

Introduction to Pension System Theory

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Introduction

What does solidarity mean to you? Do you feel solidarity in your own possible donations, for instance, to homeless or seriously ill people? Or rather in giving your shoes and clothes to poorer relatives? Can you even feel it when you take the side of your fiancé(e) or parents even in such a situation when you know that the other party has better arguments, but you feel more loyalty to your relatives than to the truth? How would you describe and define your own solidarity to others? Is it possible to measure it on a scale of 0 – 10? Let's think about it a bit, and then what number would you say?

What about defining your social solidarity from taxes and social insurance that you have to pay and from how much you get back on social benefits? If you are a student, that might be in minus, meaning that you get more than you give. Then your number previously thought shall get smaller, shall it not? But why? Is your own solidarity defined just by the money you give and get or is it rather a part of your personality, that changes only in the long run?

On the other hand, the state's solidarity must be defined by the money received, money given and a valid proposal. A state does not have a soul, a state does not have a personality. A state is just land where particular people and their souls live. Do you agree or not?

I hope that you haven't gotten lost and started thinking that you just have started reading a philosophy book. Solidarity plays a key role in all social security systems around the globe. Without solidarity it would not be social, but the definition of solidarity is more difficult to explain, as I have tried to show you in the previous paragraphs. Every human is different and solidarity means something else to each of them. Also, the meaning of pension benefit and overall the pension system is different to everybody. "My pension is so low that I cannot survive!" Is this really true? Or can the state deliver pension benefits at such a level that the pensioner will not feel the difference from their working life?

The following pages will explain to you the role of pension systems within social security systems and their variations. Furthermore, it will be presented that even a small variation can lead to a very different result.

Pension insurance and its role as a redistributor of wealth

“Many people want the government to protect the consumer. A much more urgent problem is to protect the consumer from the government.”¹ “A society that puts equality before freedom will get neither. A society that puts freedom before equality will get a high degree of both.”² Milton Friedman, the Nobelist for his achievements in the fields of consumption analysis, monetary history and theory and for his demonstration of the complexity of stabilization policy.³ The great economist shows us the possible way to build the wealth of a nation. On the other hand, we can even see another perspective on the issue of social security and particularly of the pension system, which shows us the necessity of implementing a nationwide pension system.

The Behaviour Economists (Thaler 2009, Taleb 2010) claim that there is nothing like real homo-oeconomicus or perfect competition. Rather than using utility in the decision-making of an individual, they prefer to use expected utility. We expect that the reader already understands the utility function in economics, so we would rather explain the expected utility in long-term planning, such as a pension for younger people. We probably know that we would prefer to have a great time in retirement and we need funds to cover expenditures during the time of our non-active working life from previous savings or from social benefits paid by our country (pension). Furthermore, we probably know that we would be better off to own an apartment or house than to rent one for this period of time. But do we know what our wishes or desires will be in 20, 30, 40 years? Of course not. We can only assume what they will be. Therefore, we have some expected utility of $t+40$ years and some expected utility of t , $t+1$, $t+2$, etc. Today's desire has a much higher imminent utility than the desire in 40 years, since we do not actually even know what it will be, but we at least expect that we will need to cover it.

Would you prefer to have a fancy new car that just went on sale and is a very good buy, or put the same amount of money into a pension fund to cover your wishes in 40 years? The problem gets even more complicated when we do not have any funds available. Would you buy a new Mac using credit or instead keep your old one and the possible repayments to use to save in pension funds? What would you do, yourself?

¹ Milton Friedman (1912-2006)

² Milton Friedman (1912-2006)

³ The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1976

The time preference and expected utility is one part of the problem why countries around the globe has started to have comprehensive pension systems to “help” current workers cover their needs and wishes at the time of retirement and even did not need behavioural economists to explain the problem, because of the fact that the first systems were established in the 19th century in Prussia/Germany and the United Kingdom. The Industrial Revolution and moving to the cities led to the end of “normal” families, where descendants help their elderly ancestors mainly in case of illness to cover their expenditures (Keller, 2005). Many of you have heard that the first comprehensive social security and first PAYG pension system was funded in Germany under the rule of Bismarck⁴. The truth is a bit different. Despite the fact that Bismarck himself wanted the so-called PAYG DB system, the parliament instead voted for a funded system with a small, fixed amount for every retired worker (Mierzejewski, 2016). Today we would call it FF DB/DC with a zero pillar paid from taxes on a PAYG base. But why did Great Britain and Germany implement it? The social view and feelings were rather a cover for the population. Could it have been the rise of communist ideas or the rise of the unions? Yes, naturally! What would be better for elites, politicians and higher-income families (even royals)? To pay a bit more on taxes, even to let workers themselves pay for their future pension benefits and secure them a better life in retirement or to be hanged by a mob of dissatisfied citizens that are led by communist ideas?

So far, we have presented that the reasons for implementing pension systems, rather than letting everyone save for their pensions themselves, were based on human behaviour, historical facts and the problems in Europe at the time. We can see other sociological facts, such as a declining birth rate, changes to the modern family and in CEE⁵ even the expectation of individuals that the government/country should actually take care of them during their retirement, which leads to absolute reliance on the state. In the Czech Republic, 78.5% of all income that already-retired citizens receive every month is from the first pillar of the pension system, the rest is from work or other income such as rental of rooms/flats, etc (OECD, 2019). When we look into the pension system itself, 96% of monthly income comes from just the PAYG first pillar, the remaining 4% from a voluntarily funded pillar (well-subsidised private savings).

⁴ Otto von Bismarck was PM of Prussia and the first German Chancellor (1871 – 1890). Under his rule not only was a pension system established, but also health insurance and disability pension protection was implemented.

⁵ CEE = Central and Eastern Europe

All these reasons have been described to show the reader that with a free libertarian market we would probably be better off as a whole, but some people would be left behind. The current welfare states prefer not to leave anybody behind and make them and others (in case of solidarity) pay their pension benefits in the future, without them voluntarily saving at all. This is also problematic, and I would therefore change the Friedman quote to say: “Many people want the government to secure fair pensions for elderly people. A much more urgent problem is to find a solution to get rid of this dependence.”

Classification of pension systems

We can classify the variety of pension systems by many parameters. For the purpose of our lectures, we will focus our attention mainly on classification based on funding processes and the calculations of the future benefits. Nevertheless, we shall mention that some smaller differences in pension systems can be classified by other parameters as well. Mainly the difference in paying taxes (EEE and TTT combination f.e. EET, TEE etc. systems) (see Vostatek, 2016) or on the internal process of collection of the funds (taxes x insurance x private investments) (see Krebs, 2015).

The table below shows us the four standardised pension systems and the main differences between them. Financing the system can be either on an ongoing basis (Pay-As-You-Go) or on an investment basis (Fully Funded). The calculation of the pension benefits can be either by defining the benefit itself (Defined Benefit) or defined by the contribution into the pension system during the work-life (Defined Contribution). In the next four chapters, every particular system will be described.

	Funded on ongoing basis	Funded on investment basis
Defined benefit	PAYG DB	FF DB
Defined contribution	NDC (PAYG DC)	FF DC

Table 1 – Pension system matrix - source: own

Furthermore, every welfare country does not implement just one of the systems mentioned above. The complex system usually consists of at least two of them, in some

countries from all of them. We call these combinations pillars of pension systems, where we can define 3 or 4 of them:

1st pillar – It is mainly based on an ongoing insurance basis, where pension benefits depend on many factors, not only contribution and expected survival, but also on your previous wage, number of children born to you, length of unemployment periods, studying periods, length of the maternity leaves, etc. It is mainly PAYG DB or NDC system and it is usually mandatory for all employees. It is a Public Pension with usually the full role of the state/government.

2nd pillar – It is mainly based on FF DB or FF DC basis and it is usually a mandatory system. We even call it Occupational Pensions or Private Mandatory Pensions, in all cases a Private (mandatory) Pension. Your pension benefits depend on your contributions and expected survival in the case of DC and on more factors in the case of DB, but it is in all cases fully funded and the government has mainly just a setting and supervisory role without strong intervention (at least in theory).

3rd pillar – It is a voluntary pillar based on FF DC and can be subsidised by the state either directly or indirectly (tax deduction). In all cases, it is a Private Pension.

And in modern theory and practical usage also:

0 pillar – It is paid from taxes to every citizen of the country, usually regardless of their previous work-life. Entitlement is only based on years lived in the country and is the same for every pensioner, so we call it Equal Public Pension or Basic Public Pension. It is a PAYG DB system with almost no calculations. The purpose of the zero pillar is to avoid severe poverty of elderly citizens.

Pay As You Go Defined Benefit model (PAYG DB)

The PAYG DB system is based on an ongoing basis and future benefits are defined by many parameters. In this system, all currently paid contributions (regardless if paid by income-tax or social insurance) are immediately redistributed to current pensioners. In pure theory, there shall be no surplus or deficit, so that nothing is invested. You, as a current employee or employer, pay the pension benefits to the previous generations that are already out of the labour market, through social insurance contributions or income taxes. In all cases, it is a Public Pension.

The pension benefits depend on:

- 1/ your lifetime income,
- 2/ life expectancy at the moment of retirement,
- 3/ level of solidarity in the system,
- 4/ replacement insurance periods, which are periods of the participant's life when they did not actually work, but for entitlement of pension benefits are considered as if they had worked (even 100% or smaller percentage of entitlement). Examples of such periods can include: maternity leave, study after turning 18 years old, shorter unemployment, military duty, illness,
- 5/ level and process of valorisation,
- 6/ process of indexation.

The main difference between PAYG DB and any other system is the level of solidarity, which is usually very high. We can see intergenerational solidarity, due to the fact that current employees, through social insurance or taxes, pay pension benefits to current pensioners. But there is one much more important solidarity that separates the PAYG DB from the NDC (PAYG DC) system. It is intra-generational solidarity between previously higher-income individuals and previously lower-income individuals. In this extreme case, the top level of solidarity would be an equal public pension to everyone regardless of their previous income (known as zero pillar). The extreme case of zero solidarity is an NDC system. In reality, we can find all levels of solidarity. For instance, in the Czech Republic only 10% of pensioners receive less than 74% of the average pension and only 10% of pensioners receive more than 124% of the average pension (ČSSZ, 2019, 2021), which ranks the Czech Republic as one of the most solidary countries in the OECD in terms of pension systems (OECD, 2021). The diagram below should show the reader clearly the PAYG DB functionality.

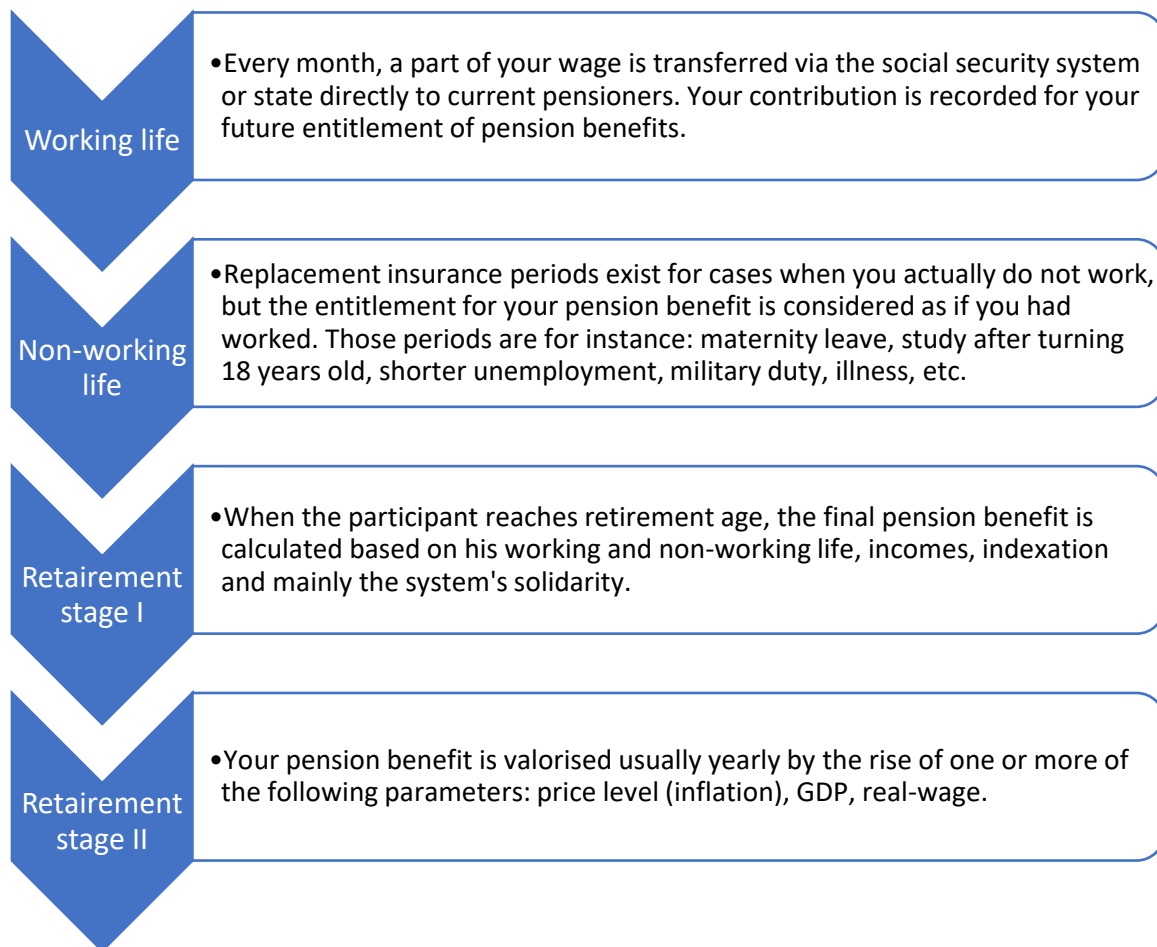


Diagram 1 – PAYG DB Functionality - source: own

Advantages:

- 1/ Very easy implementation.
- 2/ Possible immediate reaction to the economic cycle (Börsch-Supan, Härtl, Ludwig, 2014).
- 3/ Possible valorisation by the growth of the GDP or at least by the growth of the total contribution from current employees (Brabec, 2020).
- 4/ No financial market risk, at least in theory, which solves the risk-averse behaviour of individuals in the case of FF DC (Knell, 2010).
- 5/ According to the implication of Keynesian Theory of Consumption (Keynes, 1936), we can conclude the generating of a higher GDP due to the fact that current employees transfer their funds to current pensioners, which would have a higher marginal propensity to consume than current employees. In other words, pensioners are more likely to use the extra money to consume rather than save, in contrast to current employees. This theory is criticised for many reasons, such as a small impact in a small open economy (indirectly by Pašališová, 2019), or by the fact that young families face higher levels of poverty than pensioners, which is the case in the Czech Republic (ČSÚ, 2017). In this case, the marginal propensity to consume in

generation 20-45 y.o. would be higher than in generation 65+ y.o., and this advantage would not be valid.

Disadvantages:

1/ Hard to abort and reform the PAYG DB due to high current and future entitlements (Brabec, 2020).

2/ Unstable in the case of an ageing population. In a pure PAYG, it would lead to a higher retirement age or/and lowering of pension benefits (Loužek, 2014 and Vostatek, 2018), but it is hard to enforce in the case of populist governments, resulting in the system rapidly spiralling into debt.

3/ Easy to manipulate by politicians, mainly before the elections, changing the system from the pure non-deficit version into a high-deficit version, which is the case in almost all CEE countries (OECD, 2021).

Fully Funded Defined Contribution model (FF DC)

The Fully Funded Defined Contribution system is widely used in all modern pension systems around the globe (a well-known example is Chile). We have already presented in previous chapters that FF DC is used mainly for the second or third pillars of a particular pension system. The core idea is that every month an individual transfers part of his wage (2nd pillar case) or some nominal amount (3rd pillar case) to his private long-term investment account, usually in a private investment company, so-called pension company. The amount is directly invested into the chosen fund and the participant relies on the returns from the investment. If the fund brings higher returns (interest), the participant's future pension benefit rises. On the other hand, if the fund brings lower returns (interest) or even losses, the participant's future pension benefit falls.

As mentioned above, it is a private system, so there is no principle of solidarity whatsoever. This means that lower- and higher-income individuals have the same replacement rate in case of the same working life and same investment strategy, just different incomes. That is contradictory to PAYG DB, where the usual solidarity brings a much higher replacement rate for lower-income individuals.

In FF DC, you can choose from a wide range of funds based on the risk and expected returns. Assets with a higher risk (warrants, certificates, shares) have much higher expected returns in the long run than conservative investments, which are on the other hand safer for

participants (government bonds, treasury bills or even cash). The participant usually has a right to have the last word in the decision into which fund they will invest. When the participant reaches retirement age, they can usually choose from the following options:

1/ To buy valorised life annuity, which brings them certainty about future benefits, but the insurance company selling these annuities must collect some premium to avoid the situation of the participant surviving beyond their life expectancy.

2/ To keep the money in the investment account and gradually (monthly) withdraw part of it based on life expectancy. This usually brings a much higher pension benefit, but when participants underestimate their life expectancy and survive “their expected death”, the investment account is empty and their benefit will no longer be paid.

3/ To collect the balance at once, which is widely forbidden in modern pension systems. Usually, you have a right to collect just part of the balance at once, for instance, to buy real estate.

4/ Combination of the three options mentioned above.

For a better understanding, the diagram below shows the system’s functionality.

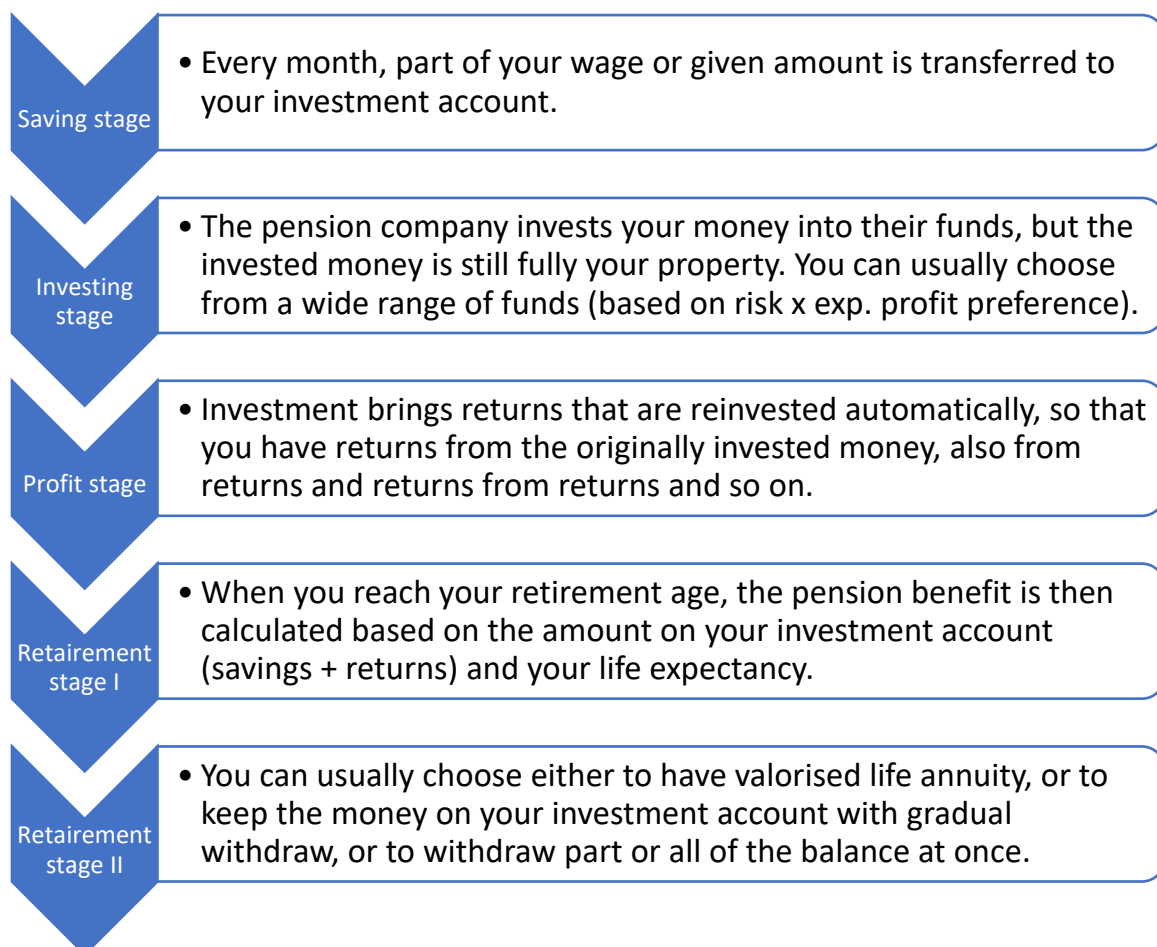


Diagram 2 – FF DC Functionality - source: own

The pension benefits depend on just four parameters:

- 1/ your lifetime contribution to the fund (as 2nd pillar based on a percentage of your income, as 3rd pillar based on the amount you save/invest)
- 2/ life expectancy at the moment of retirement,
- 3/ real returns on the investments,
- 4/ chosen option of the benefit payment.

Advantages:

- 1/ System clarity (the participant can find out their balance at any moment).
- 2/ Partial freedom of choice where to invest your savings, which can also be a disadvantage with a lack of financial literacy (see more Brabec, 2020, p. 28-29).
- 3/ Lower importance of demographic change = ageing shall be less problematic than in PAYG (Maaytová, 2015, p. 92).
- 4/ Lower importance of the economic cycle in a particular country if the fund is invested abroad, which is usual (Brabec, 2020).
- 5/ It is easy to abort the system.

Disadvantages:

- 1/ Hard to implement the system if the PAYG DB/DC is already widely used.
- 2/ Financial market risk = risk of the investment. If the lifetime investment strategy is wise, this risk gets lower in the long run. Pension investments are long-run, so while this risk of the financial market is popularly presented mainly in the media, in general it is a rather marginal problem.
- 3/ Large amounts of money in the funds bring incentives to nationalise them in cases where the country is dealing with a crisis. This was the case in Hungary (Szikra, 2014) and Poland (Chłoń-Domińczak, 2016). The nationalisation in Poland and Hungary will be described in detail in our lessons.
- 4/ Long-run lowering of returns in the funds, which can currently be observed (OECD, 2021).
- 5/ Possible risk-aversion of the participant can result in lower pension benefits. For instance, the research of Christelis, Georgarakos a Haliassos (2013) reaches the conclusion that the FF DC is rather favourable for market-orientated nations, such as the USA or Asian nations, but less favourable for European nations.

Fully Funded Defined Benefit model (FF DB)

The Fully Funded system does not have to be based just on a Defined Contribution basis and it can still be a private system without the role of the state. The FF DB system has been widely used as an employee pension in Western Europe for decades. Current countries that partially rely on FF DB are the Netherlands, Switzerland and Iceland (OECD, 2021). The logic is a bit different from FF DC and mainly brings more certainty to the individual due to the fact that pension companies and their funds are industry-wide or at least company-wide. Every participant does not have their own investment portfolio, but they share risk and returns all together within the company or within an industry. For a better understanding, the diagram from the previous chapter is used as well to see the difference from FF DC. This system is usually described as the 2nd pillar or even a part of the 1st pillar.

The pension benefits depend on:

- 1/ your lifetime contribution to the fund,
- 2/ life expectancy at the moment of retirement,
- 3/ real returns on the investments,
- 4/ replacement insurance periods, which are periods of your life when you did not actually work, but for the entitlement for your pension benefit are considered as if you had worked (even 100 % or smaller percentage of entitlement). Examples of such periods are: maternity leave, shorter unemployment, illness,
- 5/ level and process of the benefit valorisation.

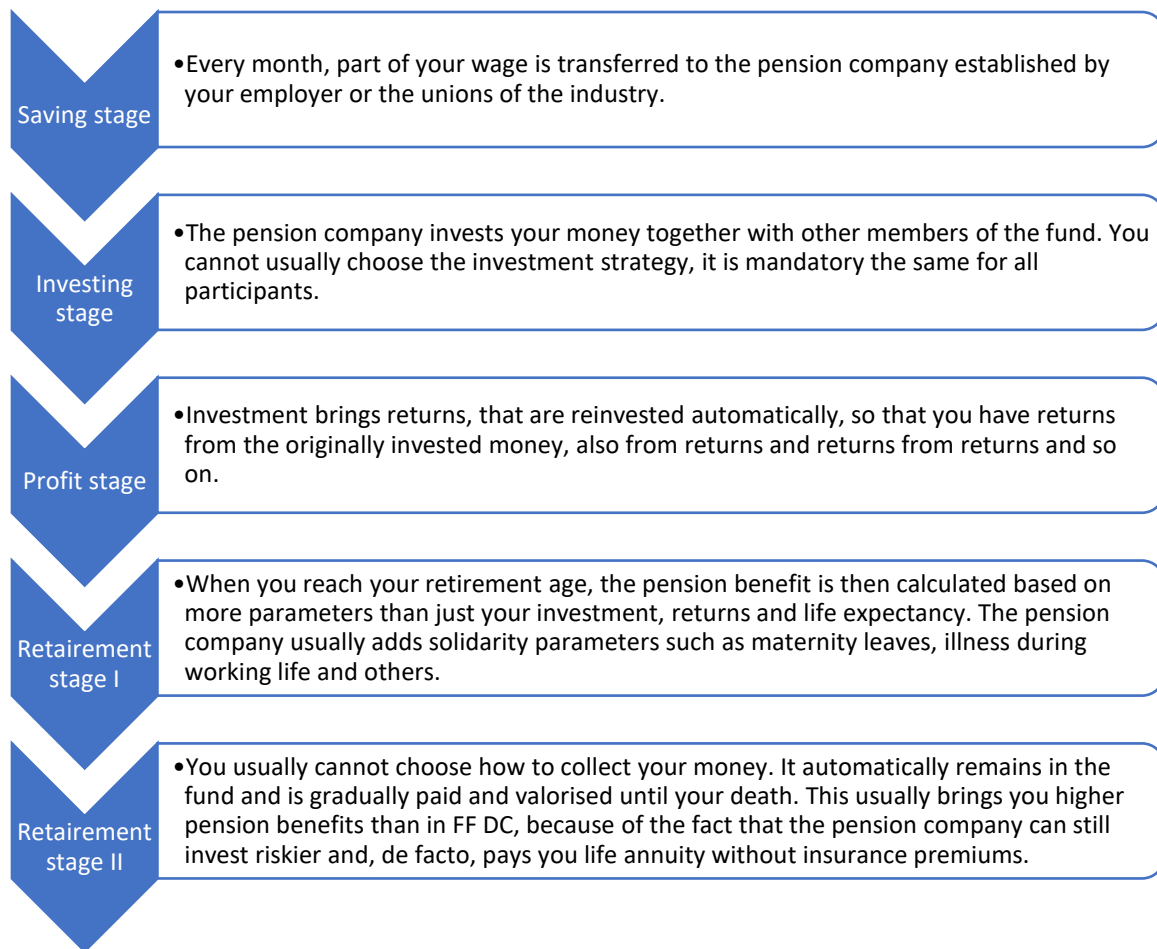


Diagram 3 – FF DB Functionality - source: own

Advantages:

- 1/ Possible higher pension benefit than in FF DC, even in the case of the same investment strategy, due to the fact that the investment can continue as risky as before even during the retirement period as the risk and profit/loss is collective of all the participants of the fund.
- 2/ Avoiding the distortions in the market of life annuities (Vostatek, 2016) due to the fact that, de facto, the life annuity is automatically given to the participant from the pension company, which calculates the pension benefit on a DB basis and keeps the valorisation process during their retirement.
- 3/ Lower importance of the economic cycle in a particular country if the fund is invested abroad, which is usual (Brabec, 2020).
- 4/ Avoiding possible risk-aversion of the individuals due to the fact that the investment strategy is the same for all participants in the pension company. (Bonenkamp, Westerhout, 2014)
- 5/ It is easy to abort the system.

Disadvantages:

- 1/ Hard to implement the system where PAYG DB/DC is already widely used.
- 2/ Financial market risk can be still observed, even within long-term investment, but is rather marginal. On the other hand, due to the DB payment of the pension benefit and keeping the usually more risky investment strategy even during the retirement period for all participants of the pension company, the decline of the markets can cause the already calculated pension benefits to lower.
- 3/ The nationalisation of funds is generally less probable in FF DB because of the fact that neither the investment nor the pension account is individual and pension benefits are paid from the current balance of all investments. In this case, a state that would want to nationalise the funds would still have to pay the already calculated pension benefits, otherwise the pensioners would lose their pensions.
- 4/ Long-run lowering of the returns in the funds, which can currently be observed (OECD, 2021) is problematic even for FF DB, but in general, the possibility of investment into riskier assets brings still better returns than balanced portfolios in FF DC.

Pay As You Go Defined Contribution model (PAYG DC / NDC)

The NDC system is based on an ongoing basis and future benefits are defined by contributions only during the participant's lifetime. In the NDC system, all currently paid contributions (regardless if paid by income-tax or social insurance) are immediately redistributed to current pensioners. This is the same logic as in PAYG DB. The participant, as a current employee or employer, pays the pension benefits to the previous generations that are already out of the labour market, through social insurance contributions or income taxes. In all cases, it is a Public Pension. The main difference to the widely used PAYG DB is the solidarity parameter. NDC systems are based on equality, not on solidarity. **The pension benefit therefore depends only on:**

- 1/ your lifetime contribution to the system,
- 2/ life expectancy at the moment of retirement,
- 3/ level and process of valorisation,
- 4/ process of indexation.

In theory, the NDC system should combine the advantages of both PAYG DB and FF DC. The implementation is rather easy as any large capital is not needed, which is in contrast with FF DC. The main idea is that every year the participant receives information on the current

balance of their virtual pension account. Why use the word virtual? Because the money does not actually exist anymore. All your contributions have been already used to pay previous and current pensioners, but it is very important for the individual to know their current balance, which is their future entitlement from the state. In literature, this system is described as transparent with a clear link between the contribution and benefit (Holzmann, Palmer, Robalino, 2012) and for its sustainability, it is recommended to be separated from the state to avoid politically motivated (populist) interventions (Valdés-Prieto 2000). In reality, it is just a PAYG system without solidarity, which can actually bring even more problems (poverty). The functionality is described in the following diagram.

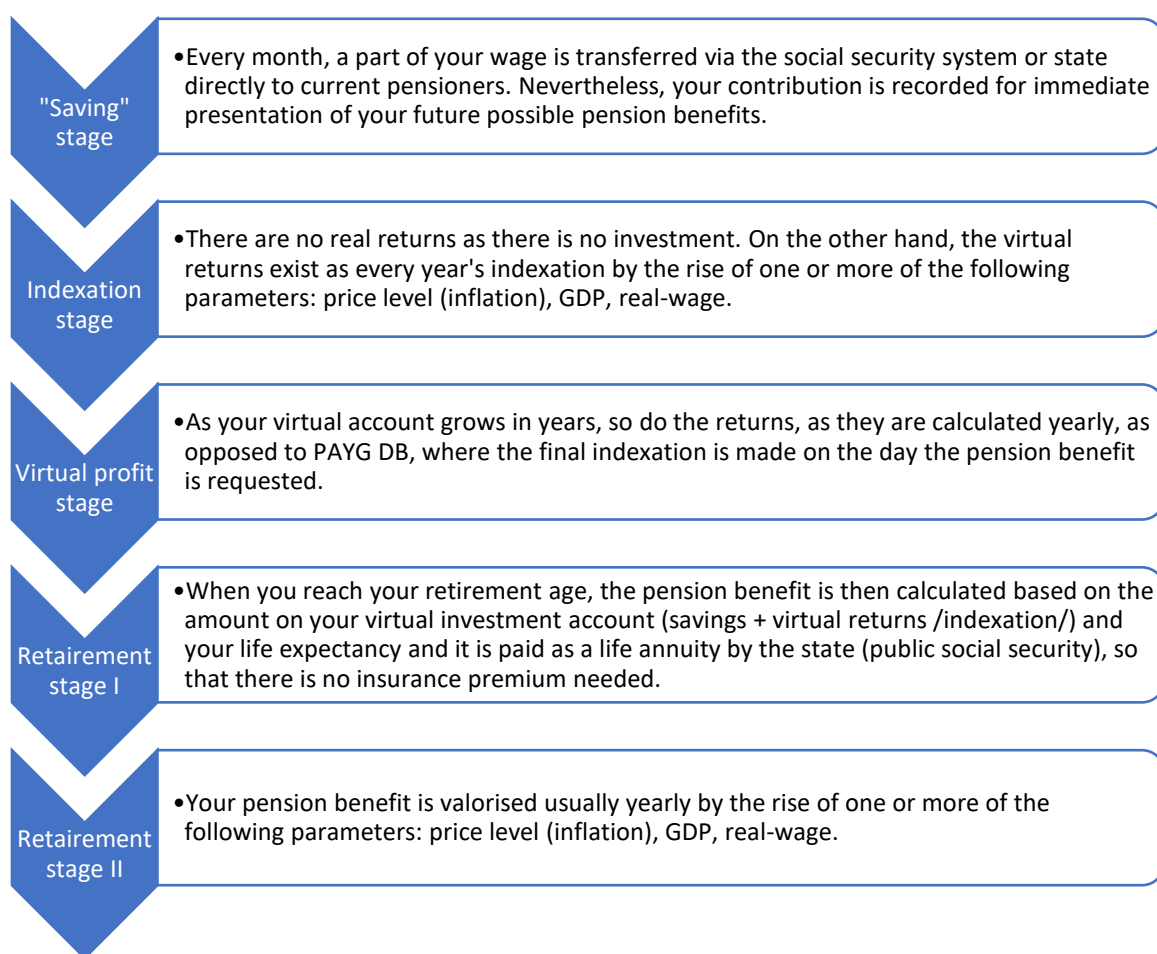


Diagram 4 – NDC Functionality - source: own

Advantages are almost the same as PAYG DB such as:

- 1/ Very easy implementation.
- 2/ Possible immediate reaction to the economic cycle (Börsch-Supan, Härtl, Ludwig, 2014).
- 3/ Possible valorisation by the growth of the GDP or at least by the growth of the total contributions from current employees (Brabec, 2020).

4/ No financial market risk, at least in theory, which solves the risk-averse behaviour of individuals in the case of FF DC (Kneel, 2010)

5/ Same conclusion of the implication of Keynesian Theory of Consumption as PAYG DB (see above)

But we can also find different advantages just for NDC:

6/ Clarity and transparency of the system.

7/ Equality, which shall stimulate individuals to try to reach higher incomes during the working life.

8/ Somewhat harder to manipulate by politicians than PAYG DB (Valdés-Prieto, 2000).

Disadvantages:

1/ Hard to abort and reform NDC due to high current and future entitlements (Brabec, 2020).

2/ It is also unstable in the case of an ageing population, but less than PAYG DB (see Williamson, Williams, 2005)

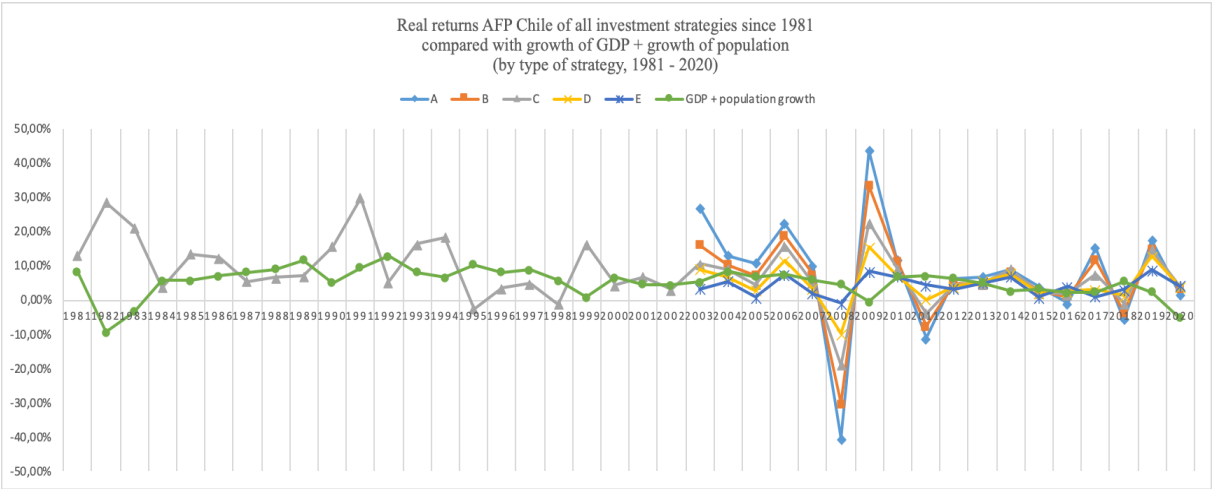
3/ Lack of solidarity brings the same replacement rate for all income groups in case of the same working life. This, in contrast to PAYG DB, can bring poverty to pensioners, which is the case in Poland (Brabec, 2020).

Hidden returns in PAYG DB, NDC and real returns in FF DC/DB

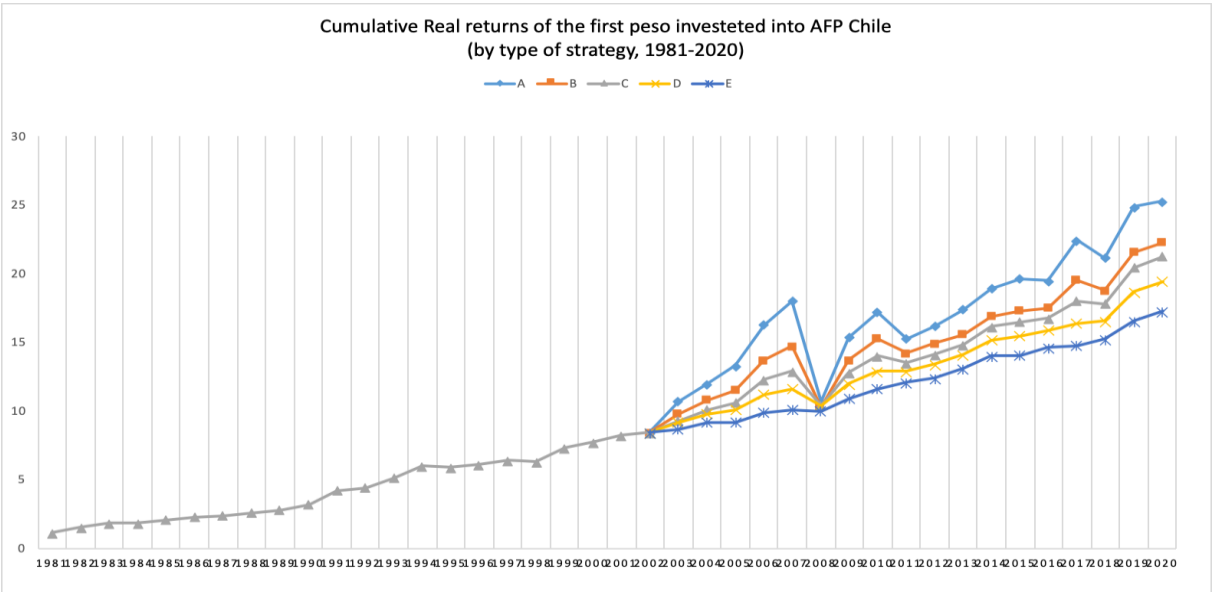
Previous chapters should help you understand the main models of pension systems. But what is the yearly return from the money transferred into the particular system? The FF DC or FF DB models bring an easy answer. The return on investment, so that for instance the rise of assets itself, dividends from shares, bond coupon, interests from saving/term accounts and so on. The real returns on investments are presented in two following graphs in the case of Chile. The first graph is real gains or losses yearly and the second graph is cumulated returns from the first investment. You can see in this example the volatility of financial markets mainly for more risky funds (A,B) and more stable for conservative investments (D,E). Also, the rise of GDP and population growth is presented in the first graph to define if the FF DC model is wisely used or if the NDC model would be better off. If the GDP rise and population growth are greater than real returns on investment, the NDC model should be implemented and vice versa. In the case of Chile, FF DC is better off (Brabec, 2020), but in other countries it could be better to use NDC models, even in long-run periods. In FF DB, the real return of “invested” money relies

not only on returns, but also on your non-working periods, which are counted as working periods and should raise your returns in the end if you have these non-working periods.

In a PAYG system, both DB and DC, the real returns are hidden. They are possible only if the country’s GDP and/or real wages are growing. Also, if the working population is growing. The real return in PAYG DC (NDC) is the rise of your virtual portfolio in real terms, in comparison with the usual rise of real wages in the economy (indexation). In a PAYG DB system, it is rather complicated, as non-working periods are also counted. Therefore, not only is the indexation your real return on “investment”, but also rises due to non-working time and in cases of lower-income classes by solidarity. On the other hand, the final pension benefit and thus the real return is lower in cases where participants have higher income and the solidarity of PAYG DB is unfavourable to them.



Graph 1 – Real returns in FF DC Chile - source: Own calculations based on FIAP (1981-2005) a SAFP (2006-2020)



Graph 2 – Cumulated real returns in FF DC Chile - source: Own calculations based on FIAP (1981-2005) a SAFP (2006-2020)

Conclusion

This paper was written to help you better understand pension system theory and mainly pension system classification. Furthermore, to define the advantages, risks and disadvantages of each model and let you understand that some models that can be favourable for one country are not necessarily favourable for another. You should now understand why demographic changes are more dangerous in PAYG systems, mainly in PAYG DB, but why they are concerning even for funded models. Moreover, you should now be able to explain even small differences between FF DB and FF DC, as well as between PAYG DB and PAYG DC and many small variations in all particular models.

The theory introduced to you in this script is even more important to be understood for any implementation or construction of the pension model in a real economy. The more pillars systems are widely used to diversify the risk of each model. The usual usage is 1st pillar of PAYG DB or NDC, 2nd pillar of FF DB/DC or NDC, 3rd pillar of FF DC and, in some cases, the flat pension on PAYG basis as 0 pillar. Multi-pillar systems are therefore, in theory, safer and should bring higher pension benefits, even in cases of financial market crises or in cases of economic downturn.

Further studying is important to understand the theory introduced in previous chapters and you are recommended to read the studies about the impact of reforms in Chile, Hungary, Poland, Slovakia and usage of the NDC system in Sweden, as well as the usage of a multi-pillar system with large usage of FF DB in the Netherlands.

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Abstract

This paper introduces the reader to pension system theory and mainly the pension system classification (FF DC, PAYG DB, FF DB, NDC models). Furthermore, the advantages, risks and disadvantages are defined for each pension model and let the reader understand that some models that can be favourable for one country are not necessarily favourable for another. The paper highlights even small differences between FF DB and FF DC, as well as between PAYG DB and PAYG DC and many small variations in all particular models.

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