test. What will you decide? Study, go to the party, or can you still not say?

c. Now forget about your parents' intervention. Instead, you receive an email from the teacher saying she will certainly not ask questions about the most difficult topic. This changes your chances of passing the test to 0.9 if you study, but the chances remain 0.2 if you don't study. What will you do? Study, go to the party, or can you still not say?

Answers

a. Your best friend will go to the party. A smaller discount factor means she attaches less weight to the future and therefore attaches less importance to the expected future utility gain of studying.

b. Study. The tickets increase the utility of passing the test, which is multiplied by the probability of passing. Since this probability is higher in the case of studying than in the

case of not studying, the expected utility in the case of studying increases more than the expected value in the case of not studying.

c. Study. The information raises the expected utility in the case of studying but does not change anything in the case of not studying.

Exercise 8 Exercise 6 continued, again **optional** and only for those who are not afraid of some serious calculations

Consider Exercise 2, but now account for the possibility that, after three years of studying, Mary does not obtain the necessary study points and is forced to leave university without a diploma. Assume she then enters the labour market and earns €25,000 per year (the same wage she earns if she does not try university at all), but now for 47 instead of 50 years. She must pay back the three years of study loan under the same conditions as before, but with a lower amount (€1,800 each year for 20 years, starting immediately after leaving university, that is, in year 4).

a. Take it as a given that Mary will have to leave the university after three years, without a diploma. Compute the NPV of all her future income under that condition.

b. Now assume that the probability of Mary leaving university without diploma is p. Compute the expected NPV of all her future income as a function of p.

c. Assume Mary maximizes the expected NPV. What is Mary's optimal choice if the probability that she will leave the university without a diploma is 0.3? What if it is smaller than 0.3?

d. Determine Mary's optimal decision for each value of p.

Answers

a. If Mary has to leave university after three years, the NPV is as follows. For the first three years, it is €10,000$(1 + 0.95 + 0.95^2)$ = €28,525; for the next 20 years (years 4 to 23), it is (€25,000 – €1,800)$(0.95^3 + \cdots + 0.95^{22})$ = €23,200 x $0.95^3(1 + \cdots + 0.95^{19})$ = €19,891$(1 – 0.95^{20})/(1 – 0.95)$ = €255,203. For the remaining 27 years (years 24, 25, …, 50), we have €25,000$(0.95^{23} + \cdots + 0.95^{49})$ = €25,000 x $0.95^{23}(1+ \cdots + 0.95^{26})$ = €7,684 x 14.993 = €115,205. So the total is 28,525 + 255,203 + 115,205 = €398,933.

b. If Mary manages to get her degree, the NPV is as we computed in Exercise 2: €503,246. If she does not get a degree and must leave after three years, the NPV is €398,933. The expected NPV of going to university is p x 398,933 + (1 – p) x 503,246.

c. Mary will decide to go to university if the expected NPV of going is larger than the NPV of not going, computed in Exercise 2: €461,527. If she goes to university, the expected NPV for p = 0.3 is 0.3 x 398,933 + 0.7 x 503,246 = €471,952. Since this is larger than the NPV of not going, Mary will go to university. For smaller probabilities such as 0.1 or 0.2, the expected NPV of going to university will be even larger, so the optimal decision is also to go to university.

d. The expected NPV of the two options is the same if p x 398,933 + (1 – p) x 503,246 = 461,527. This is the case if 503,246 – 461,527 = p x (503,246 – 398,933), so if p = 41,719/104,313 = 0.400. For p < 0.400, Mary will go to university; for p > 0.400, she will not go to university. (For p = 0.400, she would be indifferent.)

THE MAIN ISSUES

- Education is an investment in human capital.

- If successful, education increases career opportunities. This leads to higher expected earnings, lower probabilities of involuntary unemployment or shorter unemployment spells, opportunities to find a job with attractive characteristics, and so forth.

- It is important to realize that these investment returns are long-lasting. One's working career is typically much longer than the period of full-time education before entering the labour market. On the other hand, these returns are not realized immediately, but only after a number of years.

- To make good decisions, students should evaluate their decisions as an investment project, accounting for all the consequences of their decisions in future periods. Ideally, they will use life cycle planning and discounting and summing up utility and income over several (often many) periods. Educational councillors, parents, friends, and so on, can help students with these difficult decision processes.

- Studying is costly, because of tuition fees, the cost of living, study loans, fewer opportunities to do paid work and make money, and so forth. Individuals must make a trade-off between these costs and the future benefits in terms of higher wages, corrected for the costs of interest or paying back the study loan.

- Students need to deal with *risk*, which enters educational investment decisions in many ways. The choice for a certain type or level of education should account for the likelihood of dropping out and the implications of doing so. Moreover, the returns to education are not certain. Completing an educational programme changes the chances of obtaining a good job, but it *does not provide guarantees*. Conceptually, students need to think in terms of *expected lifetime utility*.

- Schooling decisions are made sequentially. See the figure below for a stylized choice scheme with only four steps (in reality, the number of choices is much larger). Students should be aware of the option value of future opportunities, particularly at the earlier stages of their educational careers. For example, 14-year-old high school students may not have any idea of which subject they want to study yet. Nonetheless, in many countries, they must already make choices, such as whether to take math at a basic level or at a more advanced level. To keep their options open and to have the opportunity to choose a study in physics or engineering, they may want to choose the advanced level, even though there is also a good chance that, when the time comes, they will be more interested in studying law.

- Utility does not only depend on income and costs. Students should realize that their educational choices also affect their well-being through other channels. There is more to it than just the economic aspects! Education choices have a huge impact on the ways students use their time during education, during their labour market career, and perhaps even after that. These choices affect the *social networks* they build through fellow students and fellow workers.

Booklet #3

Booklet Series "Be in charge of your life cycle"

MANAGING YOUR FUTURE: SAVING, INVESTMENTS AND INDEBTEDNESS

ANGLE

www.angle-cerp.carloalberto.org

This booklet is number three in a series of five booklets that aim at improving economic and financial literacy of young people. Economic and Financial Literacy is basic knowledge possibly to be acquired early in life to make individual financial decisions better informed and more effective. This applies particularly to decisions that have long-term consequences and require thinking in terms of the individuals' complete life cycle. Although the five booklets are connected and refer to each other, each of them can be read independently of the others.

The first booklet in the series provides a general introduction on the concepts needed to make financial decisions over the life cycle. The other four booklets cover the most important economic decisions relevant at various stages of the life cycle. The second booklet is about educational choices, such as the decision when to leave school and enter the labour market or how much effort to invest in studying. Booklet 3 (this booklet) deals with the economics of saving and borrowing and what to do with money that is saved. Booklet 4 discusses many aspects of what is often one of the most important financial decisions in people's lives: the purchase and financing of their own house. Finally, Booklet 5 is about pensions and financial security after retirement.

The five booklets are part of the project "A network game for lifecycle education" (ANGLE), funded by the Erasmus+ programme of the EU. This project aims at promoting and enhancing Europe's younger generations' financial and economic literacy. It adopts a life-cycle perspective to help the young to consider a long-time horizon and to think about the future consequences of their decisions. In addition to the booklets, ANGLE focuses on creating a board game that helps the young to improve their financial and economic skills through active involvement and participation. Reading the booklets is an excellent preparation for playing the game. Also for readers who do not play the game, however, they help to make people more conscious and skilled in making important economic and financial decisions.

The booklet has been realised by the **Warsaw School of Economics** team composed of:

Joanna Rutecka-Góra, Sonia Buchholtz and Łukasz Kurowski

Realised with the financial support of the European Union – **Erasmus+** programme

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Booklet 3

MANAGING YOUR FUTURE
Saving, investments and indebtedness

Incomes and expenditures vary during your life. When you are young, your needs and expenditures may be higher than your income. You therefore have to borrow or get money from your family to buy products or to finance the services you need. When you live with your parents, they provide you with a home, food, and clothing. When you get older, you start working. Your income then increases and exceeds your consumption, creating the opportunity for saving. No matter what your initial wealth is, your financial health in the life course depends on decisions regarding spending and saving money. However, these decisions can differ according to individual characteristics and preferences.

The idea of this booklet is to guide you through the issues of personal budget management, saving, and taking out loans. We will follow the choices that Andrea faced at different moments of her life.

1. Diversity of life courses

When Andrea attended high school class reunion, her classmates turned out to have very different occupations: administrative staff, a cook, a deliverer, a doctor, engineers, a nurse, a salesperson, a teacher, and business professionals. Despite the differences, they all followed the same general pattern: at some point in their lives, they entered the labour market and started working for pay, which was sometimes interrupted by periods of unemployment, parenting, care commitments, illness, and so on. At some point, they decided to retire, which meant exiting the labour market forever and financing their needs from old age pensions and savings.

They followed that course because none of them were affluent enough to not work. Paid work is globally the main source of income. This does not necessarily mean that it is always sufficient. Unfortunately, household needs rarely go hand in hand with income. Many difficult situations stem from the fact that people are not working and are unable to meet their current needs. This is why

Dan's father's severe illness or Mary's joblessness became a very large financial burden for their families; social transfers were barely sufficient.

Luckily, Andrea's parents did not encounter a similar situation, but Andrea remembered a time when she was a teenager. Her parents had decided to support one of her father's sisters whose house had burnt down. With relief, they found out that the amount dedicated to family holidays would be sufficient. That year they spent holidays at grandma's. Andrea sometimes wondered that things could have gone much worse if they hadn't had their savings.

Savings are very useful. Even if you cannot cover expenses with your current income, using savings enables you to cover the remaining part. This is how consumption goes smoothly: - there is no need to reduce it sharply (e.g. by not eating, not buying necessary medicine, or not paying utility bills) if needs increase or income becomes insufficient for some time. How can one accumulate savings? In most cases, just by not spending everything we earn. Savings in each period can be increased by earning more, by spending less, or both. In each period in which we record such a surplus, our savings can accumulate.

SAVINGS

Savings are created when we do not spend everything we earn. It is a difference between our income and our expenditures. More affluent individuals can also save by cumulating returns on existing wealth (passive saving).

This is easier said than done, though. Andrea easily recalls those moments when her parents refused to buy her that marvelous dress for prom or when she decided to move back to her childhood home, which became quite challenging for her marriage. The surplus does not fall out of the sky. More often, savings are the result of prudent household budget management: careful analysis of expenses, refraining from unnecessary purchases, and looking for cheaper substitutes, on the one hand, and job promotions and investment in one's own health and education, leading to higher income, on the other hand. Nevertheless, saving usually means refraining from consumption. In the rare cases of already wealthy people, saving also happens by cumulating returns on existing wealth.

As Andrea's parents became more affluent, they could afford more things - however, they were still saving, and saving for old age became their priority. The history of her family members confirmed the statistics: older women had only seam jobs, while younger women were active but still had more career breaks than men, implying lower old age pension benefits. At the same time, women typically live longer than men. When husbands die, widows living alone can often barely afford substantial things, even with the survivor pensions that they may receive.

Andrea's colleague Maria shared that, after dealing with the grief of her husband dying, she had to cope with surprisingly poor material conditions. Andrea's mother, now in her nineties, also needed to be financially supported by her children. Such a situation would be particularly burdensome for an only child. After the reunion with her former classmates, Andrea was even more convinced of the necessity of saving to supplement the old age pension (for more on this, see 🕮 Booklet 5).

2. Key principles of personal budget management

Bearing in mind her parents' prudence in household budget management, Andrea knew that she also needed good financial planning and personal budget management to be financially healthy no matter her age. Fortunately, she had learnt key principles of personal finance at home by observing her parents and being involved in individual budget management since early childhood. She received her first piggy bank when she was three and had started to save for sweets and toys she would like to buy at the corner store. In the course of time, she realized that even small amounts can make a significant savings when stored regularly.

SMART GOALS

SMART financial goals are as follows:

S, specific
M, measurable
A, achievable
R, relevant
T, time-bound.

She also learnt that financial plans have to be **SMART** if we want to persevere in our efforts to achieve them. We have to save for something that is really important to us (*relevant*) and realistic (*achievable*). Moreover, a financial goal should be precisely described (*specific*, e.g. two-week holidays in Asia, a new bicycle), in money terms as well (*measurable*), and assigned to a definite period (*time-bound*). Otherwise, it is very hard to stick to the plan and not become discouraged from even mid-term saving goals.

Andrea knew that effective financial planning and saving cannot be realized without being aware of one's total income and expenditures. They also require conscientious household budget management, otherwise money slips through your fingers, as it did in the case of many of her friends. They earned much more than she did, but could never set money aside for a rainy day. Their expenditures inflated with their incomes, which meant that the more they earned, the more they spent. Andrea wondered why they spent more time planning their one-week inter-term holidays than their personal financial well-being. She tried to teach her best friend, Elisa, how to curb spending and start collecting a buffer fund. She had to convince Elisa to precisely analyse her costs and write down all her income and expenditures in a given period. But nothing comes easy.

First steps of personal budget management

1. Write down **all money that comes in and goes out**. Do this at least once a week, putting the amounts in a spreadsheet or just on a piece of paper. Do it without judgement.
2. **Categorize** your inflows and outflows. The key categories could be, for example, accommodation, food, clothing, transport costs, entertainment, childcare, gifts, debt payments, and savings. Make a personal set of significant categories. Check whether expenses are covered by your total income.
3. Think of **a share of a given category in your total spending**. Are you comfortable with it? Maybe you want to curb some costs and make room for additional saving?
4. **Make improvements in your budget**. Redirect your expenses and spend money on what you really care about. As a rule of thumb, expected monthly outflows (regular expenditures) should represent no more than 70% of your after-tax income.
5. The rest should be collected to cover larger expenses in the short, medium, and long term. Collect **a fund for emergency and irregular outflows** (10%, e.g., for holidays and car insurance and repairs), **a buffer fund** for rainy days (10%, e.g., for an unemployment period) and **old age saving** (10%).
6. **Try to make your planned budget come true**. It is natural that it will not balance out in the first months. Correct it regularly if necessary. After a few months, you will notice that money is no longer slipping through your fingers, and you will find additional room for improvement.

Covering irregular or unexpected expenses is one reason why people save, but there are several others as well. People may save for large purchases, such as a car or house. If we want to buy a house, we usually need to make a down payment before taking out a mortgage (see 📖 Booklet 4). Later on, when we want to furnish the house, this, too, can become impossible to finance with our current income. The affordability of a big purchase depends on the total short- and medium-term savings we collected. These can be insufficient, however, if we are young or if we started to save just a few months earlier. Precautionary savings are also necessary to finance planned periods of unemployment, such as a gap year, during which you might want to travel or acquire broader life experience.

3. When your savings are not enough for a larger purchase

At the age of 24, Andrea started working at a small company. She did a lot of the work remotely from her rented apartment. Her old computer often malfunctioned, preventing her from performing her tasks efficiently, and she therefore also had to spend money on computer service repairs. Finally, she decided to replace her old computer with a new one. However, her savings were not enough to buy a new computer that met her expectations. She therefore decided to take out a loan of €1,000. This was Andrea's first decision to make any financial commitment. Therefore, before going to the bank, she

carefully checked what decisions she must face to enter into a loan agreement. So she called her friend Sonia, who took out a loan a year ago to buy a computer. Her friend advised her to look into bank offers for information on the components of monthly loan instalments, possible forms of loan repayment, and additional fees charged by the bank.

Components and characteristics of loan instalments

In this box, you will learn about the components of a loan instalment, the types of loan repayment schedules, the interest rate, and the most important fees that the bank charges at the time of granting the loan.

Total loan instalment = Principal component + Interest component

Principal component: An amount that covers part of the loan.
Interest component: The interest portion is remuneration for the bank. It is calculated as the loan interest rate multiplied by the outstanding loan amount.

The loan repayment schedule can be constructed depending on various types of instalments:
1. Equal total monthly instalments.
2. Equal principal instalments (implying decreasing total monthly instalments).
3. Balloon instalments (where the largest part of the loan is repaid in the last instalment).

Examples of loan repayment schedules for a total loan amount of €1,000 with an annual interest rate of 2% are shown below. The loan is repaid in four quarterly instalments (for quarterly loan instalments, the quarterly interest rate is 2%/4 = 0.5%).

	Schedule for equal total loan instalments			
	Loan capital to be repaid	Principal part	Interest part	Total quarterly instalment
1	1,000	248.13	5	**253.13**
2	751.87	249.37	3.76	**253.13**
3	502.49	250.62	2.51	**253.13**
4	251.87	251.87	1.26	**253.13**

	Schedule for equal principal component			
	Loan capital to be repaid	Principal part	Interest Part	Total quarterly instalment
1	1,000	250	5	**255**
2	750	250	3.75	**253.75**
3	500	250	2.50	**252.50**
4	250	250	1.25	**251.25**

	Schedule for balloon loan instalments			
	Loan capital to be repaid	Principal part	Interest Part	Total quarterly instalment
1	1,000	50	5	**55**
2	950	60	4.75	**64.75**
3	890	70	4.45	**74.45**
4	820	820	4.10	**824.10**

Types of loan interest rates
The loan interest rate can be **fixed** (unchanging during the loan repayment period) or **variable** (the loan interest rate varies depending on market interest rates, which are also influenced by the decisions of the central bank. The central bank's decision to increase official interest rates will ultimately raise the amount of interest that is part of the instalment, and the decision to lower the official interest rate will lower it. The frequency of interest rate changes

varies between countries, depending on central bank policy and macroeconomic conditions. For example, from 2010 to 2020, the European Central Bank made 12 decisions to change the official interest rate.

The interest component on a loan is paid periodically, in accordance with the instalment schedule. Additional fees, on the other hand, are payable once, and the amount of fees often increases the loan amount. Examples of additional fees that can be charged by a financial institution are as follows.

Processing charges: Charges that cover the administrative costs related to loan processing.
Verification charges: Before a final decision on your loan, the bank needs to check (sometimes via an external agency) your creditworthiness. This cost is regarded as a verification charge.
Late or early repayment fees: In the event of delays in repayment or early repayment, the bank can charge additional fees.

Knowing her credit preferences, Andrea went to a bank. In an interview with a consultant, she learned the terms of the loan and the repayment schedule, but she was also needed to bring several documents to the bank, including an income statement from her employer. In this way, the bank could verify Andrea's **creditworthiness**. Therefore, the purchase of a computer had to wait, since Andrea first had to prepare all the documents indicated by the consultant.

On the way home, however, Andrea noticed an advertisement for a **consumer finance company** offering a loan in a few minutes. She decided to check the conditions of a loan offered by this institution. An employee at this institution presented a very interesting offer for her: the interest rate on the loan was 4% (the bank consultant had offered 5%).

CREDITWORTHINESS

When deciding on granting a loan, the bank assesses the client's creditworthiness, which is ability of the client to settle liabilities on time. When assessing creditworthiness, the bank takes into account, for example, the client's income, credit history, current debt, maintenance costs, and so forth.

CONSUMER FINANCE COMPANY

A consumer finance company is a non-bank lender engaged primarily in making personal loans to consumers. These institutions are much less regulated than banks, which makes them attractive for customers who have difficulties obtaining a loan from a bank, since their risk of not being able to pay back the loan is higher. This also causes the consumer finance company to charge more for the services they provide.

Moreover, it turned out that Andrea could receive €1,000 shortly after signing the loan agreement. The consultant of the consumer finance company only needed the basic data that appeared on her ID card. When analysing the repayment schedule, Andrea noticed, however, that the monthly instalment of the loan at the consumer finance company was much higher than that offered by the bank. She was surprised because, when comparing interest rates, a bank loan should be more expensive.

Conditions for a loan of €1,000 at a bank and at a consumer finance company

Exercise You need to borrow €1,000. Which institution's offer will be more advantageous for you?

	Bank	Consumer finance company
Fixed interest	5%	4%
Number of instalments	12	12
Type of schedule	Equal total loan instalments	Equal total loan instalments
Total instalment amount	85.61	93.66
APR	5.12%	26.96%

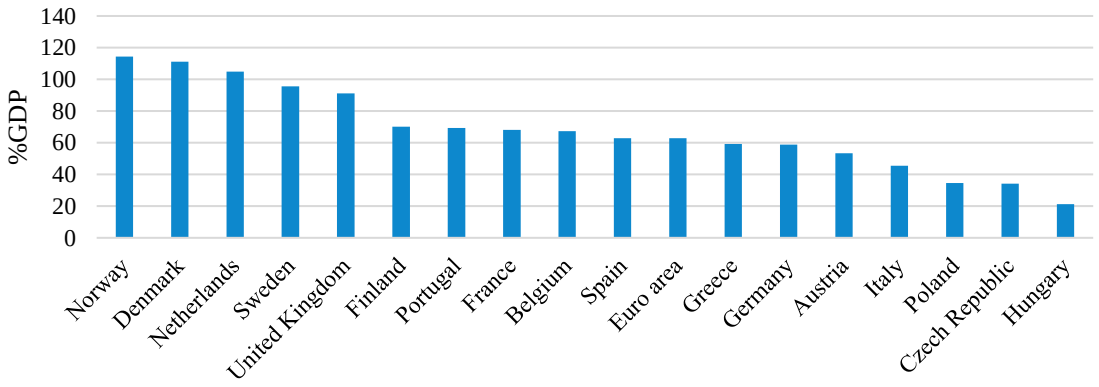
Answer When comparing loan offers, pay special attention to the **annual percentage rate (APR).** This is the yearly interest rate, including all the costs a customer must pay on a loan. The APR is used to describe the conditions of any type of loan, from mortgages and car loans to credit cards. Generally, the APR is a percentage that expresses the numerical amount paid yearly by the customer for borrowing money (including all the additional costs associated with a particular loan). In this case, comparison of the APRs shows that the bank has the more advantageous offer.

Andrea therefore decided to take a moment to carefully read the terms and conditions of the loan offered by the consumer finance company. She noticed some very important information written at the end of the offer: 'to make funds available to the client, the institution charges a 10% processing fee, the amount of which is added to the loan amount'. Andrea compared the **annual percentage rate (APR)** of the bank's and the consumer finance company's offers. She had learnt from an educational campaign on television that the APR would precisely determine which offer was more advantageous. After comparing APRs, it turned out that the processing charges of the consumer finance company were so high that the bank's offer was much more favourable. Andrea therefore decided to spend the time collecting the relevant documents and to take advantage of the bank's more favourable offer.

After collecting all the documents, Andrea took out a loan from the bank and was excited to buy a new computer. Her income was enough to regularly pay the monthly loan instalments, and she repaid

Figure 1 Household indebtedness across countries

In some countries in the first quarter of 2021, households indebtedness in relation to the GDP exceeded 100% (Norway, Denmark, and the Netherlands), while, in others, it was below 40% (Poland, the Czech Republic, and Hungary).



Source: Author's own elaboration based on Bank for International Settlements statistics

Having a high level of debt requires households to have strong personal finance management skills. Otherwise, overindebtedness combined with unfavourable economic conditions can threaten the financial security of the household, with negative consequences for financial stability.

the loan without any problems within a year. She could even have repaid the loan earlier, but she avoided this possibility because she had read in the loan agreement that the bank charges a small fee for early repayment of the loan.

4. Taking out a car loan

After three years, Andrea had collected a large amount of savings and was thinking more and more often about buying a new car. However, car prices were not so low, and she would have to collect savings over the next two years to buy a car with her own funds. Andrea often read about the conditions that must be met to receive a car loan. She learned from a bank consultant that, when deciding on granting a car loan, the bank takes into account the client's income, education, workplace, form of employment, and **credit history**.

CREDIT HISTORY

The main factor in granting a loan is the customer's credit history. This is information on the customer's past repayment of credit obligations. A good credit history means that the customer has regularly repaid his or her loans in the past, which means the customer is a reliable debtor.

Because Andrea had repaid the earlier loan on time, the bank assessed her as being a reliable debtor. She also had a permanent job contract and higher education. Before going to the bank, Andrea carefully analysed how much money she would be able to spend on paying car loan instalments. When she went to the bank, she was convinced that she met all the requirements set by the bank. The bank consultant instructed her to think about the form of instalments she preferred and the type of interest, fixed or variable. The consultant also gave her an **information brochure** that presented the level of instalments depending on the repayment period, loan amount, and interest rate.

Monthly instalments of a car loan

Exercise You would like to buy a car for €30,000. You have analysed your expenses and you know that you are able to spend €300 per month to pay your car loan instalments. What do you think the loan repayment period should be?

Below we present the monthly loan instalments (in euros) depending on the interest rate, repayment period, and loan amount. The loan is repaid in equal monthly instalments. In addition, 1.5% processing charges have been added to the loan amount.

Loan	Repayment period: 5 years		
	2%	3%	4%
30,000	534	547	561
50,000	890	912	935
100,000	1,779	1,824	1,869

Loan	Repayment period: 10 years		
	2%	3%	4%
30,000	280	294	308
50,000	467	490	514
100,000	934	980	1,028

Loan	Repayment period: 15 years		
	2%	3%	4%
30,000	196	210	225
50,000	327	350	375
100,000	653	701	751

Answer According to the loan conditions presented in the tables above, you are able to borrow €30,000 and repay the loan within 10 years. However, the amount of €300 that you intend to spend on your monthly loan repayment can be exceeded in the event of an increase in interest rates up to 4% (see the amount marked in red in the table above).

Another finding: With large loan amounts, even a 1% change in the interest rate can significantly affect the size of the loan instalment. A customer taking out a loan with a variable

interest rate should consider a possible increase in interest rates in his or her personal budget. This is especially important for long-term loans, such as a housing loan.

After several days, Andrea found a car that met her preferences. After checking her creditworthiness, the bank granted her a loan for the car purchase. Before that, however, Andrea had to decide on the type of interest rate on the loan. She was prepared for both increases and decreases in instalments due to changes in interest rates. Therefore, she decided on a variable interest rate for her loan. The monthly instalment of a €30,000 loan for five years with an interest rate of 3% was €547.

Andrea also considered decreasing instalments, because that would allow her to pay off the principal component faster, which would translate into a lower amount of interest paid, but she did not want to overburden her budget with the first high instalments of the loan. Finally, she agreed to pay equal monthly loan instalments, and the size of the instalments accounted for 20% of her net income, which meant that she would be able to repay the loan without any problems.

Along with the loan, the bank offered Andrea a **credit card** for €10,000. She remembered that her friend had been using a credit card for many years and was satisfied with this banking product, since many stores and petrol stations provide discounts for credit card users.

5. Using a credit card

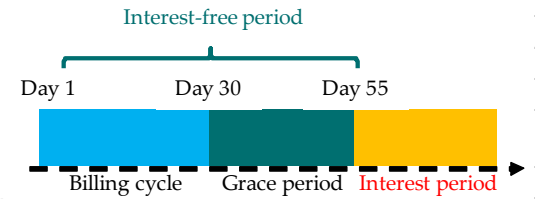
After purchasing the car, Andrea had to pay for its insurance. She heard that the insurance company gave discounts when paying with a credit card. She therefore decided to use the funds available on her credit card. She knew that paying off the credit card debt in the next few days would not be expensive for her in any way. However, she had so many urgent responsibilities that she forgot to make the payment during the grace period. Fortunately, the amount of interest related to the credit card debt was not high, because the insurance cost only €80. However, this was a lesson for her, because in the case of higher amounts of credit used on the card, the costs and interest could be much higher.

Andrea also remembered the case of her friend who had paid €3,000 for a trip with a credit card. In this situation, her friend had huge problems with the one-off repayment of such a large amount and was forced to take out another loan to pay off the credit card debt. Since Andrea's friend's repayment was made after the grace period, the bank charged her very high interest.

Credit cards

In this box, you will learn the terms of a credit card. Pay special attention to the most important benefits and dangers of using a credit card.

A credit card is a payment card that is associated with the granting of a credit limit by the bank. The credit card holder can use the funds that are currently not on the account up to the credit limit granted by the bank.



The basic periods associated with credit card settlements are as follows.
Billing cycle: This is the period during which we can use funds from the credit limit. Usually it lasts for a month and its end is marked in the credit card agreement.
Grace period: After the end of the billing cycle, the bank summarizes the funds used and gives us time to settle the debt. This period will depend on the bank's policy, but it usually lasts 20 to 30 days. During the billing cycle and the grace period, we can use a free loan granted by the bank within the credit card limit.
Interest period: If the repayment of the funds used in the billing cycle takes place after the grace period, the bank will charge interest for the period from the beginning of the billing cycle to the repayment date. The interest in this case is much higher than the interest in the case of a housing loan or cash loan.

Benefits of having a credit card	Dangers of the improper use of a credit card
- A credit card allows you to use a free-rate loan for a given period. - You do not need to have any money or cash in your account to pay by card. - Popular stores offer discounts and promotions for credit card holders. - The credit limit is renewable (when the loan is repaid, the credit card limit returns to the original amount).	- The interest is high in the event of debt repayment after the grace period. - Having a credit card reduces your creditworthiness for future loans. - Sometimes banks require you to pay off a minimum amount of debt over the interest-free rate. Otherwise, additional fees will apply and your card may be blocked. - Loan repayments on the last day of the grace period may be settled during the interest rate period, which can result in unintended charges.

Main findings: Credit cards in the United States are one of the fastest-growing types of debt. In many cases, the improper use of a credit card causes a **debt trap** (involving taking on new obligations to repay the credit card debt). To avoid the credit card debt trap, follow these rules:
1. To cover unplanned events (e.g. expensive car repairs), maintain emergency savings. Using credit card debt to cover unexpected expenditures can cause big problems, since you will have to pay off a large debt within a short period of time.

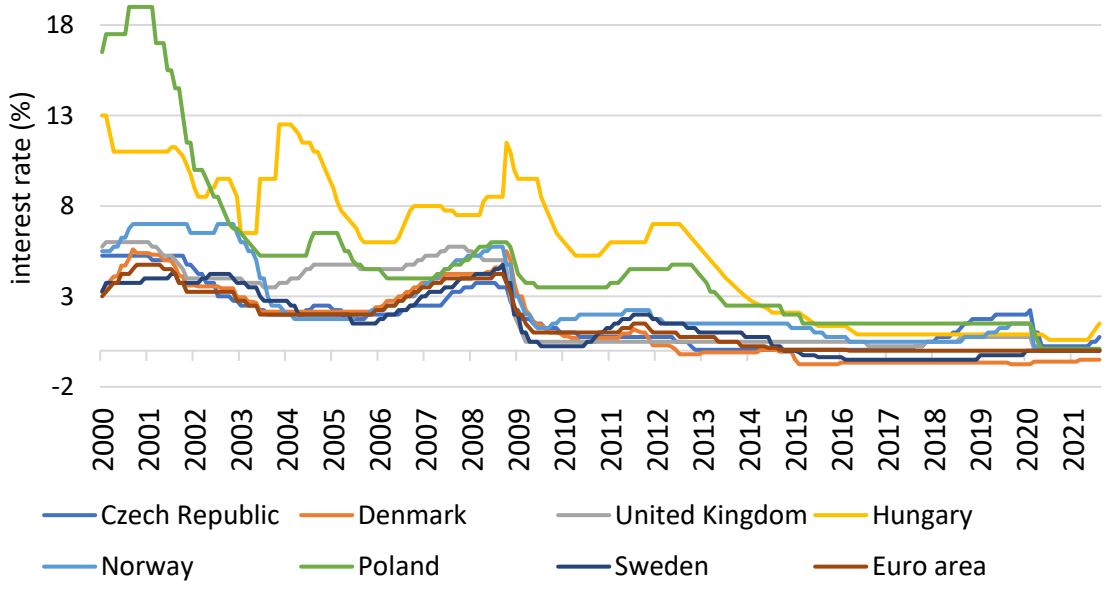
2. Pay off all your credit card debt instead of the minimum amount required by your bank.
3. Use common sense when using multiple credit cards (especially do not pay off credit card debt with another credit card).

After one year of Andrea's car loan repayments, the interest rates rose by one percentage point. Andrea knew this would result in an increase in the interest part of her loan instalments, but she did not care, because an increase of one percentage point was not much, in her opinion. She received a letter from the bank with a new repayment schedule. Previously, she had repaid the loan in monthly instalments of €547, and now her instalment according to the new schedule, after the decision to increase the rates, amounted to €558. This meant that her instalment increased by only €11; however, it was still more than 1%. Although such an increase was not a burden for Andrea's finances, she took a moment to understand the source of this growth.

The brochure she had received from the consultant was clearly indicated how the instalment would increase in the case of a given interest rate increase. She found in the brochure that, in the case of

Figure 2 Is a zero–interest rate bank loan possible?

Central banks in the last year have been lowering interest rates more frequently (see the chart below). In some countries, the level has been zero or even negative. Some banks offer loans with zero interest rates. In this case, a client must be careful, because a zero interest does not mean a zero APR. Banks will compensate for a zero-interest loan with high one-off fees, for example, insurance costs or processing charges.



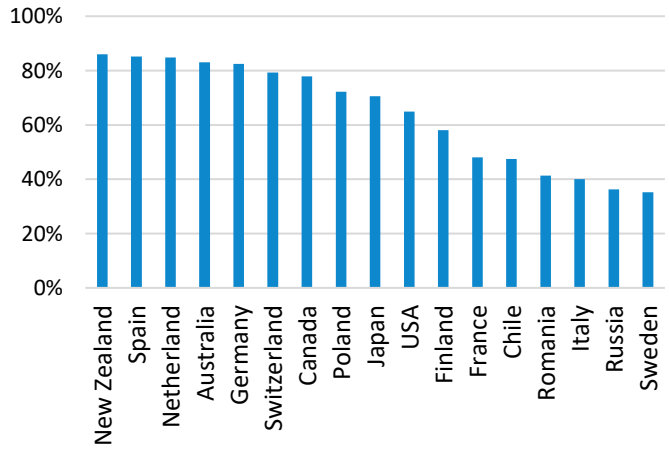
Source: Author's own elaboration based on Bank for International Settlements statistics

large loan amounts (e.g. housing loans; for more details, see Booklet 4), this increase in loan instalment is substantial.

Experiences with a car loan and a credit card taught Andrea that using financial services requires adequate knowledge about the services offered by banks and consumer finance companies. Therefore, it is worth taking the time to deepen your knowledge of personal finance. Using the services offered by the financial sector in an appropriate and sensible manner can provide many benefits. On the other hand, a lack of financial literacy or imprudent behaviour can cause someone to fall into the overindebtedness trap.

Financial literacy as a global issue

Annamaria Lusardi and Olivia S. Mitchell created the Big Three financial literacy questions used in many countries to measure financial knowledge. These questions were presented in the *Journal of Pension Economics and Finance* (2011) in the paper 'Financial literacy around the world: An overview'. Below we present these questions, and next to each question is the percentage of correct answers for several countries.

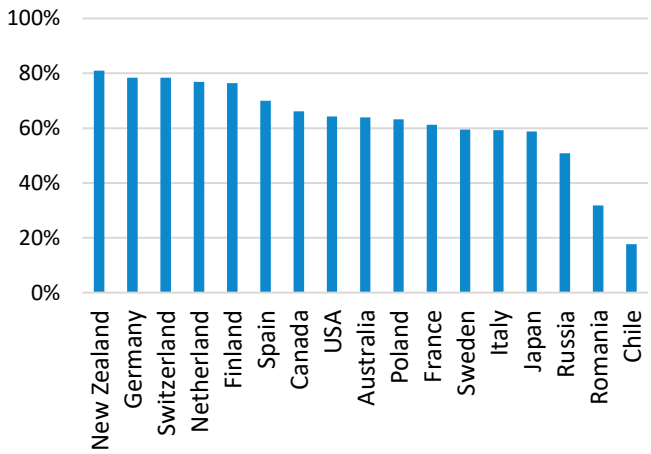


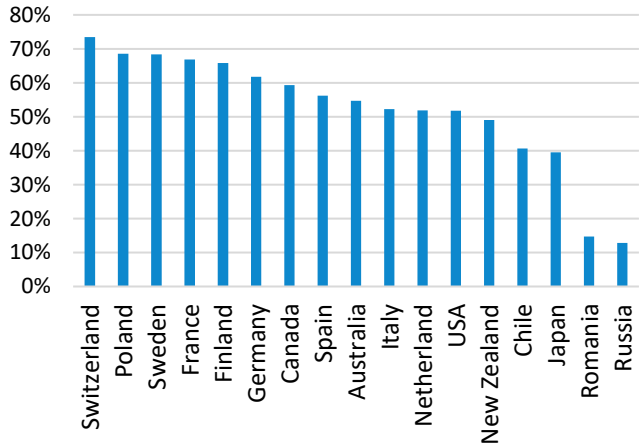
Interest compounding: Suppose you had €100 in a savings account and the interest rate was 2% per year. After five years, how much do you think you would have in the account if you left the money to grow?

a) More than €102
b) Exactly €102
c) Less than €102

Inflation and savings: Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in this account?

a) More than today
b) Exactly the same
c) <u>Less than today</u>





Risk diversification: Please tell me whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund".

a) True
b) <u>False</u>

Studies in particular countries were conducted in different periods, from 2007 (for Italy) to 2020 (for Poland). The sample sizes vary from 500 (for Spain) to 14,463 (for Chile). More information on these studies, see Annamaria Lusardi and Olivia S. Mitchell's paper 'The Economic Importance of Financial Literacy: Theory and Evidence', published in 2014 in the *Journal of Economic Literature*.

Main findings: Worldwide research on the Big Three financial literacy questions has demonstrated that the financial education of the society is a global and important issue. The percentage of correct answers varies greatly across countries. On average, the greatest lack of financial literacy is found for the risk diversification question.

6. Start saving: The earlier, the better

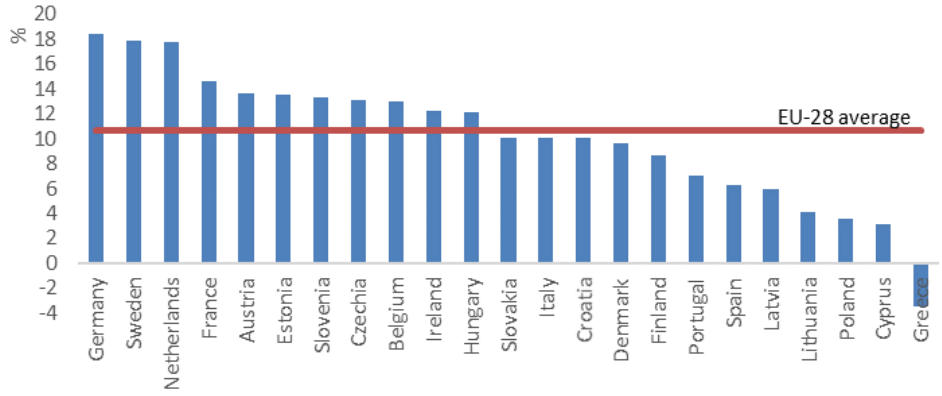
Andrea knew that making solid financial plans and feeling financially secure are not possible without savings. She managed her personal budget carefully and decided to borrow money only for really important needs. She regularly collected money to build her fund for emergency spending and irregular expenses and the buffer fund. She was aware that no matter what the objectives, it is better

to start saving early. Forming proper habits is one reason for this, but, most importantly, even if the surplus is modest initially, starting early means more savings.

How much do European households save?

In this box, you will find the statistics for household savings rates, the share of household income that is not spent. On average, the EU-28 savings rate in 2019 was 10.7%, and it varied from 18.4% (Germany) to -3.5% (Greece). The Greek case shows that households may consume more than they earn – thanks to previous savings – but one cannot do this sustainably. There are multiple reasons why some nations save more than others, including the level of income, aspirations, and cultural norms.

Figure 3 Saving rates of households in 2019 (%)



Source: Author's own elaboration based on Eurostat data

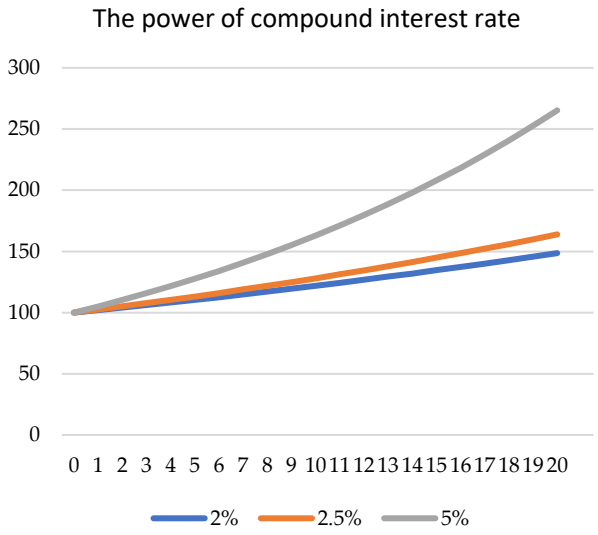
If we only save in the bank, we are remunerated for lending the bank our money. This remuneration is called the (nominal) **interest rate**. An annual interest rate of 5% means that, for each €100 saved, the bank will pay us €5 extra after one year. However, people typically save for more than one year. Each additional year of saving provides more, not only because of the larger amount saved, but also because this remuneration is piling up. This feature is called compound interest (see also Booklet 1) and offers surprisingly good progress.

Andrea had an opportunity to check this personally. She completely forgot about the post office account her father had opened for her. In her early 20s, she left €100 there. Her mother reminded her of it after 20 years (see the box on *the power of compound interest*). When Andrea checked her account, it turned out that, with an interest rate of 2.5%, she had earned €63.9 only because of compound interest. If the interest rate had been slightly lower (2%), the final amount would have been €48.6.

The power of compound interest

In this box, you will learn the mechanics of compound interest, particularly how the interest rate affects the amount saved and how interest cumulates over time.

Years	Interest rate		
	2%	2.5%	5%
1	102.0	102.5	105.0
2	104.0	105.1	110.3
3	106.1	107.7	115.8
4	108.2	110.4	121.6
5	110.4	113.1	127.6
6	112.6	116.0	134.0
7	114.9	118.9	140.7
8	117.2	121.8	147.7
9	119.5	124.9	155.1
10	121.9	128.0	162.9
11	124.3	131.2	171.0
12	126.8	134.5	179.6
13	129.4	137.9	188.6
14	131.9	141.3	198.0
15	134.6	144.8	207.9
16	137.3	148.5	218.3
17	140.0	152.2	229.2
18	142.8	156.0	240.7
19	145.7	159.9	252.7
20	148.6	163.9	265.3



Main findings

1. For savers, a higher interest rate is favourable. When choosing between saving accounts, the one with the interest rate of 2.5% remunerates higher than the one with the interest rate of 2%, if all other conditions remain the same. This holds true when saving for one year (with an interest of 2.5% vs. 2.0%) and for 20 years (€63.9 vs. €48.6, respectively).

2. When saving for more than one year, the interest rate remunerates both the initial capital and the previously earned interest. This is why 20 years of saving in the account with the 5% interest rate provides more than twice as much as the account with the 2.5% interest rate.

7. Nominal and real interest rates

Andrea knew that not everything saved increases future consumption. We are saving but, at the same time, the products and services we are going to buy are becoming more expensive. This is how inflation partially reduces our wealth. In the majority of European economies, inflation is low and affects savings minimally. However, Andrea remembered the early 1980s, when the Italian economy struggled with high inflation. Her father's wage was quickly exchanged into products, because **purchasing power** decreased each day.

There is a rule of thumb for assessing the value of our savings. We can estimate this value by deducting the inflation rate from the interest rate. The result is called the **real interest rate**, and it shows how much more affluent saving makes us each year. Andrea's saving account offered a (nominal) interest rate of 2.5%. In times of a low inflation rate (0.5%), this was quite attractive – the annual real interest rate was 2% – but when inflation increased to 2.5%, no progress was observed, since the entire remuneration was consumed by the increasing price level.

It once occurred to Andrea that, if the account is not earning, maybe it is time to withdraw the money. Peter, her husband, made a sobering calculation, though. Keeping savings "under the mattress" has a zero nominal interest rate, but this is not proof against inflation, so withdrawing money would be an even worse idea. They needed to learn more about other financial assets.

Nominal and real interest rates

In this box, you will learn how inflation affects the real interest rate and how keeping savings under the mattress is not an optimal solution in times of high inflation.

	Inflation rate	0.5%	1.0%	2.0%	2.5%
Savings account	Nominal interest rate	2.5%	2.5%	2.5%	2.5%
	Real interest rate	2.0%	1.5%	0.5%	0.0%
Savings kept under the mattress	Nominal interest rate	0.0%	0.0%	0.0%	0.0%
	Real interest rate	-0.5%	-1.0%	-2.0%	-2.5%

Main findings

1. The real interest rate can be approximated as the difference between the nominal interest rate and the inflation rate.

2. Typically, savings accounts offer a positive nominal interest. Keeping one's savings under the mattress always has a zero nominal interest. This is why withdrawing savings from the savings account does not make us inflation-proof.

8. Making money work for you

The accumulation of savings is only one part of the story; another very important part is the allocation of savings between instruments. In other words, we need to make our savings work for us. There are several rules that are useful when allocating money.

Much depends on **risk**. Some people react to potential losses badly and would like to avoid risk as much as they can. We call them risk averse. They will typically prefer safe financial instruments, such as saving accounts or **government and European bonds**. Andrea was one of these people. Her family lived modestly for many years, she sacrificed much to be where she is, and the thought that she could lose her wealth frightens her from time to time. Risk takers are the opposite, like Jerome, Andrea's brother-in-law, who invests more often, for example, in **stocks**. Risk takers are ready to suffer losses to have a chance at earning a great deal, while the risk averse are satisfied with low but very safe **returns**. Most people are somewhere in between, but closer to the risk averse.

BONDS AND STOCKS

Government bonds and stocks are among the most popular financial instruments in which one can invest. However, they vary significantly in terms of features and the risk involved. When savers buy a government bond, they lend money to the government and receive a known interest in advance. Governments rarely go bankrupt, hence the savers' income is certain, but low. In contrast, a stockholder buys shares in a company (and thus becomes the owner of part of the company), and the value depends on the company's future growth prospects, which are highly uncertain. The return is the income received from investing in an instrument.

LOW INTEREST RATES AND INVESTMENTS

In a low–interest rate environment, the profitability of bank deposits is very low. In many cases, bank deposits offer a 0% return. In such an environment, it is worth looking for other forms of investing, in funds that will ensure greater returns on your investment. Depending on the preferred level of risk, these can be government bonds (with a low level of risk), real estate, or investments in one or more stocks of private

companies (with a higher level of risk).

If interest is remuneration for lending our savings, a higher return is offered, on average, when using them for risky investments, with a lower return for safer investments. Thus, institutions offering high real interest rates at low risk are almost always scams. Transferring money to unauthorized institutions usually ends badly, since getting one's money back is extremely difficult. Luckily, Andrea and Peter avoided these successfully, partially because of being risk averse and partially because of their financial education.

But, even for risk-averse individuals and authorized institutions, there are still strategies allowing for decent growth. Diversification is amongst the most important rules. Andrea's mother used to tell her to *not put all her eggs in one basket*. She certainly was not discussing financial investments, but this rule holds even there. Allocating all one's resources into one risky instrument will most likely lead to either high profits or high losses. By contrast, allocating resources into a single safe instrument can lead to unsatisfactory returns. However, individuals can have both kinds of assets, optimizing them between expected returns and safety.

Andrea liked this concept very much. She analysed the situation of her household and concluded that 25% of stocks and 75% of government bonds would satisfy her. Diversification should also be used when deciding within one type of instrument. Purchasing the stocks of one company will almost always be a riskier investment than purchasing the stocks of multiple companies.

Asset allocation

In this box, you will compare different investment portfolios and learn why mixing different financial instruments can be beneficial for returns and the safety of one's investment.

Scenario	Portfolio				
	Stocks (100%)	Stocks (75%) + govt. bonds (25%)	Stocks (50%) + govt. bonds (50%)	Stocks (25%) + govt. bonds (75%)	Government bonds (100%)
Positive	15.0%	12.0%	9.0%	6.0%	3.0%
Moderate	7.5%	6.4%	5.3%	4.1%	3.0%
Negative	-15.0%	-10.5%	-6.0%	-1.5%	3.0%
Variability	*High*	*Rather high*	*Modest*	*Rather low*	*Low*

Main findings

1. There are many types of instruments in which one can invest, with stocks and government bonds among the most popular. While the former offers high risk and potentially high returns (or significant losses), the latter offers low risk and low returns.
2. In our example, when investing only in stocks, one can end up with a 15% profit, but also a 15% loss. By contrast, investing all one's capital in government bonds gives a sure 3% return, which can be an unsatisfactory outcome. This is why individuals create so-called investment portfolios consisting of a combination of various types of financial instruments.

The proportions between stocks and bonds differ between people. The optimal proportion depends on someone's attitude towards risk, as well as on the expected period of investment, which usually goes hand in hand with age. Young people have a long investment horizon; even if their risky investment goes bad, there is still plenty of time to improve. If you are close to retirement, the chances that the return will not recover after a large loss are quite high (for more on this, see Booklet 5). In particular, it may happen that stocks will be at

low levels just before you retire. This is why, theoretically, the older you are, the lower the share of stocks in your **investment portfolio** should be. Thus, younger savers are encouraged to have a greater share of stocks (equities) in their portfolio and to reduce this share over time. One common rule of thumb prescribes the optimal share of equities as 100 or 110 minus one's age.

INVESTMENT PORTFOLIO

An investment portfolio is a set of financial instruments one owns.

Besides government bonds and stocks, there are many other investment instruments, including advanced financial instruments, foreign currencies, cryptocurrencies, property, commodities, gold, diamonds, stamps, rare books, artwork, and alcohols – and this list is not exhaustive. People buy these to gain profits in the future. However, typically, to earn such profits, the initial capital must be substantial, this type of investment requires knowledge, and the risks are far more complex than for a simple asset such as government bonds. Therefore, although these alternative forms can complement an investment portfolio, they are rarely a good fit for beginners.

ADDITIONAL ISSUES FOR CONSIDERATION

- There is nothing wrong with using a bank loan. As long as you carefully analyse the loan repayment possibilities and carefully read all the terms of the contract, a bank loan allows you to finance purchases that would be difficult to realize with your own household budget.

- Banks offer the possibility of taking out loans in foreign currencies. In this case, use the following rule: take out a loan in the currency in which you earn your income.

- If you have problems with loan repayment, contact the bank and try to suspend the repayment for a given period or change the terms of the contract to allow you to repay the loan. The bank will likely enable you to repay the loan, since it also cares about paying the client's liabilities.

- When making a deposit, check carefully whether the funds are guaranteed by the deposit guarantee system in the event of the bankruptcy of the institution to which you are entrusting the funds. If you have doubts about a financial product or financial institution, you can check information with the financial regulator of your country.

- When you save with a product, remember to always check if it corresponds to your time horizon and risk preferences, and always read the product's key document, which indicates its past performance and level of risk.

Booklet #4

Booklet Series "Be in charge of your life cycle"

A ROOF OVER YOUR FUTURE: BUYING OR RENTING A HOUSE

ANGLE

www.angle-cerp.carloalberto.org

This booklet is number four in a series of five booklets that aim at improving economic and financial literacy of young people. Economic and Financial Literacy is basic knowledge possibly to be acquired early in life to make individual financial decisions better informed and more effective. This applies particularly to decisions that have long-term consequences and require thinking in terms of the individuals' complete life cycle. Although the five booklets are connected and refer to each other, each of them can be read independently of the others.

The first booklet in the series provides a general introduction on the concepts needed to make financial decisions over the life cycle. The other four booklets cover the most important economic decisions relevant at various stages of the life cycle. The second booklet is about educational choices, such as the decision when to leave school and enter the labour market or how much effort to invest in studying. Booklet 3 deals with the economics of saving and borrowing and what to do with money that is saved. Booklet 4 (this booklet) discusses many aspects of what is often one of the most important financial decisions in people's lives: the purchase and financing of their own house. Finally, Booklet 5 is about pensions and financial security after retirement.

The five booklets are part of the project "A network game for lifecycle education" (ANGLE), funded by the Erasmus+ programme of the EU. This project aims at promoting and enhancing Europe's younger generations' financial and economic literacy. It adopts a life-cycle perspective to help the young to consider a long-time horizon and to think about the future consequences of their decisions. In addition to the booklets, ANGLE focuses on creating a board game that helps the young to improve their financial and economic skills through active involvement and participation. Reading the booklets is an excellent preparation for playing the game. Also for readers who do not play the game, however, they help to make people more conscious and skilled in making important economic and financial decisions.

The booklet has been realised by Tarmo Valkonen of **ETLA**

Realised with the financial support of the European Union – **Erasmus+** programme

Find more information on: **https://www.carloalberto.org/wwwangle-cerpcarloalberto.org**

Co-funded by the Erasmus+ Programme of the European Union

Booklet 4

A ROOF OVER YOUR FUTURE
Buying or renting a house

Housing choices cannot be avoided, since everyone must live somewhere. The typical choice after leaving the childhood home or student residence is to rent a flat. In the longer term, however, another choice will become available: to buy a flat or house for your personal use. This normally requires saving for one's own financed share, taking out a housing loan, and committing oneself to a long period of saving afterwards. The purchase of a flat or house is for many the most significant economic decision of their lives.

The idea of this booklet is to guide you through the relevant issues that a student needs to know when deciding whether to live in a rented flat or to start to plan for buying a home. In addition, the financing of the housing investment has many details worth knowing. We will follow the story of a young couple that has these choices ahead of them.

Introducing Daniel and Eva

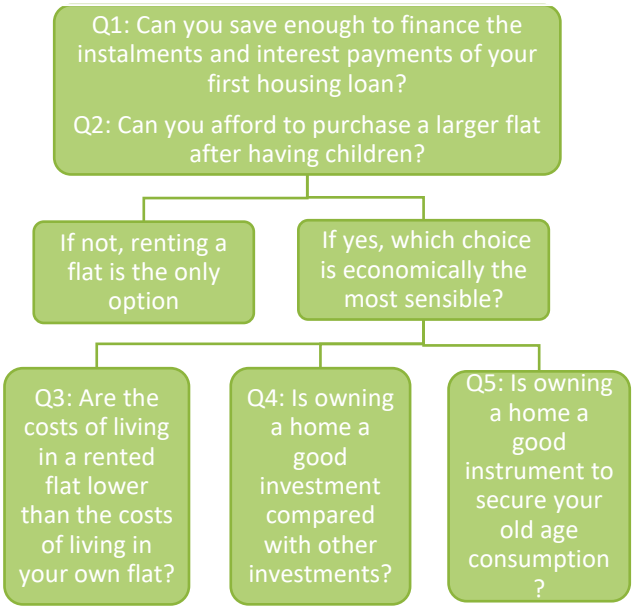
Daniel is a 24-year-old student expecting to qualify as a nurse in a few months. He lives comfortably with his parents but also longs for the independence and status that living in his own home would provide. He knows that the wages of nurses are not very high but that getting a job in his hometown is rather easy. His long-time girlfriend, Eva, studies medicine too, but she aims to become a doctor and thus continue her studies for two more years. Eva, who lives in a small student flat near the university, has also started to consider the pros and cons of moving out.

The couple has tentatively discussed living together, but they have not yet made a final decision. They chose first to consider the economic issues related to either renting a flat or starting to save for their own flat. For a young couple such as Eva and Daniel, the first home is likely to be a flat, but the issues discussed later are equally relevant to the purchase of a house.

We base our story on five key questions that Eva and Daniel must consider when they make their housing choices.

The key questions

Eva and Daniel asked the opinions of their parents and friends about the relevant issues. Going along with the advice they received, they started to search suitable flats with reasonable prices or rents. After following the rental market and housing prices for a while, they found out the obvious fact that flats that are in good condition and in popular areas have either high prices or high rents. There were also plenty of choices available. They concluded that it is unlikely that the flat itself would be the key to the choice between renting or buying.



The first of the key questions is whether they can afford to buy a flat (Q1). If not, renting is the only option. Answering the affordability question requires an estimate of their expected yearly income and expenditures and the costs related to the loan. Moreover, they must assess the expected changes and risks related to their future income and expenses. One of the expected relevant issues is how having children would change their affordability calculation (Q2). If the answer is yes to the affordability question, they must still decide whether buying or renting is the more sensible solution economically.

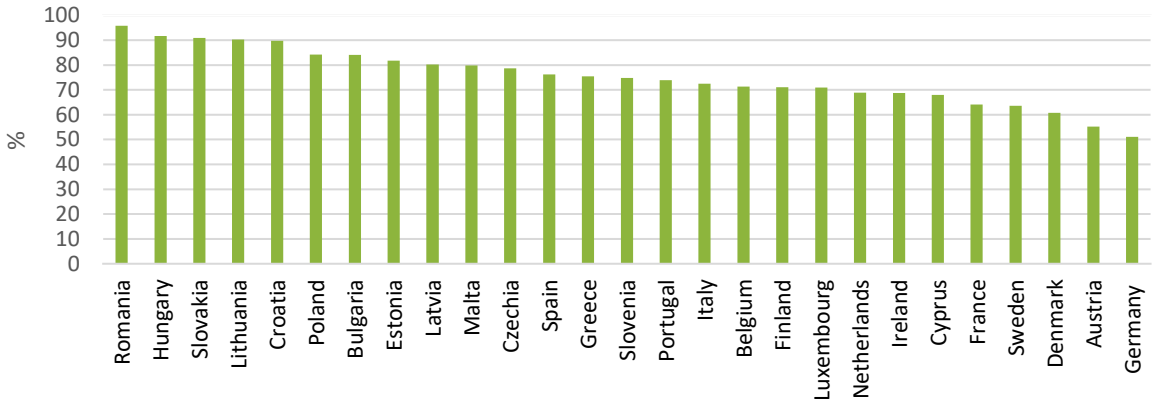
The third question is therefore whether it is cheaper to live in a rented flat or in one's own flat (Q3). Answering this question requires the comparison of rents with the costs that must be paid for one's own flat. The fourth question acknowledges that one's own flat is not only a place to live, but also a large investment. More precisely, is buying a flat for one's own use a good investment compared with, for example, common stocks or bonds (Q4)?

Closely linked to this issue is whether a housing investment is a good instrument to secure old age consumption (Q5). Eva and Daniel have been advised by their parents on the need to save for old age if they plan to keep up the same living standards as during their working years. They understand that buying a flat could be part of their preparation for old age, since it provides housing for a lifetime and is an asset. If they choose to rent a flat, they must save for old age and invest, in any case, a corresponding sum in financial products. Therefore, they must compare the investment in their own

flat with other means of saving for the phase of life in which at least part of their wealth is potentially used for old age consumption.

Eva and Daniel started to understand that answering all these questions might not be so easy, but they decided to continue their endeavour.

Figure 1 Share of persons living in an owner-occupied dwelling in 2019



Source: Eurostat, EU Statistics on Income and Living Conditions (SILC) survey.

Q1: Are Eva and Daniel able to save enough to finance the instalments and interest expenses of a home loan?

Eva and Daniel started to plan their long-term housing choices with an evaluation of their future combined income and expenditures. They immediately noticed that Eva's graduation would markedly enhance their incomes, which led to a common understanding that the final housing choice should be postponed a while. Since they, however, wanted to live together, renting a flat as soon as Daniel got a job was the only option. Luckily, Daniel had been a trainee at the local hospital and was likely to be hired soon after graduation.

The couple first evaluated their income and expenditures before Eva's graduation. The result of summing up Daniel's after-tax wages and Eva's student allowance was €24,000. Except for the rent, living together turned out to be less costly than living apart. Still, saving markedly for their own flat would mean extremely tight rules for daily expenditures, since their previous total housing costs included only the supported rent of Eva, and they must now pay the much higher market rent for a bigger flat. They therefore adjusted their expenses to the income of €24,000. In their saving plan, the year before the graduation is marked as year 0.

After Eva's graduation (year 1), their total yearly income after tax was expected to jump to €60,000. The couple had, however, plans to save yearly €12,000 for a buffer fund and a car. They estimated that the yearly savings for a flat would climb to €24,000, which sounded like a nice amount of money. Since the money is saved in a bank account, the interest income is so low that they did not take it into account in their savings plan. After purchasing the flat, their expenses would decline by the difference between the rent and the expected maintenance costs, which would allow them to upgrade their living standards.

Year	Saving plan			
	Yearly after-tax income	Yearly expenditure	Saving for a buffer fund and a car	Saving for the flat
0	24,000	24,000	0	0
1	60,000	24,000	12,000	24,000
2	5,000	2,000	1,000	2,000

They also considered the possibility of asking for financial help from their parents, but agreed that it would not be sufficient to influence their affordability calculation. Another factor to consider was their current assets and debts. On the one hand, they had earned some money from temporary jobs, part of which was saved in their bank accounts. On the other hand, Eva had taken out a small student loan. The couple neglected, however, these minor sums, just to simplify the calculation.

Eva and Daniel learned that using the purchased flat as **collateral** for the loan is very common and that this type of housing loan is called a **mortgage loan**, or just a **mortgage**. Because it is unlikely that the mortgage would fully cover the purchase price of the flat, they needed to save for the **self-financed share**. It seemed that the share that banks normally require before granting a mortgage is about 10% of the value of the flat.

LOAN

Collateral is an asset that will be transferred to the lender if the loan is not paid back.

A **mortgage loan** is a housing loan where the flat is used as the collateral.

The **self-financed share** is the share of the purchase price that must be financed by own savings.

The **loan period** is the time from receiving the borrowed amount to the final repayment of the principal of the loan.

The **principal of a loan** is the remaining sum to be paid back.

The next step was to estimate the size of an affordable mortgage. Besides the size of the loan, Eva and Daniel had to consider the **loan period**, interest rates, the sizes of the yearly repayments of the **principal of the loan**, and the additional cost charged by the bank. They wanted to avoid risks related to variation in the interest rates and asked several banks for tenders for **fixed-rate mortgages** only. The alternative would have been a **variable-rate mortgage**, whose interest rate is composed of a reference market interest rate and a fixed margin set by the bank.

A **loan with equal principal payments** is a loan where the repaid shares of the principal are equal, but the amount of interest paid varies.

A **loan with equal total payments** is a loan where the yearly sums of the repaid share of the principal and the paid interest are equal.

A **fixed-rate mortgage** is a housing loan where the interest rate is the same during the whole loan period.

Since various banks seemed to offer mortgages with different terms, the couple had to find the mortgage with the lowest total costs and which best fit their expected saving capability. Eva and Daniel started the comparison of the loan tenders. The most promising two loan tenders for a loan of €200,000 and a 10-year loan period were provided by Bank 1 and Bank 2 (see table below).

Bank 1	Bank 2
The initial fixed costs are 1% of the value of the mortgage and the fixed interest rate charged for the mortgage is 2.2%. The mortgage will be repaid using **equal principal payments**. The yearly interest payments are large at the beginning of the loan period and decline as the remaining principal diminishes with time.	The initial fixed costs are 1.5% of the value of the mortgage and the fixed interest rate is 2%. The mortgage will be repaid using **equal total payments**. This means that the composition of the repayments varies in time so that the proportion of principal repayments is smaller at the beginning but increases with time.

The comparison of the offers was somewhat complicated. Eva and Daniel had to compare sums of different sizes in different years in the future. The solution to this problem is to use **discounting**, which provides the **present value** of the stream of payments in the future. The idea is that money in hand is more valuable today than it is in the future, and the interest rate used in the discounting measures the change in value.

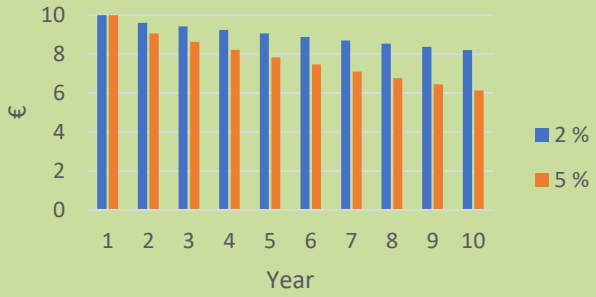
There is no general rule for the choice of the **discount rate**, but often some market interest rate is used, since it describes the true potential of receiving an additional amount of money next year, if the money is invested and not spent this year. On the other hand, for an impatient person, the market rate may be too low for saving and lucrative for borrowing. People sometimes base the comparison

of loans on the total interest payments without discounting. This method is feasible only in the case of zero interest rates for both the debt and savings during the whole loan period.

DISCOUNTING

Discounting is a method of determining the current value of payments that take place in the future. The **present value** is the current value of the discounted future payment. For example, if the yearly discount rate is 2% (in calculations, the percentage is always divided by 100, that is, in this case it is 0.02), the present value of the €10 paid next year is 10/(1 + 0.02), which, rounded to the nearest whole cent, is €9.80. If the €10 are paid two years from now, the present value is 10/((1 + 0.02)*(1 + 0.02)), which gives a rounded amount of €9.61. Correspondingly, the present value of a sum that is paid 10 years from now is $10/(1 + 0.02)^{10}$, which has a rounded value of €8.20.

Present value of €10 received in different years in the future for two discount rates



More generally, the formula for discounting is $PV = FV/(1 + r)^t$, where *PV* is the present value, *FV* is the future value of the amount that is paid/received *t* years from now, and *r* is the discount rate.

Eva and Daniel chose to make the first calculation using a discount rate of 2% per year. They made an Excel spreadsheet to illustrate the two choices and to calculate other possible options later. The payment schedules allocate the yearly repayments of the principal and the interest to the end of each year. Since the couple planned to buy the house at the end of year 1, the first total payment comprises the €2,000 fixed cost of the bank. The payment of interest expenses and the repayment of the loan starts at the end of year 2. The repayments of the principal are fixed at €20,000 in the case of a mortgage from Bank 1. The total payment declines gradually with time. The discounted sum of the payments is €200,073.

Calculating the payment schedule for the equal total payments loan from Bank 2 was more complicated. Eva and Daniel used the bank's online calculator to determine the required amounts. The present value of the payments to the bank would be €199,078, which is lower than in the offer of Bank 1.

Year	Bank 1

Eva and Daniel noticed that the total discounted costs of the loans were not very different from each other, which was not a big surprise, since there is intense competition between the banks in the area. They also used different discount rates to test the sensitivity of the result, but the costs of Bank 2 were always lower. The couple also noticed that the profile of having higher total payments at the beginning of the loan period, as in the offer from Bank 1, did not fit well with their ability to save. Therefore, their choice was to use the offer of Bank 2 as a basis for their affordability calculations.

	Balance owed	Principal payment	Interest payment	Total payment	Discounted value
1	200,000	0	0	2,000	2,000
2	180,000	20,000	4,400	24,400	23,453
3	160,000	20,000	3,960	23,960	22,578
4	140,000	20,000	3,520	23,520	21,729
5	120,000	20,000	3,080	23,080	20,904
6	100,000	20,000	2,640	22,640	20,104
7	80,000	20,000	2,200	22,200	19,326
8	60,000	20,000	1,760	21,760	18,572
9	40,000	20,000	1,320	21,320	17,840
10	20,000	20,000	880	20,880	17,129
11	0	20,000	440	20,440	16,439
Present value					200,073

The next step was to compare the yearly amounts of their planned savings to see whether they could afford to take on the mortgage. At the end of the first year, they would have total savings of €24,000. They planned to take out a mortgage of €200,000 and buy the flat at that time. Together with the required 10% self-financing share, they could buy a flat with a maximum purchase price of €222,220. The self-financing share would then be €22,222. They also would have to pay a fixed cost of €3,000 for the mortgage. That meant that the total net savings would be –€1,222 at the end of the first year, which would have to be covered from their buffer fund. After that, there would be a surplus that would increase the total net savings every year.

Year	Bank 2				
	Balance owed	Principal payment	Interest payment	Total payment	Discounted value
1	200,000	0	0	3,000	3,000
2	181,735	18,265	4,000	22,265	21,401
3	163,104	18,631	3,635	22,265	20,981
4	144,101	19,003	3,262	22,265	20,570
5	124,718	19,383	2,882	22,265	20,166
6	104,947	19,771	2,494	22,265	19,771
7	84,780	20,166	2,099	22,265	19,383
8	64,211	20,570	1,696	22,265	19,003
9	43,229	20,981	1,284	22,265	18,631
10	21,829	21,401	865	22,265	18,265
11	0	21,829	437	22,265	17,907
Present value					199,078

Year	Affordability calculation

The outcome of the affordability calculation is that Eva and Daniel can take out a mortgage of €200,000 if there are no surprises in how much they can save. They will even accumulate some net savings that can be used as a buffer for unexpected expenditures. This calculation does not consider the deductibility of interest expenses in taxation, which is in force in several European Union (EU) countries. If that is considered, they might be able to afford an even higher mortgage.

	Yearly loan payments	Self-financing share	Yearly savings	Cumulative net savings
1	3,000	22,222	24,000	-1,222
2	22,265		24,000	513
3	22,265		24,000	2,247
4	22,265		24,000	3,982
5	22,265		24,000	5,717
6	22,265		24,000	7,451
7	22,265		24,000	9,186
8	22,265		24,000	10,921
9	22,265		24,000	12,656
10	22,265		24,000	14,390
11	22,265		24,000	16,125

Eva and Daniel also considered the uncertainties related to affordability. It is conceivable that getting a new job after becoming unemployed would require moving to another city. Selling the flat and buying a new flat would incur additional costs. This is a risk that can be avoided only by renting a flat instead of buying one, but that could generate other problems, such as the difficulty of finding a suitable flat.

As mentioned earlier, Eva and Daniel both have occupations that are likely to mitigate the risks of not finding jobs after graduation and becoming unemployed later. They are also healthy and do not expect long sickness leaves that would reduce their earnings. In addition, they could take life insurance against the very unlikely case one of them dies. The insurance is cheap, because of the low probability of dying early. Even if a separation seems very unlikely to them, they made a prenuptial agreement just to clarify the ownership of their wealth.

Other risks related to their wage income are likely to be positive. Their wages seem to grow by about 2% each year. If they save the same share of their income in the future, the initial savings of €24,000 will grow by 2% yearly. The possibility of saving is affected also by unexpected expenditures. As mentioned, Eva and Daniel had already taken this into account by adding a 10% margin to their estimated monthly expenditures. They also planned to use insurance to limit the losses in case of accidents.

The example above represents a case in which the mortgage has a fixed interest rate. This means that the bank bears the risk of variation in market interest rates. Therefore, the interest rate Eva and Daniel are charged is higher than the expected average interest rate of a variable-rate mortgage. In this type of housing loan, the interest rate is typically linked to some short-term reference rate and the borrower bears the risk of variation in the mortgage rate.

The ability to bear the interest rate risk can be enhanced, for example, by saving first for a buffer fund or choosing a mortgage with a variable interest rate that allows for extending the loan period if the interest rate increases. Eva and Daniel prefer to avoid the risks related to both the variation of yearly payments and the length of the loan period and therefore chose the fixed–interest rate mortgage.

Q2: What about having children?

Since both Eva and Daniel love the idea of having children, they must consider the consequent breaks in the working careers. The plan is that, for each child, Eva would take a break of 18 months and Daniel would continue with a six-month childcare period. Assuming two children, the affordability calculation must include four years of lower savings. The couple estimated that possible savings would be halved during these years,[1] resulting in a total loss of €48,000 to their saving plan.

There are at least two possible solutions to the problem: obtain a loan with longer maturity or postpone the purchase of the larger flat until they have saved enough for a higher self-financed share. The couple chose the first option but also noticed that they needed a larger flat because of the children. Therefore, they ended up asking for offers for a loan sum of €240,000 and a loan period of 14 years. With a 10% self-financing share, the maximum purchase price of the flat is €266,667.

1 Actually, the loss is larger during the year that Eva takes care of the children, because of her higher wage, and smaller in the divided childcare years, but this does not essentially change the affordability calculation if the average is €12,000 per year. The calculation also considers the family benefits Eva and Daniel will receive.

It turns out that the offers were similar as the previous ones in terms of loan type, interest rate, and the determination of the fixed costs. Eva and Daniel again compared the discounted sums of the yearly payments of the principal and interest and found that the offer of Bank 2, which provides equal total payments loans, was the better offer for them. Eva and Daniel again used the website calculator of Bank 2 to generate the prepayment schedule. The yearly payments were €19,824, somewhat lower than in the previous case. The fixed costs to be paid at the end of the first year were, at the time, €3,600 (1.5% of the loan sum).

Year	Bank 2			
	Balance owed	Principal payment	Interest payment	Total payment
1	240,000	0	0	3,600
2	224,976	15,024	4,800	19,824
3	209,651	15,325	4,500	19,824
4	194,019	15,631	4,193	19,824
5	178,075	15,944	3,880	19,824
6	161,812	16,263	3,562	19,824
7	145,224	16,588	3,236	19,824
8	128,304	16,920	2,904	19,824
9	111,045	17,258	2,566	19,824
10	93,442	17,604	2,221	19,824
11	75,486	17,956	1,869	19,824
12	57,172	18,315	1,510	19,824
13	38,490	18,681	1,143	19,824
14	19,436	19,055	770	19,824
15	0	19,436	389	19,824

They made a new affordability calculation assuming that the first child would be born in year 6 and the second in year 11. The first-year savings were again needed to finance the 10% own-financed share of the purchase price of the apartment (€26,667). The first-year balance of –€6,267 shows that they would have to postpone the purchase of the car and use these other savings to finance the initial expenditures.

Year	Affordability calculation			
	Yearly loan payments	Self-financing share	Yearly savings	Cumulative net savings
1	3,600	26,667	24,000	-6,267
2	19,824		24,000	-2,091
3	19,824		24,000	2,084
4	19,824		24,000	6,260
5	19,824		24,000	10,435
6	19,824		12,000	2,611
7	19,824		12,000	-5,214
8	19,824		24,000	-1,038
9	19,824		24,000	3,137
10	19,824		24,000	7,313
11	19,824		12,000	-512
12	19,824		12,000	-8,336
13	19,824		24,000	-4,161
14	19,824		24,000	15

15	19,824		24,000	4,190

Moreover, the sums saved during the childcare years (years 6 and 7 and 11 and 12) would not be high enough. The balance of cumulative savings shown in the last column would be negative only for some of the years in the future. Given that Eva and Daniel's wages are likely to grow yearly, these shortfalls are not likely to become a problem. This new plan confirms that they can afford both having two children and buying the flat. This calculation was made assuming that the interest rate is zero for the cumulative balance of total net savings, but a small positive number would not essentially change the saving plan.

Q3: Is it cheaper to live in a rented flat or to buy one?

Eva and Daniel had heard from their friends that renting a house means giving away money to the landlord and that paying the costs of your own flat means that you benefit from the payments. However, following this kind of rule of thumb is not always the best way to make informed decisions.

The simplest way to determine the difference is to compare the market rents of a given type of flat to the costs of living in a similar owned flat. The information is not, however, easily available, since the flats must be identical. For example, the maintenance costs, such as small repairs, are likely to be lower in younger flats. Luckily, Daniel's uncle, Peter, owns and rents out several flats and is therefore likely to be familiar with the details. Hence, the couple asked for help with the comparison.

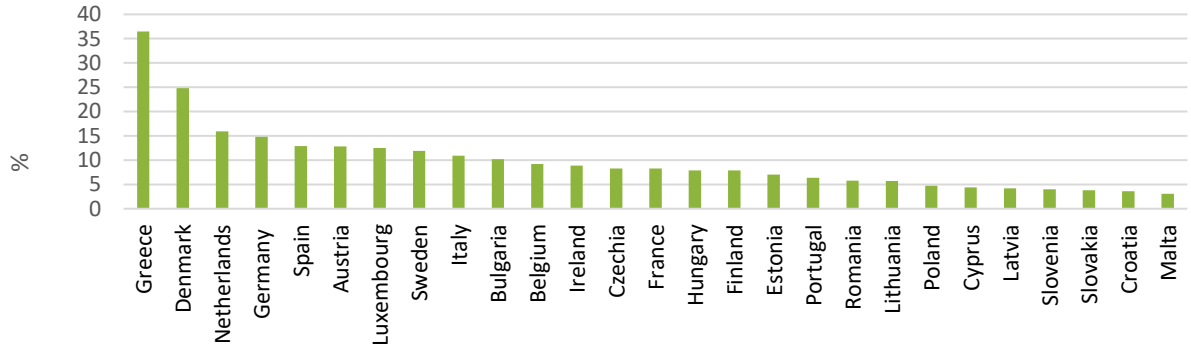
Peter happily agreed and said that he had a very good example for them, since he rents out a flat that is exactly similar to the one in which he lives. Both are financed with a loan and have similar maintenance costs and property tax to be paid. The only expenditure that differs is that Peter must pay tax on the net rental income that he receives. Since this tax increases his costs, he adds it to the rent. Therefore, renting a flat is more costly by the amount of tax paid, which is less than Eva and Daniel initially thought.

Additional country-specific issues to be considered in the comparison of costs

In many countries, there are flats with a lower rent or a housing allowance for low-income people, which can change the outcome of the comparison. In our case, Eva and Daniel are well off and not eligible for this kind of subsidy. Another issue is that the interest expenses for a landlord are deductible in taxation, but this is not the case in all EU countries for persons who live in their own flat. There are also country-specific deviations from the main rule that the right to live in your own flat is not taxed, and the property tax on an owner-occupied flat can differ from the property tax on a rented flat.

Figure 2 Housing cost overburden rate for 25- to 29-year-olds

The housing cost overburden rate is measured as the share of households that spend 40% or more of their disposable income on housing. This figure is higher for those who are starting their working career, due to their lower incomes, and typically highest for tenants who pay market rents.



Source: Eurostat, EU-SILC survey.

Q4: Is buying a house for yourself a good investment?

COMPARING INVESTMENTS

The **expected yield** is the average yield expected from an investment in the future. It is often approximated by the previously realized rate of return on similar investments. The expected yield can be divided into the running yield, which provides the yearly income, and a change in the market price of the investment.

Investment risks can be related to the variation of the yield or lower-than-expected average yield.

Liquidity measures the ease with which an investment can be converted into cash without accepting a price that is lower than the market price.

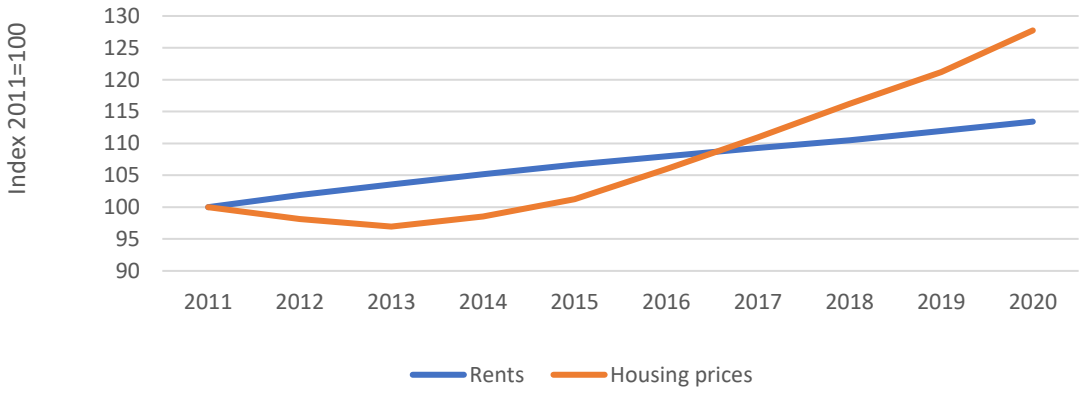
The next notion that Eva and Daniel often ran across is that, in addition to providing the necessary housing services, an owner-occupied flat is a good investment because of the continuous increase in housing prices. However, as the experience from the cost comparisons shows, this kind of belief must be taken with a grain of salt. The previous consultation with Peter increased the couple's confidence in his knowledge. Hence, they asked for his advice in this case as well.

The key properties to be used to compare various investments are the **expected yield**, the **investment risks** related to the variation in the yield, and **liquidity**. Liquidity can be measured, for example, by the time it takes to sell the flat, or the discount that must be given in comparison with market prices if the sale is speeded up.

Eva and Daniel started first to estimate the expected yield from an owner-occupied house. They noticed that one must first give a market price for the benefit of being able to live in their own home. Since the alternative is to live in a rented flat, the market rent of a corresponding flat provides one possible value for the price of the benefit. Therefore, the running yield can be calculated by deducting the maintenance costs and the real estate tax from the market rent of a corresponding flat and dividing the remainder by the market price of the flat.

Another element of the expected yield is the increase or decrease in house prices. Here Peter advised that the value of a house in cities is strongly affected by land prices. If the area is popular, there is the possibility of gaining in the long term, but in areas with migration losses, the expected change in house prices is negative. These expectations influence current prices. Regarding the risks of a housing investment, it seems that rents have an upward trend but are not likely to vary very much. In addition, the variation in housing prices is lower than for stock market prices. Realization of the price risk also requires that the couple sell their own flat when housing prices have generally fallen and do not buy a new one under the prevailing low prices.

Figure 3 Rents and housing prices in the EU



Source: Eurostat.

On the other hand, the flat will be the largest single asset during the lifetimes of Eva and Daniel. There is also the saying warning against putting too many eggs in the same basket. Translated into the language of expected yields and risks, it says that a well-diversified portfolio can have the same expected yield with lower risks related to variation in the yield. A housing investment limits the possibilities of a more diversified portfolio. One of the issues is whether the affordability risks and investment risks are correlated. In bad economic times, unemployment risk is high and stock market prices and housing prices are low. The correlation of the risks can be reduced by investing in riskless assets, but then the average yield declines.

How taxation influences the choice between housing investment and other savings

As noted previously, the benefit of living in one's own flat or house is not taxed directly in most countries. Moreover, the capital gain due to the potentially increased price when selling the flat is normally not taxed. A property tax applied to residential buildings or land is, however, quite common. Still another tax that must often be considered is a transfer tax, which is paid by the buyer in the case of the purchase of the flat. The influence of taxation on the choice between buying and renting a flat is highest in

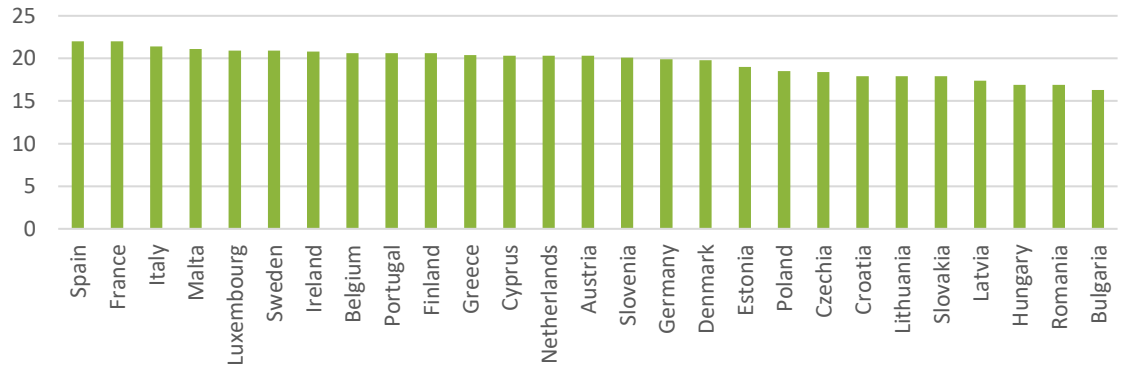
countries where capital income taxes are highest and mortgage interest rates can be deducted from taxable income.

To sum up, a housing investment is likely to generate a moderate but a rather stable yield compared to, for example, the performance of investments in the stock market. However, since a house represents the largest investment for individuals by far, it limits the opportunities for risk diversification. For Eva and Daniel, the lenient taxation of owner-occupied housing explained in the information box above is likely to be the single most important factor supporting purchasing a flat of their own instead of renting one.

Q5: Housing investment and old age consumption

Eva and Daniel attended Eva's family reunion and noted that four generations were present. Eva's grandparents said that this is the first time this has happened. The phenomenon illustrates well how life expectancies have lengthened. Economically, this means that people must prepare to live at least 20 years after retirement.

Figure 4 Life expectancy at age 65 in 2019



Source: Eurostat.

The main income source in retirement years is typically pensions, but these are often not high enough to compensate for the lost labour income and to avoid a drop in consumption possibilities. Living in an owner-occupied home lowers the housing cost and thus helps to maintain the consumption level. It also provides an asset that can be realized to add to purchasing power.

There are many ways to use home equity. Typically, the size of the home is rather big compared with the number of persons living there after the children have left and sometimes also after a divorce or

death of a spouse. One obvious way of converting part of the value of the home to consumption is to move to a smaller house or flat or sell it and rent a smaller place.

Another possibility is to use the value of the home as collateral for a consumption loan. These **reverse mortgages** are often designed so that there is no loan amortization, and the accrued interest and principal are paid when the loan period ends, or the owner sells the flat, or dies. In most countries, the market for reverse mortgages is not well developed, and there are therefore good reasons to check whether the interest rate and other costs that are charged are reasonable. The interest rate can be fixed or variable. There are also many different types of products in terms of monthly sums and loan periods.

If there is a lump sum payment for the full sum at the beginning of the loan period, the total interest payment of the loan can be high. On the other hand, a lump sum payment allows one to reinvest the principal and flexible use of the money, which can be useful, for example, in case of unexpected health costs or costs for long-term care. The monthly payments can also be fixed during the loan period. Finally, the loan period can be fixed for a given number of years or the borrower can receive payments as long as she or he is alive.

Risk sharing influences the costs of reverse mortgages. If the interest rate is fixed, it is higher than the expected average of the future yearly short-term reference interest rates, because the bank bears the interest rate risk. Furthermore, if the payments are provided as a **lifetime annuity**, the bank takes on the risk that the borrower will live a very long time and selling the house will not cover the loan principal and accrued interest. Therefore, the monthly annuity payment is smaller than that calculated using average expected lifetimes. Since the lender also bears the risks related to variation in housing prices, the maximum principal of the reverse mortgage loan is likely to be markedly lower than the current market value of the home.

Exercise

a) How would Eva and Daniel's initial affordability calculation change if the interest expenses can be deducted fully from taxed income and the income tax rate is 30%?

b) Let us assume that two friends are aiming to buy identical flats in the same building and live there. How would income and expenditures change if they rented their apartments to each other?

c) What happens to rents when capital income tax rates increase?

d) If housing prices first increase by 10% and then decline by 10%, are the prices the same, higher, or lower than before the prices changed?

e) Global warming and the actions aimed to prevent it are likely to influence housing costs. Try to find reasons why the costs could increase.

f) Use the equation below to calculate the yearly total payment from an equal total payment loan of €240,000 with a loan period of 14 years and an interest rate of 2%. The formula for the calculation is

$$A = \frac{N \times (1+r)^T \times r}{(1+r)^T - 1}$$

where *A* is the amount of each equal payment, *N* is the amount of the mortgage, *T* is the loan period, and *r* is the interest rate.

Answers

a) The after-tax interest expenses would decline by 30%, which corresponds to a situation in which the interest rate declines from 2% to 1.4% (0.7 x 2% = 1.4%).

b) Both must pay capital income tax for the rental income.

c) Rents increase since the owner must pay taxes on rental income.

d) The prices are lower.

e) Climate change increases the average outdoor temperature, which limits the need for warming, but increases the need for cooling. The prices of fossils fuels as well as the prices of home insurances are likely to increase.

f) The yearly payment is the same as for Eva and Daniel buying the larger flat.

$$yearly\ payment = \frac{240{,}000 \times (1+0.02)^{14} \times 0.02}{(1+0.02)^{14} - 1} = 19{,}824.47$$

THE MAIN ISSUES

- The facts related to housing choice are important, because everyone must live somewhere, and the purchase of a home is one of the largest financial decisions that individuals are likely to make.

- The affordability of a mortgage is typically most challenging at the beginning of one's working career, especially if the first yearly payments of the mortgage are higher.

- Society often provides support for low-income people in terms of low-rent apartments or housing allowances. Eligibility for these can well mean that renting a flat is financially the best choice.

- On the other hand, society supports home ownership in terms of taxation. The most typical tools are exempting the benefit of living in one's own flat (sometimes called imputed rent) from taxes and leaving the capital gains on owner-occupied principal residences untaxed. Correspondingly, a landlord's net rental income and capital gains are taxable.

- A landlord's interest expenses are tax deductible, but the tax treatment of the interest expenses of a mortgage varies between countries, which can influence the comparison between housing costs.

- The lenient tax treatment of owner-occupied housing also makes the purchase of one's own home a good investment for old age, presuming that the flat or house is situated in an area where the housing prices are likely to increase.

- Owning a flat or a house at the time of retirement means that the costs of living in old age will be lower and that there is also the possibility of converting part of the value of the home to consumption by using it as collateral for a reverse mortgage.

Booklet #5

Booklet Series "Be in charge of your life cycle"

MAPPING YOUR FUTURE: PREPARING FOR RETIREMENT

ANGLE

www.angle-cerp.carloalberto.org

This booklet is number five in a series of five booklets that aim at improving economic and financial literacy of young people. Economic and Financial Literacy is basic knowledge possibly to be acquired early in life to make individual financial decisions better informed and more effective. This applies particularly to decisions that have long-term consequences and require thinking in terms of the individuals' complete life cycle. Although the five booklets are connected and refer to each other, each of them can be read independently of the others.

The first booklet in the series provides a general introduction on the concepts needed to make financial decisions over the life cycle. The other four booklets cover the most important economic decisions relevant at various stages of the life cycle. The second booklet is about educational choices, such as the decision when to leave school and enter the labour market or how much effort to invest in studying. Booklet 3 deals with the economics of saving and borrowing and what to do with money that is saved. Booklet 4 discusses many aspects of what is often one of the most important financial decisions in people's lives: the purchase and financing of their own house. Finally, Booklet 5 (this booklet) is about pensions and financial security after retirement.

The five booklets are part of the project "A network game for lifecycle education" (ANGLE), funded by the Erasmus+ programme of the EU. This project aims at promoting and enhancing Europe's younger generations' financial and economic literacy. It adopts a life-cycle perspective to help the young to consider a long-time horizon and to think about the future consequences of their decisions. In addition to the booklets, ANGLE focuses on creating a board game that helps the young to improve their financial and economic skills through active involvement and participation. Reading the booklets is an excellent preparation for playing the game. Also for readers who do not play the game, however, they help to make people more conscious and skilled in making important economic and financial decisions.

The booklet has been realised by **Arthur van Soest** of Tilburg University

Realised with the financial support of the European Union – **Erasmus+** programme

Find more information on: **https://www.carloalberto.org/wwwangle-cerpcarloalberto.org**

Co-funded by the Erasmus+ Programme of the European Union

BOOKLET 5 – RETIREMENT CHOICES

Juliette, Albert and Joe: preparing in advance for retirement

Many people near the end of their working career regret 'not saving early enough': According to recent research by the insurance company Aegon, more than half of all workers wish they had started to save for their pension earlier or regret having taken a break from saving.[1, 2]

Similarly, another survey finds that 'failure to save earlier in life to build up a pension is the biggest financial regret for over a quarter of over 65-year-olds.'[3]

In all developed countries, the large majority of individuals retire when they get old: they no longer earn wages and usually receive an *old age pension* instead. During their working life, part of their earnings is withheld and used to build up this pension. The pension gives them a monthly income from the time they retire until they die or simply gives them the amount they have built up through their contributions in the form of financial wealth that they can use to maintain their standard of living or spend in other ways. The way in which pensions are organized varies across countries and occupations. In many countries, pensions organized and provided by the government play a large role (first pillar). In other countries, employers work with an occupational pension fund to organize the pension savings for their workers (second pillar). Additional voluntary pension arrangements can be made on an individual basis, for example, by self-employed workers (third pillar).

In this booklet, we focus on what pensions mean for individuals before and after retirement, and not so much on pension institutions or how the pension system is organized. The general idea is that pension contributions essentially transform current income into future income, independent of the exact nature of the pension system.

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[1] Creative, 'Pension Savings and Members' Biggest Pension Regret', creativebenefits.co.uk.
[2] Retirement Planner, 'Members' biggest pension regret is "not saving early enough", Survey, retirement-planner.co.uk.
[3] Blue Sky Financial Planning, 'Failing to save for pension is top money regret of over 65s', blueskyfp.co.uk.

Pension savings are crucial to guarantee an adequate standard of living and financial well-being in old age. Depending on many factors, some individuals will almost automatically build up an adequate pension, while others must be more active to save enough for retirement. Pension contributions at working age provide income after retirement, and, due to the expected return on investment, contributions at an early age can be particularly valuable, even though retirement is still far away. This makes it important to account for the pension consequences of labour market choices early in one's career. A job with a good pension provision and somewhat lower pay can be more attractive than a similar job with higher pay but without a pension provision.

In this booklet, we discuss the main common features of pension systems in Europe. We will explain why retirement planning and pensions already matter for the labour market decisions and financial planning of individuals at an early stage of their career. Some questions we consider are the following:

- Should you worry about your pension when choosing your first job or when deciding to switch jobs?
- If you have the choice to save for a voluntary pension or to save in a different way, what are the considerations that can help you make that decision?
- What does it mean to have an adequate pension, and how can you investigate whether your pension will be adequate?
- What are the consequences of your pension arrangement for your partner and children, and do these matter for the choices you make?
- How do pensions relate to your planning for earlier or later retirement?
- How does your pension fit into the complete picture of your financial life cycle planning?

Two very different labour market careers

In this section, we introduce several important concepts in the context of pensions, using two very different examples. While institutional arrangements vary greatly across countries, the main characteristics of financial preparation for retirement in these two examples are representative of many European countries.

1. Juliette: An employee with a model pension

Juliette has made a career in the public sector, working for several ministries in different jobs. She started as a young civil servant, helping to write policy reports for the Ministry of Employment, and after a series of promotions and switches to different ministries, she is now turning 63 and is the head of one of the departments of the Ministry of Finance. Since she has always worked in the

public sector, there have not been any changes in her pension arrangement. Part of her salary was always used to build up her pension, and her employer contributed an even larger share. This was the default plan offered by her employer (and other employers in the public sector). Juliette did not have to worry too much about it, as long as she stayed in the public sector and automatically accumulated more pension rights every month.

Following the advice of her colleagues, Juliette always kept track of her pension wealth, since she realized that the process of making sure you have an adequate pension starts already early in one's career. Now that she has reached age 63, she wants to get a more detailed view of her financial situation after retirement. In terms of non-pension wealth, she has put all her savings into her house, with the result that she paid the last payment on her mortgage last month: she is now completely free of mortgage debt! On the other hand, she has no financial wealth.

Recently, however, not only has Juliette been studying the pension overview that she receives every year, but she has also been visiting her personal pension website, where she can use a tool to explore her choice opportunities at retirement. The first thing she wants to know is how much pension wealth she has accumulated throughout the years and how much she can still add during the years to come. Her official retirement age is 67, which is the age at which her employer will normally force her to retire. She can retire earlier if she wants.

Juliette's accumulated pension wealth is illustrated in the figure below. If she were to retire now, her accumulated pension wealth would be €680,000 (left-hand side of the graph in the figure). If she keeps working until age 67, the expected amount (assuming her earnings do not change) will be €800,000 (right-hand side of the graph). The longer she works, the higher the total amount will be. There are two reasons for this: First, as long as Juliette works, she and her employer make new contributions. Second, the contributions from the past are invested by the pension fund, with a positive return on investment. The longer wealth remains invested, the higher its ultimate value will be.

Although not directly relevant to what Juliette can do once she retires, it is interesting to see how accumulated pension wealth builds (see the different colours in the graph, ignoring the yellow line at the top). The orange portion at the bottom is Juliette's own contribution, the amount she has paid and is paying herself directly over the years, subtracted from her gross wage. The light blue portion is the amount directly paid by her employer. (This is not part of Juliette's gross wage, but it does incur additional labour costs for the employer.)

The dark blue portion of the graph comes from the return on investment. This is by far the largest chunk (€440,000 at age 63 and more than €500,000 euros at age 67)! The reason is that many contributions were already made years ago, at earlier stages of Juliette's career. This part of her pension wealth has had a long time to grow, with, on average, positive returns during quite some years. In Booklet 1, you already learned that, in the long run, the total gain of an investment can become substantial, even with a modest rate of return per year.

Exercise 1 Accumulated pension wealth at different retirement ages (see 🕮 Booklet 1 for details on compound interest)

a. Suppose the rate of return is 4% and you start investing with wealth €10,000. You leave the money alone and do not make new contributions either. How much wealth do you have after 10 years? After 30 years? How long does it take to double the amount with which you started?
b. Now suppose that you contribute €10,000 in each year for 10 years. The rate of return is again 4%. How much wealth do you have after 10 years? Let us assume that

all contributions are made on January 1, and we want to know the value at the end of the year in which you made the final contribution.

Answers

a. With compound interest, after 10 years, we obtain 10,000 x $(1 + 0.04)^{10}$ = 10,000 x $(1.04)^{10}$ = €14,802.44; after 30 years, we obtain 10,000 x $(1 + 0.04)^{30}$ = 10,000 x $(1.04)^{30}$ = €32,433.98. After *k* years, the amount is 10,000 x $(1.04)^{k}$. If we set the amount equal to €20,000, we get $(1.04)^{k}$ = 2. Now $(1.04)^{17}$ = 1.948 and $(1.04)^{18}$ = 2.026, so it takes 18 years to double the amount.

b. The first contribution (made at t = 0) has 10 years to generate a return, so its final value is 10,000 x $(1 + 0.04)^{10}$. The second contribution is made one year later and only has nine years to generate a return, so its final value is 10,000 x $(1 + 0.04)^{9}$, and so forth. The last contribution has one year to generate a return, and its final value is 10,000 x (1.04). The total value of all contributions at t = 10 is 10,000 x ($1.04^{10} + 1.04^{9} + \cdots + 1.04^{1}$) = 10,000 x 1.04 x ($1 + 1.04 + \cdots + 1.04^{9}$). Using the formula for a geometric series (see Booklet 2) or just adding up the 10 numbers, we find that this value is 10,400 x $(1 - 1.04^{10})/(1 - 1.04)$ = 10,402 x 0.4802/0.04 = €124,863.

Assuming that Juliette will retire at age 67, the amount €800,000 sounds great, but, in fact, this amount is not so informative to her. The rules of her pension fund imply that she cannot use this amount in whichever way she wants. It will be used to generate monthly income from the moment she retires for as long as she lives. (Juliette is single, otherwise there could also be an arrangement for her partner if Juliette were to die.) In principle, the monthly income will remain the same during the rest of her life in purchasing power terms, that is, price changes will be accounted for by raising the nominal amount. This means that, to evaluate what Juliette can do with this amount, she can assume that prices remain the same over time; if they change, her cost of living and her income will change in the same way.

The annual payment as long as Juliette lives is called a (*pension*) **annuity**. The amount obviously depends upon her total pension wealth when she retires (used to buy the annuity), as well as on her retirement age: if she retires later, the expected number of years that she will receive the annuity will drop, so the monthly amount can be higher. Using the tool on her personal pension website, Juliette figures out that her before-tax (gross) monthly income from the annuity if she retires at age 67 will be €3,200. If she retires at age 63, it will be €2,800. Using the income tax rules that apply to Juliette, the tool shows that her after-tax monthly income (net income) from the annuity will be approximately €2,080 if she retires at age 67, and €1,904 if she retires at age 63.

PENSION ANNUITY

An annuity is a product that pays you a regular income. A **pension annuity** is a special case of this, meant to provide a stable income after retirement. Once in payment, it cannot be changed, and it is payable for the rest of your life, no matter how long you live. It therefore provides ***insurance against longevity***: you will never run out of money, even if you live much longer than the average individual.

The income you will receive depends on the amount of money in your pension plan, your age when the annuity starts, and other options you may be able to choose (e.g. a provision for your partner if you die before your partner). Depending on the nature of your pension plan, the amount can also depend upon the market conditions at the time you buy the annuity.

Exercise 2 (income from a pension annuity):

a) Explain why this annuity implies an insurance against living very long.

b) Check that the percentage difference between the net and gross income is larger if Juliette retires at age 67 than if she retires at age 63. Can you explain why?

c) Assume Juliette retires at age 67. At age 67, Juliette's expected remaining lifetime is about 21 years. Compute the total gross amount she expects to receive during these 21 years (just the total amount, not the present value). Compare this with her pension wealth at age 67.

d) If Juliette had a partner and wanted her partner to receive some of the pension if dies before her partner does, would the monthly amount she gets be higher, lower, or the same?

Answers

a) The longer you live, the higher your total living expenses are. If you just spent your wealth, you run the risk of running out of money if you live very long. With an annuity, this risk is covered, since the annuity guarantees the same income every year for the rest of your life.

b) The figure of 2,080 is 65% of 3,200, while 1,904 is 68% of 2,800. The reason is that the tax system is always progressive: the higher your gross income, the larger the percentage of your gross income paid as income tax, so the lower the percentage that remains as after-tax income.

c) A total of 21 years, 12 months each year, so 12 x 21 x €3,200 = €806,000. this differs from pension wealth at age 67 (€800,000), since the amount still generates a return

after age 67. On the other hand, there are also costs and an insurance premium charged by the pension provider, which reduce the monthly annuity.

d) Lower, since part of the pension wealth Juliette has accumulated will be used to provide insurance for her partner.

The amounts mentioned above do not depend, in principle, on the returns that the pension fund makes on the invested wealth of the participants, since the plan is a **Defined Benefit plan (DB)**. (There is a small risk that the pension fund will face financial hardship and will be forced to lower the amounts it gives to all its participants, but Juliette decides to ignore this.) This would be different for a **Defined Contribution plan (DC)** (see Booklet 1), where the annual pension income depends directly on the returns the pension fund makes in the financial market.

The final step in evaluating the adequacy of Juliette's pension is the comparison with what she wants to spend once she is retired. Her pension fund offers a tool for this as well. Juliette can indicate how much money she expects to spend per month on different categories of commodities and services: mortgage or rent; heating, electricity, and other fixed costs; insurance; transportation; food and sundries; personal care; health; leisure activities; and other. Adding up these expenditures gives the income that she would need.

DEFINED BENEFIT (DB) and DEFINED CONTRIBUTION (DC) PENSION SCHEMES

A **defined benefit (DB) pension plan** is a type of pension plan that promises specified pension payments, computed from the employee's earnings history, tenure of service, and age. It does not depend directly on the individual investment returns. Traditionally, many governmental and public entities, as well as many larger companies, provide DB plans. Contributions are usually made by the employer (on top of the employee's salary) and the employee (using part of the gross salary) and are often treated favorably for tax purposes.

A DB plan is defined, in the sense that the benefit formula is defined and known in advance. Conversely, for a **defined contribution (DC) retirement saving** plan, the formula for computing the employer's and employee's contributions is defined and known in advance, but the benefit to be paid out is not known in advance. In many countries and for many occupations, participation in the plan is mandatory. Sometimes, the contributions are flexible within certain bounds, so the employee can (to some extent) choose how much to invest in pension wealth. In other cases, there is no flexibility whatsoever, and everything is automatic.

To help her with this difficult task, the pension fund informs her what an average household with a similar income would spend in each category. Juliette can use these amounts but will probably deviate from them. For example, she owns her house and has already completely paid off her mortgage, so her housing costs will be much lower than the comparison benchmark. (See also Booklet 3, which describes the key principles of budget management.)

Juliette concludes that she expects to spend €2,000 per month, but there is uncertainty: she might also want to spend more. For example, if her health deteriorates, she may want to hire someone to do the cleaning and shopping. She considers it very unlikely, however, that she will need more than €2,300 per month. If necessary, she could also exploit her housing wealth and acquire a *reverse mortgage*, enabling her to spend part of the money invested in her house without having to move. (See Booklet 4 for more on mortgages and housing.)

Exercise 3 (early retirement and making ends meet):

a) Would you advise Juliette to retire at age 63? Why or why not?

b) If Juliette insists on retiring at age 63 because she is really fed up with her job (and does not think another paid job will be better), what can she do to make this financially feasible?

Answers

a) Without additional income, the answer seems to be a clear no, since her monthly income (€1,904) would not be enough to cover her expected cost of living (€2,000).

b) Essentially, there are two possibilities. One is to spend less than originally planned and accept a lower standard of living. This has the obvious disadvantage that Juliette would not be able to afford the luxuries she is used to. The other possibility is to borrow money. The most attractive way to do that, in her case, is probably through a *reverse mortgage*. This would allow her to spend the savings that she has invested in her house.

Albert and Joe: Never worked for a boss!

Albert and his partner, Joe, always valued their independence and take pride in saying that they never worked for a boss. This does not mean that they did not work, of course: throughout the years, they made a living with freelance jobs. Albert worked many years as an independent photographer, and his partner is a freelance journalist. Since several years, they have been specializing in history and architecture and now they mainly offer guided walking tours, showing foreign and domestic visitors their city's historic highlights and beautiful architecture. They enjoy

their work, taking Mark Twain's words in Booklet 1 very seriously: 'Find a job you enjoy doing, and you will never have to work a day in your life.'

Albert and Joe always made a point of enjoying life more than saving for an unsure future or a distant old age. They rent an apartment in the city's centre and spent most of the income they did not need for expenditures on traveling to exotic places such as Brazil and Thailand. Consequently, they have not accumulated any financial wealth and no housing wealth.

Although Albert and Joe like their jobs and have no intention of retiring, they recently faced some health problems and started thinking that perhaps they cannot continue working like this forever. They both recently turned 60 and, for the first time in their lives, considered their financial future in the somewhat longer run, beyond their next trip to another exotic part of the world. They talked to some friends and went on the Internet to learn the basics of the pension system in their country.

The first thing they discovered was that, as in many other countries, the pension system has essentially **three pillars**. First, they will be entitled to a state pension (first pillar) as soon as they reach the official retirement age of 67 years. According to the rules in their country, this will provide them with a basic income of about €1,000 per month, enough to keep them out of poverty if they do not have debts or excessive fixed costs, such as a very high rent. They will get this pension in any case, whether they continue to work or not. As long as they retain their monthly earnings, it is just extra income every month – something to look forward to!

The second pillar does not apply to Joe and Albert, since they were always self-employed and never worked as employees. Like almost all self-employed and freelance workers, they did not contribute to an occupational pension and never will. They could have built up their own pension voluntarily in the third pillar, but until now they did not – they had other priorities! They might regret this now, but they enjoyed their lives until now and there is no reason for immediate panic, particularly not as long as they continue to work.

What can Joe and Albert conclude and what should they do in terms of planning for their future? The first thing they conclude is that it is probably not a good idea to retire earlier than or even at age

67. This would lead to a dramatic loss in earnings and without other income sources on which to rely. Their only income would be the state pension. They would have to move to a much cheaper apartment, probably on the outskirts of the city instead of in the lively city centre, and they would have to change their lifestyle dramatically.

THE THREE PILLARS OF MOST EUROPEAN PENSION SYSTEMS

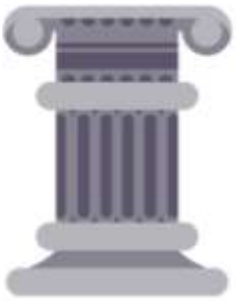
First pillar: The first pillar is the state pension, organized at the national level. It usually pays a monthly annuity that can depend on the number of years of residence in the country, the individual's earnings and contribution history, and/or the individual's needs (i.e. other sources of income). In some countries (e.g. Italy, France, Poland, and Germany), the first pillar is the main pension provision, whereas in other countries (e.g. the Netherlands), it only provides a basic income that is just enough to stay out of poverty in old age. First pillar pensions are usually funded through taxes or the contributions of current workers (called a pay-as-you-go system).

Second pillar: The second pillar is a pension linked to an occupational fund, usually a DB or DC and often mandatory, with independent investment management by a pension fund or insurance company, usually organized through the employer or a group of employers in the same sector. It supplements the state pension and aims to help employees smooth consumption over their life cycle and maintain their pre-retirement standard of living when they retire.

Third pillar: The third pillar consists of voluntary pension contributions in various forms, including occupational and private saving plans, offered by insurance companies, banks, or other financial companies. These can supplement the first and second pillar pensions or replace these pensions for groups with little first or second pillar savings, such as the self-employed.

This is not really a problem for them in the short run, as long as they stay healthy and enjoy the work they are doing. After all, the advantage of being one's own boss is that there is no age-related mandatory retirement, and Joe and Albert can keep doing what they do now for as long as their health permits. They can also gradually downsize their effort by working fewer hours. The state pension would allow them to do so at age 67 without a reduction in monthly income.





Still, there is a risk due to ageing and deteriorating health. The smaller health issues they already face have made them realize that they probably will not be able or want to do the same job when they are 77, for example, and negative health shocks might even come sooner. Finally, they decide to start planning for retirement!

Joe and Albert are currently still healthy enough to work as much as before and make the same earnings. They decide to change their lifestyle and give up part of their life, reducing, for example, the number and extravagance of their exotic trips and their visits to fancy restaurants. That way, they think they can save about €10,000 each year in the years to come. They decide to invest the money in a third pillar voluntary pension and make an appointment with a reliable financial advisor recommended by some friends to arrange this.

The financial advisor is immediately enthusiastic about making a decent and feasible plan. For a moment, she wants to say how sorry she is that Albert and Joe did not come to her earlier, since earlier investments would have given positive average returns for more years, and it would have been much cheaper to build up a decent amount of pension wealth (see Juliette's story). However, she keeps these thoughts to herself, since there is no use in blaming her clients for something they cannot undo.

Since the state pension provides a basic income and because the time horizon is reasonably long, the adviser thinks that Albert and Joe should invest their money in risky financial assets, to raise the expected return. She advises a pension investment with a company that guarantees that the money will only be used to finance socially responsible and sustainable companies. The company convincingly argues

that the expected annual return on the investment is 5%.

Exercise 4 (accumulating pension wealth – an optional exercise that requires some serious calculations):

a. Suppose Albert and Joe invest €10,000 each year for the next five years. They do not want to commit to investing more in the five years after that, but they do intend to let the investment grow for another five years. What will their expected pension wealth be after 10 years?

b. There is no guarantee that the actual return will always be 5%, but their financial advisor convincingly argues that it is very unlikely that the average return will go below 2% (the worst case). There may be a few years with negative returns, but, most likely, these will be compensated by years with returns that are higher than 5%. It is also very unlikely that the average return will be above 8% (the best case). What will be the pension wealth amount be after 10 years in these two extreme cases?

c. The financial advisor is a real expert and knows that pension contributions are tax deductible, since Albert and Joe did not accumulate much pension wealth yet relative to their earnings, because the tax rules allow for *delayed taxation*. This means that Albert and Joe can invest much more than €10,000 per year. The (marginal) tax rate they face is 37.5%. How much can they invest each year if the net amount (after tax) they spend on pension savings is €10,000? What will be the answer to question a if they invest this amount instead of €10,000?

Answers

a. The investment amount is €10,000 every year for five years, with a rate of return of 5% for a period of 10 years. Similar to Exercise 1b, the expected pension wealth after 10 years is $(1 + 0.05)^5$ x 10, 000 $(1.05 + 1.05^2 + \cdots + 1.05^5)$ = 10, 000 x $(1.05)^6$ x $[1 - (1.05)^5]/(1 - 1.05)$ = €74,048.74.

b. Using similar calculations with different rates of return yields the following: if the rate of return is 0.02, €58,605.94; if the rate of return is 0.08, €93,095.58.

c. Since the tax rate is 37.5%, if the amount they invest in pension wealth is 1/(1 – 0.375) x €10,000 = €16,000, the tax they will have to pay is reduced by 37.5% of this, that is, by €6,000. This means their net pension savings will be €10,000. In that case, their pension wealth of 1.6 x €74,048.74 = €118, 478. Quite a bit more than the amount obtained in a!

DELAYED TAXATION (THE REVERSAL RULE)

Delayed taxation means that pension contributions are exempt from income tax.

Instead, the pension income is taxed once it is received by the individual (after retirement). Many countries use this as a tool to stimulate pension savings. The most common situation is that income is higher during the working years than after retirement. Since marginal tax rates increase with income, this means that delayed taxation not only delays paying taxes, but also reduces the total income tax paid over the life cycle. In other words, delayed taxation is an implicit subsidy on accumulating pension wealth.

Before making their decision, Albert and Joe want to know what the accumulated amount of pension wealth really means for them. A condition for favourable tax treatment is that the amount be used to buy an annuity, in this case an annuity on two lives: Albert's and Joe's. To simplify matters, let us split the amount into two equal parts, used to buy two separate annuities, one on Albert's life and the other on Joe's life. This means that the surviving spouse receives half of what the couple receives when the other spouse passes away.

The financial advisor proposes buying two simple annuities with certain annual amounts and no risk due to changing financial market conditions. Albert and Joe intend to claim their annuity once they turn 67. The situation is the same for each of them and essentially also the same as for Juliette in the previous example. The only difference is the total amount of pension wealth, but the annuity amount is proportional to the amount of pension wealth: if pension wealth is twice as high, the monthly annuity before tax is also twice as high.

Exercise 5 (income from a pension annuity optional – requires some serious calculations):

a) Using the numbers for Juliette's annuity and combining them with the results in Exercise 4c, determine the expected before-tax monthly annuity payments for Albert and Joe individually and as a couple.

b) Determine the same amounts, but now in the worst-case scenario of Exercise 4.

c) Assume that Albert and Joe face the same income tax rules (the tax system treats them as individuals who both receive the same income). What can you say about the after-tax monthly amounts that Albert and Joe can expect?

Answers

a) Retiring at age 67 gave Juliette a pension wealth of €800,000. For this amount, she could buy an annuity of €3,200 per month (before tax). Albert and Joe expect to have €118,478 in total pension wealth, or €59,239 each. Assuming that everything works proportionally (ignoring fixed costs and assuming that Juliette's and Albert and Joe's company operate in the same way), this would provide a gross monthly annuity of 59,239/800,000 x 32 = €237 per month for each of them, or €474 for the couple. This

would be in addition to their basic pension of €1,000 per month, so their total income would be €1,474 per month.

b) In the worst-case scenario, their pension wealth would be 1.6 x €58,606 = €93,770 (€46,885 each). This would give them an annuity income of €375 per month plus a basic pension of €1,000.
c) The proportion of income that must be paid in the form of taxes will be lower than for Juliette (even if Juliette retired at age 63; see Exercise 2), since their income is lower and the tax system is progressive. Their net income will therefore be at least 0.68 x €1474 = €1,002 per month.

Pension systems across countries

The two case studies presented above hopefully give you some first insights into the complicated world of pensions. For more details, country-specific rules matter a great deal. Each country has its own pension system, with its own complexities and advantages and disadvantages. It is not possible to explain the features of all these pension systems in this booklet. Some pension systems are arguably better than others, and there is an international ranking that makes the pension experts proud in some countries, such as the Netherlands and Denmark, and less proud in other countries, including Japan, perhaps surprisingly (see Stylized Facts Figure 1).

Figure 1 Stylized Facts: The 2019 Melbourne Mercer Global Pension Index

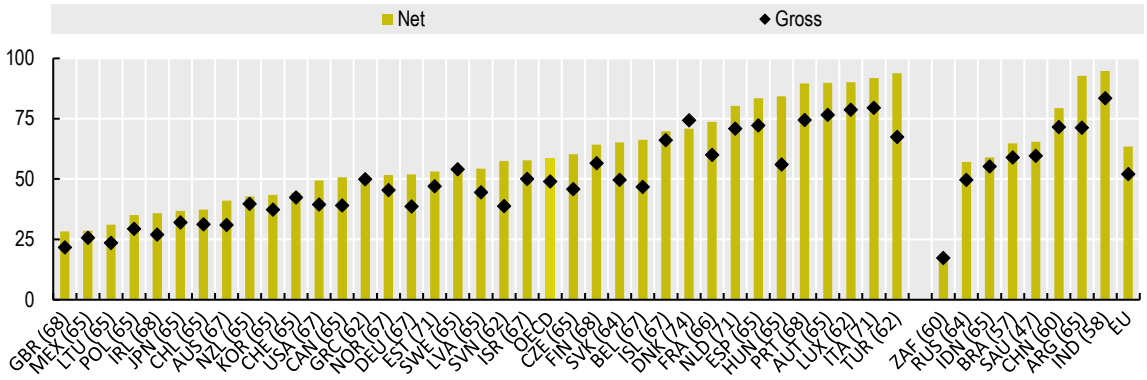
Grade	Index Value	Countries		Description
A	>80	Denmark Netherlands		A first class and robust retirement income system that delivers good benefits, is sustainable and has a high level of integrity.
B+	75–80	Australia		A system that has a sound structure, with many good features, but has some areas for improvement that differentiates it from an A-grade system.
B	65–75	Canada Chile Finland Germany Ireland	New Zealand Norway Singapore Sweden Switzerland	
C+	60–65	France Hong Kong SAR Malaysia	UK USA	A system that has some good features, but also has major risks and/or shortcomings that should be addressed. Without these improvements, its efficacy and/or long-term sustainability can be questioned.
C	50–60	Austria Brazil Colombia Indonesia Italy	Peru Poland Saudi Arabia South Africa Spain	
D	35–50	Argentina China India Japan Korea	Mexico Philippines Thailand Turkey	A system that has some desirable features, but also has major weaknesses and/or omissions that need to be addressed. Without these improvements, its efficacy and sustainability are in doubt.
E	<35	Nil		A poor system that may be in the early stages of development or non-existent.

Source: Table 5 in https://info.mercer.com/rs/521-DEV-513/images/MMGPI%202019%20Full%20Report.pdf.

One criterion for the ranking is the average earner's net replacement rate, that is, the ratio between the net pension income and net earnings before retirement. This amount varies substantially across countries, as shown in Stylized Facts Figure 2. In the European Union (EU), the average net replacement rate in 2018 for an average earner was approximately 64%, varying from less than 28% in the United Kingdom to more than 90% in Italy.

However, the average earner is not the only person that matters; perhaps the most important factor is how the pension system prevents poverty among the elderly (say, the population of those 65 and older). Stylized Facts Figure 3 tells us that, in South Korea and China, poverty among the elderly is very high, much higher than in other age groups, whereas in countries such as the Netherlands and France, poverty among the elderly is quite rare. This can largely be explained by the pension system, which provides a basic income to almost everyone, irrespective of their employment or earnings history.

Figure 2 **Stylized Facts: Net and gross replacement rates for an average earner**



Source: OECD Pensions at a Glance, 2019. Official retirement ages are in parentheses.[4]

Exercise 6 Use Stylized Facts Figure 2 to answer the following questions:

a) What is the average net replacement rate for an average earner in the EU countries?

b) Which EU country had the highest net replacement rate for an average earner? And which EU country had the lowest net replacement rate?

c) Why is the net replacement rate usually higher than the net replacement rate?

Answers

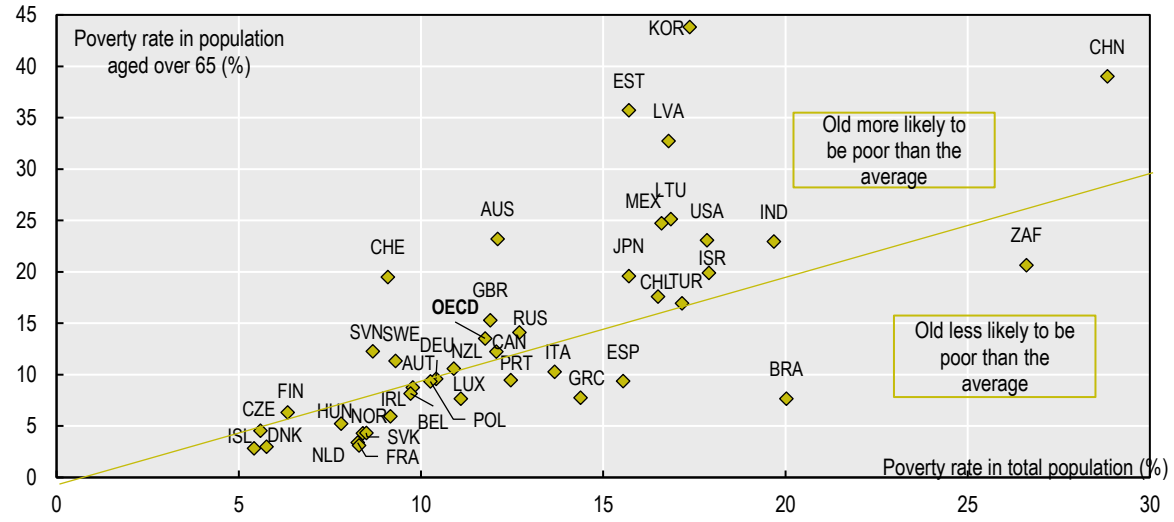
a) Approximately 65%. See the histogram bar on the far right of the figure.

b) The United Kingdom had the lowest net replacement rate, and Italy the highest.

c) This is because the tax rate is higher for higher incomes. Since income before retirement is higher than after retirement, the tax is also higher before than after retirement.

Figure 3 Stylized Facts: Income poverty rates by age, older versus total population in 2016 or the latest available year

[4] See https://www.oecd-ilibrary.org//sites/b630ed29-en/index.html?itemId=/content/component/b630ed29-en#figure-d1e28616.



Source: OECD Pensions at a Glance, 2019.[5]

Exercise 7 Use Stylized Facts Figure 3 to answer the following questions:

a. What is the poverty rate among the elderly in the OECD, on average? And the poverty rate for the entire population?

b. Which countries have the lowest poverty among the elderly in the EU? Are these also the countries with the lowest poverty rates for the entire population?

Answers

a. See the dark blue diamond; approximately 14% among the elderly and approximately 12% for the entire population.

b. Denmark, France, and the Netherlands have the lowest poverty rates among the elderly (approximately 3%). The Czech Republic has the lowest poverty rate for the population as a whole (less than 6%).

If you want to know more details about the pension system in your own country, you can find an incredible amount of information on the Internet, perhaps too much. A better way to start for most of you is probably to consult your human resources manager, a senior colleague, or an expert friend or family member.

THE MAIN ISSUES

[5] See https://www.oecd-ilibrary.org//sites/fb958d50-en/index.html?itemId=/content/component/fb958d50-en#figure-d1e41733.

- It is important to account for the pension consequences of choosing among different jobs. If your employer contributes to building up pension wealth, you can see this as delayed earnings. A good pension arrangement can compensate for a lower wage. This already applies at early stages of your career.

- Generally (but not always), a permanent job as an employee for a large or medium-sized firm automatically comes with a pension arrangement. In other cases, particularly if you are self-employed or work freelance, you should make your own arrangements.

- If you can choose how much to save for your pension, you should realize that it is often beneficial to invest in your pension wealth rather than in financial assets, because of the tax-favoured treatment of pension contributions and, sometimes, subsidies on pension contributions provided by your employer.

- Contributions made at an earlier age have more time to generate positive returns and will normally provide a greater increase of your pension than contributions made just before you retire. This makes it worthwhile to start planning for your retirement at an early stage in your career, particularly if you do not fall under a mandatory pension arrangement.

- There are many different pension schemes (e.g., mandatory or not, DB or DC, paid by the employer or the employee). DC pensions are usually riskier than DB pensions, since pension wealth depends directly on financial market conditions.

- There are many other sources of risk: inflation (purchasing power vs. nominal value), unemployment risk, earnings variation, household composition (divorce, widowhood), medical expenditures, and so forth. This makes it impossible to plan everything perfectly. This uncertainty can encourage you to be prudent in your choices and account for the worst-case scenario.

- Not only does your income after retirement matter, but also your expenditures. If you know you will spend much less once you have retired (e.g. because your mortgage is completely paid off), a lower pension could be enough to maintain your standard of living.

- When you retire, your pension wealth can be transformed into an annuity. Sometimes this is mandatory and sometimes you can choose to receive part or even all of your pension wealth immediately (a lump sum). The annuity usually gives you a fixed amount until you die, insuring you against running out of money due to living longer than expected. The annuity guarantees that you will have an income as long as you live (and it will stop if you die).

- On the other hand, a lump sum provides liquid wealth that you can use in several ways, for example, to pay off your mortgage. If you die, what remains of the lump sum goes to your heirs as a bequest.

- If you have a partner and/or dependent children, you should, of course, consider the financial adequacy of your pension in the context of your household. For example, it is important to carefully look at what would happen to the income of your household if you were to die either before or after retirement. In most cases, you can choose a (somewhat lower) annuity that provides your partner with an income after you have died.

- When you retire matters a great deal for your annual income after retirement. If your retirement age is flexible, you may be able to use the option value of retiring later if your pension wealth is lower than expected. Gradual retirement (working part-time at an older age) can also be an attractive option.