

Univerzita Karlova v Praze
Fakulta sociálních věd

Institut ekonomických studií

Diplomová práce

**Czech Pension Funds in an International Context –
Prospects and Challenges**

Vypracoval: Michal Ježek
Konzultant: Ondřej Schneider, PhD
Akademický rok: 2003/2004

Prohlášení:

Prohlašuji, že jsem diplomovou práci vypracoval samostatně a použil pouze uvedené prameny a literaturu.

V Praze dne 12. června 2004

Podpis:

Acknowledgements:

I would like to thank Ondřej Schneider, PhD of the Faculty of Social Sciences for his supervision. I also owe thanks to RNDr. Boris Burcin of the Faculty of Natural Sciences who kindly provided me with population forecasts. All errors are mine.

Diploma Thesis Project

Term of the state examination: September 2004

Author: Michal Ježek

Supervisor: Ondřej Schneider, PhD

Expected title: Czech Pension Funds in an International Context - Prospects and Challenges

Objective: The objective of the thesis is to describe the voluntary pension scheme in the Czech Republic, put it in an international context, and identify its strengths and weaknesses. The major concern is the low rate of return the system has generated since its inception in 1994 and the thesis will describe how much the regulatory framework is likely to have contributed to this. The system has been successful in attracting a large number of participants in the past decade. However, it seems that it is viewed by the participants as an advantageous medium-term savings vehicle rather than a supplementary pension scheme. The thesis will attempt to make some suggestions how to transform the scheme into a medium which the participants would use to increase their retirement income through additional pension benefits. Pension funds could possibly play an important role in the future mandatory pension provision in the Czech Republic, but unless they generate higher rates of return, they provide no viable alternative to the public pay-as-you-go scheme for a very large number of workers and thus may not help solve the population aging problem in the country. Based on the age-wage structure of the labor force, the author will attempt to estimate the cash flow into pension funds if they become part of the mandatory pension scheme and if individuals are allowed to partially contract out of the current public scheme. If individuals expect that pension funds improve their performance to the level attained by developed pension funds schemes in other countries, they will contract out massively and pension funds will soon become major players in the financial market.

Outline:

- Introduction
- Pension Funds as Institutional Investors
- Pension funds in Countries with Mandatory Funded Schemes
- Description of the Czech System of Pension Funds
- Why the Lackluster Performance in the Past Decade?
- After Reform in Czechia: How Much Would Flow to Pension Funds?
- Conclusion

Literature: see the enclosed list

Michal Ježek

Ondřej Schneider, PhD

.....

.....

Abstract

The object of the thesis is to describe the Czech system of pension funds and put it in an international context. A particular attention is devoted to the issue of low investment performance of Czech pension funds in the past decade. It is argued throughout the thesis that the voluntary pension scheme as currently structured is unlikely to ease the pension problem in the country, and that this can only be accomplished through a systemic pension reform. A number of weaknesses in the regulatory framework are identified and suggestions for improvement are given. The contribution of the thesis is the simulation of the dynamics of assets accumulation in pension funds if a systemic pension reform is adopted in the country, which to the author's knowledge has not been published so far.

Abstrakt

Cílem této práce je popsat český systém penzijních fondů a zasadit jej do mezinárodního kontextu. Zvláštní pozornost je věnována problematice nízkých investičních výnosů českých penzijních fondů v posledních deseti letech. V práci argumentuji, že současně nastavený systém dobrovolného penzijního připojištění nemá velkou naději na to, že pomůže snížit sílící problémy s penzijním zabezpečením v zemi, a že tohoto lze dosáhnout pouze systémovou penzijní reformou. V práci je popsána řada nedostatků současného regulačního prostředí a jsou předloženy návrhy na jejich odstranění. Příspěvkem této práce je simulace dynamiky akumulace aktiv v penzijních fondech, bude-li přistoupeno k systémové penzijní reformě, což dle autorových informací dosud nebylo publikováno.

Table of Contents:

1	Introduction.....	7
2	Pension Funds and Financial Markets	9
2.1	Basic terms.....	9
2.2	Pension Funds as Institutional Investors.....	13
3	After Pension Reform: Latin America & Eastern Europe	23
3.1	Latin America	25
3.2	Eastern Europe	30
4	Description of the Czech System of Pension Funds	37
4.1	Basic Information.....	37
4.1.1	State Contributions.....	39
4.1.2	Tax Incentives.....	41
4.2	Participation	42
4.3	Contributions.....	47
4.4	Payouts.....	50
4.5	Tax Savings.....	53
4.6	Organization of the Supplementary Pension Industry	54
4.7	Transfers between Pension Funds.....	56
4.8	Assets	57
4.9	Capital Structure	59
4.10	Operational Costs.....	61
4.11	Summary.....	62
5	Why the Lackluster Performance in the Past Decade?	65
5.1	Past Investment Returns vs. Alternative Opportunities	65
5.2	Investment Strategy ‘Play It Safe’	72
5.3	Regulatory Framework – How It Works and Why It Matters	73
5.3.1	Pension Funds and Implicit Options.....	75
5.3.2	Prudent Person Rule versus Quantitative Restrictions.....	79
5.3.3	Performance of Pension Funds in Reforming Countries	84
5.4	Summary and Policy Recommendations	86
6	After Pension Reform in Czechia	87
6.1	Rate of Return 3 % p.a.....	94
6.2	Rate of Return 4 % p.a.....	95
6.3	Rate of Return 5 % p.a.....	96
6.4	7% Contribution Rate under Various Rates of Return.....	97
6.5	Summary.....	98
7	Conclusion	100
8	References.....	102
9	Annex.....	107
9.1	Implicit Rates of Return in a Sustainable Pay-As-You-Go Scheme.....	107
9.2	Parameters Used for the Calculation of Minimum Wages with which It Pays to Contract out of the Pay-as-you-go Scheme	108
9.3	Simulation of the Dynamics of Assets Accumulation in Pension Funds after a Systemic Pension Reform.....	109
9.3.1	Expected Real Rate of Return 3 % p.a.....	111
9.3.2	Expected Real Rate of Return 4 % p.a.....	112
9.3.3	Expected Real Rate of Return 5 % p.a.....	113

1 Introduction

Ten years ago, a system of pension funds was established in the Czech Republic in which individuals may save for retirement on a voluntary basis in addition to mandatory social security. With a profound demographic change under way and its negative consequences for the public pension scheme, it is hoped by many policy makers that pension funds strengthen pension provision in the country. After a decade of experience, it should already be possible to evaluate whether it is happening under the current arrangement or not, which we will attempt to do.

Most public pension schemes are traditionally operated on the pay-as-you-go principle, i.e. today's pensioners receive benefits out of payroll taxes paid by today's workers and these workers expect to be supported in the same manner after they retire. The increasing number of pensioners relative to workers renders these schemes financially unsustainable, bringing some of them to the brink of collapse. Therefore, an increasingly popular way of reforming public pension systems is to reduce the role of the pay-as-you-go scheme and introduce mandatory retirement saving in pension funds instead. By and large, both schemes are subject to different kinds of risk. While funded schemes are subject to investment risk, public pay-as-you-go schemes are susceptible to political risk and labor income risk. Since those risks are unlikely to be perfectly correlated, their combination leads to a reduction in the overall risk and this is an argument for the introduction of a mixed scheme.

This has already happened in a number of countries and their experience may be an invaluable source of inspiration for countries that are going to reform their social security in the same fashion. The Czech Republic is still obstinately sticking to the old pay-as-you-go scheme while a number of countries in the region have already allowed pension funds into mandatory social security. I will argue that if the system of pension provision in the country is to be improved, a similar reform should be done as well. This reform would have a profound impact on the scale and character of the pension business in the country.

The remainder of the thesis is structured as follows. The second chapter describes the major issues concerning pension funds, their role in financial markets and some experience from countries where these institutional investors have a long tradition. One of the major objectives of the thesis is to describe the Czech system of pension funds and examine its preparedness to

assume part of the mandatory pension provision in the country. This would be difficult without a benchmark based on experience from countries that have already implemented such a profound reform of social security. Therefore, the third chapter gives the reader a brief exposure to the international experience with pension funds under mandatory schemes, and only then follows the fourth chapter describing the Czech voluntary scheme, now put in an international context. The fifth chapter deals with the issue of low historical rates of return generated by Czech pension funds. The sixth chapter attempts to estimate what the initial cash flow to pension funds would be if the Czech Republic joined the club of reforming countries, and then simulates the dynamics of assets accumulation in the next decades. Finally, a summary and some concluding remarks are given.

2 Pension Funds and Financial Markets

2.1 Basic terms

Pension funds are financial intermediaries which collect and invest funds for eventual payment to participants in the form of pensions. Thus, they are vehicles that enable individuals to efficiently accumulate savings over their working life in order to finance their retirement consumption.

When a pension fund is set up, contributions start flowing in but there are no benefit payments yet. Over time, some participants start retiring and part of the assets accumulated by the fund begins to flow out in the form of benefits. Finally, a long-term equilibrium ratio between contributing participants and those receiving benefits is reached, the average age of participants is constant and the system is mature. In some countries, participation in pension fund schemes is mandatory for every worker and pension funds are an integral part of the national social security scheme¹ while in some other countries participation is completely voluntary and individuals are encouraged to supplement their public pension income with pension fund savings mostly through a system of tax incentives.² Some countries are in between and individuals may decide whether their mandatory pensions will be provided by the public pay-as-you-go scheme or by pension funds.³

The institutional arrangement of pension funds is basically of three major types. There are public pension funds, occupational pension funds and personal pension funds. Public funds exist in some countries as the so-called provident funds managed by the government on behalf of all or selected groups of employees. Publicly managed funds can be found in many developing countries such as Zambia, Kenya, Egypt or India.⁴ Public bodies investing centrally on behalf of individuals also exist in Hong Kong or Singapore where they have for instance very low costs of administration. However, these funds usually possess strong features of inefficiency, for example they tend to (or are explicitly required to) overinvest into government

¹ E.g. in Australia, Switzerland or Chile.

² E.g. in the United States.

³ Such is the case in the United Kingdom. Employees may contract out of the public pay-as-you-go scheme (except for the basic flat-benefit scheme) and save in pension funds instead. In Denmark or the Netherlands, participation in occupational pension funds is quasi-mandatory as a result of collective bargaining.

⁴ A weak institutional environment and political mismanagement of assets under the administration of these funds in some developing countries can have a disastrous effect on the level of benefits provided to individuals in

bonds⁵ and into shares or bonds issued by companies in which the government has a major stake.⁶

Occupational pension funds are set up by the sponsor (typically a non-financial company) on behalf of its employees and these funds are usually managed by professional asset managers, not directly by the employer. There are reasons in favor of employer provision as well as against. The advantages of this arrangement are for instance lower information asymmetries and low administrative and marketing costs. The disadvantages are for instance limited portability of accrued pension rights hindering labor mobility as well as the possibility that a financial contagion in the company affects the pension assets or that company managers interfere with the investment strategies of the fund in pursuit of their own goals. It is necessary that there is a clear separation between the company and the fund, otherwise in the event of bankruptcy a participant would face the risk of losing both his/her job and his/her acquired pension rights.⁷ Occupational funds are the prevalent form of pension funds in developed countries such as the United States, United Kingdom, Switzerland or the Netherlands.

Personal pension funds are neither state nor employer based. They are financial institutions collecting and investing funds from their participants on an individual basis. They are often closely connected with banks, life insurance companies or other types of institutional investors. Their advantages are that they enable easy portability of accrued pension rights, do not cause labor market distortions and do not suffer from exposure to the interests of politicians or employers. Their disadvantages are information asymmetries, agency costs and generally rather high costs of administration. Personal pension funds can be found for instance in Chile, Hungary, Poland or in the Czech Republic.

There are four basic types of pension plans.⁸ The first is a pension plan based on the defined contribution (DC) principle. In this type of a plan, contributions are fixed and benefits depend on investment returns. Thus, participants bear the risks of low returns and hence low benefits in

retirement. In the 1980s, the average annual real rate of return on assets invested by these funds in Kenya, Egypt and Zambia was -3.8 %, -11.7 % and -23.4 %, respectively (World Bank data in Musilek 2003).

⁵ Some countries whose pay-as-you-go schemes have accumulated some surplus funds invest such reserve funds into government bonds (e.g. US or Japan). Obviously, this has little to do with funding and it is virtually a pay-as-you-go mechanism under cover.

⁶ I.e. investing with objectives other than to select some kind of optimal portfolio for participants.

⁷ This requirement can be found in EU Directive 2003/41/EC on pension funds.

⁸ A pension plan is a contract between a pension fund and its participants setting out the rights and obligations of both parties.

retirement,⁹ there are no insurance features. Pension funds need not apply asset-liability management, their clients' assets equal liabilities to them by definition. Thus, there is great resemblance to other institutional investors such as mutual funds. In the case of a stock market crash just prior to retirement, an individual could incur severe losses. In principle, such risks can be reduced through a kind of life-cycle investment, i.e. by gradual switching to less risky assets as retirement approaches. A young participant who has a longer investment horizon would probably choose a more aggressive portfolio containing more shares whereas an older participant would probably choose a conservative portfolio with a higher proportion of fixed-income instruments, both optimizing given their risk-return preferences. These plans tend to have lower administrative costs and there is a relative ease of transferability of pension assets. Davis (2003b) notes that occupational pension funds with DC plans tend to have lower performance since employers bearing no risk may have lower incentives to optimize investment.

The second is a pension plan based on the defined benefit (DB) principle.¹⁰ In this type of a plan, benefits are pre-defined independent of the rate of return on investments. There are clear insurance elements since the investment risks are borne by the pension funds. Also, pension funds bear the risks of changes in government regulation as well as labor earnings risks since benefits are usually derived from final earnings. Pension funds based on DB principle have to conduct careful asset-liability management since their obligations are given regardless of the market value of their assets. They may be forced to top up participants' funds in order to keep them in actuarial balance when assets decline in value or liabilities increase. For example in 2000, UK pension funds held about half of their portfolio in domestic equities. At the end of 2002, the UK stock market was some 50 % below its peak in 2000. In addition, the situation of these pension funds was aggravated by some earlier government policies and regulations of DB plans which raised their liabilities. Thus, the bear market combined with some other factors resulted in large underfunding of DB pension plans (Davis 2003b).¹¹ In the case of occupational pension funds, DB plans may assist employers in reducing labor turnover.¹² For

⁹ Of course, they also bear the "risks" of high returns and high benefits.

¹⁰ These plans are often offered by occupational pension funds.

¹¹ In times of surplus, some employers raise their profitability through the so-called contribution holidays, i.e. by ceasing to contribute to an overfunded DB occupational pension fund. This also happened in the UK before the bubble burst.

¹² This is usually because the employer is allowed to institute imperfect vesting, i.e. full pension rights accrue only after a given number of employment years. Early leavers then gain less than a proportionate share of benefits in relation to contributions, thus subsidizing their colleagues who stay longer. Also, the benefits of early leavers may be frozen against the growth of wages or even inflation, which may make them virtually worthless over time.

mobile workers, low portability of accrued pension rights is a disadvantage which can happen to be very costly. Blake and Orszag (1997) did some research into the costs of low portability of pension rights in occupational DB pension plans in the UK and found out that changing a job six times in a career may result in a loss of approximately one quarter of benefits. These plans are connected with higher administrative and regulatory costs. In general, DC plans have tended to replace DB plans in developed countries in recent years since employers have sought to minimize their obligations, while employees desired funds that are readily transferable between employers.

The third type of a plan is a hybrid between DC and DB. The pension plan is based on a DC principle, but a certain minimum level of benefits is guaranteed. There are clearly some option features due to the floor on benefits and as usual, options come at a cost. The fourth type of a plan is the so-called employee stock ownership plan. This is a plan in an occupational pension fund whereby employees may purchase their own company stock tax free. This basically means that the firm uses its employees' pension savings to buy its own stock. Musílek (2003) believes that employees under such plans are exposed to too high a risk of bad performance of the company¹³ and that these plans serve primarily as a shield against a hostile takeover.

Tax exemptions for individuals and their employers are a powerful incentive for pension saving in most countries where it is not mandatory. This view of pension funds as tax shelters suggests that tax privileges are likely to have contributed to the growth and increasing coverage of pension funds in many countries. There are usually ceilings on the amount of assets used for pension purposes that receive preferential tax treatment in order to limit abuse. Pensions may be taxed at three points: when contributions are made, when interest and capital gain accrue, and when benefits are paid. Economic literature uses a certain shorthand for different tax regimes in which either T as 'taxed' or E as 'tax exempt' is used for each of the three points.¹⁴ Taxation under the EET regime is lower than under TEE owing to tax deferral,

Moreover, DB formulae are often final-salary based whereby benefits accrue more rapidly as the retirement day approaches, a phenomenon known as 'backloading'. In sum, those who change jobs lose. In contrast, pension rights in DC plans accrue evenly throughout the career.

¹³ Generally, occupational pension plans should have restrictions on "self-investment". As noted by Davis (2002a), the Enron case showed a major flaw in the regulation of US 401(k) plans (these are widely-used voluntary DC pension plans with tax incentives) that enabled unlimited investment in the employer's stock. Thus, when the energy company Enron went bankrupt in late 2001 participants incurred huge losses on their pension assets.

¹⁴ For instance EET denotes a regime in which contributions and investment income are tax exempt whereas benefits are taxed.

given that progressive taxation will be lower on lower retirement income and deferment itself means that pre-tax rather than post-tax income is available for investment and accumulation. Various tax regimes exist in the world,¹⁵ albeit the most common seems to be EET.¹⁶ The power of tax incentives can be demonstrated on the case of New Zealand whose shift from EET to TTE in the late 1980s so that pensions were treated similarly to all other forms of savings led to very undesirable consequences. Soon after this change a sharp fall in pension savings occurred, with many small firms' schemes collapsing and large firms reducing their promised benefits, assets of pension funds falling and total private saving and probably also national saving being reduced (Davis 1995, Musílek 2003). Also, pension funds themselves are in many countries given preferential tax treatment, which should lead to higher net returns and ultimately higher benefits for participants.

2.2 Pension Funds as Institutional Investors

The major feature of pension funds is the long-term nature of their investment. Since early withdrawal is usually restricted or forbidden, pension funds have long-term liabilities which allow them to invest into assets with the highest returns at the far "end" of the yield curve, compensating for the increased risk by diversifying across assets with imperfectly correlated returns. In many countries, pension funds have accumulated huge amounts of assets and they have been a major catalyst of change in financial markets, driving the process of financial innovation. Many new instruments which have come to dominate global financial markets owe their invention to large, sophisticated pension funds.¹⁷ Clark (2000) refers to the remarkable size and significance of pension funds in the Anglo-Saxon part of the world as 'pension fund capitalism' and argues that pension funds profoundly affect the structure and performance of the global economy.

The assets under the administration of pension funds differ substantially across countries. Generally, pension funds tend to be sizable in countries where mandatory participation has been instituted (since coverage is usually much greater), where they have a longer tradition and

¹⁵ Of course, for quite obvious reasons a country with the EEE regime seems rather hard to find. On the contrary, some countries with mandatory schemes may not feel any need to entice participation as in the case of Australia with TTT. However, e.g. the mandatory funded pension scheme in Hungary operates under a regime resembling EEE.

¹⁶ For instance in the US, the UK, Canada, Switzerland, the Netherlands, France or Italy.

¹⁷ Among the new instruments that were tailored to the needs of pension funds belong e.g. zero-coupon bonds, mortgage-backed securities or indexed futures and options, to name but a few.

the scheme has a higher degree of maturity, where taxation and regulatory framework are favorable to pension funds and where the public pension scheme is limited (since a large public scheme tends to crowd out private savings for retirement). A contrast is apparent between the role of pension funds in the Anglo-Saxon countries (the UK, the US, Australia, and Canada), the Netherlands and Switzerland where they manage large assets relative to the size of the economy, and the role of these funds in some other continental European countries. Japan occupies an intermediate position with large absolute assets which are nevertheless rather small relative to the size of the economy.

In 1996, pension funds in Switzerland controlled assets amounting to 117 % of the Swiss GDP and assets under the management of pension funds in Australia reached 61 % of the Australian GDP.¹⁸ In 1998, US pension funds managed assets worth over USD 7 trillion which was 84 % of the country's GDP. This constitutes an enormous economic power and pension funds are the most important players in the US financial sector. In the UK, pension funds have a similarly established tradition and mature occupational pension funds of some older industrial firms such as Rolls Royce are worth more than the company itself.¹⁹ Assets of UK pension funds exceeded a trillion US dollars in 1998, which was 83 % of the British GDP. In the same year, pension funds in Canada administered assets worth 47 % of the GDP and in the case of Japan it was 16 % of the GDP.

In the EU, pension funds accounted for about 30 % of the GDP in 2000.²⁰ They are, however, unevenly distributed. The Netherlands, the UK, Sweden, Ireland and Denmark have large pension fund sectors while in Italy, Greece, Belgium, Spain or France the size of the sector is negligible. For instance Dutch pension funds managed assets amounting to 111 % of the GDP in 2000, whereas Italian pension funds controlled assets worth some 3 % of the GDP.

Saving for retirement does not occur only through pension funds but also via other institutional investors such as life insurance companies or mutual funds. Thus, the products offered by different types of institutional investors often overlap. Mutual funds are used as a vehicle for precautionary saving for retirement, pension fund saving based on a DB principle has a life insurance aspect and insurance companies launch their own investment funds, are involved in

¹⁸ World Bank data in Součková (2003).

¹⁹ Davis (2003b).

direct pension provision on a DC principle and in the provision of annuities and external asset management for pension funds.

A strong growth of institutional investors has been a salient feature of financial markets in the past few decades. Individuals have shifted away from bank deposits and direct holdings of securities towards institutional investment. Davis and Steil (2001) suggest that this is due to various supply and demand factors that have increased investing via institutional investors, the major supply-side factor being that they offered their services more efficiently relative to banks and direct holdings, the major demand-side factors being demography and growing wealth. In 2000, the total value of institutional assets in the EU was 11 trillion euro.²¹ As shown in table 2, insurance companies stand out in countries like Luxembourg, the UK, Sweden, Denmark or the Netherlands while investment funds are large for instance in France if we ignore the offshore markets of Luxembourg and Ireland. The phenomenon of disintermediation and securitization in continental Europe represents a shift of the financial market structure towards the Anglo-Saxon paradigm.

	Pension Funds		Life Insurance		Mutual Funds		Total	
	bil. \$	% GDP	bil. \$	% GDP	bil. \$	% GDP	bil. \$	% GDP
UK	1,163	83	1,294	93	284	20	2,742	197
US	7,110	84	2,770	33	5,087	60	14,967	176
Germany	72	3	531	24	195	9	798	35
Japan	688	16	1,666	39	372	9	2,727	63
Canada	277	47	141	24	197	34	615	105
France	91	6	658	43	624	41	1,373	90
Italy	77	6	151	12	436	35	664	54
G-7	9,479		7,212		7,195		23,886	

Table 1: Assets of institutional investors in G-7 countries in 1998
Source: National flow-of-funds balance sheets, Davis (2003c)

²⁰ Insurance company assets were over 50 % of GDP and investment fund assets were about 40 % of GDP (Davis 2002b).

²¹ 30 % of these assets were under the control of UK institutional investors (Davis 2002b).

	Pension funds	Insurance companies	Investment funds
Belgium	6	42	30
Denmark	24	78	20
Germany	16	43	12
Greece	4	1	25
Spain	7	13	30
France	7	61	55
Ireland	51	45	144
Italy	3	21	39
Luxemburg	1	117	3,867
Netherlands	111	65	25
Austria	12	24	40
Portugal	12	20	16
Finland	9	57	10
Sweden	57	90	34
UK	81	107	27

Table 2: Assets of institutional investors in the EU (% GDP) in 2000²²

Source: Centre for European Policy Studies, Davis (2003a)

Particularly in countries with less developed equity markets, the development of these markets connected with the expansion of pension funds is likely to enhance economic performance (Demirgüç-Kunt and Levine 1996). The growth of pension funds and other institutional investors should lead to reduced cost and greater availability of equity and long-term debt financing to companies (Davis 2003c). Thus, as a major provider of corporate finance, pension funds play an important role in the functioning of the corporate sector and hence the economy as a whole. Their role in equity markets in the Anglo-Saxon world and to a lesser extent beyond has gradually shifted from that of a passive investor towards a more active one, exercising their voting rights and direct influence on the management of companies to ensure it maximizes shareholder value and does not act contrary to their interest.²³ This leads in many respects to better corporate governance and higher efficiency (Boersch-Supan and Winter 2001, Friedman 1995).

The debate over how to reform current pay-as-you-go schemes threatened by insolvency as the population ages often involves potential rates of return in the alternative funded scheme, taking

²² It is possible that there is some double counting in the table since insurance companies are important managers of pension fund assets and pension funds are important investors in investment companies. Note also that in Sweden, a publicly managed earnings-related funded scheme (known as ATP) with mandatory participation was established in 1960 to supplement the flat-rate pay-as-you-go scheme, hence the large accumulated assets.

²³ This is so especially if pension funds have a big stake in a company. If it is not so, it is sometimes easier for them to vote with their feet through selling of shares, which has a rather negative impact on corporate governance since the monitoring of the long-term performance of the company management is reduced. Also, pension funds sometimes show little interest in small companies, thus making it harder for them to obtain equity financing despite their potential for innovation, growth and job creation (Davis 1995 or Davis 2003c).

historical returns attained by pension funds into account. However, various studies suggest that population ageing may have a profound impact on asset prices as well. The decline in the ratio of labor to capital may result in lower returns on capital. Davis and Li (2003) argue that generally an increase in the proportion of the middle-aged population (about 40-65 years, i.e. the “saving years”) tends to boost the demand for assets and their price. A decline in the fraction of these people in the coming decades will have the opposite effect,²⁴ which shows the risks of sole reliance on funded social security schemes and the needs to retain some pay-as-you-go elements as a form of insurance. The impact of population aging on asset prices is also analyzed in Schieber and Shoven (1994) or Brooks (2000). In general, this effect is very difficult to quantify and some studies suggest it might be rather weak (Poterba 1998).

If we look at the historical returns of pension funds in developed countries, we find that they differ substantially across these countries. This is due to the fact that they operate under different economic conditions and also different regulatory frameworks. It will be demonstrated in chapter 5 that the government approach to regulation significantly determines the investment behavior and hence the performance of pension funds. Table 3 shows the real rate of return on the portfolio of pension funds and compares them with returns on alternative portfolios. Namely, a portfolio formed by a balanced mix of domestic bonds and equity, and an internationally well diversified portfolio. Finally, to be able to compare the performance of a funded scheme with a pay-as-you-go one, the growth rate of real wages is shown as well since it can be used as a rough approximation of the implicit rate of return in a pay-as-you-go scheme.²⁵

First and foremost, we see that the performance of pension funds exceeded that of pay-as-you-go schemes in all observed countries, the rate of return being mostly by 2-3 percentage points higher.²⁶ Over a long time period, such a difference results in substantially higher benefits obtained via saving in pension funds. Comparing pension funds’ performance across the selected countries, we see that the lowest rates of return were in Australia, Sweden and

²⁴ The baby boom generation will be reaching retirement and will start reducing its assets holdings while the baby bust generation will move to the “saving years”.

²⁵ The implicit rate of return in a pay-as-you-go scheme equals the growth rate of the underlying wage bill in the economy, which approximately equals the growth rate of the labor force plus the growth rate of wages (Samuelson 1958).

²⁶ Note that as expected, the volatility of investment returns is substantially higher than the volatility of wages, implying a higher risk involved in a funded scheme. However, as mentioned above, pay-as-you-go schemes are additionally exposed to a substantial political risk, which may well compensate for this difference from the point of view of individuals.

Switzerland, approximately 2 % p.a. in real terms. However, Sweden operated a major public pension fund, which may be the reason for the low performance. Similarly, pension funds in Switzerland were required to attain a minimum rate of return which is a regulatory requirement that may have led the funds to overly safe investment decisions (as indeed shown by a relatively low volatility), thus adversely affecting long-term returns given the risk-return trade-off. As noted above, this issue will be discussed in more detail in chapter 5. In general, pension funds in the other countries generated rates of return of about 4-5 % p.a. in real terms.

US, UK and Canadian pension funds traditionally hold a large proportion of their portfolios in equities. As a result, their long-term performance would not be improved by switching to a portfolio consisting of 50 % bonds and 50 % equities as shown in the table. For the other countries in which pension funds mostly hold a modest proportion of equity, this switch would result in increased volatility on the one hand, but to an improvement in the long-term performance on the other.

Modern portfolio theory suggests that diversifying in a domestic market can eliminate unsystematic risk resulting from the different performance of individual firms and industries, but not the systematic risk resulting from the performance of the economy as a whole. To the extent that national business cycles are not correlated and shocks to equity markets are country specific, international diversification can reduce systematic risk for a given return. As noted by Barberis and Thaler (2002), investors generally exhibit a pronounced “home bias” by heavily investing into domestic instruments relative to foreign ones and sometimes it is not easy to explain this phenomenon on rational grounds. For instance, as shown in Baxter and Jermann (1997), normative portfolio choice models that take human capital into account typically advise investors not to “overinvest” into domestic equity because of its high correlation with their human capital. In some cases, such a behavior of investors can be explained by lower costs of researching domestic environment, tax considerations or various regulatory requirements. Additionally, behavioral finance offers an attempt to explain this phenomenon on the basis of the preference for the familiar (Barberis and Thaler 2002). However, it still remains to be a puzzle. Most countries impose restrictions on their pension funds’ foreign investment, but the funds often invest below those limits voluntarily. An obvious important reason for their lower international investment is for instance additional exchange rate risk.²⁷

²⁷ Foreign exchange risk is also present in a purely domestic portfolio, because there are companies competing in world markets.

The movement from the second column to the third column of table 3 illustrates the effect of international diversification of our artificial portfolio. Naturally, the investment decision ultimately depends on the preferences of investors given the risk-return trade-off. It seems that most countries would be able to attain a more favorable risk-return combination. Some countries would have attained higher returns with little increase in risk (Australia, Canada and the US), some would have attained lower returns with a lower risk (Sweden and the Netherlands) and some would have attained higher returns with a lower risk (Japan, Switzerland and the UK). In our sample, international diversification would have brought much lower returns with little decrease in risk to investors in Denmark and investors in Germany would have clearly lost.²⁸

	Actual portfolio real rate of return		50 % bonds, 50 % equities		Global portfolio		Rate of growth of average real wage	
Australia	1.8	(11.4)	3.5	(17.5)	6.1	(18.2)	1.0	(3.4)
Canada	4.8	(10.0)	4.0	(12.1)	7.1	(14.7)	1.3	(2.4)
Denmark	5.0	(11.1)	6.1	(19.0)	3.7	(18.5)	2.4	(3.5)
Germany	6.0	(5.9)	6.4	(17.7)	3.9	(18.4)	2.7	(2.7)
Japan	4.4	(10.2)	6.1	(16.9)	6.9	(16.0)	2.4	(3.0)
Netherlands	4.6	(6.0)	5.5	(18.3)	4.8	(14.7)	1.4	(2.6)
Sweden	2.0	(13.1)	8.0	(20.1)	6.3	(14.8)	1.4	(3.5)
Switzerland	1.7	(7.5)	2.4	(18.1)	3.7	(17.0)	1.5	(2.1)
UK	5.9	(12.8)	4.7	(15.4)	5.9	(15.0)	2.8	(2.3)
US	4.5	(11.8)	4.4	(13.3)	7.5	(15.2)	-0.2	(1.9)

Table 3: Real returns on pension fund portfolios and their standard deviations in selected countries in 1970 – 95 (in %)²⁹

Source: Davis and Steil (2001)

In recent years, increasing economic integration and globalization in general have led to a higher interdependence of national economies and hence a higher correlation among national business cycles. Goetzmann *et al.* (2001) examined the correlation structure of the major world equity markets over the last 150 years and found that correlations vary considerably through time and are the highest during periods of economic and financial integration. Their analysis thus suggests that the diversification benefits to global investing are not constant, and that they are currently low compared to the rest of capital market history. They also show that this has

²⁸ Needless to say, German investors enjoyed historically high returns on domestic bonds. Also, currency appreciation played a part.

²⁹ Standard deviations are in parentheses. The second column shows returns that would have been attained on a portfolio consisting of 50 % domestic bonds and 50 % domestic equities. The third column shows returns that would have been attained on a portfolio with a similar asset allocation as the previous one (second column) but

recently been compensated by the emergence of new markets. In addition, in the very long-run international investment could offer some protection against the effects of ageing of the domestic population due to imperfect correlation of demographic changes across countries (Blake 1997).

In the context of European integration, investors can expect the importance of country specific factors to diminish and the importance of sectoral factors to come to dominate instead (Kraus 2001). Especially investors in small countries with narrow markets that do not allow sufficient diversification within the domestic economy benefit from sectoral investment across the whole of Europe. The launch of a single currency in the EMU countries is bringing enhanced liquidity, lower transaction costs, improved transparency in international investment and increased competition in the integrated capital market.³⁰ There seems to be an increasing pressure for concentration of exchanges towards pan-European electronic trading platforms. In sum, a better risk-return trade-off should ultimately be attainable.

In due course, a deeper securities market may give rise to financial innovations tailored to the needs of pension funds such as for instance currently unavailable bonds with coupons indexed to average earnings.³¹ With pressures on fiscal discipline in the EU³² the supply of government bonds may somewhat diminish over time, and it can be expected that the increasingly more available and popular corporate bonds and securitized loans will be gaining importance in the portfolio of European pension funds.

As shown by Davis (2002b), pension funds in the EMU countries still tend to be oligopolistic and segmented on a national basis, which has tended to lead to higher prices and lower returns than could otherwise be obtained. Nevertheless, they intensify cross border investment, particularly within the EMU due to the elimination of exchange rate risk and sustained lower inflation. International diversification should indeed be facilitated by the EU Directive on pension funds³³ which introduces regulatory elements more favorable to cross border

diversified across OECD countries. Foreign exchange rate plays an important role in the latter for domestic investors, hence different results for different countries.

³⁰ For more on this including a discussion about unresolved issues in this area, see Mejstřík (2000), Santillán *et al.* (2000), Galati and Tsatsaronis (2001) or Karlinger (2002).

³¹ Such instruments could be expected to be sought by pension funds with DB plans matching assets to liabilities that are derived from the development of earnings.

³² At the time of writing, the Stability and Growth Pact is still surviving, at least in formal terms.

³³ Directive 2003/41/EC on the Activities and Supervision of Institutions for Occupational Retirement Provision came into force in September 2003 which requires each member state to bring its legislation in line by September

investment, although tax obstacles hampering cross border activities seem to remain an unresolved issue.

Pension funds are sometimes accused of herd behavior³⁴ and overly rapid response to price changes, thereby increasing stock market volatility and the cost of capital. According to Bikhchandani and Sharma (2000), there are several reasons why an institutional investor such as a pension fund may imitate the behavior of others. The most important ones are that the investor may believe that others have knowledge about the returns on an investment and their behavior reveals this information, and that the incentives of the investor may be such that imitation is rewarded. The latter is especially relevant in countries where the regulatory framework imposes requirements on the pension funds' performance relative to the pension industry average.³⁵ As noted by Srinivas and Yermo (1999), this ensures that almost all pension funds in a given country perform identically since they allocate their assets in the same fashion in order to play it safe.³⁶

Straight comparisons of the costs of running private and public pension schemes may be sometimes misleading since the quality of the services provided has to be considered as well, but in general private pension funds tend to have somewhat higher administrative costs than public social security schemes. The administrative costs of pension funds vary across countries and are mainly influenced by the organization of the pension industry, the regulatory framework under which they operate, the maturity of the scheme as well as the services they provide.³⁷ As mentioned above, DC plans are often substantially cheaper to administer than DB plans. Similarly, as demonstrated by Mitchell (1996), the costs of administration of public schemes vary a great deal across countries and institutional settings, and a key factor influencing the costs is the scale of the scheme. Comparing the costs of private and public

2005. For instance, employers operating in more than one member state will be able to launch a single pension scheme to cover all their employees throughout the EU (single license needed). Pension funds will be able to invest at least 30 % of their portfolio into assets denominated in currencies other than domestic and at least 70 % into equity as long as prudence in investment is exercised. We will discuss the latter in more detail in chapter 5.

³⁴ Herding happens when investors copy their investment strategies from one another.

³⁵ In other words, a downward deviation from the average returns in the pension industry is punished.

³⁶ Similarly, asset managers are often rewarded based on relative rather than absolute returns. Thus, the competition for asset management skills under such conditions may result in the same phenomenon (Davis 2003c).

³⁷ For instance in the US or the EU, pension funds increasingly adopt passive indexation strategies which minimize expenses while it seems that returns do not suffer given the performance of active managers. Competition in the EU is putting downward pressure on costs and for instance Davis (2002b) notes: "[A]ctive managers are finding it hard to compete with indexers, since the main focus of cross-border investment is on the

schemes, Mitchell argues that higher costs of private schemes can be offset by substantial economic benefits and she notes that these could include “the opportunity for participants’ contributions to earn a higher rate of return than feasible under the public program, the possibility that labor supply and savings disincentives would be diminished, and a reduction in the political risk regarding future benefits” (p. 40).

We have finished a brief overview of the major issues concerning pension funds illustrated by examples from developed countries in which they are well established institutional investors, mostly with a long tradition. The major goal of the thesis is to describe the Czech system of pension funds and examine its preparedness to be included in the mandatory social security scheme. To do so, it seems necessary to set a certain benchmark by describing the experience with pension funds in countries that have already carried out a systemic pension reform. To that we turn now.

top 200 shares in EMU, and it is harder to find undervalued stocks among such giants than among smaller firms. Also, the scope for active management diminishes, owing to the loss of currency risk in EMU” (pp. 16-17).

3 After Pension Reform: Latin America & Eastern Europe

If the Czech Republic decides to reform its social security operated on a pay-as-you-go principle through a partial switch to funding, models from abroad will be needed. In fact, success of reforms in other countries is likely to strengthen the cause for a similar reform in the Czech Republic, failure would do the opposite. The Czech system of pension funds has a ten-year history under the regime of voluntary saving. In contrast, systems of pension funds in many reforming countries started from scratch under the mandatory regime with no or little prior experience. A question arises how much of an advantage this constitutes and whether the development of the Czech private pension industry has been sufficient for such a radical change of the game that a reform would bring about. Nevertheless, the fact that a consolidated system of pension funds seems already to be in place is undoubtedly a good starting point. A big advantage for Czech policymakers is that they can learn from the mistakes of others and/or adopt approaches which were successful elsewhere.

A pioneer among the reforming countries was Chile which implemented its revolutionary reform³⁸ under the authoritarian rule of General Augusto Pinochet in 1981. Success of this policy change triggered a chain reaction in which seven other countries in the region carried out a similar reform in the 1990s and four others have followed at the beginning of the new millennium so far. Orenstein (2003) applies a multidisciplinary approach of the diffusion of innovation on the process of spreading of new policy ideas and institutional change in pension provision, and suggests that a regional example appears to be an important predictor of pension reform adoption.³⁹ This appears to be the case in Eastern Europe as well. The first country to carry out a systemic pension reform was Hungary in 1998 and it was soon followed by nine other countries in the region where reform either has been or is now being implemented. Among the reforming countries are neighboring Poland and Slovakia, and it remains to be seen whether the Czech Republic joins this club and strengthens its social security as well.

A systemic pension reform may have important effects on saving, labor and capital markets, and ultimately economic growth. Such effects are not easy to measure, especially in the short run. The only country with a sufficiently long post-reform period for assessment is Chile,

³⁸ Developed by an economic team of “Chicago boys” in Santiago.

³⁹ As pointed out by Palacios (2003), “... the fact that the ideas, people, examples and reform context were all aligned favorably for systemic reform would probably not have been sufficient to overcome the inertia of public

having more than two decades of this experience. The switch from the pay-as-you-go mode to funding itself does not guarantee that those effects will be positive. The impact on saving depends crucially on how the transition is financed. If it is largely through a fiscal accommodation, i.e. higher taxes or lower government expenditures, saving is very likely to increase. If the transition is purely debt-financed, positive effects are unlikely. If for instance the government forces pension funds to invest mainly into government bonds through regulation, it reintroduces a pay-as-you-go scheme with the contributions only being channeled through pension funds to the government again which uses them to finance the transitional deficit.⁴⁰ The impact on labor markets is through the reduction of the perceived tax element of pension contributions and the resulting distortions.⁴¹ As also touched upon in the previous chapter, the impact on capital markets arises from the presence of a new class of institutional investors interested in long-term instruments, thereby extending the yield curve, from increased liquidity, reduced spreads and improved price discovery processes in local markets. Increased saving⁴² combined with more efficient labor and capital markets leads to enhanced economic growth. Corbo and Schmidt-Hebbel (2003) attempted to quantify these effects on the Chilean economy and after isolating them from other potential effects, they found that their combined impact on economic growth between 1981 and 2001 was 0.2 – 0.9 percentage points p.a.,⁴³ or alternatively that in 2001 1.9 % to 9.8 % of the Chilean GDP was due to the reform.

Reformed pension schemes in Latin America and Eastern Europe rely on a system of private personal pension funds⁴⁴ and some countries manage public pension funds as well. The design of the schemes differs across these countries and it is not the purpose of this chapter to provide their comprehensive description and assessment. The following text is merely to provide a

pension policy and resistance from certain interest groups. Reforms did proceed however, due in large part to the failings of the existing systems” (p. 16).

⁴⁰ This deficit is caused by the fact that contributions are diverted to pension funds while benefits continue to be paid under the old pay-as-you-go scheme for quite some time.

⁴¹ Palacios (2003) provides a review of literature on this topic in the context of Latin American reforms, concluding that although labor market efficiency may be improved, there is little evidence that the informal sector was reduced and coverage of the pension scheme increased.

⁴² In a small open economy such as the Czech Republic, the link between domestic investment and domestic saving may be weaker, implying a less clear impact on economic growth. For more on this issue, see Schimmelpfennig (2000).

⁴³ For the future, they estimate that the pension reform’s contribution to growth rate will converge to zero, as the elimination of the pay-as-you-go system reaches completion and the economy moves towards its new dynamic steady-state equilibrium.

⁴⁴ As opposed to occupational pension funds.

brief picture of the main features of systems of pension funds in those two regions,⁴⁵ thus giving the reader a general idea about their coverage, the level of contributions and accumulated assets, the mechanism of contribution collection, industrial organization, supervision, and costs and charges before the Czech system of pension funds is described in the chapter that follows.⁴⁶

3.1 Latin America

The following countries have adopted a systemic reform of their pension scheme so far: Chile (1981), Peru (1993), Argentina (1994), Colombia (1994), Uruguay (1995), Bolivia (1997), Mexico (1997), El Salvador (1998), Costa Rica (2000), Dominican Republic (2003), Ecuador⁴⁷ and Nicaragua (in the process of implementation now).⁴⁸

In each country, a residual pay-as-you-go scheme survives for a finite period, affecting mostly older workers, and a parallel pay-as-you-go scheme continues to be an option for workers in Argentina, Colombia and Peru.⁴⁹ A safety net, mostly in the form of a minimum pension guarantee is instituted in each country except Peru, although to a different extent and with different eligibility criteria.

Coverage in Latin American countries is low and it had been low prior to reforms due to the prevalence of informal sector activity. Among the reforming countries, coverage defined as the proportion of the working age population by *any* pension scheme varies from about 9 % in Bolivia to about 47 % in Uruguay, the second highest coverage being 34 % in Chile. Several

⁴⁵ Apart from Latin America and Eastern Europe, a similar reform has only been conducted in Kazakhstan and Hong Kong. In line with the theory of diffusion of pension innovation by Orenstein (2003), both were until recently part of major European empires.

⁴⁶ The following two subchapters are largely based on data from the International Federation of Pension Fund Administrators (FIAP; www.fiap.cl), the World Bank (www.worldbank.org), and a series of papers presented at the International Seminar “Results and Challenges of Pension Reforms” organized by FIAP in Mexico in May 2003 and published as a book in December of the same year (see references). This was the most updated information available to the author in early 2004.

⁴⁷ Although Ecuador is included in this list, it is possible that challenges in the Supreme Court and a lack of support from the current government may result in a situation similar to what happened in Venezuela after a law introducing a funded scheme was passed in 1998, but never implemented.

⁴⁸ The year given corresponds in each case to the beginning of the operation of the mandatory pension scheme.

⁴⁹ I.e. these countries allow new labor market entrants to choose which scheme they prefer. It appears that only in the case of Colombia it is likely that the parallel pay-as-you-go scheme will play a significant role in the long run, since a very small proportion of new workers (fewer than 5 % of those covered) choose the public scheme in Argentina and Peru, this partly being because the funded scheme is a default option for workers not expressing a preference. In contrast, Colombia even allows workers to reverse their decision to join the funded scheme every

countries exempted from reform certain workers such as civil servants or certain income-based groups. In most countries, transition arrangements were such that they allowed those already in the old scheme to remain, so coverage of the funded scheme gradually increases as the scheme matures. The switching patterns, however, indicate workers' dissatisfaction with the old system. Younger workers generally opted to switch into the new system once given the opportunity. In Argentina and Chile, more than 80 % of those under the age of 40 eligible to choose switched to the new scheme. Similarly, more than 50 % of the younger workers switched in Colombia and Peru. In El Salvador, 80 % of those eligible to switch did so and in Uruguay, the number joining the funded scheme exceeded expectations by 500 %.⁵⁰ As for the age structure, over 80 % of participants in private pension funds in Latin America are currently under the age of 45 and half of these are under the age of 30.⁵¹

Contributions to pension funds in Latin American countries vary as a percentage of gross wages; in some countries only individuals contribute, in others employers are obliged to contribute as well. In addition to contributions for old-age pensions, contributions for disability insurance have to be added in some countries⁵² as well, which is not included in the following table. Moreover, administrative charges are levied on top of these contributions as discussed later in the text.⁵³

	Individual	Employer		Individual	Employer
Argentina	7.74	-	Ecuador	varies	-
Bolivia	10	-	El Salvador	3.25	6.75
Colombia ⁵⁴	2.5	7.5	Mexico ⁵⁵	1.125	5.2
Chile	10	-	Nicaragua	4	6.5
Costa Rica	1	3.25	Peru	8	-
Dominican Rep.	8.0	-	Uruguay ⁵⁶	12.27	-

Table 4: Contributions to pension funds as a percentage of gross wages

Source: Müller (2003), Palacios (2003)

three years, a unique option among the reforming countries since it essentially gives workers a guarantee equivalent to what they would get if reform had never been implemented, which may turn out to be pernicious.

⁵⁰ Palacios (2003).

⁵¹ International Federation of Pension Fund Administrators.

⁵² Pension funds are mandated by law to provide insurance for disability and survivors with the exception of Mexico, Costa Rica and Ecuador, where disability insurance continues to be provided by the public pay-as-you-go scheme.

⁵³ For instance in Chile, Colombia, El Salvador or Peru, contributions are fixed at the level specified in the table and pension funds require participants to pay additional charges. In contrast, charges in Argentina are deducted by pension funds from a fixed 10% contribution rate; in the table, the average recent charge was deducted to make the numbers comparable.

⁵⁴ Total contribution rate rising to 12 % until 2008.

⁵⁵ Plus a 2.2% state subsidy. Contributions may vary.

⁵⁶ Contributions may vary.

In five countries, employers provide information and pay contributions on behalf of their employees directly to pension funds.⁵⁷ Seven other countries opted for a centralized collection. In some countries, the entity for collection and record keeping is public. Countries such as Costa Rica, Uruguay and Nicaragua continue to collect contributions through the old public pension scheme. In other countries, the entity is private. Mexico adopted a model in which pension funds are shareholders in a centralized agency set up as a non-profit organization for the collection of contributions. And for instance the Dominican Republic introduced a hybrid entity involving a public-private partnership.

There have been a number of mergers in the process of consolidation of the pension industry in most countries, but no pension fund has failed in any country.⁵⁸ Mergers have been primarily driven by the aim to reap the economies of scale that seem to exist in the industry.⁵⁹ In countries which reformed their pension schemes in the 1990s and the industry has had at least some time to develop, the number of pension funds had decreased from the inception to 2002 from 5 to 3 in El Salvador, from 8 to 4 in Peru, from 14 to 4 in Colombia, from 17 to 11 in Mexico and from 25 to 12 in Argentina.⁶⁰ In Chile, there were 13 pension funds in 1990, this number then increased to 19 in 1994 and then steadily declined till it reached 7 in 2002. Thus, this consolidation has resulted in substantial market concentration. Among all twelve reforming countries, five allowed public pension funds in the market. Pension funds owned by state banks in Argentina or Uruguay are major players in their respective markets, whereas the public pension fund in Mexico is of minor importance. In contrast, public pension funds are expressly prohibited by the law in Chile.

In all these countries, three largest pension funds control more than half of the market in terms of participants. The average number of participants in a pension fund is roughly between 300,000 and 500,000 with the exception of Mexico where it is more than a million. All countries restrict transfers between pension funds. The minimum time a participant has to stay with a pension fund before switching to another one ranges from two and a half months in Chile to one year in several countries. In most countries, the share of foreign ownership of the market exceeds 50 % and some big players such as Citibank participate in multiple markets in

⁵⁷ By this we mean that both the employer's contribution and individual contribution withheld from the employee's wage are paid by the employer to a pension fund.

⁵⁸ Palacios (2003).

⁵⁹ *Ibid.*

the region. Pension funds are supervised either by specially set up supervisory bodies or by agencies integrated in central banks or institutions for insurance supervision. In some of the countries, supervisory institutions are financed either in part or completely from fees paid by pension funds.

Assets under the management of pension funds have accumulated rapidly and they are expected to grow strongly in the coming decade. The projected assets of Chilean pension funds are expected to reach about 90 % of GDP in 2015 as the scheme will be approaching maturity. In the next decades, the accumulation of assets in several countries in the region is expected to reach a similar magnitude, which is likely to have an important impact on their capital market and the economy as a whole.

	Assets/GDP in 2002 (%)	Projection: assets/GDP in 2015 (%)
Argentina (1994)	10.4	30.9
Bolivia (1997)	33.5	43.5
Colombia (1994)	6.5	24.7
Chile (1981)	56.2	89.7
Mexico (1997)	5.2	26.0
Peru (1993)	7.2	28.1
Uruguay (1995)	7.7	13.3

Table 5: Pension funds' assets in 2002 and their estimates for 2015 as a proportion of GDP⁶¹
Source: International Federation of Pension Fund Administrators

In all countries, workers may convert their accumulation into a life annuity upon retirement. There is very little experience as yet with paying out benefits, with the notable exception of Chile where over 400,000 pensioners received benefits from the funded scheme in 2002. Palacios (2003) notes that this has already had an impact on the insurance sector in the country, stating that while annuities represented 7 % of the insurance market in 1988, it was no less than one third in 2002. He also adds that similar trends can be observed in Argentina and Peru. Withdrawals upon retirement are restricted because unlike annuities, they do not provide longevity insurance. Retiring workers may opt for a scheduled withdrawal in all countries except Uruguay, and in most of these countries richer workers may withdraw part of their accumulation exceeding a certain minimum level as a lump sum.

The structure of pension funds' charges varies across these countries. It is worth reiterating that charges are levied on top of the contributions as summarized in table 4.⁶² All countries allow

⁶⁰ Ignoring Bolivia with its duopoly. Also, Uruguay has had 5 pension funds since the reform.

contribution-based charges. In addition, asset-based charges are allowed in Mexico and Nicaragua, charges based on returns are allowed in Mexico, Costa Rica and the Dominican Republic, and flat charges are allowed in Mexico, Chile and Uruguay. This makes a country-to-country comparison very difficult.⁶³ Due to this complexity of charge structures, Whitehouse (2000) concludes that “it is impossible to measure costs at any point in time: the only meaningful calculation is over the lifetime of pension membership” (p. 11). He then goes on to calculate the reduction in individual lifetime savings (and hence benefits) in a pension fund due to charges,⁶⁴ finding that this ranges from 13.5 % in Colombia to 26 % in Mexico, which is equivalent to a reduction in the rate of return of 0.65 % to 1.39 % p.a.⁶⁵ For instance in Chile, he predicts that charges reduce savings by 17.7 % or, alternatively, the rate of return by 0.88 % p.a. Using mean values, he also notes that in some countries charges levied by different pension funds vary significantly.

Naturally, the potential impact on net returns and ultimately the pension level attained is a major concern regarding charges, and various attempts to put pressure on their reduction have been undertaken. This can generally be achieved by increasing competition in the industry. For instance in Mexico and Argentina, the default option for new labor force entrants who have not expressed a preference for a particular pension fund is one of those with the lowest charges. Half of the reforming countries directly place a ceiling on what pension funds can charge to participants. Also, the aforementioned restrictions on the frequency of transfers between funds are supposed to lower charges since they are likely to prevent pension funds from incurring substantial costs through a marketing arms race as well as interrupted investments.⁶⁶ Latin American pension funds still suffer from relatively high charges, although it is expected that

⁶¹ Years in parentheses indicate the beginning of the operation of the funded scheme.

⁶² It can be argued that a country where the contribution rate is fixed and pension funds put administrative charges on top of it introduces more transparency and brings charges closer to participants' attention.

⁶³ For instance contribution-based charges (in absolute terms) grow over time at the rate equal to the wage growth rate, whereas asset-based charges grow at the rate equal to the growth of the individual's assets in a pension fund, the latter growth being much faster. As a result, the former charges are 'front-loaded', i.e. fees are heavier in the first years of participation and smaller in the last years as opposed to the latter case. Thus, pension funds recover their costs faster with contribution-based charges than with asset-based ones.

⁶⁴ The measure known as a charge ratio is used, which is defined as the present value of charges paid over the lifetime divided by the present value of assets that would have been accumulated if no charges had had to be paid (and would have been saved as contributions).

⁶⁵ These calculations are based on the assumption that the level of charges does not vary over time as the scheme matures, which may not be very realistic. He shows that in Chile, the charge ratio fell due to charge reductions from 30.3 % to 22.5 % between 1987 and 1992. Thus, caution should be exercised when comparing countries.

⁶⁶ For instance in Chile, the percentage of participants who changed a pension fund fell from 5 % in 1996 to 0.3 % in 2002.

these are reduced over time as the schemes accumulate more assets and economies of scale are realized.⁶⁷

3.2 Eastern Europe

The following countries have adopted a systemic reform of their pension scheme so far: Hungary (1998), Poland (1999), Latvia (2001), Bulgaria (2002), Croatia (2002), Estonia (2002), Macedonia (2003), Lithuania, Ukraine and Slovakia (in the process of implementation now).⁶⁸ Since reforms in the above countries are relatively recent and little can be inferred from their short experience, we will include in the following overview the Asian country of Kazakhstan (1998).

In all Eastern European countries, the shift to funding was partial and a residual pay-as-you-go scheme was retained.⁶⁹ In all countries participation in the funded scheme is mandatory for new labor market entrants. There were various patterns chosen by each country as to how participants with accrued rights under the old scheme were treated. Switching was mandatory for workers under the age of 42 in Bulgaria, under the age of 40 in Croatia and under the age of 30 in Poland and Latvia.⁷⁰ In Poland, Latvia, Estonia and Croatia, workers within specified age brackets were given the option to choose whether to switch or not. In Hungary and Macedonia, all workers under the old scheme were allowed to switch on a voluntary basis.⁷¹ In all cases, some time was given to workers to decide and the decision to switch was mostly irrevocable.⁷²

Consequently, different modes of transition resulted in a different coverage of the new schemes. Naturally, the largest coverage is in Kazakhstan (100 %). Then follow Hungary (76.4 %), Croatia (67.5 %), Poland (49.6 %), Bulgaria (48.4 %), Estonia (35 %) and Latvia (32 %) as

⁶⁷ For instance Palacios (2003) presents some evidence on economies of scale being present in the Chilean pension industry.

⁶⁸ E.g. Romania considers introducing a funded scheme as well.

⁶⁹ All countries made some modifications of the pay-as-you-go scheme through parameter changes. Chlon-Dominczak (2003) notes: "From the political economy perspective, the creation of funded accounts is well perceived by the public and thus helps to justify unpopular, but necessary, cuts in pay-as-you-go systems." In Poland and Latvia, the so-called notional defined contribution scheme was introduced, which establishes a perfect link between contributions and benefits.

⁷⁰ In Kazakhstan, a one-off transfer of all workers to a funded scheme took place.

⁷¹ As noted by Rocha and Vittas (2001), Hungary originally considered a no-choice scenario whereby workers under 40 would be forced to switch, while older workers would remain in the old scheme. In the end, however, this turned out to be likely to spark some constitutional battles and become too costly to implement. According to Havlíčková *et al.* (2003), there has been an actual ruling of the Constitutional Court declaring such a scenario discriminatory against older cohorts.

of 2002.⁷³ Since new labor market entrants are obliged to join the funded scheme, the coverage in each country will be increasing over time until every worker saves for retirement on a personal account in a pension fund. The case of Hungary where only labor market entrants were mandated to join the new scheme shows how massively workers can switch on a voluntary basis. Rocha and Vittas (2001) present the switching outcome which shows that by 2000, 90 % of the labor force in their twenties, 80 % aged 30-34, over 60 % aged 35-39, 40 % aged 40-44 and 20 % aged 45-49 had switched to the new system.

In all countries except Estonia,⁷⁴ the total level of pension contributions (pay-as-you-go and funded combined) is unchanged for those who switch. In all countries, contributions to pension funds are for old-age pensions only, disability and survivor pensions are covered by the old pay-as-you-go scheme.⁷⁵ Total contributions to social security are divided between the employer and the employee so that either the majority or all of them are paid by the employer. In reforming Eastern European countries, the funded scheme is viewed as a complementary component of social security, only a fraction of total pension contributions flows to pension funds, although as a proportion of gross wages this fraction is comparable to the contribution rates in many Latin American countries as shown in the following table.⁷⁶

Bulgaria	2 rising to 5 until 2007	Kazakhstan	10
Croatia	5	Latvia	2, planned 9
Estonia	6	Macedonia	7
Hungary ⁷⁷	7	Poland	7.3

Table 6: Contributions to pension funds as a percentage of gross wages
Sources: Chlon-Dominczak (2003), Müller (2003)

Hungary is the only reforming country that opted for a decentralized approach to collecting contributions. In all other countries, employers transfer contributions⁷⁸ to a central agency for their collection and record keeping which distribute them to pension funds. Under the centralized mode, the predominant approach was to assign this role to institutions already

⁷² In Hungary, switchers had the possibility to switch back to the pay-as-you-go scheme by the end of 2002.

⁷³ International Federation of Pension Fund Administrators.

⁷⁴ Where the total contribution rate increases by 2 percentage points for switchers.

⁷⁵ In Kazakhstan, the pay-as-you-go scheme closed down. The difference between the old contribution rate (25.5 %) and the current contribution rate (10 %) to the funded scheme was transformed into a tax which is used for the financing of benefits accrued under the old scheme as well as disability and survivors' benefits.

⁷⁶ In Slovakia, switching workers (and all new labor force entrants) are going to divert 9 % of their gross wages to pension funds starting in 2005.

⁷⁷ Original scheduled increase: 6 % in 2002, 7 % in 2003 and 8 % in 2004. This was later changed by a new government in a rather confusing series of adjustments and readjustments. Thus, the final decision may not have been made as yet.

⁷⁸ Including those withheld from employees' wages.

experienced in this field, i.e. social security administrations or tax offices, since they had performed fairly well in the past. New institutions were established only in Kazakhstan and Croatia. In Poland, Bulgaria and Macedonia, pension funds are charged for these services. In the other countries, these services are free of charge, which reduces pension funds' costs and hence the possible level of charges to participants.

In Hungary, Bulgaria, Estonia and Latvia, voluntary pension systems were created prior to reform. However, only in Hungary and Bulgaria did these voluntary schemes succeed in attracting a significant number of participants. Both these countries introduced their voluntary scheme in 1994 and in 2000, the number of participants was over a million in Hungary (with managed assets equal to 1.4 % of GDP) and over 400 thousand in Bulgaria (with managed assets equal to 0.4 % of GDP). In both countries, the system has continued to exist after reform as a supplementary system.⁷⁹ In Estonia, a voluntary scheme was introduced in 1998 and it covered less than 1 % of the employed population in 2000. In Latvia, the size of the voluntary pension industry was even smaller as of 2001.⁸⁰ Other countries such as Croatia and Macedonia implemented their voluntary schemes simultaneously with the mandatory ones, thus having no experience whatsoever when starting their recent reforms. Similarly in Kazakhstan, workers can save in addition to their mandatory contributions within their pension funds, but very few of them have done so. In Poland, a voluntary system of occupational pension funds exists, but less than 1 % of employees joined it as of 2002. In sum, pension funds had operated only in a few countries before the reform and in most of the reforming countries voluntary plans were not very popular.

Due to the short history of mandatory funded schemes, their consolidation through mergers and acquisitions is only taking place in most of these countries. The largest number of pension funds in the initial year of reform was in Hungary, totaling 38. According to Chlon-Dominczak (2003), this can be explained by a different legal form of pension funds in that country.⁸¹

⁷⁹ In Hungary, the carrot used is the deductibility of 30 % of contributions up to a certain level from the tax payable (i.e. not from the tax base). In Bulgaria, employer contributions up to a certain level are tax exempt. No explicit government guarantees are present.

⁸⁰ In Slovakia, a voluntary pension scheme was introduced in 1996. In mid-2003, the number of participants was more than five times lower than the labor force and the system managed assets worth just 0.6 % of GDP. Currently, contributions are tax exempt, but incentives for voluntary pension savings are going to be strengthened simultaneously with the start of the operation of the mandatory funded scheme in 2005.

⁸¹ Hungarian pension funds are independent legal entities owned by their participants that operate as mutual foundations and can be founded (separately or jointly) only by employers, chambers of commerce, professional associations, employees' interest organizations or local governments. No minimum capital is required to establish a pension fund. A pension fund must have at least 2,000 participants if it purchases annuities from an insurance

However, this number had fallen to 18 by the end of 2002. Poland started with 21 pension funds and there were 17 funds in 2002. In contrast in Kazakhstan, the number of funds had increased from 11 to 14 by the end of 2002. In the initial year of the reform, there were 7 pension funds in Croatia, 8 in Bulgaria, and 6 in Estonia and Latvia. In Kazakhstan and Latvia, one of the pension funds is public.

The market concentration in these countries is high. In all countries except Poland, five largest funds control more than 80 % of the market in terms of participants. In Poland it is around 70 %. Public pension funds are the biggest players in the market in both Kazakhstan and Latvia, where they covered 46 % and 74 % of all participants in 2001, respectively. However, there has been a steady trend towards leaving the public fund for a private one in Kazakhstan since the inception of the scheme and a similar trend appears to exist in Latvia. Transfers between funds are allowed, but there are regulations in all countries to limit their frequency and hence the costs they could give rise to. Direct⁸² regulations of transfers take basically two forms: administrative limits and special fees. The limits on the frequency of transfers usually allow participants to transfer to another pension fund once or twice a year. Regarding special fees for early⁸³ transfers, there are usually ceilings⁸⁴ that pension funds cannot exceed when imposing them, and these ceilings differ across countries. Kazakhstan, Latvia and Estonia have only limits on the frequency of transfers, Poland and Croatia impose only transfer fees, and Hungary, Bulgaria and Macedonia have both types of regulations. The average number of participants in a pension fund differs across these countries. While it is less than 50,000 in Estonia and Latvia or around 100,000 in Hungary, Bulgaria and Croatia, it is over 300,000 in Kazakhstan and over 600,000 in Poland.

The supervisory structure differs across the countries. In Croatia and Macedonia, pension funds' supervision is conducted by separated bodies, in Hungary, Bulgaria, Latvia and Estonia,

company or at least 25,000 participants if it provides annuities itself. Of course, as in all other countries, a license is needed for a pension fund to operate.

⁸² There are also indirect regulations aimed at reducing the costs due to frequent transfers. These include for instance the prohibition to offer extra benefits in order to entice and take over clients of other funds. Similar requirements also apply when pension funds compete for workers who are in the old public system and have not decided whether to switch or not.

⁸³ For instance in Poland, a fee is payable only if a transfer takes place before two years of participation in a pension fund are completed.

⁸⁴ In Hungary and Croatia, the fee depends on the amount of accumulation at the time of transfer. However, the ceiling in Hungary is 0.1 % of the accumulation while it is 5 % in Croatia if the transfer takes place during the first year of participation. For instance in Bulgaria, the fee must only cover the actual cost of transfer incurred by the old fund.

the supervisory agency is integrated with other elements of the financial market supervision, while in Poland and Kazakhstan the supervision structure is only partially integrated. Overall, there seems to be a trend towards a consolidated supervision.

Most countries use the EET tax regime for their funded pension scheme. In addition, pension benefits from this scheme receive preferential tax treatment in some countries. Exceptions are Hungary and Estonia. In Estonia, contributions are taxed as well.⁸⁵ In Hungary, a quarter of individual contributions is deductible from the tax payable and pension benefits are tax exempt, i.e. the EEE tax regime is applied with an additional tax credit on contributions.

Assets of pension funds are growing fast in all countries. Since, however, mandatory funded schemes in most of these countries are in very early stages of development, it is not possible to assess the situation yet. In the three countries with the longest time since reform, pension funds' assets as of the end of 2002 were in absolute values nearly USD 8 billion in Poland and nearly USD 2 billion in Hungary and Kazakhstan. As a proportion of GDP, this was about 4 % in Poland, about 2.7 % in Hungary and about 7.5 % in Kazakhstan.⁸⁶ According to Chlon-Dominczak (2003), assets under the management of pension funds in 2030 are predicted to be around 80 % of GDP in Poland and around 30 % of GDP in Hungary.⁸⁷

Retirement ages in all reforming Eastern European countries are the same for the pay-as-you-go and the funded scheme, thus requiring participants to take their pension benefits from both schemes at the same time. Consequently, they not only cannot withdraw their pension fund savings earlier, but they also cannot defer the purchase of an annuity, thus temporarily receiving only pay-as-you-go benefits. Regarding the form of benefit payouts, retiring workers in most countries are required to purchase an annuity. Lump sum withdrawals are currently allowed only in the case of small values of savings in Kazakhstan and Estonia, and they are

⁸⁵ Given the mandatory nature of funded pension schemes, tax incentives are not necessary in terms of long-run coverage. However, they may have some impact on switching decisions in the initial phase of reform if there are differences in tax treatment between switchers and those who stay in the old scheme, although the most important factor affecting the switching decision is the expected level of benefits in the alternative schemes.

⁸⁶ Using World Bank GDP data.

⁸⁷ It seems (at least) that the forecast for Hungary was made at the time when it was still unclear whether the contribution rate would be increased from the initial level as originally planned, thus assuming 6 % throughout. The marked difference between Poland and Hungary is not explained by Chlon-Dominczak, nor does she give the parameters used when simulating the accumulation dynamics. Unfortunately, I have not found any other forecast in the literature. As I will show later, if Czech workers could divert to pension funds the same percentage of wages as Polish and Hungarian workers, the accumulation would be somewhere in between the forecast for the two countries.

going to be discontinued in the future. Scheduled withdrawals are allowed to a limited extent in Macedonia and Estonia. Some countries require the use of unisex mortality tables in the process of annuitization, thus not discerning between genders when the level of funded benefits is calculated.⁸⁸ In most countries, annuities are provided by insurance companies, pension funds themselves can provide annuities only in Hungary and Bulgaria. In Latvia, annuities are also provided by the Social Security Administration. Given the immaturity of the schemes and age limits on switching in most countries, there have been very few cases of benefit payouts as yet.

Unlike most Latin American countries, charges are not paid by participants on top of the contributions as presented in table 6, but are deducted from contributions, assets or investment returns. Only in Hungary an admission fee can be charged by pension funds. All countries except Hungary allow contribution-based charges, all countries except Kazakhstan allow asset-based charges, and Kazakhstan and Latvia allow charges on returns. In addition, Hungary and Poland allow fees to the depository and operational fees to be deducted from assets. As noted above, there are also transfer fees in place in some countries. All countries place ceilings on charges. As noted in the previous section, it is difficult to compare the level of charges across countries given the complexity of charge structures, and this is even more so given the short history of most funded schemes in the region. Chlon-Dominczak (2003) presents some evidence of economies of scale with respect to the number of participants being present in Poland and Kazakhstan.⁸⁹ Over time, similar economies with respect to the accumulated assets can be expected to arise, thus leading to lower costs and hence lower charges.

This chapter has outlined the major features and early experience of systems of pension funds in countries in which they are part of mandatory social security. Since I will argue that the Czech Republic should also carry out a partial shift from the pay-as-you-go mode to funding, this will serve as a useful point of reference in the chapters that follow. Undoubtedly, the rates of return generated by pension funds are of the highest importance since they ultimately determine the level of pensions received by participants. In this chapter, however, returns have

⁸⁸ It is so in Hungary, Poland, Croatia and Estonia. This is likely to be related to the mandatory nature of the scheme and the fact that pay-as-you-go benefits are treated equally. In some other countries, regulations regarding annuitization are yet to be passed.

⁸⁹ She excluded Hungary from the sample of three countries with some funding history, arguing that it is impossible to assess the level of costs and charges given the legal structure of pension funds. The problem is a non-transparent division between the assets of participants and the assets of pension funds. A similar problem exists in the Czech Republic as discussed in the next chapter.

not been discussed since I find it more appropriate to deal with this issue in the context of low performance of Czech pension funds, which is the subject of chapter 5. In that chapter, historical rates of return of pension funds in the above countries will be given and the extent to which they can be influenced by the regulatory framework, especially the investment rules, will be discussed. Overall, pension funds in Latin America and Eastern Europe have been successful in the initial phase of reform and no major problem has occurred. It seems that funding is likely to lead to more secure pensions through diversification of retirement income between returns to labor and capital, and probably also through higher economic growth spurred by the reform. With the above in mind, we can now proceed to the description of the Czech system of pension funds.

4 Description of the Czech System of Pension Funds

The objective of the following text is to describe the major features of the voluntary pension scheme in the Czech Republic and where possible, put them in an international context. Where appropriate, references will be made to countries which have instituted mandatory saving in pension funds, since if there is a will on the part of Czech policymakers to carry out a reform of social security via a partial shift to funding, the design of the mandatory scheme could largely be based on that of the voluntary scheme if successful. Also, current pension funds with experience from the voluntary scheme would very likely become major players in the mandatory funded scheme. I believe that this is especially relevant since a systemic reform could substantially strengthen the ailing system of pension provision in the country and references to mandatory schemes abroad will illustrate what changes this reform could entail.

4.1 Basic Information

The voluntary pension scheme was created in 1994 by Act No. 42/1994 Coll. Since then, it has been amended several times – in 1996, 1998, 1999, 2001, 2002 and the latest amendment came into effect in 2004 (*inter alia* making the act consistent with EU directives). Thus, the Czech Republic was a Central and Eastern European pioneer in introducing a voluntary pension scheme together with Hungary and Bulgaria that did so in the same year.

There are only personal pension funds in the Czech Republic, i.e. the Latin American/Eastern European paradigm applies in contrast to the prevalence of occupational pension funds in the Anglo-Saxon part of the world or major developed countries such as the Netherlands, Switzerland or Japan. They are joint stock companies licensed by the Ministry of Finance (in agreement with the Ministry of Labor and Social Affairs and the Securities Commission), licenses are issued for an indefinite period and are not transferable. The minimum registered capital of a pension fund is CZK 50 million. There are restrictions imposed on the ownership structure as well as the internal organization of pension funds.⁹⁰ Every pension fund chooses one bank which acts as its depository.⁹¹ Pension funds are supervised by the Office of the State

⁹⁰ For instance health insurance companies cannot acquire shares of pension funds and members of the board of directors or of the supervisory board must be approved by the Ministry of Finance. Also, any transfer of the shares of a pension fund exceeding 10 % of its registered capital must be approved by the Ministry of Finance after an agreement with the Securities Commission.

⁹¹ This is where the assets of the pension fund are kept. Neither the depository nor any legal entity in which the depository holds directly or indirectly more than 10 % of registered capital can own shares of the pension fund.

Supervision of Insurance Companies and Pension Funds of the Ministry of Finance, and by the Securities Commission. Pension funds pay no fees to these institutions; both are financed from the state budget. An important feature of the scheme is that pension savings are not insured and no government guarantees apply.⁹²

Individuals over 18 years of age can participate in the scheme on a voluntary basis if they have a permanent residence in the Czech Republic or if they reside in another EU member state and participate in the public pension scheme or healthcare system in the Czech Republic.⁹³ A pension fund must have a statute⁹⁴ and a pension plan.⁹⁵ It can offer only one pension plan at a time.⁹⁶ Individuals can be members of more pension plans simultaneously, but they can pay contributions to only one plan at a time. Individuals are free to move from one pension fund to another as discussed later in more detail.

To receive an old-age pension, participants must pay contributions for at least 5 years and must reach 60 years of age.⁹⁷ However, this stipulation regards only contracts signed after the 1999 amendment had come into effect. Participants who had concluded their contracts prior to this legal change are only required to reach 50 years of age (and they were required to pay contributions for 1 year). Participation is encouraged through a system of state subsidies and tax incentives as discussed in the next two sub-chapters.

Pension plans must be based on the DC principle, but if a pension fund offers a disability pension plan, the disability pensions can be based on the DB principle. Pension funds may

The depositary is part of the controlling mechanism and this is to prevent conflict of interest; it is not possible that a pension fund owned by a bank chooses the very same bank as its depositary. Interestingly enough, in early 2004 the depositary of Penzijní fond Komerční banky, a.s. was Česká spořitelna, a.s. and the depositary of Penzijní fond České spořitelny, a.s. was Komerční banka, a.s.

⁹² This is to be compensated by stringent regulation rules, which is the subject of chapter 5.

⁹³ Participation of other EU nationals was allowed from the 1st May 2004 onwards by Act No. 36/2004 Coll. amending Act No. 42/1994 Coll. on State Contributory Supplementary Pension Insurance. This amendment also prohibits various forms of discrimination, but allows using mortality tables discriminating between genders.

⁹⁴ The law stipulates that this basic document include the activities of the pension fund (which can only be connected with the pension business), the objectives of its investment strategy, the principles along which the business is run, the way profits are used, the depositary and the way information about the pension fund's economic performance is made public.

⁹⁵ The law stipulates that this basic document *inter alia* specify the types of pensions that are on offer, eligibility requirements for benefits and the method of their calculation, the conditions for the termination of the contract, the conditions of the transfer of assets from another pension fund and the principles along which the participants share the pension fund's returns.

⁹⁶ However, if two pension funds merge, participants may retain their original plans. Also, if a pension fund changes its plan, old participants may keep the old one.

⁹⁷ Before the 2004 amendment came into effect, an individual could qualify for his/her old-age pension prior to reaching 60 years of age if he/she already received old-age pension benefits from the public scheme.

offer four types of pensions, but their offer must include old-age pensions. Other options may be the aforementioned disability pensions, survivors' pensions or pensions due to the length of insurance. The benefits paid may take the form of pension payments (regular payments until the time of death or in the case of survivors pensions regular payments for a certain period), a lump sum payment (a one-off payment of all benefits) or a settlement payment (in the case of the termination of insurance⁹⁸). If a participant is entitled to benefits, he/she can choose between pension payments and a lump sum payment under the conditions specified in the pension plan.⁹⁹

4.1.1 State Contributions

Since the scheme is voluntary, participation is encouraged. As discussed in chapter 2, an overwhelming majority of countries with voluntary schemes do so through tax exemptions and the example of New Zealand given in that chapter demonstrated that their elimination may lead to a collapse of the system. The Czech Republic uses a system of direct state subsidies that are sent to pension funds on behalf of their participants, which is a rather unique approach in international comparison with only Mexico having adopted a similar system as shown in the previous chapter. From a certain level of contributions up to a limit, the subsidy is replaced by tax exemptions as shown in the next sub-chapter. Of course, both subsidies and tax exemptions are in fact state-budget outlays, but human psychology being what it is, the former may create an illusion of greater attractiveness. Nevertheless, a big question arises whether the administrative costs¹⁰⁰ connected with direct state subsidies do not outweigh their potential marketing benefits.¹⁰¹

Contributions from the state budget match the contributions of participating individuals in the following manner:

⁹⁸ It may be questionable whether e.g. saving for old age in a pension fund should be called 'insurance', but the Czech law uses this term and it will be used throughout.

⁹⁹ Partial lump sums are possible as well.

¹⁰⁰ Incurred by the Ministry of Finance and pension funds alike.

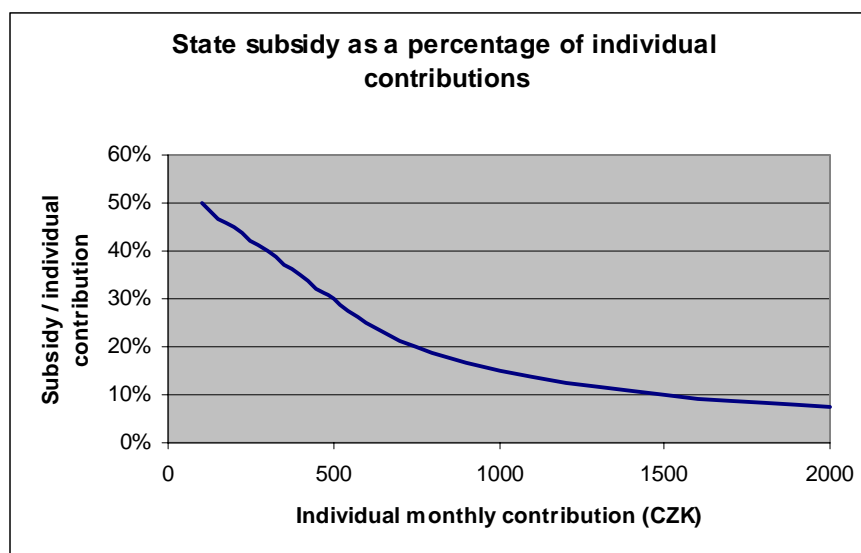
¹⁰¹ Unfortunately, no estimates of marketing benefits are available to the author, but the administrative costs of distributing some billions CZK in trifle amounts across pension funds are naturally non-negligible. In addition, the control of the Ministry of Finance has revealed up to tens of thousands of erroneous data every quarter, which means that pension funds have to find errors, correct them and reapply for subsidies (further complications are added by migration of participants across funds).

Participant's contribution (CZK):	State subsidy (CZK):
100 – 199	50 + 40 % of the amount exceeding 100
200 – 299	90 + 30 % of the amount exceeding 200
300 – 399	120 + 20 % of the amount exceeding 300
400 – 499	140 + 10 % of the amount exceeding 400
500 +	150

Table 7: State contributions

Source: Act No. 42/1994 Coll.

The minimum amount of individual contributions is the amount which establishes entitlements to state contributions, i.e. CZK 100 per month. Thus, the matching subsidy as a percentage of the individual contribution decreases with the amount contributed as shown in the following graph:¹⁰²



Graph 1: State subsidy as a percentage of individual contributions

Source: Calculations based on table 7

Participants pay their contributions on a monthly basis or they may choose to pay less frequently for a longer period ahead. If they choose the latter mode, the state contribution is derived from the average monthly amount of the individual contribution in the given period. A pension fund submits a request for state contributions for all its participants to the Ministry of Finance on a quarterly basis.

Contributions may be paid by a third party on behalf of a participant. This also includes contributions from employers. These contributions, however, are not matched with a state subsidy. Also, if a participant terminates his/her contract before he/she is entitled to receive

¹⁰² Note, however, that a certain contribution range is additionally tax exempt as shown in the next sub-chapter.

benefits or if he/she dies before receiving benefits and no entitlements to survivors benefits are established, pension funds are obliged to return the state contributions that this participant has received to the Ministry of Finance.

4.1.2 Tax Incentives

Both contributions and pension benefits receive preferential tax treatment. If we consider state subsidies as merely a different form of tax incentives, the Czech Republic maintains the EET tax regime similarly to most other countries as shown in the previous chapters. However, since the tax treatment of benefits is very preferential, it is not that far away from EEE.¹⁰³

The amount of participants' yearly contributions exceeding CZK 6,000 can be deducted from the personal income tax base; the limit on this amount is CZK 12,000.¹⁰⁴ In terms of monthly contributions, this means that individual contributions up to CZK 500 per month are matched with state subsidies and additional monthly contributions up to the total level of CZK 1500 are income-tax deductible, i.e. tax exempt.

Employers' contributions up to 5 % of the gross wage are not considered as part of the employee's income. Thus, the employee's base for social security contributions (i.e. the gross wage) is not affected, nor is the income-tax base. Most importantly, employers can increase their employees' compensation through contributing on their behalf to individual pension plans without having to pay additional social security contributions. In addition, employers can deduct from their tax base the contributions they have made to the pension plans of their employees up to 3 % of their annual wages.

If a participant chooses to receive his/her benefits as a lump sum payment, the difference between the lump sum payment and the sum of his/her contributions and state contributions (i.e. employer's contributions if applicable and investment returns) is taxed at the rate of 15 %. If he/she chooses to receive the benefits as pension payments, a withholding tax of 15 % is levied on the difference between the amount of pension payments and the sum of his/her contributions, the employer's contributions if applicable and state contributions (i.e. investment

¹⁰³ Similarly, the Czech pay-as-you-go scheme operates under the EEE regime as neither social security contributions, nor public pension benefits are taxed. This is rather unique in international comparison.

¹⁰⁴ I.e. the first CZK 6000 per year is not tax exempt, nor is anything above CZK 18000.

returns are taxed).¹⁰⁵ Thus, participants with contributing employers are encouraged not to take lump sum payments.

A participant can terminate his/her contract at any time whereas a pension fund can terminate the contract with the participant only if he/she hasn't paid contributions for at least 6 months or hasn't fulfilled some conditions specified in the contract or has provided some false information in the contract. If an individual has been with a pension fund for 12 months, has paid all contributions and is not entitled to benefits, he/she is entitled to a termination settlement payment.¹⁰⁶ In that case, a 25% tax is levied on the difference between this surrender payment and the sum of individual and state contributions (i.e. the employer's contributions and investment returns are taxed). Moreover, pension funds are obliged to return the state contributions to the Ministry of Finance. Thus, there are incentives for participants not to terminate their pension plans.¹⁰⁷

4.2 Participation

The number of participants rose from 183,000 in 1994 to approximately 2.6 million in 2002,¹⁰⁸ which can be viewed as a success of the scheme in attracting clients relative to the working population. No Eastern European country that reformed its social security as discussed in the previous chapter had such a sizable voluntary pension scheme at the time of the switch to funding, and the Czech voluntary scheme can be viewed as the most successful in Central and Eastern Europe in terms of participation.

¹⁰⁵ The tax base for a given year is calculated as the difference between pension payments in that year and the sum of individual, state and the employer's contributions divided by the number of years in which pension should be paid out. If payments are scheduled till the end of life, mortality tables are employed.

¹⁰⁶ If he/she has been with the fund for a shorter period than stated, no entitlements to any amount are established, but the participant can transfer all his/her contributions (or contributions on his/her behalf) plus state contributions plus investment returns to another pension fund.

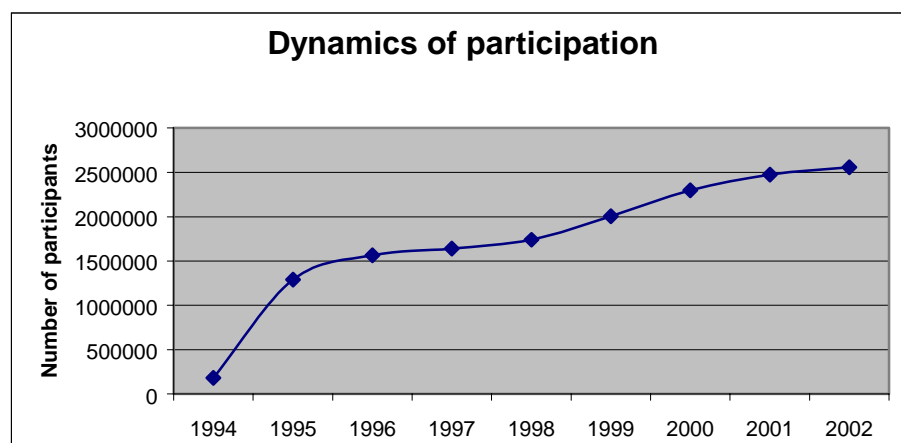
¹⁰⁷ Unless they want to switch to another pension fund.

¹⁰⁸ At the time of writing (early 2004), data for 2003 were still unavailable. Therefore, only the period until 2002 is considered throughout. Of course, this should have no impact whatsoever on the general analysis of the system.

Year	Participants	Growth rate (in %)	Contributors to the public pension scheme (CPPS)	Labor force	Employment	Participants/ CPPS (in %)
1994	183,000	–	5,223,000	5,217,000	5,051,000	3.5
1995	1,290,000	604.9	5,221,000	5,220,000	5,067,000	24.7
1996	1,564,000	21.2	5,200,000	5,297,000	5,110,000	30.1
1997	1,638,000	4.7	5,161,000	5,214,000	4,945,000	31.7
1998	1,740,000	6.2	4,893,000	5,276,000	4,889,000	35.6
1999	2,006,000	15.3	4,727,000	5,223,000	4,736,000	42.4
2000	2,298,000	14.6	4,635,000	5,193,000	4,736,000	49.6
2001	2,475,000	7.7	4,694,000	5,209,000	4,747,000	52.7
2002	2,556,000	3.3	4,709,000	5,246,000	4,781,000	54.3

Table 8: Participation in the supplementary pension scheme
Source: Ministry of Labor and Social Affairs and Iglesias (2003)

Table 8 shows that the scheme attracted almost 1.3 million participants in the first two years of its existence and the number of participants has doubled since. There has been an increase in participation in every single year, but the dynamics seems to be decreasing and the scheme as currently structured might be reaching saturation as indicated in graph 2 below. The growth rate of the number of participants declined from the scheme's inception until 1997, then increased till 1999, and has been declining since. The jump in 1999 might be associated with that year's introduction of tax incentives for employers to contribute on behalf of their employees.



Graph 2: Dynamics of participation
Source: Data in table 8

The voluntary scheme has only about one half of participants compared with the public pension scheme, and the development of participation as shown in graph 2 indicates that there may be no significant increase in the coming years. Most importantly, the age structure as revealed in table 9 indicates more profound weaknesses of the coverage of the scheme. There are too few young participants and too many old ones. The population of participants grew older from 1994 to 1999 and has grown younger since. The average age of participants in the

scheme started at 45 years, peaked at 51 years in 1999 and then went down to 48 years in 2002. The slow decline in recent years may be the result of the fact that in 1999 the period necessary to qualify for old-age benefits increased from one to five years and also tax incentives for employers were introduced, which may have brought more younger workers to the system.

However, these trends are only mild and one of the major problems of the scheme remains. For comparison, the average age among employed persons (including employed old-age pensioners) was less than 42 years¹⁰⁹ in 2002 and they were distributed more evenly as can be seen in graph 3. In 2002, only 28.3 % of participants in the voluntary scheme were younger than 40, while 31.4 % were 55 or older. As indicated by the average age, nearly one half of participants in the scheme were 50 years old or older. About 450 thousand participants were aged 60 or more, which means that 23.3 % of Czechs over 60 participated in the scheme in 2002.¹¹⁰

Thus, it is possible that nearly half a million old-age pensioners¹¹¹ in the country take every month part of their pension benefits from the public pension scheme and deposit it in the private pension scheme in order to cash in the state subsidy. Given the high rate of return on these savings due to state subsidies,¹¹² we might even witness a kind of intertemporal substitution of pension income of these pensioners who may save for later stages of their retirement, expecting (quite rightly¹¹³) that their benefits from the public scheme will not be able to keep up with the growth of wages in the coming years. However, if state subsidies are to serve their purpose, they should stimulate participation among the working population, especially the young who can benefit from the effects of long-term saving. If we exclude participants over 60, participation falls to 2.1 million as of 2002, which was about 44.8 % of contributors to the public pension scheme and 40.2 % of the labor force.¹¹⁴ This coverage still

¹⁰⁹ Czech Statistical Office structural survey.

¹¹⁰ Using population data of the Czech Statistical Office.

¹¹¹ Author's estimate, given statutory retirement ages and the extent of early retirements; better data not available to the author.

¹¹² The return-enhancing effect of state subsidies is demonstrated in chapter 5.

¹¹³ For a macroanalysis of the current pay-as-you-go scheme and its prospects, see e.g. Bezděk (2000). The author shows that the scheme can be kept going, but measures that can realistically be undertaken would not suffice to maintain the current level of benefits relative to wages.

¹¹⁴ This cut-off is rather arbitrary and the resulting numbers may be somewhat misleading since as shown in graph 3, there were about 150,000 employed persons aged over 60 in 2002. Unfortunately, lack of data about the status of participants (which are not disclosed by pension funds and may not even be relevant for them) prevents us from obtaining more accurate results. Consequently, the presented estimates of coverage after excluding participants over 60 (whom we implicitly consider to be non-employed old-age pensioners) are the lowest estimates and are likely to be actually higher. Similarly, participants in the voluntary scheme may be unemployed or outside of the

keeps the Czech Republic at the top among voluntary schemes in Central and Eastern Europe, but the age structure indicates that the scheme may not be doing its best in terms of strengthening pension provision in the country, since the young who could benefit the most participate the least as shown in graph 3.

The root cause of this adverse age structure may be some liquidity constraints faced by the young. Above all, due to state subsidies and the rules of the game in the scheme, pension funds may primarily be viewed as medium-term advantageous savings vehicles as discussed later. Hence, since participants are entitled to withdraw their savings only upon reaching 60 years of age, the young may rationally choose other savings schemes such as building societies where state subsidies exist as well, but in which they can make their investments liquid much earlier. As mentioned in chapter 2, the prime saving age is approximately between 40 and 65 years, which may in this case explain lower participation of the young by their lower saving rate and fewer resources available for private pension saving, which is undoubtedly exacerbated by high social security contributions in the country. Certainly, there are countries (for instance the US) where voluntary pension funds are very popular and cover a large part of the population without any age bias, but as noted in chapter 2, the burden of social security contributions in those countries tends to be low, whereas it is quite heavy in the Czech Republic.

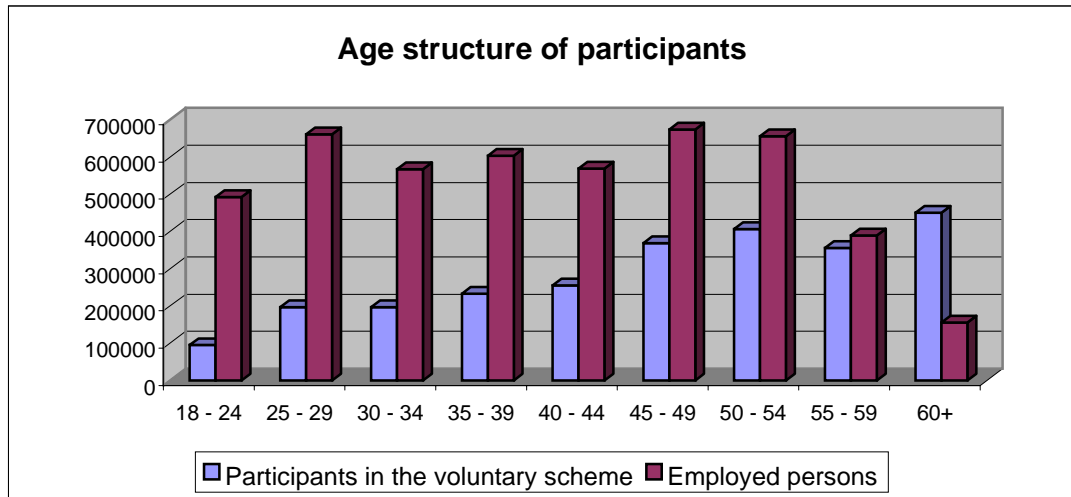
Whatever the reason, if young workers have not been attracted by very enticing state subsidies so far, it is unlikely that the situation improves substantially in the coming years. As I will argue later, a systemic reform which would enable workers to divert part of their mandatory social security contributions to pension funds would eliminate this problem and would finally lead to improved pension provision in the future, which the current voluntary scheme does not seem to fulfill. As shown in the previous chapter, the largest proportion of switching workers in Latin American and Eastern European reforming countries is by design among the young, and I will estimate in chapter 6 how the age structure in a mandatory funded scheme would evolve in the first years of reform. In general, an inverse age structure to what we can see in table 9 would arise, since few old workers would switch to the funded scheme at the beginning and the majority would start saving young, which would ultimately lead to the desired effects of long-term saving on the final level of pension benefits.

labor force, which renders all our calculations less accurate. Actually, it may not be unreasonable to expect that a non-negligible number of persons outside of the labor force save in pension funds since they are mostly not covered by the public pension scheme. Unfortunately, this hypothesis cannot again be verified due to lack of data.

Age	1994	1995	1996	1997	1998	1999	2000	2001	2002
18-19	1.6	0.8	0.4	0.1	0.1	0.1	0.1	0.2	0.2
20-24	5.0	4.4	4.4	3.4	2.8	2.4	3.1	3.9	3.5
25-29	5.3	4.6	4.7	4.9	5.2	5.3	6.7	7.5	7.7
30-34	7.5	7.0	6.8	6.0	5.6	5.4	6.7	7.3	7.7
35-39	10.8	9.3	8.6	7.6	7.4	7.2	8.6	9.0	9.1
40-44	15.3	14.4	13.5	11.4	10.1	9.1	10.1	10.4	10.0
45-49	18.9	19.2	18.1	15.7	14.4	13.2	14.8	15.0	14.4
50-54	18.0	17.5	17.6	18.2	17.5	17.1	16.9	16.4	15.9
55-59	9.2	10.2	11.0	13.3	14.2	14.4	13.4	12.9	13.9
60-64	4.4	5.7	6.3	7.5	8.4	9.4	7.6	6.9	7.3
65-69	2.4	3.9	4.6	5.7	6.5	7.0	5.3	4.8	4.6
70-74	1.1	2.0	2.6	3.6	4.4	5.0	3.7	3.2	3.2
75-79	0.3	0.6	0.9	1.9	2.5	3.0	2.0	1.7	1.6
80-84	0.2	0.3	0.4	0.4	0.6	0.9	0.7	0.5	0.6
85+	0.1	0.1	0.2	0.3	0.5	0.6	0.3	0.2	0.2
Over 40	69.9	73.9	75.2	78.0	79.1	79.7	74.8	72.0	71.7
Over 45	54.6	59.5	61.7	66.6	69.0	70.6	64.7	61.6	61.7
Over 50	35.7	40.3	43.6	50.9	54.6	57.4	49.9	46.6	47.3
Ø age	45	46	47	49	50	51	49	48	48

Table 9: Age structure of participants (in %) ¹¹⁵

Source: Ministry of Labor and Social Affairs and Iglesias (2003)



Graph 3: Age structure of participants vs. age structure of employed persons in 2002

Source: Data in table 8 and table 9, Czech Statistical Office

¹¹⁵ According to the Association of Pension Funds (2003), the age structure of male and female participants in the voluntary scheme is approximately the same. The percentages in table 9 may not add to 100 % due to rounding error.

4.3 Contributions

Between 1995 and 2002, the yearly inflow of individual and state contributions to the scheme rose from CZK 4.3 billion to CZK 13.7 billion. This was mainly due to the increase in the number of participants. In nominal terms, the amount of contributions has grown steadily. As a proportion of GDP, there was a growth from the inception of the scheme until 1997. Between 1997 and 1999, the yearly inflow of contributions was about 0.5 % of GDP and after a jump in 2000, the proportion was about 0.6 % of GDP until 2002. This development is summarized in table 10. The burden of subsidies for the state budget was near CZK 3 billion in 2002, which was 20 % of the total contributions flowing into the scheme.¹¹⁶

Year	Individual contributions	State contributions	Total contributions	Total contrib. in 2002 prices	Total/GDP (in %)
1994	65	24	89	143	0.01
1995	3,178	1,122	4,300	6,353	0.31
1996	5,332	1,820	7,152	9,713	0.46
1997	6,175	1,871	8,046	10,071	0.48
1998	6,841	1,955	8,796	9,945	0.48
1999	7,244	2,050	9,294	10,292	0.49
2000	9,084	2,470	11,554	12,315	0.58
2001	10,040	2,658	12,698	12,927	0.58
2002	10,957	2,770	13,727	13,727	0.60

Table 10: Yearly contributions to the voluntary pension scheme (millions CZK)

Source: Ministry of Finance, Czech Statistical Office, own calculations

The average amount of individual contributions in nominal terms has been slowly increasing since 1994. In real terms, however, it had increased from the inception until a peak was reached in 1997, and since then it has declined. Between 1995 and 2002, the average contribution increased by 35 % in nominal terms, but decreased by 8.5 % in real terms. It will be shown in chapter 5 that the rate of return on participants' savings falls with the amount of their contributions due to the system of state subsidies (and tax exemptions). It may, therefore, be so that participants try to keep contributions low in order to reap very high rates of return compared to alternative opportunities, thus trying to take advantage of a very attractive medium-term savings opportunity rather than building a sufficient accumulation for financing their retirement consumption. Whatever the reason for this unfavorable trend, it seems that the scheme as currently structured is unlikely to strengthen pension provision in the country in any significant manner. To lessen the problem of low contributions, it might be worthwhile

¹¹⁶ Excluding employers' contributions; this will be discussed later. The estimated reductions in revenues for the state budget due to tax exemptions are also presented later.

restructuring the system of state subsidies so that the fiscal burden remains the same,¹¹⁷ but participants are motivated to contribute more. This might be for instance achieved by (much) less regressive subsidies.¹¹⁸

Average contributions as a proportion of the average wage have declined steadily since 1995. While in 1995 the average contribution represented 3.2 % of the average gross wage, it was only 2.2 % in 2002. This represents a worrying trend. Compared with countries that have mandatory funded schemes, contributions to pension funds in the Czech Republic are very small. We saw in chapter 3 that the contribution rate in Latin American countries is about 10 % of gross wages and that it is about 5 – 8 % in reforming Eastern European countries.

The government would like to achieve a situation in which pensioners receive supplementary pension benefits amounting to 5 – 10 % of their last wage.¹¹⁹ This target is, however, unlikely to be reached. We have seen that the average participant in the scheme is an almost 50-year-old individual contributing about 2 % of his/her gross wage.¹²⁰ Apart from contributions being low, it seems that the average period of contributing may not be much longer than the subsequent period of drawing pension benefits.¹²¹ This is still too short a period for the power of compound interest to show up compared to the desired situation in which a worker saves all his/her working life. In sum, it is unlikely that a worker contributing 2 % of his/her gross wage for say twenty years can receive benefits amounting to 5 – 10 % of his/her last wage for the same period in retirement, state subsidies notwithstanding.¹²²

¹¹⁷ Having seen the relatively large proportion of state subsidies in total contributions, it seems that “bribing” the population even more to participate would not be a sound approach; nor does it seem feasible given the current state of public finance in the country.

¹¹⁸ It could be argued that this might discourage some low-income individuals from participation. Unfortunately, this sacrifice seems rather necessary. Participants with very low contributions are in relative terms the most costly for pension funds due to the fixed cost of administering one pension account. Since depositing very low amounts even for a longer time does not yield any significant pensions, these participants should either contribute more or leave the scheme if not attracted by lowered subsidies matching low contributions. If pension funds performed in the future as they did in the last decade (this will be discussed in the following chapter), a person depositing under the current rules CZK 100 per month in the next 15 years would accumulate about CZK 35,000. This would be less than three times the subsistence wage (its growth over time taken into account), let alone the fact that a third of the accumulation would be state subsidies.

¹¹⁹ See Iglesias (2003) citing the Ministry of Labor and Social Affairs (p. 30).

¹²⁰ This may not be precise; the reference should be made to the average wage in the economy. Information about the average wage among the participants (excluding pensioners) is not available. Information about the average amounts of contributions in individual age groups is not available either.

¹²¹ If we exclude pensioners and near-pensioners who join the scheme for a very short period to cash in state subsidies (the shortest possible period is 5 years), we still see in the age structure of participants presented above that a large number of workers start joining the scheme only in their mid-forties.

¹²² This is unlikely for any realistic rates of return. Returns will be dealt with in chapter 5.

For comparison, the contribution rate to the pay-as-you-go scheme was 26 % of the gross wage for most of the period.¹²³ As noted by Davis (1995), pension funds tend to play a minor role where there are large public pension schemes and indeed it seems that these high contributions to the public scheme might crowd out pension fund savings strongly. For instance, Jelínek and Schneider (1999) show that the introduction of the voluntary scheme led to no increase in the saving rate of households and in fact a decrease in the national saving rate occurred due to the relatively high amount of money spent by the government on promoting the scheme. Thus, as also found by Iglesias (2003), households merely convert some of the savings they would make anyway into pension fund savings since the latter snowball attractive state subsidies, i.e. only a kind of substitution between alternative forms of savings takes place. Obviously, we can hardly speak of strengthening pension provision in the country.

Year	Contribution			Ø gross wage ¹²⁴	Indiv. contrib./ Ø gross wage	Individual contrib. in 2002 prices
	Individual	State	Total			
1994	118	43	161	7,004	1.7 %	190
1995	262	93	355	8,307	3.2 %	387
1996	305	103	408	9,825	3.1 %	414
1997	333	97	430	10,802	3.1 %	417
1998	333	95	428	11,801	2.8 %	377
1999	324	92	416	12,797	2.5 %	359
2000	337	93	430	13,614	2.5 %	359
2001	348	92	440	14,793	2.4 %	354
2002	354	90	444	15,857	2.2 %	354

Table 11: Average contributions (CZK)

Source: Association of Pension Funds, Czech Statistical Office, own calculations

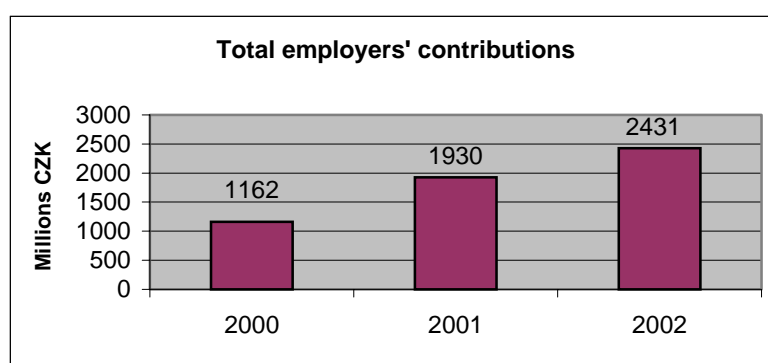
In 1999, 279 thousand participants (13.9 % of all participants) received contributions from their employers.¹²⁵ In 2000 it was 416 thousand (18.1 %), in 2001 it was 568 thousand (22.9

¹²³ It was 27.2 % in 1994 and 1995, and 26 % thereafter. It has been 28 % since 2004, although the latest change was only a cosmetic fiscal reshuffling, since total social security contributions remained the same (47.5 % of the gross wage).

¹²⁴ The Czech Statistical Office publishes average wages obtained via two distinct methods. One is obtained by collecting data from firms in the whole economy and dividing their total wage bills by the number of their employees, including those on sickness leave or with unpaid absences. The other is obtained through a structural survey by collecting data on wages of individual workers and also some other personal data such as age, gender and education. The objective of the former method is to provide reliable information on the average wage in various sectors of the national economy, while the objective of the latter method is to provide detailed estimates of average wages in various occupations and the distribution of wages with respect to age and gender. The latter method does not include part-time jobs, workers who spent part of the year on sickness leave or were absent for some other reason, and it is also subject to statistical error. We use the former in the table since it is more appropriate for our purposes. Data obtained through the latter method are available only from 1996 onwards when the structural surveys were started. If we used those data, average individual contributions as a proportion of the average wage would be 2.8 % in 1996 (the average wage CZK 11,069), 2.6 % in 1997 (CZK 12,572), 2.5 % in 1998 (CZK 13,361), 2.3 % in 1999 (CZK 14,097), 2.2 % in 2000 (CZK 15,187), 2.1 % in 2001 (CZK 16,353) and 2.0 % in 2002 (CZK 18,133).

¹²⁵ Data for 1999 are from Iglesias (2003), data for 2000 – 2002 are from the Ministry of Finance (2003).

%) and in 2002 it was 650 thousand (25.4 %). Thus, there has been a clearly growing trend in the number of participants receiving contributions from their employers and one in four participants received such contributions in 2002. In that year, 14 thousand participants (2.15 % of those receiving employers' contributions) received contributions from their employers only. Total employers' contributions grew by 66 % between 2000 and 2001 and by 26 % between 2001 and 2002 as shown in graph 4. Since the number of participants receiving contributions from their employers grew at a lower rate, the average contribution of employers increased in this period as well. In 2000, it was CZK 233 per month, in 2001 CZK 283 per month and in 2002 CZK 312 per month.



Graph 4: Total employers' contributions
Source: Ministry of Finance

4.4 Payouts

The Czech voluntary pension scheme practically does not pay out regular pension benefits. From the inception of the scheme in 1994 until the end of 2002, CZK 20.9 billion was paid out as a lump sum. This is 85 % of the total amount paid out in that period. Similarly, settlement payments over that period were CZK 3 billion, which is 12.3 % of the total amount paid out.¹²⁶ This again suggests that the scheme may not actually be used by participants for pension purposes. The reasons for this may be manifold, one of them being the fact that due to low contributions and short saving periods, the participants' accumulation when they become eligible for benefit payments is so low that regular incremental¹²⁷ pension benefits would be negligible. Even when the scheme becomes more mature and participants who have contributed for a longer period of time start retiring, their accumulation may still be small given low contributions.

¹²⁶ Ministry of Finance (2003).

¹²⁷ In addition to public pensions.

We saw in chapter 3 that in all Latin American countries with mandatory funded schemes, lump sum withdrawals are restricted. In those countries that allow them, only amounts over and above a certain limit can be withdrawn in this way. In some reforming Eastern European countries, lump sums are temporarily allowed only in the case of individuals who switched at an old age and their accumulation is thus small. The logic behind the latter seems to support the idea that annuitizing meager amounts would make little sense and participants in the Czech scheme are well aware of this. In the current situation, requiring annuitization would very probably only discourage some individuals from participation. If a mandatory funded scheme were established in the country, however, a complete freedom to withdraw all accumulation as a lump sum should definitely not be in place and a purchase of an annuity should normally be required.

Total yearly contributions (individual, state and employers' contributions¹²⁸) plus profits generated by pension funds have grown steadily since 1994. The total yearly amount of benefits paid out steadily increased from CZK 123 million in 1996 to CZK 5.8 billion in 2000. Then there was a drop in total benefit payments and they seem to have stagnated since. As a proportion of total contributions collected plus profits, the amount of benefits paid out increased from 2 % in 1996 to 40 % in 1999 and 42 % in 2000. Then it fell to 28 % in 2001 and slightly increased to 29 % in 2002. Because almost all benefits are paid out as lump sums, this is likely to be the result of the change in regulation in 1999. For participants who signed their contract for old age pensions before 1999, a minimum of one year of contributing and reaching 50 years of age was required in order to receive benefits (either as regular payments or a lump sum payment). After the regulatory change, however, a minimum of 5 years of contributing and reaching 60 years of age¹²⁹ has been required. Thus, participants are likely to be temporarily constrained by this regulation and the growth of the amount of benefits paid out can be expected to resume with a certain lag.

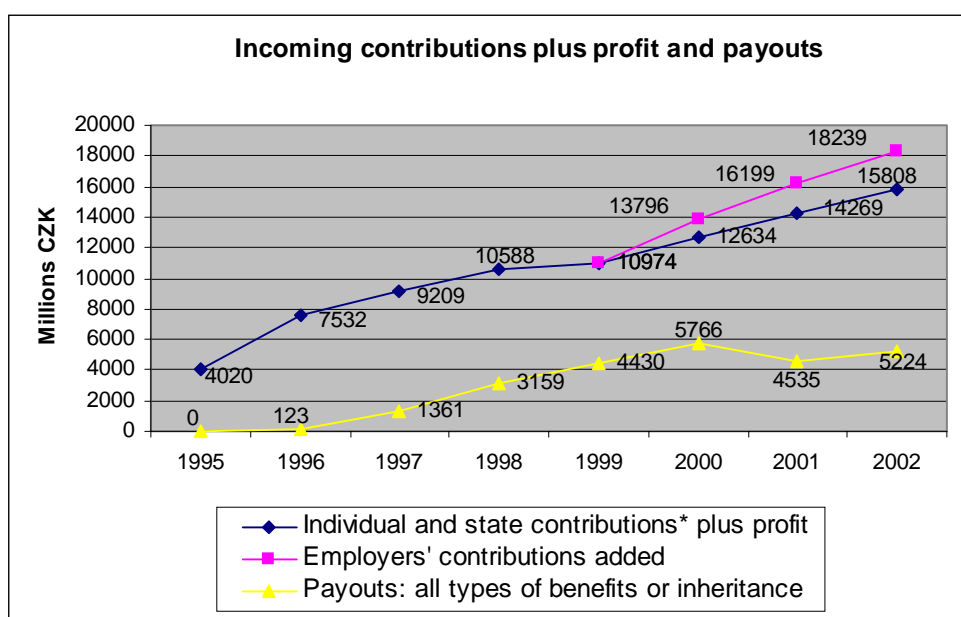
Since all contributions and distributed profits are eventually to be paid out as benefits,¹³⁰ the large difference between pension funds' incoming contributions plus profits and benefits paid

¹²⁸ It can be seen in graph 5 that the growing amount of employers' contributions increased the yearly cash inflow into pension funds substantially.

¹²⁹ Until 2004, old-age pensioners from the public scheme could qualify for old-age pensions from the voluntary scheme regardless of age.

¹³⁰ This will be explained in more detail in the next chapter. Suffice it to state now that this is required by the law.

out shows that the scheme still develops and it is in the phase of accumulation of assets. When the number of participants in the scheme ceases to grow,¹³¹ the gap will be closing over time as the ratio between those receiving benefits and those contributing increases and eventually becomes stable. The system then becomes mature and the amount of benefit payments will be close to the amount of contributions and distributed profits. At that point, the growth of the amount of accumulated assets slows down to around the growth of wages¹³² and assets as a proportion of GDP then become more or less stable. Normally, a pension system becomes mature after several decades.¹³³ Since, however, the average age of participants in the voluntary scheme is rather high and the average period after which they become eligible for benefits (which they mostly take as a lump sum as shown above) is rather short, the system may find itself near saturation with respect to the accumulated assets relative to GDP rather sooner than later. The hitherto development of assets accumulation will be presented later in this chapter.



Graph 5: Incoming contributions plus profits and payouts of pension funds

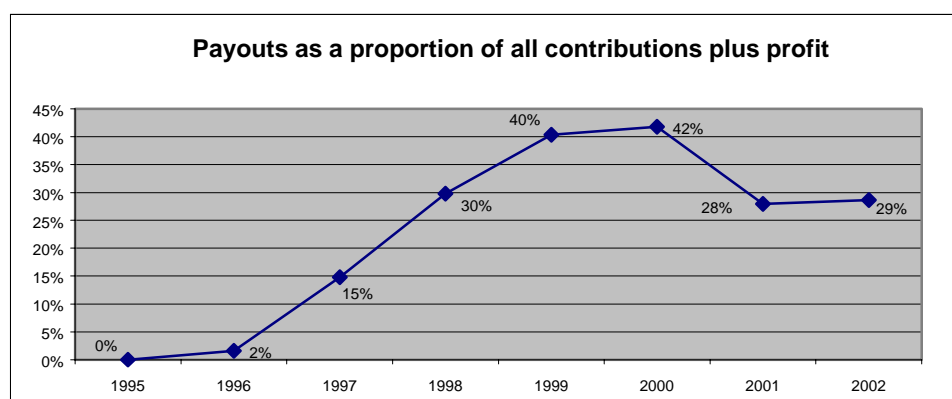
Source: Ministry of Finance

* Excluding state contributions returned to the Ministry of Finance

¹³¹ As shown above, there are signs that this may be relatively soon.

¹³² This is, of course, on the *ceteris paribus* condition about contribution rates, etc.

¹³³ This will be demonstrated in chapter 6 by a simulation of assets accumulation in pension funds if a systemic reform is adopted in the Czech Republic.



Graph 6: Payouts as a proportion of all incoming contributions plus profit
Source: Data in graph 5

4.5 Tax Savings

According to the estimates of the Ministry of Finance (2003), tax relief for employers contributing on behalf of their employees resulted in a loss of government revenues of CZK 651 million in 2002. The fact that employers' contributions are not considered as employees' income saved the individuals participating in the scheme about CZK 470 million. Also, participants increasingly took advantage of the tax deductibility of contributions exceeding CZK 6,000 per year up to the amount of CZK 12,000 as shown in the table.

Year	Number of participants
2000	150,447
2001	193,105
2002	213,028

Table 12: Number of participants deducting contributions from the tax base
Source: Ministry of Finance

In 2002, 83,509 participants deducted the maximum amount of CZK 12,000 from their tax base.¹³⁴ The growing trend of participants taking advantage of the tax relief offered is mainly due to the information campaign carried out by pension funds. In the same year, the total savings of participants due to these tax exemptions is estimated by the Ministry of Finance at CZK 282 million. In sum, the total "loss" of the state budget due to tax exemptions for employers and employees is estimated at CZK 1.4 billion in 2002. Adding state subsidies, this means that the government gave up CZK 4.2 billion of revenues in order to make individuals contribute CZK 11 billion and to make firms contribute on behalf of their employees CZK 2.4

¹³⁴ As shown above, this implies that they contributed at least CZK 1,500 per month.

billion in that year. In other words, it cost the government 31 hellers¹³⁵ to stimulate a contribution of 1 Czech crown. Given this high cost, it should be noted that although the transition costs associated with a systemic reform would be high, there would be no additional costs needed to stimulate individuals to contribute unlike the voluntary scheme.¹³⁶

4.6 Organization of the Supplementary Pension Industry

In 1994, 24 pension funds started to operate in the market. That number grew until it reached 44 in 1995 and 1996. Then there were 38 pension funds in 1997, 30 in 1998, 24 in 1999, 19 in 2000 and 14 in 2001. Thus after some mergers, acquisitions, liquidations and bankruptcies¹³⁷ had taken place, there were 13 pension funds operating in the market at the end of 2002.¹³⁸ Four had a direct foreign majority owner (three from the EU and one from Switzerland) and among the domestic majority owners of the remaining nine pension funds, four were banks and three were insurance companies.¹³⁹ When it comes to direct and indirect foreign control, however, most of the pension funds in 2002 were foreign-controlled. In addition to pension funds, there were 3 life insurance companies and 16 composite insurance companies at the end of 2002 offering competing life-insurance products with tax deductibility elements.

Thus, there has been a clear trend towards market concentration both in terms of participants and assets per pension fund. As shown in chapter 3, such a consolidation process has been taking place in mandatory funded schemes in Latin America and Eastern Europe due to economies of scale that exist in the industry. This seems to be especially so in the Czech voluntary scheme given the extremely low level of contributions. The average number of participants per pension fund was about 200,000 in 2002. As we have seen, this number is still substantially higher in many reforming countries where the industry has had at least some time to consolidate, and it may thus be an indication of possible further concentration in the Czech voluntary market.

¹³⁵ The costs of administering the system of state subsidies not included.

¹³⁶ There would, however, have to be government guarantees that are not present in the current voluntary scheme.

¹³⁷ Some clients of small pension funds that went bankrupt lost (at least some of) their savings.

¹³⁸ In early 2004, there were only 12 pension funds in the market (after a merger had taken place) and another merger was announced. Since, however, the other relevant data about the system were available to the author for the period 1994 to 2002 only, the thesis focuses on that period. The market develops and the process of consolidation has not finished yet, but this should not affect the general analysis of the system.

¹³⁹ Ministry of Finance (2003).

In 2002, three pension funds (Credit Suisse Life & Pensions penzijní fond, a.s., Penzijní fond České spořitelny, a.s. and Penzijní fond České pojišťovny, a.s.) concentrated 50.8 % of participants, five pension funds (Českomoravský penzijní fond, a.s. and Penzijní fond Komerční banky, a.s. in addition to the previous three) concentrated 71.8 % of participants and seven pension funds (ING penzijní fond, a.s. and ABN AMRO penzijní fond, a.s. in addition to the previous five) concentrated 89.9 % of participants. In terms of assets, three pension funds (Credit Suisse Life & Pensions penzijní fond, a.s., Penzijní fond Komerční banky, a.s. and Penzijní fond České pojišťovny, a.s.) managed 51.6 % and six pension funds (Penzijní fond České spořitelny, a.s., Českomoravský penzijní fond, a.s. and ING penzijní fond, a.s. in addition to the previous three) managed 82.8 % of all assets in the sector in 2002. Credit Suisse Life & Pensions penzijní fond, a.s. was the largest pension fund, controlling about one quarter of the market.

Name of a pension fund/Share of:	Assets	Participants	Profit
Credit Suisse Life & Pensions penzijní fond, a.s.	26.54	23.19	26.98
Penzijní fond Komerční banky, a.s.	14.06	9.98	18.56
Penzijní fond České pojišťovny, a.s.	11.02	12.88	8.87
Penzijní fond České spořitelny, a.s.	10.78	14.76	10.50
Českomoravský penzijní fond, a.s.	10.24	11.01	9.08
ING penzijní fond, a.s.	10.13	9.91	10.71
ABN AMRO penzijní fond, a.s.	6.70	8.13	5.35
Allianz penzijní fond, a.s.	4.74	4.26	5.00
Commercial Union penzijní fond, a.s.	2.79	3.33	2.10
Hornický penzijní fond Ostrava, a.s.	1.14	0.73	1.01
Generali penzijní fond, a.s.	0.89	0.88	0.98
Zemský penzijní fond, a.s.	0.59	0.52	0.51
ČSOB penzijní fond, a.s.	0.38	0.42	0.35

Table 13: Individual pension funds' share of assets, participants and profit in 2002 (in %)
Source: Ministry of Finance

At the end of 2002, all 13 pension funds were members of the Association of Pension Funds of the Czech Republic. This is a voluntary joint-interest association of legal persons, in particular pension funds. It was established in mid-1996 as a legal entity, but existed before without this status. The objectives of this association are to coordinate and further the interests of its members. It promotes the idea of supplementary pension insurance and comments on or initiates changes of legislation concerning this area. It also makes sure that its members observe its code of ethical conduct. Membership is voluntary and takes two forms, ordinary and associate. Ordinary membership is open to pension funds, associate membership is open to legal persons operating in areas related to or closely connected with supplementary pension

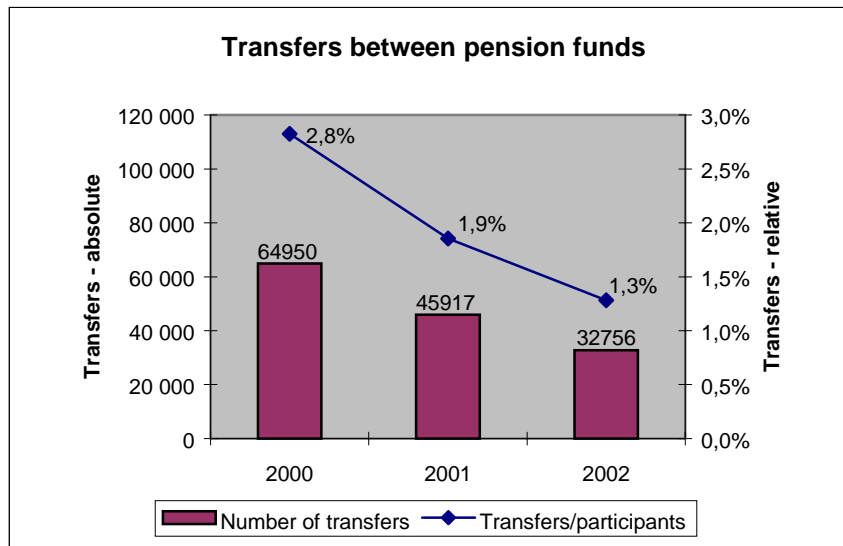
insurance. There was one associate member at the end of 2002.¹⁴⁰ Of course, this association keeps lobbying for a systemic pension reform in the country, since the reform would bring an enormous amount of assets under pension funds' management¹⁴¹ and would thus lead to a radical change of the pension business in the Czech Republic. It can be expected that after a systemic reform, some new players would emerge as it happened in reforming Eastern European countries with prior voluntary schemes, and a gradual process of consolidation would start anew in the mandatory scheme. However, existing pension funds already established in the market would have enormous competitive advantages.

4.7 Transfers between Pension Funds

Participants are free to sign a contract with another pension fund and transfer all their accumulated contributions (including state contributions and contributions from their employers if applicable) plus their share of distributed profits from their current pension fund to the new one without any penalty. According to the Ministry of Finance (2003), there were 347 925 such transfers between 1994 and 2002. There seems to be a trend towards lower migration between pension funds, however. The number of participants in the scheme increased by 7.7 % in 2001 and 3.3 % in 2002 while the number of transfers fell by 29 % in both years, which may be a sign of further stabilization. We saw in the previous chapters that in all Latin American and Eastern European countries with mandatory funded schemes, transfers between pension funds are restricted either by placing direct limits on the frequency of transfers or through transfer fees or through both. I believe that similar regulations should be adopted in the Czech voluntary (and later also mandatory) scheme as well. Although transfers seem to take place less and less often, they still represent an omnipresent source of uncertainty and we will discuss in the next chapter that this may have an adverse impact on pension funds' investment strategy. At the same time, a lot of transferring participants may base their decision on the momentary short-term performance of their current funds, which is exactly what they should be protected against in this long-term savings business.

¹⁴⁰ It was KPMG Czech Republic, Ltd.

¹⁴¹ Again, this will be demonstrated in chapter 6.



Graph 7: Number of transfers between pension funds
Source: Ministry of Finance

4.8 Assets

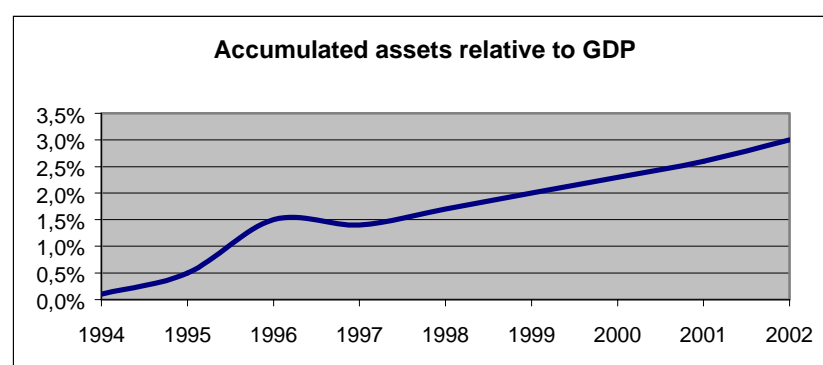
As we have seen before, pension funds' inflowing contributions plus profits have exceeded the amount of benefits paid out since the inception of the scheme. As a result, the assets under the management of pension funds grew from CZK 1.2 billion in 1994 to CZK 69 billion in 2002.¹⁴² The average rate of growth of the nominal value of assets was 66 % between 1994 and 2002, 38 % between 1995 and 2002, and 24 % between 1997 and 2002. Since the assets grew at a higher rate than the number of participants, the average amount of assets per participant increased as well. The average real amount of assets per participant sharply increased in 1996, remained rather stable until 2000 and started to increase again thereafter. Almost a decade after the inception of the scheme, this value was only CZK 27,000 in 2002, which is a natural result of low contributions as discussed before.¹⁴³

Compared to voluntary pension schemes in reforming Eastern European countries, the Czech scheme is, similarly to participation, at the top with respect to the assets under management relative to the GDP. The assets as a proportion of the GDP grew from 0.1 % in 1994 to 3.0 % in 2002. Iglesias (2003) shows that pension funds' assets also increased relative to the assets in the insurance sector and relative to the assets in the banking sector. As it can be seen in graph 8, after eight years of the existence of the scheme there seemed to be no weakening of the

¹⁴² The composition of the assets will be analyzed in the following chapter.

¹⁴³ Since we are using total assets of pension funds, the average savings per participant are lower than this value.

trend; and it would be a reason to worry if there had been such signs so early. As discussed before, it normally takes decades before the scheme becomes mature. However, due to the adverse age structure in the scheme plus signs that participation may not increase significantly plus also decreasing contributions relative to wages as shown before, the growth of assets relative to GDP may weaken sooner in the case of the Czech voluntary scheme. It will be demonstrated in chapter 6 that if individuals were allowed to contract out of the public pension scheme and divert part of their mandatory contributions to pension funds on a voluntary basis, the accumulated assets relative to the GDP might be several times higher after the same period with a stronger further dynamics.



Graph 8: Accumulated assets as a proportion of the GDP
Source: Table 14

Year	Assets (billion)	Growth (%)	Assets/participants	Assets/participants in 2002 prices	Assets/GDP (%)
1994	1.2	—	6,600	10,600	0.1
1995	7.1	491.7	5,500	8,100	0.5
1996	24.0	238.0	15,300	20,800	1.5
1997	23.2	- 3.3	14,200	17,700	1.4
1998	31.1	34.1	17,900	20,200	1.7
1999	37.4	20.3	18,600	20,600	2.0
2000	44.4	18.7	19,300	20,600	2.3
2001	55.0	23.9	22,200	22,600	2.6
2002	69.0	25.5	27,000	27,000	3.0

Table 14: Assets under the management of pension funds (CZK)
Source: Iglesias (2003)

A highly non-standard feature of Czech pension funds in international comparison is the non-segregation of participants' assets from the assets of pension funds' shareholders. Thus, the profits to be distributed among participants depend not only on the investment returns, but also on non-financial operations of the pension fund. In short, in addition to investment strategies participants' profits are affected by the way pension funds operate as companies. For instance,

it should thus not be difficult for pension funds to run their business so that total profits are lowered and the amount by which they are reduced is transferred to third parties and used in the shareholders' interest somehow.¹⁴⁴ For this reason, segregation of assets should make clearer the possibly blurred picture of pension funds' management of participants' assets.

It does not seem to be a big problem at present, since a strong counterbalancing factor is the competition among pension funds for clients. There have been rather opposite tendencies of shareholders in the past to top up pension funds in order to distribute more profits and attract clients, hoping for better times and above all a systemic pension reform soon. Nevertheless, flows of assets may occur where "Chinese walls" should be in place. In contrast, the law requires that there be a strict segregation of assets of investment companies and the mutual funds they set up. I believe that a similar requirement to segregate assets should be enacted for pension funds as well, especially if there seems to be a tendency towards a single unified supervisor of all these institutions in the future. This would be especially important for pension funds in the mandatory scheme if a systemic reform adds a new dimension to the private pension provision and dramatically changes the nature and scale of the pension business in the country.¹⁴⁵

Current Czech pension funds are what should rather be labeled as 'pension companies', whereas the term 'pension fund' is normally used to denote only the pool of participants' assets that are managed by a pension company on their behalf.¹⁴⁶ To see participants' accumulated contributions plus distributed profits, it is necessary to examine the liabilities side of the consolidated balance sheet, to which we turn now.

4.9 Capital Structure

There was an enormous growth of equity of pension funds between 1994 and 2001 due to the accounting rules pension funds had to follow. Until 2001, all contributions and distributed

¹⁴⁴ There is a floor on this possibility since a non-negative profit is required every single year. This will be discussed in the next chapter.

¹⁴⁵ Another problem currently lowering transparency are asset valuation rules; assets are not valued on a 'continuous' basis and profits/losses are entered in the profit and loss account only when the respective asset is sold, i.e. book/market value differences are registered only after sale. This should be corrected – assets should be valued frequently, if possible on a daily basis, and investment profits/losses should be entered in the profit and loss account at the time they actually occur.

profit¹⁴⁷ were entered into the balance sheet as equity. From 2002 onwards, they must be accounted as liabilities. Total accumulated contributions grew rapidly throughout the period and so did distributed profit. The registered capital of pension funds grew from 1994 to 1997, then fell until 2001 and remained at about the same level in 2002. Reserve funds increased as well, but on the whole there was a sharp drop in the ratio of registered capital plus reserve funds to total contributions plus distributed profit. In 1994, this ratio was 485 %, in 1995 it went down to 40 %, in 1996 further down to 19 %, to 11 % in 1997, to 8 % in 1998, to 5 % in 1999, to 4 % in 2000, to 3 % in 2001 and down to less than 3 % in 2002. Of course, this is the result of gradual accumulation of participants' contributions and profits distributed among them, but these numbers show a kind of deterioration in the "implicit insurance" of participants' savings and illustrate the increased exposure of participants to the risks of insolvency that might be encountered by pension funds.¹⁴⁸

	1994	1995	1996	1997	1998	1999	2000	2001
Equity	994	6,094	13,699	22,236	30,039	36,048	43,224	53,609
Total contributions	178	4,523	11,395	18,909	25,056	30,063	36,943	46,308
Distributed profit	0	2	155	647	1,673	2,947	3,643	4,451
Reserve funds	57	92	96	85	141	196	264	332
Registered capital	807	1,738	2,097	2,110	1,965	1,573	1,488	1,206
Other	- 48	- 262	- 44	484	1,203	1,269	887	1,314
Liabilities	232	975	10,274	1,003	1,058	1,385	1,136	1,347
Equity and liabilities	1,227	7,069	23,974	23,239	31,096	37,433	44,360	54,956

Table 15: Equity and Liabilities in 1994 – 2001 (millions CZK)¹⁴⁹

Source: Ministry of Finance and Iglesias (2003)

Equity	4,781
Registered capital	1,230
Reserve funds	436
Other	3,115
Liabilities	64,147
Total contributions	57,788
Distributed profit	5,281
Other	1,078
Equity and liabilities	68,927

Table 16: Equity and Liabilities in 2002 (millions CZK)¹⁵⁰

Source: Ministry of Finance

¹⁴⁶ To draw a parallel to investment companies and their mutual funds. In previous chapters, however, we used the term 'pension fund' where the term 'pension company' or 'pension fund manager' might be more appropriate in order to maintain consistent terminology throughout the text.

¹⁴⁷ As noted before, this is the minimum amount that pension funds are obliged to pay out as benefits.

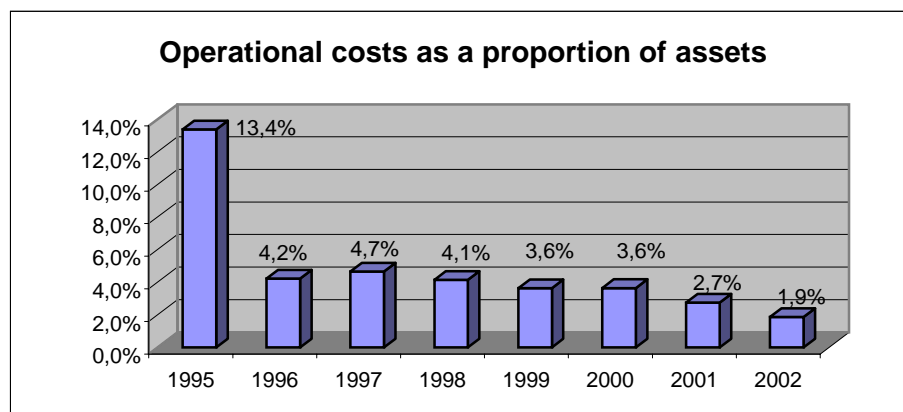
¹⁴⁸ As noted before, neither an explicit insurance of deposits nor government guarantees are present.

¹⁴⁹ Some figures may not add exactly due to rounding error.

¹⁵⁰ Again, some figures may not add exactly due to rounding error.

4.10 Operational Costs

Operational costs as a proportion of assets are still rather high in the private pension industry, but there seems to be an unambiguous trend towards higher efficiency as assets under the management of pension funds grow, the market consolidates and economies of scale are realized. Also, a “learning-curve” effect may have played a role. Operational costs as a proportion of assets fell from 13.4 % in 1994 to 3.6 % in 2000, 2.7 % in 2001 and 1.9 % in 2002. Also, average yearly operational costs per participant fell from about CZK 700 in 2000 to about CZK 600 in 2001 to about CZK 500 in 2002.¹⁵¹ Iglesias (2003) plots the average operational costs per participant of individual pension funds in 2001 as a function of the number of their respective participants, receiving a downward-sloping curve. He concludes that “the trend towards industry concentration could be interpreted as the natural result of an industry whose competitors are trying to create competitive advantages” (p. 28).



Graph 9: Operational costs as a proportion of assets

Source: Calculations based on data from the Ministry of Finance¹⁵²

There is no regulation on fees and charges, and unlike some Latin American countries there are no such payments on top of contributions. Participants pay solely their contributions and pension funds distribute profits only after all expenses are taken into account. It has been already mentioned that participants are guaranteed non-negative profits and it will also be

¹⁵¹ Ministry of Finance (2003).

¹⁵² There seem to be some inconsistencies between figures published by the Ministry of Finance and the Association of Pension Funds. Operational costs as a proportion of assets presented by the Association of Pension Funds (2003) are lower in all years but for 2002. However, I use the data published by the Office of the State Supervision of Insurance Companies and Pension Funds of the Ministry of Finance, which are consistent with the other data used in this chapter. Actually, there are some more data published by the Association which differ from those published by the Ministry. This may be attributed to different methods of calculation (e.g. using average

explained in chapter 5 that pension funds' shareholders can retain at most 10 % of profits. Thus, 90 % of any additional revenues generated by fees or charges over and above total expenses would have to be either distributed back to participants or put aside to the reserve fund. If participants' assets were segregated from those of shareholders, the only source of income for pension funds would be fees and charges for their asset management and other services; in this case they would have to be regulated as it is for instance in all countries discussed in the previous chapter. Since, however, there is no such segregation and given the existing rules about profit distribution, the concept of fees and charges is not particularly relevant.

The great difficulty with international comparisons of costs and charges in funded schemes was discussed in the previous chapter, and different stages of development of these schemes across countries would make this especially complicated. We will, therefore, not attempt to do so. Nevertheless, although direct comparison is again not possible, it is useful to have an idea about the operational costs of the public pay-as-you-go scheme. The Czech Social Security Administration administers the whole social security program including pension, sickness and unemployment insurance; its operational costs as a proportion of all benefit payouts were 1.76 % in 2002 and 1.65 % in 2003.¹⁵³ In international comparison, this is not high.¹⁵⁴ Public pay-as-you-go schemes tend to have lower costs than private funded ones, but as explained in chapter 2, the latter provide services that tend to more than compensate for this.

4.11 Summary

After the assessment of the early experience of the Czech voluntary pension scheme, we can conclude that it overcame the mistrust of the population towards the word 'fund' after extensive scandals with investment privatization funds in the 1990s, and managed to attract a large number of participants as well as to accumulate a large amount of assets compared to voluntary schemes in other transitional countries. Unfortunately, there is little more that can be attributed to the scheme as success in strengthening pension provision in the country.

values in a year vs. values at the end of the year, etc.). Details about the methods used are not provided, but I have presented the data by the Ministry since it has fewer incentives to cook numbers.

¹⁵³ For some strange reason, the Czech Social Security Administration presents on its website (www.cssz.cz) its operational costs as a proportion of the sum of its total collected contributions and benefit payouts (0.86 % in 2002 and 0.81 % in 2003). Unfortunately, I have not discovered what sense this double-counting makes. I think that the sole purpose of the agency is to pay some benefits and its efficiency should be measured as costs relative to the benefits paid out. Hence I have presented numbers obtained through the latter method.

A significant number of participants join the voluntary scheme at an age when the benefits of long-term saving can no longer be realized and it seems that these participants perceive pension funds as advantageous medium-term savings vehicles with attractive state subsidies rather than a means to increase retirement income through regular savings over the working life. A very large number of old-age pensioners are among these participants. I believe that some regulations should be adopted that would make eligible for state subsidies only those who join the scheme before reaching a certain age, which would prevent near-pensioners and pensioners from drawing state subsidies that could be used elsewhere to really strengthen pension provision in the country. Another drawback of the scheme is the fact that contributions are low and most participants do not accumulate a sufficient amount to increase their pension income in any significant manner. This may be one of the reasons why most retiring participants withdraw their savings in the form of lump-sum payments and the scheme practically does not pay out pensions.

There are some regulatory weaknesses, the most important being the non-segregation of assets of participants from the assets of pension funds' shareholders. This should be a cause of concern and measures should be undertaken by policymakers to correct for this as soon as possible. Only the future can show whether the process of market concentration reaches a point at which the positive effects of a competitive environment are threatened. The situation so far is similar to most other countries with personal pension funds and the consolidation process is primarily driven by economies of scale.

From time to time, some policymakers come up with a suggestion that a system of occupational pension funds should be introduced as well in the Czech Republic, similarly to many developed countries. We saw in chapter 2 that these pension funds are very successful and well established in a large number countries. However, they have evolved gradually under different institutional settings there. I believe that there would be too many risks associated with the introduction of these pension funds in the Czech Republic and their disadvantages¹⁵⁵ would outweigh their advantages. Above all, the system of personal pension funds has consolidated and given the economies of scale, it is unlikely that occupational pension funds

¹⁵⁴ For more, see Mitchell (1996).

¹⁵⁵ For instance labor mobility could be hampered as discussed before. Most importantly, however, the risks of mismanagement of assets could be substantial in the Czech Republic.

mostly concentrating rather a smaller number of employees could bring any significant cost reductions.¹⁵⁶ In sum, I believe that such proposals are far from being a good idea in the Czech Republic and in this respect, the Latin American/Eastern European paradigm of personal pension funds should be maintained.

It was argued that large social security contributions in the country might crowd out contributions to the voluntary scheme strongly. I believe that the major problems of the funded scheme will not be solved unless a systemic reform is carried out and individuals are allowed to contract out of the public scheme and divert part of their mandatory contributions to pension funds. Another worrying aspect of the scheme is a poor investment performance, which has not been analyzed in this chapter and which is the subject of a separate chapter that follows now.

¹⁵⁶ Some asset managers of occupational pension funds would most likely be current players in the market anyway. In the current situation, personal pension funds actively seek out employers and offer them various benefits (in addition to tax exemptions) for contributing on behalf of their employees, bringing whole groups of clients in house at a time.

5 Why the Lackluster Performance in the Past Decade?

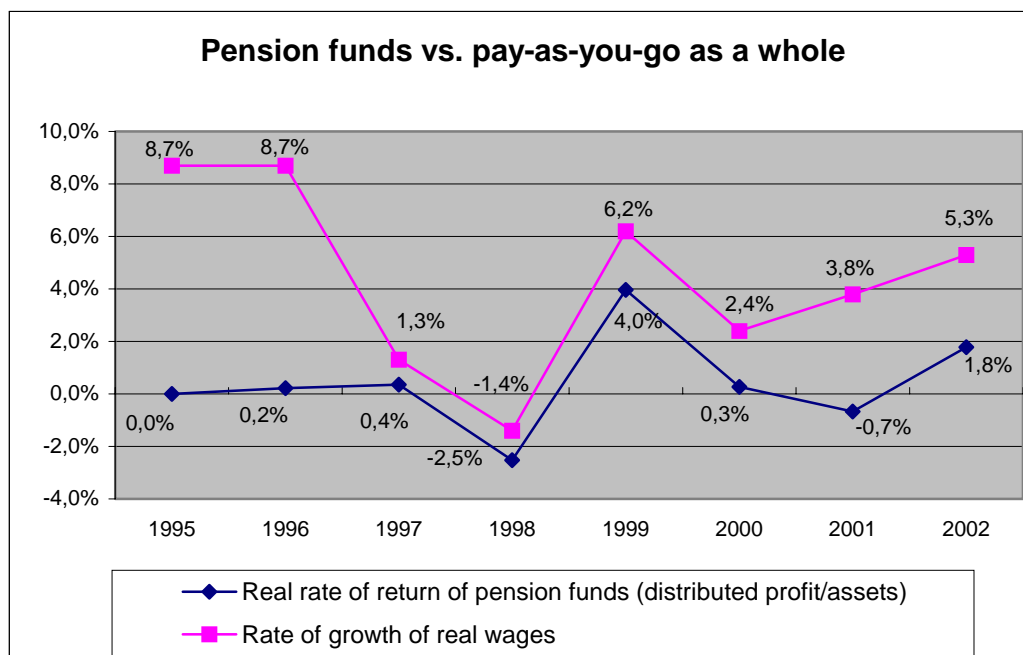
Returns on participants' savings in pension funds are an extremely important determinant of their overall attractiveness, since over a long period of time the power of compound interest may translate even a small change in the rate of return into a substantial change in the final level of pension benefits. The long-term nature of their investments should enable pension funds to attain higher returns than most alternative short-term or medium-term savings mechanisms while maintaining safety of participants' lifetime savings. On average, the performance of Czech pension funds has been quite poor so far. Compared to pension funds in many other countries as discussed in previous chapters, Czech pension funds have not been doing well and should their meager investment returns continue in the future, they would not provide a viable alternative to the pay-as-you-go scheme in spite of a labor force implosion and a boom of pensioners that are under way and encumber the latter scheme.

5.1 Past Investment Returns vs. Alternative Opportunities

As noted earlier, the implicit rate of return in a pay-as-you-go scheme as a whole is in the long run equal to the rate of growth of wages.¹⁵⁷ Although comparisons made over a short period of time in the early years of post-socialist transition may not show very much,¹⁵⁸ it is still interesting to note that the growth of wages exceeded the rate of return generated by pension funds significantly in every single year as illustrated in graph 10. The geometric average of the growth rates of real wages was 4.32 % p.a. in the period 1995 – 2002, while it was only 0.41 % p.a. in the case of returns on pension funds' assets.

¹⁵⁷ This holds once the ratio of contributors to pensioners is stabilized in the pay-as-you-go scheme. If this ratio falls due to population ageing (which, however, will not continue forever), the implicit rate of return is lower than the wage growth rate.

¹⁵⁸ Also, wages grow *ceteris paribus* faster in a converging economy than in a steady-state economy. The closer is the economy to the steady state, the smaller is the growth rate differential.



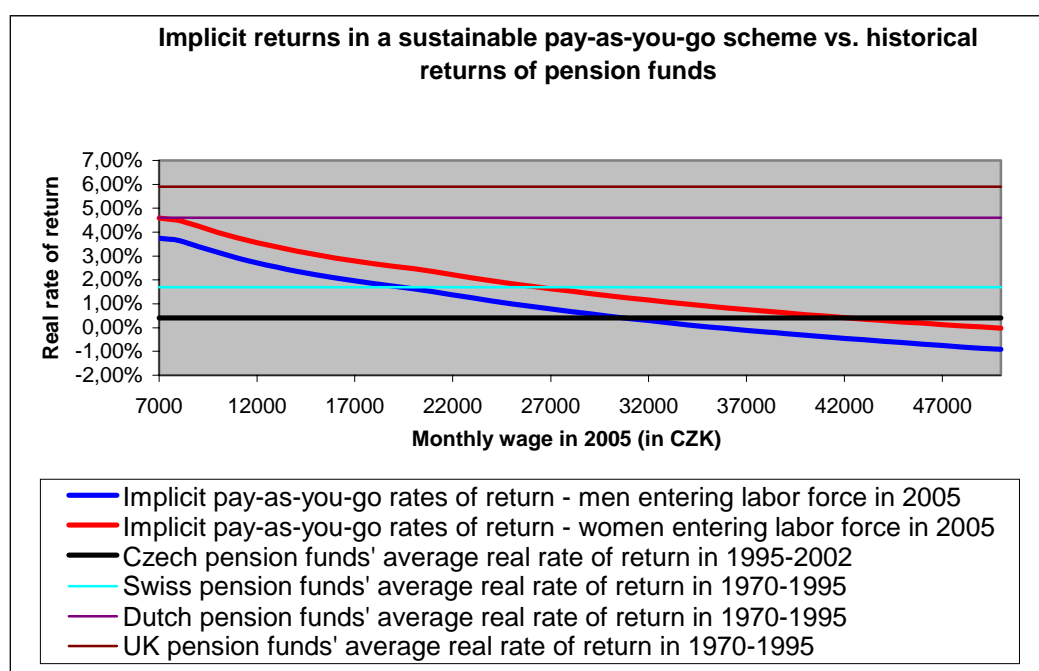
Graph 10: Real rates of return vs. real wage growth rates
 Source: Ministry of Finance, Czech Statistical Office

The major merit of a partial switch to funding in the mandatory pension scheme is expected to be the fact that pension funds are capable of generating higher returns than a scheme operated on a pay-as-you-go principle, thereby enabling to pay out higher pensions at the end of the day. Thus the higher is the differential between pension funds' investment return rate and the wage growth rate, the more advantageous the switch. We saw in chapter 2 that in many developed countries this differential was about 2-3 percentage points in the last decades of the 20th century. In the Czech Republic, the differential has been negative since the inception of the scheme. Should this continue forever, a transformation of the current public pension scheme into a notional defined contribution pay-as-you-go scheme would do the same or a better job than a switch to funding, and in addition huge amounts of money would be saved since no transition costs would arise. In short, pension funds' performance must be improved if a systemic reform is to live up to expectations.

As noted before, the implicit rate of return of a pay-as-you-go scheme as a whole approximately equals the wage growth rate if there are no demographic turbulences. However, due to strong redistribution in the current pay-as-you-go scheme, the implicit rate of return differs for different income groups. In contrast, there is no redistribution in a funded scheme.¹⁵⁹ This is all depicted in graph 11 that illustrates which workers would be better off in a funded

scheme and which in the pay-as-you-go one should future returns of pension funds be the same as in the past.¹⁶⁰

Since the performance of pension funds is thus assumed to be really low, only very high income workers would be better off in a funded scheme. If, however, Czech pension funds attained the same returns as for instance Canadian, Danish, German, Japanese, Dutch, UK or US pension funds between 1970 and 1995 as shown in chapter 2, an overwhelming majority, if not all, income groups would be better off in a funded scheme. Even traditionally ‘low-performing’ Swiss pension funds attained a real rate of return of 1.7 % p.a. in that period, which would still make Czech pension funds much more attractive than they were in the past decade.



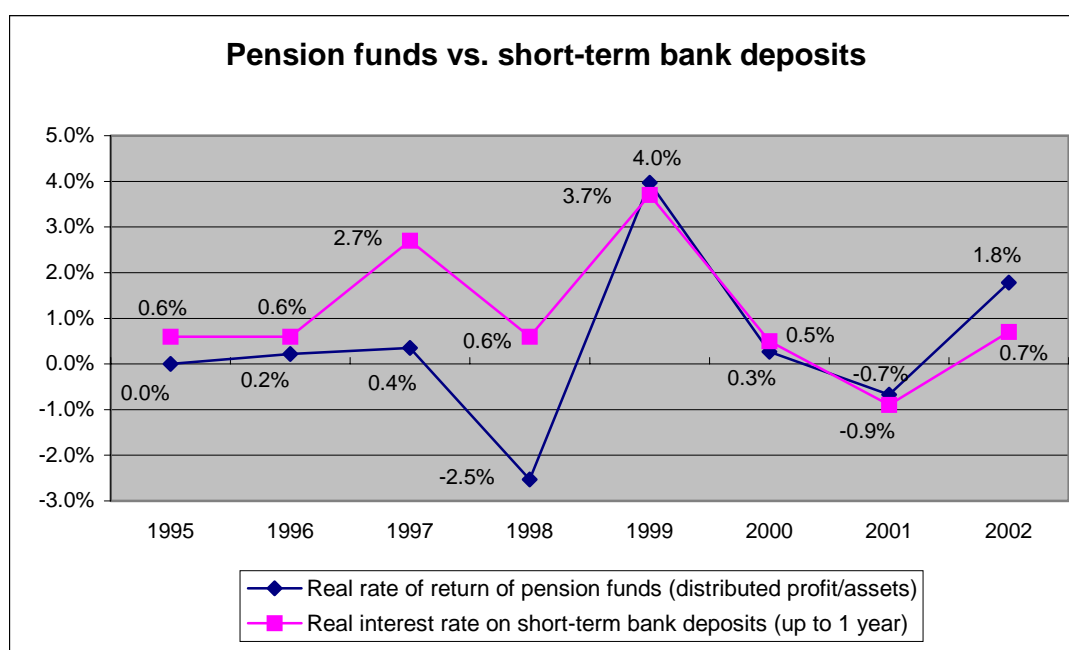
Graph 11: Historical returns of pension funds vs. implicit pay-as-you-go returns
Source: Own calculations, Davis and Steil (2001)

Pension funds as long-term investors should be able to attain higher returns than their shorter-term alternatives. It is, therefore, not daring to expect that they offer substantially more in the long run than banks do on their short-term deposits.¹⁶¹ Graph 12, speaking for itself, shows that they did not even manage that, although the latest trend may be promising. The geometric

¹⁵⁹ There may, however, generally be some redistribution due to the structure of charges or in the process of annuitization.

¹⁶⁰ Detailed estimates of implicit rates of return for various income levels in the pay-as-you-go scheme as well as the assumptions made in the calculations are presented in the Annex.

average of pension funds' real rates of return in the period 1995 – 2002 was 0.41 % p.a., whereas it was 1.05 % p.a. in the case of real interest on short-term bank deposits.



Graph 12: Real rates of return vs. real interest rates on short-term bank deposits
Source: Ministry of Finance, Czech National Bank

A question that immediately comes to mind is why individuals joined the scheme on such a massive scale if it seems that they could have saved more for retirement elsewhere. The answer can be found in the following table that illustrates how state subsidies raise perceived rates of return for individual participants depending on the amount contributed and the participation period. The first and second columns show individual monthly contributions in CZK and as a proportion of the average gross wage in 2002 (which was CZK 15,857). The third and fourth columns show matching state subsidies and savings due to tax exemptions for a person facing a 20% marginal income tax rate (this is so for those earning the average wage). The remaining columns show the real annual rate of return on savings in a pension fund to an individual participating for periods of alternative length (5, 10 and 15 years).

These internal rates of return were calculated under the following assumptions. An individual starts contributing to a pension fund in 2002 and contributes the same nominal amount throughout the saving period. The future rate of return on investment of the pension fund is expected to be the same as the scheme's historical average (i.e. 0.41 % p.a. in real terms) and

¹⁶¹ Unlike savings in pension funds, 90 % of bank deposits up to the amount of CZK equivalent of 25,000 euro are currently insured (in line with EU standards).

the inflation rate is expected to be 2 % p.a. throughout the period. In addition, no changes in the current system of state subsidies and tax exemptions are expected. It is assumed in the calculations that tax savings due to tax exemptions are reinvested at the rate of return on the pension fund's investment, but not in the pension fund itself since it would snowball further savings due to additional tax exemptions. The resulting returns are in gross terms, since as noted in chapter 4, the difference between the total lump sum payment and the sum of contributions and state subsidies (i.e. investment returns) is taxed at the rate of 15 % upon retirement. Given low investment returns, however, the difference between the gross and net total rate of return is rather negligible anyway.

The rate of return falls with the length of the savings period because incremental state subsidies and tax savings represent a decreasing proportion of the total individual accumulation over time. We can see that a participant contributing CZK 350 per month (the average contribution in 2002) for 10 to 15 years can expect a real rate of return between 4.2 % and 6 % p.a. despite the fact that pension funds' investments yield 0.41 % p.a. only. It may now be difficult to find a similar opportunity in the same risk class elsewhere.

Individual contribution	% of average wage in 2002	State subsidy	Tax savings	Real return: 5-yr saving	Real return: 10-yr saving	Real return: 15-yr saving
100	0.6 %	50	0	14.4 %	7.6 %	5.2 %
150	0.9 %	70	0	13.6 %	7.2 %	4.9 %
200	1.3 %	90	0	13.2 %	7.0 %	4.8 %
250	1.6 %	105	0	12.4 %	6.6 %	4.6 %
300	1.9 %	120	0	11.9 %	6.4 %	4.4 %
350	2.2 %	130	0	11.2 %	6.0 %	4.2 %
400	2.5 %	140	0	10.7 %	5.7 %	4.0 %
450	2.8 %	145	0	9.9 %	5.4 %	3.7 %
500	3.2 %	150	0	9.4 %	5.1 %	3.5 %
600	3.8 %	150	20	8.9 %	4.9 %	3.4 %
700	4.4 %	150	40	8.6 %	4.7 %	3.3 %
800	5.0 %	150	60	8.3 %	4.6 %	3.2 %
900	5.7 %	150	80	8.2 %	4.5 %	3.1 %
1000	6.3 %	150	100	8.0 %	4.4 %	3.1 %
1100	6.9 %	150	120	7.9 %	4.3 %	3.0 %
1200	7.6 %	150	140	7.8 %	4.3 %	3.0 %
1300	8.2 %	150	160	7.7 %	4.2 %	3.0 %
1400	8.8 %	150	180	7.6 %	4.2 %	2.9 %
1500	9.5 %	150	200	7.5 %	4.2 %	2.9 %
2000	12.6 %	150	200	5.9 %	3.3 %	2.3 %
3000	18.9 %	150	200	4.1 %	2.4 %	1.7 %
4000	25.2 %	150	200	3.2 %	1.9 %	1.4 %
5000	31.5 %	150	200	2.7 %	1.6 %	1.2 %
6000	37.8 %	150	200	2.3 %	1.4 %	1.1 %
7000	44.1 %	150	200	2.1 %	1.3 %	1.0 %
8000	50.5 %	150	200	1.9 %	1.2 %	0.9 %
9000	56.8 %	150	200	1.7 %	1.1 %	0.9 %
10000	63.1 %	150	200	1.6 %	1.0 %	0.8 %

Table 17: Real rate of return on individual contributions after the effect of state subsidies and tax exemptions is taken into account

Source: Own calculations

A 55-year-old average wage earner who starts saving in a pension fund CZK 100 per month (0.6 % of his/her wage) and withdraws the savings as a lump sum at 60 attains a rate of return of 14.4 % p.a. in real terms. In contrast, a 45-year-old average wage earner who decides to contribute CZK 2,000 per month (12.6 % of his/her wage) and withdraws the savings as a lump sum at 60 attains a rate of return of 2.3 % p.a. in real terms. While the former would hardly find a better alternative investment in a given risk class, it may not be so for the latter,

especially if he/she can't obtain liquidity during a 15-year period without being severely punished.¹⁶² Needless to add, the latter situation would be even less attractive for a 25-year-old.

Thus, state subsidies significantly enhance the rate of return to individuals contributing low amounts for a short period of time while their return-enhancing effect is substantially diminished in the case of individuals contributing larger amounts for a longer period of time. For the latter individuals (a highly desirable situation for pension provision in the country is that every participant belongs to this category), state subsidies are not sufficient to compensate for poor investment performance and investment returns matter a lot in terms of overall attractiveness of the scheme. In other words, unless pension funds increase their investment returns,¹⁶³ they can hardly stimulate higher participation among the young and generally higher contributions, since they cannot even compete with some alternative short-term or medium-term savings vehicles. Saving in pension funds is entirely voluntary in the country, so individuals can be expected to rationally choose other schemes to save (whether for retirement or not) if those schemes offer the same or even higher returns and at the same time do not constrain their liquidity until the age of 60.¹⁶⁴

Differences among individual pension funds were not large either. If we consider 13 pension funds that operated in the market at the end of 2002, the difference between the rate of return of the best-performing one and the worst-performing one was 1.63 percentage points. This was 2.43 percentage points in 2001 and 3.58 percentage points in 2000.¹⁶⁵ If we consider the second-best performer and second-worst performer, the differences shrink to 2.11, 2.12 and 1.06 percentage points in 2000, 2001 and 2002, respectively. Thus, the poor investment performance of the industry seems to apply to every single pension fund.¹⁶⁶

¹⁶² As noted in the previous chapter, in the case of an earlier withdrawal an increased 25% tax is applied on investment returns and most importantly, state subsidies are forfeited.

¹⁶³ This would increase total annual rates of return regardless of the amount contributed and the length of saving. Again, this is because investment returns accrue on the total accumulation of individual assets that are invested whereas state subsidies depend only on the level of contributions (that fall as a proportion of the total accumulation over time).

¹⁶⁴ It should not be unreasonable to assume that alternative opportunities in the same risk class exist that offer more while not locking in the individual's savings possibly for several decades.

¹⁶⁵ Using data from the Association of Pension Funds (www.apfcr.cz). Since data for all pension funds in 2000 and 2001 are not published by the Association (there were 14 funds in 2001 and 19 funds in 2000), some survivor bias may be present.

¹⁶⁶ At the time of writing, a proposal is being discussed to reduce the corporate income tax for pension funds. According to the Ministry of Finance, it should fall from 15 % to 5 % (bringing it in line with the existing legislation concerning the income tax for mutual funds). This should result in a slight increase in pension funds' profits to be distributed. Of course, this is little more than a cosmetic change and the problem with investment returns stems from pension funds' investment strategy as discussed later.

5.2 Investment Strategy 'Play It Safe'

Let us examine the investment portfolio of pension funds in search for the sources of their low performance. Pension funds' assets consist mainly of fixed-income instruments and there has been a trend towards an even higher proportion of this type of securities. This means that Czech pension funds fear riskier investments and prefer instruments with minimum volatility that promise safer, albeit on average lower, returns.¹⁶⁷ We discussed earlier that pension funds as long-term investors often make riskier investments that bring higher returns in the long run although their portfolio value may be less stable in the short run. This is not the case of Czech pension funds that seem to be extremely risk averse.

Between 2000 and 2001, the proportion of bonds in the consolidated portfolio of the pension industry increased by 4.25 percentage points while the proportion of T-bills remained constant. Between 2001 and 2002, the proportion of bonds further increased by 13.43 percentage points, but at the same time the proportion of T-bills decreased by 12.65 percentage points. Consequently, the proportion of fixed-income instruments increased from 78.42 % to 83.5 % between 2000 and 2002. Thus, bonds represented almost three quarters of the assets and T-bills almost one tenth in 2002. In the same period, the already low proportion of shares dropped from almost 10 % to about 6 %. Also, the proportion of real estate decreased from 1.79 % to 0.94 %, ¹⁶⁸ i.e. a negligible amount of the assets is invested into real estate. In sum, there has been a trend from a high proportion of fixed-income instruments towards an even higher proportion of these securities to the detriment of alternative investments.

	2000	2001	2002
Shares and unit certificates	9.43	7.23	6.24
Bonds	56.12	60.37	73.80
T-bills	22.30	22.35	9.70
Term and deposit accounts	5.70	3.90	5.07
Real estate	1.79	1.15	0.94
Other assets	4.42	4.02	2.15
Other investments	0.24	0.98	2.10
Total:	100	100	100

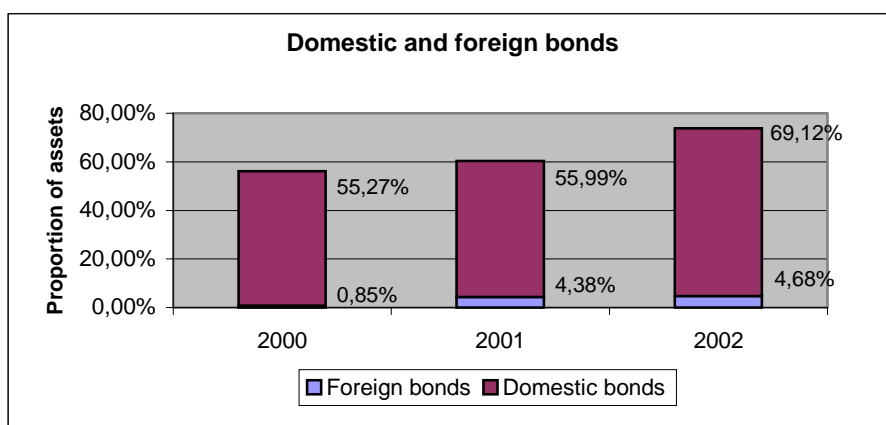
Table 18: Structure of the portfolio of pension funds in 2000 – 2002 (in %)

Source: Ministry of Finance

¹⁶⁷ Naturally, fixed-income instruments do so only in a stable low-inflationary environment.

¹⁶⁸ In 2002, operational real estate was 0.35 % of the portfolio and real estate as financial investments was the remaining 0.59 % (Ministry of Finance 2003).

As discussed later, the law limits the holdings of foreign assets only to debt issued by governments or central banks of OECD member countries. As shown in the graph below, there was a relatively large increase in foreign bonds holdings as a proportion of total assets in 2001. A further increase that took place in 2002 was only small. As a proportion of total bonds, foreign bonds jumped from 1.52 % to 7.26 % in 2001 and slightly decreased to 6.34 % in 2002. Given the importance of bonds in the portfolio of pension funds, this represents at least some international diversification.



Graph 13: Domestic and foreign bonds in the portfolio
Source: Ministry of Finance

The Association of Pension Funds (2003) shows that every single pension fund in the market holds a portfolio consisting mainly of T-bonds, T-bills, bank bonds and corporate bonds. At the end of 2002, individual pension funds held only between 0.42 % and 9.16 % of shares and unit certificates in their portfolio. Thus, the phenomenon is systemic and a natural question arises why pension funds choose such an investment strategy. The next sub-chapter shows that a crucial factor shaping pension funds' investment behavior is the regulatory framework under which they operate.

5.3 Regulatory Framework – How It Works and Why It Matters

Until the 2004 amendment of Act No. 42/1994 Coll., pension funds' investment opportunities were restricted substantially.¹⁶⁹ Foreign investments were restricted only to debt instruments issued by governments or central banks of OECD member countries. The very unfavorable

¹⁶⁹ The restrictions were even more stringent before some previous amendments came into effect. Interestingly enough, Kohout (2001) notes that until the 1999 amendment the law did not even list demand deposits and term deposits as permitted investments, so all pension funds had been breaking the law up until 1999.

conditions in the Czech stock market¹⁷⁰ seem to have contributed to the fact that pension funds held a very modest proportion of shares and unit certificates in their portfolio.¹⁷¹ The law permitted up to 25 % of the portfolio to be invested into shares and unit certificates, but the highest proportion of these instruments held by a pension fund was merely 9.16 % in 2002.

While foreign investments introduce foreign exchange risk,¹⁷² they may also allow substantial risk diversification compared to narrow local markets. The 2004 amendment, in line with EU standards, substantially increases the range of instruments pension funds may invest into. They may now additionally invest into any securities (e.g. shares, unit certificates, corporate bonds) admitted to trading on regulated OECD markets. Up to 30 % of assets may now be invested into instruments denominated in currencies other than pension funds' liabilities and up to 70 % of assets may be invested into shares.¹⁷³

Investments into foreign shares are going to allow pension funds to overcome the difficulties resulting from the underdeveloped Czech stock market and significantly diversify the stock part of its portfolio. Since, however, pension funds have invested into shares significantly below the regulatory limits so far, the newly opened opportunity to invest into foreign shares may still not lead to a desired rebalancing of pension funds' portfolios in favor of higher yielding securities. This is because pension funds are likely to continue to shy away from instruments with higher volatility, despite their higher mean return, due to the following regulatory element.

¹⁷⁰ In the Czech capital market, the bond market fares very well and can be viewed as a success (it would be even more successful without a great competition of syndicated loans for the corporate sector in the past). This cannot be said of the stock market, however. The latter suffers from low liquidity and does not function as a place for raising external capital, i.e. practically no initial public offerings (IPO) take place. There has been a single IPO since the beginning of trading (and that was by the company Software 602 in the RM-System over-the-counter market in 1998). Another IPO is expected in June 2004 (pharmaceutical company Zentiva). A more detailed analysis of this problem can be found e.g. in Securities Commission (2001) or Havel (1998).

¹⁷¹ As a senior representative of the largest pension fund put it at the Leadership Forum Conference on Pension Funds held in November 2003 in Prague: "Just try to purchase available interesting shares worth CZK 100 million with CZK 10 billion in your pocket!"

¹⁷² For long-term investments denominated in euros, we should perhaps label it conversion rate risk, referring to the 'final rate of exchange' set irrevocably upon entry into the Economic and Monetary Union.

¹⁷³ Some additional restrictions apply; this will be discussed later. If pension funds invested all 70 % of their portfolio into shares, they would not be allowed to invest into corporate bonds, movables or real estate.

5.3.1 Pension Funds and Implicit Options

The law stipulates that the profit of a pension fund be distributed as follows. At least 5 % must be put aside to the reserve fund and at most 10 % may be distributed among the pension fund's shareholders. Thus, a maximum of 95 % of profits can be distributed among participants. If there is a negative profit in any particular year, the loss has to be covered from the reserve fund and other funds created from past profits. If this is not sufficient, the remaining loss has to be covered through a reduction in the registered capital.¹⁷⁴ Thus, a zero nominal rate of return is guaranteed to participants, i.e. pension funds have to guarantee that participants will be paid at least the sum of what they have contributed and state contributions and potential employers' contributions. If profits are distributed to participants in any year, they become irrevocably part of the guaranteed accumulation and cannot compensate for any future losses. Thus, once profits are distributed in any single year, participants are guaranteed a positive nominal rate of return for the whole participation period.

According to the law, Czech pension funds are based on the DC principle.¹⁷⁵ Since participants are guaranteed at least zero nominal returns, a floor on future benefits is effectively set. Following definitions from chapter 2, this should perhaps be labeled as a hybrid between DB and DC since minimum benefits are implicitly 'defined'. In fact, we may find a number of countries that impose some requirements on minimum returns in DC plans. For instance Swiss pension funds are required to generate 4% nominal returns on participants' assets, backed by a central guarantee fund. In Latin American countries, only Argentina and Uruguay impose absolute return guarantees and this is so only for public pension funds. Otherwise a majority of countries in Latin America impose guarantees of relative returns, which typically means that a floor on returns is set as a function of the industry average.¹⁷⁶ In reforming Eastern European countries, a minimum rate of return is required only in Hungary, Poland and Croatia.¹⁷⁷ There have been several modifications recently in this area in the first two countries, however.¹⁷⁸ The

¹⁷⁴ The registered capital must not fall below CZK 50 million.

¹⁷⁵ As mentioned in the previous chapter, if a pension fund offers a disability pension plan, the disability pensions can be DB. The Association of Pension Funds (2003) does not provide information on this, but Iglesias (2003) states: "According to information received from industry sources, none of the pension plans which are actually offered in the market includes the option of disability pensions ... as a 'defined benefit'." (p. 26)

¹⁷⁶ As mentioned in chapter 2, this regulation often results in herding; the closer the minimum required rate of return to the industry average, the more intensely pension funds copy investment strategies from one another.

¹⁷⁷ It is so in the Asian country of Kazakhstan as well.

¹⁷⁸ For instance, Hungary cancelled a minimum pension guarantee in the funded scheme in 2002 and introduced a minimum rate of return guarantee instead. In Poland, the reference period was two years and this was evaluated on

minimum return rate in Hungary is set by the authorities, in Poland and Croatia¹⁷⁹ it is established relative to the industry average.

Pension funds are then obliged to create reserves which are used to make up for any difference below a minimum required return. Reserves are often established not only at the pension funds' level, but also centrally at the industry level.¹⁸⁰ All these guarantees naturally result in some distortions of investment strategies and in general absolute guarantees do so even more than the relative ones.¹⁸¹ Most importantly, the shorter the reference period, the more distortions they bring about.¹⁸²

As discussed in the previous chapter, the non-segregation of participants' assets from the assets of pension funds' shareholders opens ample opportunities for the shareholders to use part of investment profits in their own interest and in fact determine reported profits irrespective of actual returns on investment. For this reason, an annual guarantee of non-negative profits distributed among participants may be substantiated to a certain degree, although as mentioned before, a strong counterbalancing factor in this area is competition among pension funds for clients in which distributed profits are an important marketing tool. Nevertheless, whatever the reason for the existence of this requirement, the distortions it introduces to the investment strategy of pension funds are likely to be enormous.

So in the Czech case, the reference period is one year and an underperforming pension fund is not given a 'second chance' by the regulators to make up for its poor performance in a particular year e.g. in the year that follows. Neither is there a central reserve fund. If reserves of this particular pension fund are insufficient, its shareholders have to make up for the difference. Annual absolute-return guarantees are rather rare in international comparison for this type of pension funds and as we will see later on, they give rise to substantial costs.

a quarterly basis. From 2004 onwards, however, the reference period should be three years and this would be evaluated every six months.

¹⁷⁹ Also in Kazakhstan; in this country, an absolute guarantee of zero real rate of return is established as well.

¹⁸⁰ In the latter case, redistribution across pension funds may take place. The example of Switzerland has already been given; central reserve funds also exist in Hungary, Poland and Estonia.

¹⁸¹ For instance, we saw in chapter 2 that Swiss pension funds tend to invest into low-volatility (and correspondingly lower-return) instruments and their historical returns are indeed significantly lower than those of their counterparts in most other developed countries. The following text will shed some light on how this is likely to be connected with the regulatory framework.

¹⁸² For instance, Poland opted for the aforementioned modifications because the existing system appeared unnecessary, but costly (Chlon-Dominczak 2003).

To estimate these costs incurred by pension funds, the contingent claim (option) pricing theory can be applied. This technique is often used for the valuation of guarantees of life insurance companies that are obliged to generate a certain rate of return on their technical reserves. Since, however, Czech pension funds possess similar features, implicit options are present as well and the same technique can be employed. In the Czech context, this analysis was carried out by Kohout (2001).¹⁸³ He also attempted to quantify the value of these guarantees using the Black-Scholes formula. Generally, different option pricing models could be employed that would probably yield different quantitative results. As the author himself admits, his quantitative results should only be taken as illustrative examples¹⁸⁴ and the focus should be on the underlying principles. We will, therefore, not replicate illustrative calculations and will focus on a qualitative analysis only, which is sufficient for the description of the problem.

The implicit options in Czech pension funds can be identified in the following. At the beginning of every year, each pension fund is obliged to distribute non-negative profits to its participants for the past year. Hence, the situation is equivalent to a pension fund issuing a European put option at the beginning of every year. The obvious parameters of the option are an expiration of one year and the strike price equal to the value of the portfolio at the time of issuance. In simple terms, if a pension fund achieves positive returns, it has to distribute (or put in reserves) an overwhelming majority of them. If returns are negative (and reserves are insufficient to compensate for them), the shareholders of the pension fund have to make up for the difference. Since, however, pension funds are not paid the option premium by anyone (they are forced by the regulatory framework to hold a short position in this implicit put option), they bear the cost themselves. Since they want to minimize these costs, they invest into instruments with low volatility (in line with the option pricing theory). Most importantly, the investment horizon is thus effectively shortened to a single year, which in many respects runs against the very purpose of pension funds.

If we properly discounted and summed all future option values, we would obtain the present value of the total guarantees. If we subtracted that result from the present value of all future profits distributed to shareholders, we would find out what the value of the pension fund for

¹⁸³ E.g. for the Colombian system of pension funds, a theoretical implicit option pricing framework is developed and guarantees are valued by Fischer (1998).

¹⁸⁴ For instance, he estimates that in the period May 2000 – May 2001 the volatility of the consolidated portfolio of pension funds was 2.64 % and the corresponding value of the guarantee (implicit put option premium – see

shareholders is. A highly volatile portfolio would drive the value of guarantees up, which could in turn bring the value of the pension fund for shareholders even to negative numbers. Consequently, the current regulatory framework pushes pension funds into overly safe investments that do not yield very high returns in the long run.¹⁸⁵

Pension funds could theoretically mitigate this problem through a reserve fund. In fact, they could always put some ‘excessive’ profit aside for a rainy day. When profits in a bad year fall below the required minimum, these reserve funds would be used to fill the gap. So if a pension fund decides that any profit over and above a certain level is ‘excessive’ and it will not be distributed to participants, it would in fact hold a long position in an implicit call option with a one-year expiration and the strike price equal to the level above which profits are ‘excessive’. Of course, the value of this implicit option goes up with the volatility of the portfolio as the option theory suggests. In sum, the pension fund holds a short position in an implicit put option and a long position in an implicit call option. Kohout (2001) shows an example in which the combined value of these two positions increases with the volatility of the portfolio, but tends to stagnate after a certain level of volatility is reached and may eventually even slightly fall for high volatility. Thus, the problem could theoretically be somewhat diminished.

However, some crucial assumptions for the ‘excessive profits approach’ to do this job are not satisfied in practice. For instance, the level over and above which profits are ‘excessive’ should be low since the lower it is, the more flexibility there is in transferring profits from one year to another (alternatively, the lower is the strike price of the implicit call option, which increases its value). Similarly, pension funds should not face the risk of a massive outflow of clients. Given the fierce competition for clients, Czech pension funds tend to distribute their profits and take advantage of this in a marketing campaign.¹⁸⁶ Thus, ‘excessive’ returns seem rather hard to achieve. Since clients can transfer to other pension funds without any limitations,¹⁸⁷ asset management is hampered and pension funds resort to holding a large part of their portfolio in more liquid instruments with a lower volatility.

later) was 0.07 % of the portfolio. However, if the volatility of the portfolio increased to say 6 %, the value of the guarantee would jump up to about 1 % of the portfolio with a further sharp increase for higher volatility.

¹⁸⁵ Taking, for instance, a very long-term view on alternative asset returns in the UK in the period 1871-1999, the average real rate of return on bonds was 2.2 % p.a. while it was 7.6 % p.a. for equity (Davis 2003b).

¹⁸⁶ It can be seen in the financials that pension funds tend to put in the reserve fund little above the minimum required 5 % of profits.

Another assumption that would have to be satisfied is that pension funds could borrow with a zero interest if reserve funds are not sufficient and repay the loan from future ‘excessive’ profits. Of course, the fact that none of the above assumptions is satisfied in practice significantly reduces the potential benefits from the long position in the implicit call option, and the costs of the short position in the implicit put option prevail. As a result, pension funds minimize the costs resulting from their guarantees by investing conservatively into safe low-volatility instruments, mainly T-bonds and T-bills, to the detriment of the long-run performance.

In fact, there is one more option feature to be identified in the current voluntary pension scheme. Since strong financial groups that are pension funds’ shareholders are likely to have had little profit from their undertaking so far,¹⁸⁸ it seems that they rely on a real option¹⁸⁹ on an improvement of the regulatory framework and a systemic pension reform. Only these are likely to turn pension funds into viable profit-making enterprises that do not excessively burden their shareholders with costs resulting from contingent claims, are not heavily dependent on the system of state subsidies (that attract mostly older and low-contributing clients anyway), and also become more efficient as the assets under management increase significantly.

5.3.2 Prudent Person Rule versus Quantitative Restrictions

There are two distinct approaches towards the regulation of institutional investors, namely the prudent person rule and quantitative restrictions. Both approaches seek to ensure adequate portfolio diversification and liquidity, but in a fundamentally different fashion.¹⁹⁰ The prudent person rule is a behaviorally oriented standard which stipulates that investors should behave as careful and responsible professionals in making their investment decisions (as they would do in the conduct of their own affairs). Quantitative restrictions¹⁹¹ are explicit quantitative limits on holdings of a given asset class; restrictions are typically imposed upon instruments with high volatility and/or low liquidity. Pure forms of these approaches are implemented rather rarely.

¹⁸⁷ For instance, Swiss pension funds that are required to attain a minimum 4% nominal return on assets are occupational, which gives significantly less room for participants’ transfers.

¹⁸⁸ As noted by Musilek (2003), pension funds made sure that participants receive positive returns in the first years of the existence of the scheme via the distribution of the share premium, although they incurred losses due to set-up and marketing costs.

¹⁸⁹ I.e. an option whose underlying asset is real (as opposed to financial). These include land, buildings, machinery, plants, etc. For instance, a company that has undertaken a project has an option to abandon it if things go wrong, etc. For more, see e.g. Hull (2003).

¹⁹⁰ A detailed analysis can be found in Davis (2002a) or OECD (2002).

Notably, prudent person rules are typically accompanied by at least some quantitative restrictions.

Rather than focusing on external rules, the prudent person principle also relies on internal controls and governance structures in which the authorities have confidence. A high degree of transparency is needed and monitoring is also delegated to self-regulatory bodies that have incentives to maintain compliance with the principles of prudence in order to protect the reputation of the industry. Compliance with quantitative restrictions seems easier to verify and monitor by supervisors than it is with the prudent person principle.¹⁹² Implementing the prudent person rule thus requires a higher degree of sophistication on the part of the supervisory structure.

Where it has been achieved, however, the prudent person rule has introduced more efficiency into the investment process without exposure to excessive risk. Pension funds operating under the prudent person regime tend to have higher equity and foreign asset holdings. Bloomenstein (2001) notes that these funds have on average three times as high equity holdings and almost twice as high foreign asset holdings as their counterparts under quantitative restrictions. This is because quantitative restrictions usually enforce holdings of a high proportion of bonds and domestic assets. In addition, experience shows that these restrictions are rarely binding, i.e. pension funds hold proportions of ‘restricted’ assets that fall well short of the limits. This may be because they want to avoid breaching the limits when these instruments do well in the market and their relative value in the portfolio rises (Davis 2002a, Bloomenstein 2001).¹⁹³ Regarding security of participants’ assets, OECD (2002) states that “prudent person rule has a constraining effect on pension asset management and has created a culture of cautious behavior among pension fund trustees, fiduciaries and other relevant parties” (p. 28).

In general, quantitative restrictions may prevent pension funds from proper risk-return optimization. Srinivas and Yermo (1999) demonstrate on Latin American countries that quantitative restrictions create distortions in asset management, limit opportunities for diversification and consequently hamper the performance of pension funds. They conclude that

¹⁹¹ A.k.a. ‘draconian regulation’ following Vittas (1996).

¹⁹² Davis (2002a) adds with respect to quantitative restrictions that “there is a strong link to the civil law tradition typical of Continental Europe, where rules are codified, rather than in the common law tradition of the Anglo Saxon countries” (p. 10).

the net welfare gain from pension reform is lower under quantitative restrictions than under a more liberal pension fund investment regime. They note that Chilean pension funds initially underperformed with respect to a balanced market benchmark, but “[a]fter investment limits were relaxed in the late-1980s, pension fund performance improved significantly. ... The liberalization of asset restrictions ... led to a shift in the investment regime, taking it closer to the balanced market portfolio with a 60/40 equity/bond distribution.” (p. 29). They go on to emphasize that “[t]he tight regulatory framework regime in place in the early years of the Chilean system will have drastic implications for workers’ retirement income. Expected replacement rates will be significantly lower than what they would have been under a liberal investment regime” (p. 29). Davis (2002a) shows on a sample of OECD countries¹⁹⁴ that the prudent person rule seems superior to quantitative restrictions, and ultimately enables pension funds to optimize their investments and generate higher returns for their participants. He concludes that “quantitative restrictions are particularly inappropriate for pension funds” (p. 24). Similar findings were made by Bloomenstein (2001).

Davis (2002a) adds, however, that a rationale for quantitative restrictions may exist if pension fund managers as well as regulators are inexperienced and the financial system lacks transparency (as it is the case of many a transitional economy). According to him, restrictions in such economies may justifiably be eased as expertise develops. This seems to apply to the case of the Czech Republic at the time the voluntary pension scheme was started and I believe that the stringent quantitative restrictions that were imposed at that time may have done more good than harm. During the turbulent 1990s that witnessed extensive cases of mismanagement of investment privatization funds, stringent rules were needed to protect the reputation of the industry and the whole project of voluntary private pensions in the country. Nevertheless, these rules lasted almost a decade with only minor loosening¹⁹⁵ and combined with the aforementioned annual minimum return requirements, this rather long period of a stifling regulatory framework may have prevented pension funds from performing better and perhaps attracting younger and/or higher-contributing clients.

¹⁹³ Of course, some restrictions may be so loose that they are no restrictions in the true sense of the word and do not affect the investment strategy.

¹⁹⁴ Prudent person rule is applied on pension funds e.g. in the US, UK, Canada, the Netherlands, Japan, Italy or Finland whereas no such rule exists e.g. in Germany or Sweden.

¹⁹⁵ For the sake of brevity, we will not track all legislative changes that have taken place since the inception of the scheme and in the following text we will focus on the latest amendment only since it seems to represent a major shift.

As mentioned before, quantitative restrictions prevented Czech pension funds from investing into some asset classes at all. Until 2004, these were for instance all foreign securities except for debt issued by OECD governments or central banks and no derivative instruments were allowed either. In addition, a 25% limit on shares and unit certificates had been imposed.¹⁹⁶ There was an ownership concentration limit through which pension funds were not allowed to hold more than 20 % of securities issued by a single entity and traded on the exchange. Moreover, diversification rules applied whereby pension funds were not allowed to hold single-issuer securities traded on the exchange representing more than 10 % of their assets with only government debt being exempted, and deposits held in accounts with a single bank were not allowed to exceed 10 % of the assets either. Also, the value of one piece of real estate or a movable was not allowed to exceed 5 % of the pension fund's assets.

The 2004 amendment introduced different rules of the game, opening new investment opportunities to pension funds. As mentioned before, they may now invest into any securities admitted to trading in OECD markets, i.e. most importantly foreign shares and foreign corporate bonds are allowed in the portfolio. While exposing pension funds to foreign exchange risk,¹⁹⁷ this is going to enable them to diversify their portfolio and also invest into instruments that may not be to be had in the domestic market. Derivatives for hedging purposes are newly allowed as well, thus for instance enabling pension funds to hedge against the aforementioned exchange rate risk.¹⁹⁸ In addition to OECD government/central bank debt, pension funds may invest into debt instruments guaranteed by an OECD government or issued by the European Investment Bank, European Bank for Reconstruction and Development, World Bank or other international financial organizations of which the Czech Republic is a member. Pension funds may now also invest into units of open-end mutual funds.

At least 70 % of the assets must be denominated in the currency in which the liabilities of the pension fund to participants are denominated. The proportion of assets invested into securities admitted to trading in regulated OECD markets,¹⁹⁹ units of open-end mutual funds, movables

¹⁹⁶ Only those admitted to trading in the main or the secondary market of the stock exchange were allowed (units of open-end mutual funds were thus not allowed).

¹⁹⁷ As noted in chapter 2, foreign exchange risk is also present in domestic shares if the company competes in world markets.

¹⁹⁸ The law requires that derivative contracts be valued on a daily basis and can be sold at the market price at any time; the settlement of these transactions may only be done by the pension fund's depository. The law stresses that these contracts may only be for hedging purposes, i.e. speculative or arbitrage trades are not allowed.

¹⁹⁹ This limit does not concern debt issued by OECD governments, central banks or international financial institutions, or guaranteed by an OECD government.

and real estate must not exceed 70 %. There is an ownership concentration limit through which pension funds are not allowed to hold more than 20 % of securities of a single issuer. Diversification rules further stipulate that pension funds must not hold single-issuer securities representing more than 10 % of their assets, with the debt of OECD governments,²⁰⁰ central banks or international financial organizations being exempted. A 10% limit on the proportion of assets represented by deposits held on accounts with a single bank remains intact, but an absolute limit of CZK 20,000,000 has been added; deposits may newly be made to banks located in OECD member countries.²⁰¹ Unlike the previous arrangement, a limit on the value of a single movable or a piece of real estate is no longer in place, but a 10% limit on the proportion of assets represented by the total value of movables²⁰² and real estate has been added instead.²⁰³

Additionally, instruments such as shares, unit certificates or corporate bonds could previously be purchased only in the main or secondary market of the exchange; this limitation has been eliminated.²⁰⁴ Moreover, other restrictions have been lifted such as municipal bonds having to be guaranteed by a bank or issued by a bank. While there was previously a strict list of assets pension funds could invest into, they are allowed by the latest amendment to invest up to 5 % of their portfolio otherwise than explicitly listed in the law. In sum, domestic investment opportunities have been substantially broadened as well.

The EU Directive 2003/41/EC as discussed in chapter 2 calls for a prudent person rule.²⁰⁵ It covers occupational pension funds and does not address personal pension funds, however. Nevertheless, it can be expected that this approach will also be extended to the latter funds sooner or later as they play a very important role in some new EU member countries and their investment principles are not different from those of their occupational counterparts.²⁰⁶ Indeed, some restrictions have been relaxed by the latest amendment so that they are in accordance

²⁰⁰ Or debt guaranteed by an OECD government.

²⁰¹ In that case a foreign currency equivalent is considered for the purpose of the absolute limit.

²⁰² Except for securities.

²⁰³ Apparently limiting investments into assets with potentially very low liquidity.

²⁰⁴ For instance, the Prague Stock Exchange has also the so-called New Market and Free Market that may allow pension funds access to riskier capital.

²⁰⁵ Although it allows countries to impose some quantitative restrictions, which could constitute a loophole.

²⁰⁶ For instance Poland negotiated with the EU an exemption from the 'free pension capital movement' rule based on the argument that personal pension funds are part of its social security (thus only occupational pension funds that exist in the Polish negligible voluntary pension scheme are covered by the directive).

with EU standards;²⁰⁷ some signs of prudent-person-rule features that can be found in the directive can be found in the latest amendment as well,²⁰⁸ since the more quantitative restrictions are relaxed, the more regulators have to rely on prudence in the investment behavior of pension funds. Nevertheless, quantitative restrictions remain in place. As mentioned before, I believe that their imposition in the early years of the scheme was right given the existing institutional framework and lack of experience, but I think they should gradually be abandoned en route to the more efficient prudent person rule.

5.3.3 Performance of Pension Funds in Reforming Countries

As previously noted, the poor performance of Czech pension funds so far raises questions when they are likely to improve and become a viable alternative to the current pay-as-you-go scheme. Although returns attained by pension funds differ across countries due to different institutional arrangements and economic conditions, experience shows that Czech pension funds should be capable of achieving substantially better results. These are likely to be realized when a friendlier institutional framework is implemented with respect to stifling annual guarantees and pension funds rebalance their portfolios towards instruments with higher mean yields. Also, a systemic pension reform would trigger a major shift in the age structure of participants which would enable pension funds to take advantage of their very long-term nature and move towards the desired long-term investments with higher mean returns.²⁰⁹

As discussed before, data support the idea that a regulatory framework resting on the prudent person principle fosters higher returns, although it may sometimes be difficult to separate the impact of the regulatory framework from other potential influences.²¹⁰ Nevertheless, table 3 in

²⁰⁷ Such as 30 % of the portfolio allowed in non-matching currencies or 70 % of the portfolio allowed to be invested into equity.

²⁰⁸ Such as the general formulation that “the assets shall be invested with professional care in such a manner as to ensure the security, quality, liquidity and profitability of the portfolio as a whole” (par. 33, article (1) of the Act No. 36/2004 Coll.).

²⁰⁹ Due to stringent annual-return requirements and shorter participation periods, pension funds are likely to head towards rather uniform investment patterns and little product diversification can be expected. However, Československá obchodní banka, a.s. (ČSOB) currently runs two pension funds with different life-cycle investment objectives. ČSOB penzijní fond Stabilita, a.s. is designed for older risk-averse individuals with a short investment horizon, investing mainly into domestic fixed-income instruments. In contrast, ČSOB penzijní fond Progres, a.s. is tailored for younger participants with a long investment horizon and less aversion to risk, holding a higher proportion of shares and foreign assets in its portfolio. In 2003, the latter pension fund achieved the highest rate of return in the whole industry with 4.3 % p.a. while the former finished in last place with 2.3 % p.a. (with practically zero inflation in that year, the given numbers represent nominal as well as real returns).

²¹⁰ Also, some quantitative restrictions are more stringent than others, thus making it more difficult to isolate their effect.

chapter 2 shows that returns of pension funds in a number of developed countries significantly exceeded those of Czech pension funds in the past, and with the latest reduction in quantitative restrictions and possible relaxation of the annual guarantees in the future, there is no reason to expect that Czech pension funds will continue to lag behind. On the contrary, in all likelihood they are going to strengthen their performance and become ready to assume the role of mandatory pension provision. As noted in chapter 2, pension funds possess the capacity to generate rates of return exceeding the wage growth rate, thus ultimately delivering higher pensions than a system operated on a pay-as-you-go principle.

Due to a short history of pension funds under mandatory social security in reforming Eastern European countries, few or no data on their performance are available thus far. Chlon-Dominczak (2003) states that “Hungarian pension funds did not provide information on a comparable basis, but the net returns in 2001 were estimated by financial supervision at 6.1 per cent. ... In the period 2000-2002 the compounded average real rate of return for Polish pension funds was higher than the average real wage growth or real deposit rate” (pp. 207-208). She adds that the average annual real rate of return in Kazakhstan was around 6 % in 2000-2002.

Let us now look at the rates of return generated by pension funds in reforming Latin American countries as shown in table 19. Due to rather special conditions in these emerging economies, rates of return exceeded wage growth rates significantly beyond any expectations. These very high returns are unlikely to last forever,²¹¹ but they illustrate what a strong performance pension funds in these countries have been achieving, thus significantly improving the standard of living of pensioners compared to a no reform scenario.

²¹¹ Palacios (2003) states that “[a] return-wage growth differential based on the rate of return on capital is more likely to resemble the 3-4 percentage point spread observed in Peru and Chile over the last decade or similar differentials observed for private pension funds with diversified portfolios in OECD countries. This depends crucially however, on how the regulation of investments evolves” (p. 88).

Country	Real rate of return from inception to 2002 (in %)	Standard deviation (in %)	Real wage growth (in %)
Argentina	11.7	13.4	-0.8
Bolivia	16.2	-	8.8
Colombia	11.8	2.6	1.4
Chile	10.5	9.3	1.8
El Salvador	11.3	3.6	-0.2
Mexico	10.6	-	0
Peru	5.7	7.5	1.8
Uruguay	9.5	-	3.6

Table 19: Rates of return in reforming Latin American countries
Source: Palacios (2003); “-” denotes “no data available”

5.4 Summary and Policy Recommendations

Czech pension funds competing for new clients as well as existing clients who can transfer freely to other funds without any limitations are required to generate annual non-negative returns for their participants. The most important policy recommendation resulting from this chapter is that this tight restriction should be relaxed since it hampers the voluntary pension scheme enormously and ultimately prevents it from attaining higher returns in the long run. The frequency of transfers should be limited. Quite a unique feature of the Czech system of pension funds in international comparison is the non-segregation of participants’ assets from the assets of shareholders; with respect to guarantees, assets should be strictly segregated so that there are fewer reasons to impose a floor on annual distributed profits.

The recent relaxation of investment restrictions is a step in the right direction, taking away some constraints preventing pension funds from optimal investment strategies. However, the desired positive effects of these regulatory changes on the investment performance of pension funds are unlikely to be fully realized unless the annual return guarantees are revised. Shortly after a systemic reform takes place and if the initial stage proves to be smooth, quantitative restrictions should be further relaxed on the way towards the prudent person paradigm. Improving the stifling regulatory framework should be high on policy makers’ agenda, since a better performance of pension funds is a *conditio sine qua non* for a successful systemic pension reform in the country.

6 After Pension Reform in Czechia

After the change of pension paradigm in the Czech Republic, pension funds would accumulate huge amounts of assets compared to what they manage now and would soon become dominating players in the financial sector. It is, therefore, interesting to simulate the dynamics of the process based on decisions of individuals to contract out of the pay-as-you-go scheme conditional upon the expected performance of the funded alternative.

I believe that any contracting out should only be partial, thus leading to a diversification of risks associated with these alternative schemes, and a realistic extent of transition towards funding could be allowing workers to divert 5-10 % of their gross wages to pension funds.²¹² I also believe that no current worker should be forced out of the pay-as-you-go scheme so that very-low-income workers are given the protection of the public scheme. It is a question whether new labor force entrants should automatically be transferred to the funded scheme as it was the case in all reforming Eastern European countries or whether they should be given a choice as well. The former has the advantage of administrative simplicity whereas the latter might provide a social net for very-low-income workers. I believe that the latter has at least some merits and in the following calculations I will assume that even new entrants are given a choice, thus making the scheme in this respect resemble that in the UK rather than those in reforming Eastern European countries.

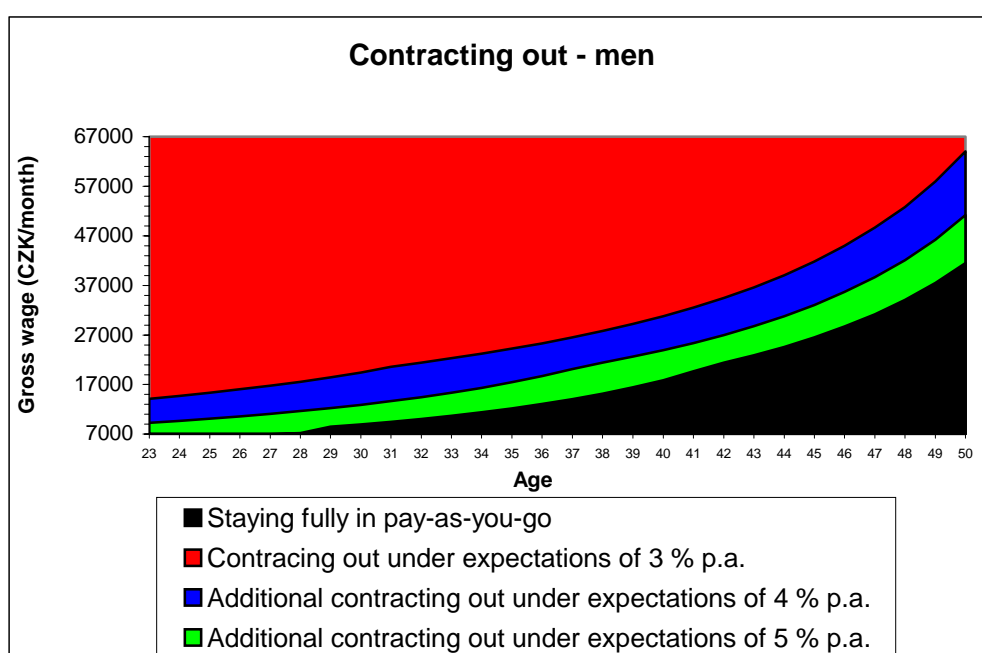
If contracting out is exclusively voluntary, workers' decisions to do so and join a funded scheme are dependent on their expectations about the investment performance of pension funds, i.e. the rate of return they will generate for their participants.²¹³ As discussed earlier, it is difficult to prophesy the rates of return that can realistically be attained by pension funds in the next 60 years, but I believe that a conservative forecast of 3-5 % p.a. in real terms should be no

²¹² A more extensive reform is probably unthinkable given the resulting costs of transition. As shown in chapter 3, a similar percentage of gross wages is diverted to pension funds in reforming Eastern European countries.

²¹³ More precisely, they depend on the expectations about the performance of pension funds relative to the performance of the pay-as-you-go scheme. It was shown in the previous chapter that the pay-as-you-go scheme offers different implicit returns to different income categories due to substantial redistribution. As also noted before, in the long-run when the current demographic shift is over the implicit rate of return of the pay-as-you-go scheme as a whole is approximately equal to the rate of growth of wages. In our simulations, we assume the growth of wages to be 2.5 % p.a. in real terms between 2005 and 2065. Our results concerning the extent of contracting out would be different if we assumed a higher wage growth and held the rates of return attained by pension funds unchanged (i.e. *ceteris paribus* fewer persons would contract out). Thus, the higher the "returns – wage growth" differential, the more attractive pension funds are, and *vice versa*.

overestimation, considering historical returns attained by pension funds in developed countries.²¹⁴

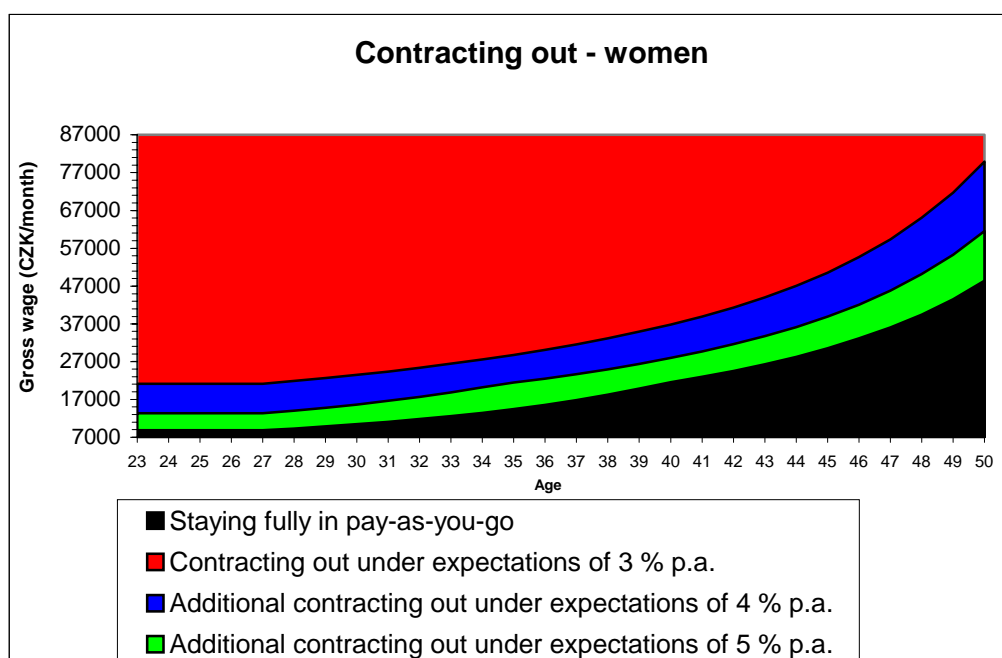
We expect in the simulations that a systemic reform is carried out in 2005. Thus, workers are given the opportunity to contract out in that year and all values in CZK used from this point onwards are in expected 2005 prices. Like in many reforming Eastern European countries, workers over 50 years of age are not allowed to contract out. The estimates of the minimum wages with which it pays to contract out at a given age are shown in graph 14 and graph 15.²¹⁵



Graph 14: Contracting out in 2005 – men
Source: Own calculations

²¹⁴ Even after taking into account the downward pressure on rates of return due to population ageing as discussed in chapter 2.

²¹⁵ We expect that workers can contract out in exchange for a reduction in pay-as-you-go pension benefits. This reduction (as a proportion of pension benefits) is the same for all age categories, hence the older a worker is, the higher wage he/she needs in order to save sufficiently for retirement. Since women have a higher life expectancy than men and we assume that different mortality tables are employed for each gender when an annuity is purchased upon retirement, women need to earn more in order to attain the same level of benefits as men since they spend a longer period of time in retirement. Since the pay-as-you-go scheme does not discern between genders, it is *ceteris paribus* more attractive for women than for men. The assumptions and parameter values used in the calculations are presented in the Annex.



Graph 15: Contracting out in 2005 – women
Source: Own calculations

We can see that with an increasing age, the minimum wage with which it pays to contract out grows exponentially since workers have less time to save for retirement and the effect of compound interest is weaker as well. Due to redistribution, some are better off than others in the current pay-as-you-go scheme and, therefore, a higher rate of return is needed to induce them to contract out. The graphs show that an increase in the expected rate of return by 1 percentage point significantly lowers the minimum wage a worker needs to earn in order to benefit from contracting out. Based on these microsimulations, we estimate the proportions of workers contracting out in given age groups; the results are summarized in table 20 and table 21.²¹⁶

Expected returns/age	20-24	25-29	30-34	35-39	40-44	45-49
3 % p.a.	> 50 %	> 50 %	> 50 %	30 %	15 %	5 %
4 % p.a.	> 80 %	> 80 %	> 80 %	60 %	30 %	10 %
5 % p.a.	100 %	95 %	95 %	90 %	55 %	15 %

Table 20: Worker coverage in age groups - men
Source: Own calculations

²¹⁶ Given the unavailability of data on wage distribution in individual age categories, I had to estimate it based on the average wage in these categories and the wage distribution in the whole labor force as published by the Czech Statistical Office (in both cases separate survey-based data for men and women available). Nevertheless, I believe that my estimates differ little from actual values (and it is worth reiterating that they are the best I could get anyway). Even with some better survey-based data obtained for a particular year in the past, any result would have to be taken *cum grano salis*, since the structure of the labor force changes over time. Therefore, I do not present in these tables the exact outcomes I obtained, but rather an approximate level at which contracting out could be expected. The symbol “>” denotes that a higher level can possibly be expected; “< 5 %” (“<<5 %”) denotes “fewer (many fewer) than 5 %”.

Expected returns/age	20-24	25-29	30-34	35-39	40-44	45-49
3 % p.a.	20 %	20 %	15 %	5 %	<< 5 %	<< 5 %
4 % p.a.	60 %	60 %	50 %	20 %	5 %	<< 5 %
5 % p.a.	90 %	90 %	85 %	55 %	15 %	< 5 %

Table 21: Worker coverage in age groups - women

Source: Own calculations

Let us first examine the youngest age category. One can see that the extent of contracting out depends crucially on returns. Expecting 3 % p.a., over one half of male workers and only about one fifth of female workers contract out, while all male and an overwhelming majority of female workers do so under expectations of 5 % p.a. This has important implications for the coverage of the scheme in the long run, since the coverage of the whole working population in about four decades will approximately equal the coverage in the youngest age category at the time of reform.²¹⁷

Similar conclusions about the importance of returns hold for the other age categories. Notably, men aged 25-39 and women aged 25-34 may contract out on a massive scale under expectations of high returns or rather modestly if returns are expected to be low. In the oldest age category considered, only a minority of the highest earning individuals would choose to contract out. Compared to the age structure in the current voluntary scheme, one can see that the age structure in the mandatory funded scheme would be inverted with the highest proportion of workers being young and having a long investment horizon. As discussed before, this would have a positive effect on the investment strategy of pension funds.

Let us now compare the worker coverage of the funded scheme after reform with its wage bill coverage, i.e. the proportion of the wage bill in individual age categories obtained by those contracting out. These estimates are summarized in table 22 and table 23.

Expected returns/age	20-24	25-29	30-34	35-39	40-44	45-49
3 % p.a.	> 70 %	> 70 %	> 70 %	50 %	25 %	15 %
4 % p.a.	> 90 %	> 90 %	> 90 %	75 %	45 %	20 %
5 % p.a.	100 %	> 95 %	> 95 %	95 %	70 %	30 %

Table 22: Wage bill coverage in age groups - men

Source: Own calculations

²¹⁷ Of course, this idea holds in our simplified model; reality may turn out to be somewhat more complicated. It is also worth reiterating that free choice for new labor force entrants is assumed. If they are compelled to enter the funded scheme, the whole labor force will be covered in about four decades regardless of the patterns of contracting out in the youngest age category.

Expected returns/age	20-24	25-29	30-34	35-39	40-44	45-49
3 % p.a.	35 %	35 %	25 %	15 %	> 5 %	5 %
4 % p.a.	75 %	75 %	65 %	35 %	15 %	5 %
5 % p.a.	95 %	95 %	> 90 %	70 %	30 %	10 %

Table 23: Wage bill coverage in age groups - women

Source: Own calculations

The results only confirm what was to be expected. The wage bill coverage is greater than the worker coverage, i.e. generally the richer tend to leave whereas the poorer tend to stay put in the old scheme. Since all workers contribute the same percentage of wages to social security, the outflow of social security contributions from the pay-as-you-go scheme would be more than proportionate to the outflow of contributors. This is especially so for older workers. Since, however, these older workers will soon retire and they relinquish part of their rights accrued under the old scheme when contracting out, thus reducing its implicit debt, it is not so much of a problem in the long run.

In contrast, this adverse²¹⁸ selection among the young might threaten the stability of the residual pay-as-you-go scheme. If new labor force entrants are given the choice of a scheme and not all of them contract out, this problem might persist even in the long run. Due to redistribution in the pay-as-you-go scheme,²¹⁹ those who leave would receive a lower proportion of total pension benefits compared to the proportion of total contributions that they would pay if they stayed. Thus, although we used parameters in our simulations under which the pay-as-you-go scheme would be sustainable,²²⁰ this phenomenon might *ceteris paribus* weaken the sustainability.

It can be seen in the above tables that the extent of adverse selection (the ratio of wage bill coverage and worker coverage) falls with the proportion of workers contracting out. Obviously, the more young workers contract out, the thinner the residual pay-as-you-go scheme would be in the long run and the less of a problem this would pose. Moreover, some assumptions made in the simulations might somewhat counterbalance this. It was assumed that the old-age pension part of the pay-as-you-go scheme would be sustainable with a 21.5% contribution rate and those contracting out could divert 5 – 10 percentage points to a pension fund, i.e. 23.3 % to 46.5 % of their old-age contributions. However, the corresponding

²¹⁸ From the point of view of the current public scheme.

²¹⁹ It is assumed in the simulations that the current level of redistribution in the pay-as-you-go scheme remains the same after reform.

²²⁰ Based on the macrosimulations by Bezděk (2000).

reduction in pay-as-you-go pensions for these persons would be 25 % to 50 %. This actually means that we set the rules of the game of contracting out so that these workers would pay 0.375 % to 0.75 % of their gross wages every month without getting any pay-as-you-go benefits for this. Given the fact that those contracting out outnumber those staying in the old scheme (this holds especially for men as shown above) and that they earn more than those who stay, some offsetting would obviously take place.

As noted above, the extent of the problem depends on the extent of contracting out in young age cohorts. Should problems arise after reform, the residual²²¹ pay-as-you-go scheme might gradually slightly reduce pension benefits promised to these cohorts (and all cohorts that follow in the future) in order to maintain financial sustainability in the long run.²²² In sum, it should be possible to make the funded scheme voluntary even for new labor market entrants.

Having estimated the extent of contracting out in individual age categories, let us present the aggregate results for the whole working population.²²³ If all workers expect the real rate of return on pension fund savings to be 3 % p.a., over 700 thousand male workers and over 150 thousand female workers would contract out in the first year of reform. That would be almost 20 % of the working population. If all workers expect the real rate of return to be 4 % p.a., over 1.1 million male workers and over 450 thousand female workers would contract out in the first year of reform. That would be about 35 % of the working population. Finally, if all workers expect the real rate of return to be 5 % p.a., over 1.4 million of male workers and over 800 thousand female workers would contract out in the first year of reform. That would be almost half of the working population.

²²¹ The term 'residual' is used to denote only that part of the pay-as-you-go scheme to which low-income workers contribute what those contracting out divert to pension funds, not the whole pay-as-you-go scheme after reform.

²²² Obviously, a dynamic-inconsistency problem arises. *Ex ante*, the government announces certain rules for the residual pay-as-you-go scheme and workers contract out accordingly given their expectations about returns. *Ex post*, the government changes the rules since workers did not contract out as much as it expected. Under the new rules, more workers would probably have contracted out at the time of reform. Nevertheless, this problem would probably not be large. Most importantly, workers older at the time of reform would receive benefits as promised if they stayed fully in the old scheme (any discrepancies would be taken as part of the costs of transition), these slight reductions concern only workers who are young at the time of reform (and all subsequent cohorts). Since the real value of pension benefits of these workers will be substantially higher than the value of pensions today, some slight gradual reductions should be under the threshold of perception of the cohorts concerned. Subsequent cohorts entering the labor market would incorporate these changes in their choice of schemes.

²²³ For simplicity, we assume that all workers contract out at the beginning of the first year of reform, although in practice there would be a longer period over which individuals would have time to make their choice.

The corresponding cash flow to pension funds depends on the part of contributions that individuals are allowed to divert there. As noted before, I think that the range 5-10 percentage points of the total contribution rate is a reasonable estimate of what might be acceptable given the costs of transition that would arise. For illustration, we will use three scenarios in which 5 %, 7 % and 10 % of gross wages will be diverted to pension funds by those contracting out. Then, the first-year cash flow under the expectations of the rate of return of 3 % p.a. would be about CZK 13 billion (0.5 % GDP) with 5% contributions, about CZK 18 billion (0.7 % GDP) with 7% contributions and about CZK 26 billion (1.0 % GDP) with 10% contributions. Under the expectations of the rate of return of 4 % p.a., it would be over CZK 19 billion (0.7 % GDP) with 5% contributions, over CZK 27 billion (1.0 % GDP) with 7% contributions and over CZK 39 billion (1.5 % GDP) with 10% contributions. Finally, under the expectations of the rate of return of 5 % p.a. it would be over CZK 24 billion (0.9 % GDP) with 5% contributions, over CZK 34 billion (1.3 % GDP) with 7% contributions and over CZK 49 billion (1.9 % GDP) with 10% contributions.

Clearly, the above cash would be missing in the pay-as-you-go scheme. Moreover, the yearly cash flows would grow in the coming years as new workers would enter the labor market, join the funded scheme and increase the proportion of the working population sending part of their contributions to pension funds instead of the pay-as-you-go scheme. Since the first workers who contract out would retire around 2020,²²⁴ the pay-as-you-go scheme would have to honor the same benefit payments as without a reform until then, thus running deficits²²⁵ equal to the amount of contributions diverted to pension funds. After first workers start receiving pensions from the funded scheme, the burden on the pay-as-you-go scheme would gradually be alleviated, but it would still take some time before the transitional deficits disappear. This is basically the major obstacle to pension reform since the government will have to finance the deficits somehow.²²⁶

As shown in chapter 4, there were almost 2.6 million participants in the voluntary scheme in 2002. However, their average contribution was only 2.2 % of the average wage. Moreover, the adverse age structure in the scheme resulted in a relatively early start of the payout stage.

²²⁴ The retirement age of 65 is assumed; parameters used in the simulations are presented in the Annex.

²²⁵ To be more precise, additional deficits if there are to be some even without a reform.

²²⁶ A brief overview of alternative ways of financing the deficits and their macroeconomic/welfare impacts can be found in Ježek (2003).

Consequently, the contribution inflow²²⁷ in 2002 was about CZK 16 billion and benefits paid out totaled about CZK 5 billion, giving a net inflow of about CZK 11 billion.²²⁸ In contrast, the inflow to the mandatory funded scheme in the first year of its existence would potentially significantly exceed the inflow to the voluntary scheme after a decade of its operation, and the difference would increase rapidly over time. In sum, the scale of the pension business in the country would change dramatically.

Let us now proceed further and simulate the dynamics of assets accumulation in pension funds under various scenarios.²²⁹ Our simulations are based on microeconomic grounds in that workers expect a given rate of return, contract out accordingly and the rate of return is in turn really attained by pension funds. The development of the total assets under their management over time is estimated based on the forecast of population development in the country.²³⁰

6.1 Rate of Return 3 % p.a.

With a 5% contribution rate under this scenario, pension funds would manage assets worth over 3 % of the GDP after 6 years of their operation under mandatory social security. This is equal to the total accumulation in the voluntary scheme in 2002, i.e. after eight years of its existence. With a 7% contribution rate, pension funds would manage assets of this value after the first four years and it would take them only three years with a 10% contribution rate. In 2010, the accumulation of assets in pension funds would total over 3 %, almost 5 % and almost 7 % of the GDP with a 5%, 7% and 10% contribution rate, respectively.

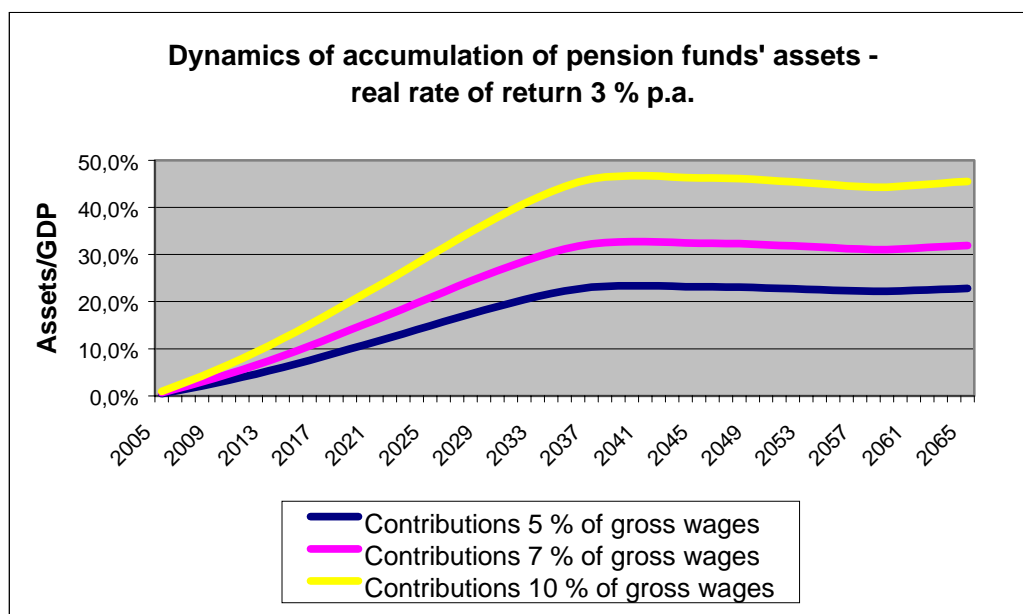
In 2015, it would be about 7 %, 10 % and 14 % of the GDP, respectively. Growing further, the accumulation would reach about 11 %, 15 % and 22 % of the GDP, respectively, in 2020. At that point, first benefit payouts would start, but these outflows would be outdone by strong contribution inflows as well as accruing investment returns, thus resulting in further assets accumulation. In 2030, pension funds would manage assets worth approximately 19 %, 27 % and 38 % of the GDP, respectively. Only in 2040, first signs of saturation would appear. The

²²⁷ Including employers' contributions and state subsidies; the latter were almost CZK 3 billion.

²²⁸ Unlike all other CZK values in this chapter, these are in 2002 prices. Of course, the difference is negligible and the values presented are rounded off anyway since they are only to give the reader an idea about the difference in contribution flows to the current voluntary scheme and to a potential mandatory scheme.

²²⁹ We focus exclusively on the mandatory scheme and disregard assets already accumulated in the voluntary scheme.

scheme would be reaching maturity, managing assets worth about 23 %, 33 % and 47 % of the GDP, respectively. The assets accumulated in pension funds should then remain stable around these values, although some minor fluctuations would occur mainly due to demographic developments. In sum, pension funds would manage substantial assets even with expectations of rather modest returns.



Graph 16: Dynamics of assets accumulation – rate of return 3 % p.a.²³¹
Source: Own calculations

6.2 Rate of Return 4 % p.a.

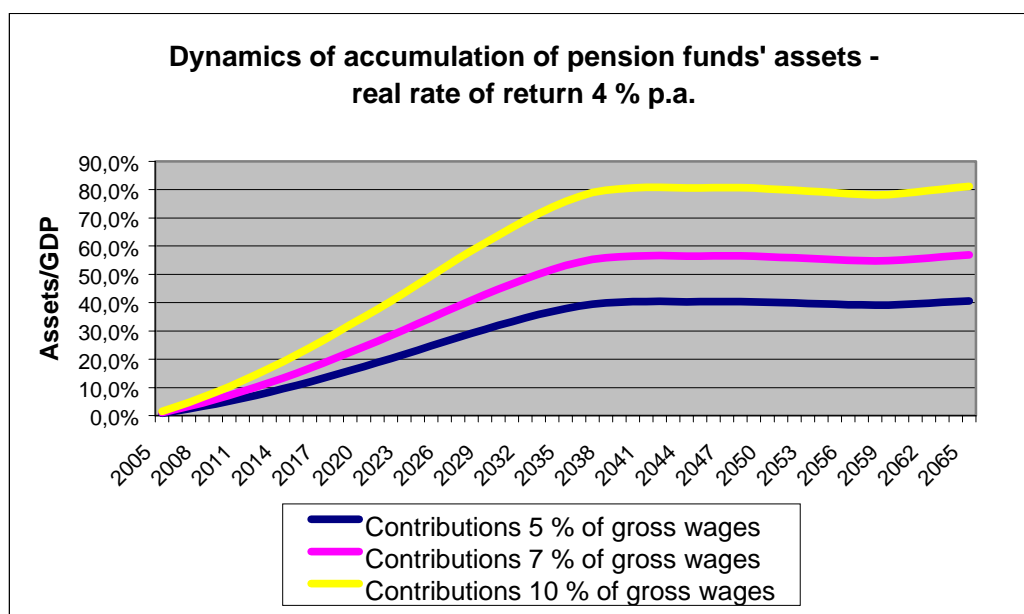
Under this scenario, pension funds would accumulate even faster what the voluntary scheme accumulated in the first eight years. They would hold assets worth 3 % of the GDP after four, three and two years with a 5%, 7% and 10% contribution rate, respectively. In 2010, pension funds would manage assets whose value would exceed 5 %, 7 % and 10 % of the GDP, respectively.

In 2015, it would already be about 11 %, 15 % and 22 % of the GDP, respectively. The growth of assets would continue further, reaching approximately 17 %, 24 % and 35 % of the GDP, respectively, in 2020. Again, first benefits would start to be paid out at that time, but this would not stop the strong accumulation dynamics that would bring the assets under the management

²³⁰ I based my calculations on the population forecasts of the Charles University Faculty of Natural Sciences (Burcin and Kučera 2003).

²³¹ Detailed estimates for this as well as the following scenarios are presented in the Annex.

of pension funds to about 32 %, 45 % and 64 % of the GDP, respectively, in 2030. As in the previous scenario, the dynamics would cease only around 2040. In that year, pension funds would administer assets worth approximately 40 %, 56 % and 81 % of the GDP, respectively. From then on, assets as a proportion of the GDP would remain rather stable. We can see that in this scenario, pension funds could ultimately manage assets whose value would be well over one half of the GDP.



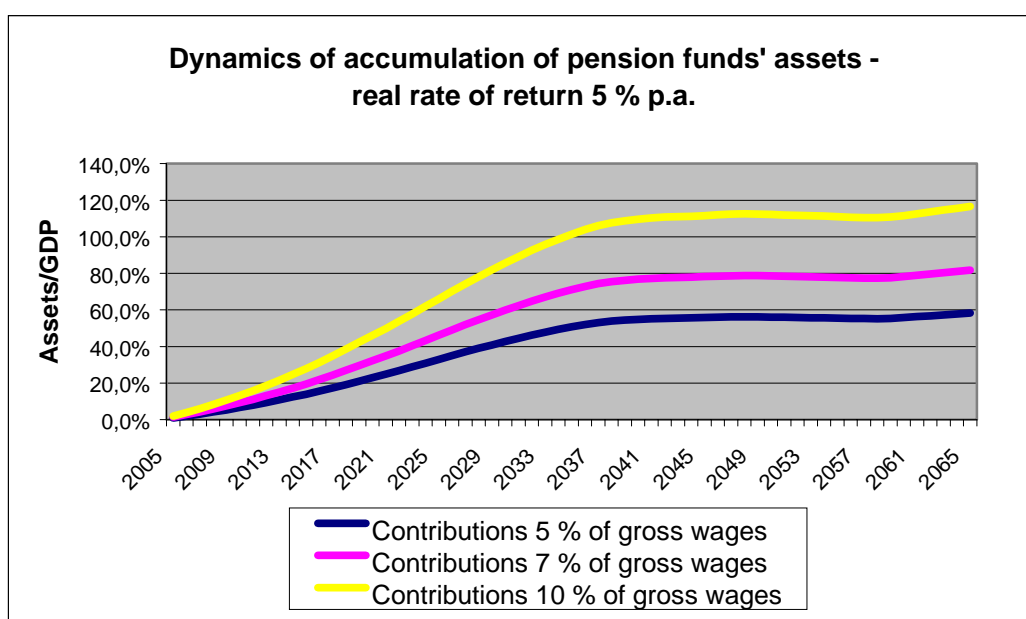
Graph 17: Dynamics of assets accumulation – rate of return 4 % p.a.
Source: Own calculations

6.3 Rate of Return 5 % p.a.

Expecting returns of 5 % p.a., workers would switch so massively that three years after reform pension funds would manage assets worth 3 %, over 4 % or 6 % of the GDP if the contribution rate were 5 %, 7 % or 10 % of the gross wage, respectively. In 2010, they would manage assets whose value would be almost 7 %, over 9 % and over 13 % of the GDP, respectively. Thus, after a relatively short period of time the accumulation would be substantial.

In 2015, pension funds would administer assets worth 14 %, 20 % and 28 % of the GDP, respectively. In 2020, it would already be 23 %, 32 % and 46 %, respectively, and despite payouts that would gradually start in that year the accumulation would almost double over the next ten years, reaching 43 %, 60 % and 86 % of the GDP, respectively. Approaching maturity, the scheme would manage assets worth 55 %, 77 % and 110 % of the GDP, respectively, in

2040. Thus, the total accumulation in pension funds could potentially be enormous, possibly exceeding the GDP in three decades.



Graph 18: Dynamics of assets accumulation – rate of return 5 % p.a.
Source: Own calculations

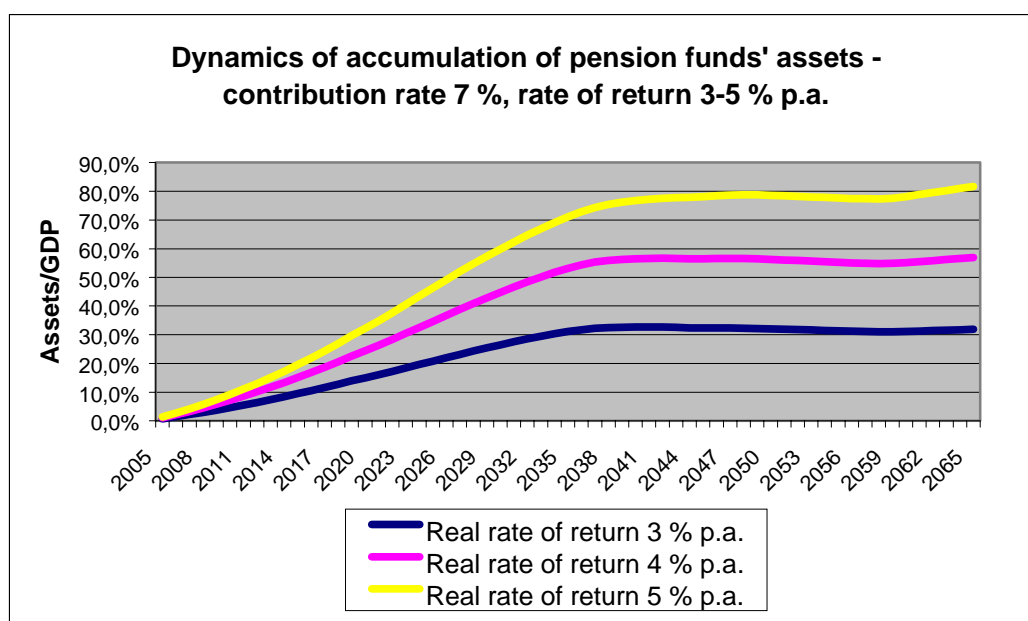
6.47% Contribution Rate under Various Rates of Return

The extent to which policy makers allow workers to divert part of their mandatory social security contributions to pension funds is difficult to prophesy. Since, however, the resulting accumulation is commensurate with the contribution rate, we will now set it similarly to that in Poland or Hungary in order to present some hopefully realistic estimates of the dynamics of assets accumulation for a reasonable range of returns. Namely, workers in this scenario may divert 7 percentage points of their mandatory social security contributions to pension funds, they expect the rate of return to be 3-5 % p.a. and contract out accordingly. Then the actual rate of return attained by pension funds in the period 2005-2065 really turns out to fall in the range 3-5 % p.a.

The outcomes of the simulations show that the resulting range of assets accumulated in pension funds at given points in time is very wide and the final accumulation is highly sensitive to rates of return (as well as their expectations²³²) as depicted in graph 19. In 2010, pension funds

²³² Naturally, this is so for transitional deficits in the pay-as-you-go scheme as well since expectations about returns determine the extent of contracting out. If all workers expect 3 % p.a., the deficit would grow from 0.7 % of the GDP in the first year of the reform to 1.1 % of the GDP in 2020. After that, yearly cash flows to pension

would manage assets worth 5-9 % of the GDP. Continuing in their fast growth, assets under pension funds' administration would reach 10-20 % of the GDP in 2015 and 15-32 % of the GDP in 2020. Ten years later they would already amount to 27-60 % of the GDP. As the scheme would approach the maturity stage, its assets would be worth 33-77 % of the GDP in 2040, then just slightly rising, slightly falling and slightly rising again. Thus, our estimates suggest that under this arrangement pension funds would ultimately manage assets whose value could well exceed one half of the GDP.



Graph 19: Assets accumulation: 7% contribution rate, rate of return 3-5 % p.a.
Source: Own calculations

6.5 Summary

We simulated the dynamics of the accumulation of assets in pension funds in a setting in which individuals vote with their feet between the current pay-as-you-go scheme and its funded alternative based on their expectations about returns. While rates of return are difficult to predict, I believe a reasonable range was used. The outcomes suggest that pension funds would become major players in the financial sector and as discussed in chapters 2 and 3, they would hopefully contribute to the development of the Czech capital market as well. This is likely to be so despite the recent elimination of strict limits on foreign investments and also the expected

funds would still increase a bit, but at the same time the pay-as-you-go scheme would start to pay out lower pensions to retiring persons who have contracted out, which would eventually drive the deficits down to zero. If all workers expect 4 % p.a., the deficit would grow from 1.1 % of the GDP in the first year of the reform to 1.6 % of the GDP in 2020. And finally, if all workers expect 5 % p.a., the deficit would increase from 1.3 % of the GDP in the first year of the reform to 2 % of the GDP in 2020.

entry into the Economic and Monetary Union at the turn of the decade,²³³ an empirical strong home bias having been discussed earlier. The estimated final accumulation of assets as a proportion of the GDP is in accordance with the situation in a number of countries with developed systems of pension funds as shown in previous chapters. Apparently, the scale of the pension business in the country will be fundamentally determined by the extent of mandatory contributions that individuals are allowed to divert to pension funds.

²³³ The elimination of the exchange rate risk would also be accompanied by a further substantial fall of limits on foreign investments, since the euro would no longer be a non-matching currency and so the 30% limit on investments denominated in non-matching currencies would no longer apply to the common currency.

7 Conclusion

We have presented an overview of basic issues concerning pension funds as long-term institutional investors and their role in retirement income provision. Examples were given of different institutional arrangements of systems of pension funds across countries, and special attention was devoted to those countries that reformed their mandatory social security by delegating the task of pension provision to pension funds, be it partially or fully.

We have described the voluntary system of pension funds in the Czech Republic and have shown that it managed to attract a very large number of participants compared to voluntary schemes in other transitional countries. It is still in a developmental stage with only modest assets under administration and a further increase in its coverage is still expected, although room for it seems to be rather limited. However, we identified a number of weaknesses the scheme is suffering from, among the most important being an unfavorable age structure and heavy dependence on state subsidies that induce extremely low contributions, which makes it more of an advantageous medium-term savings mechanism rather than anything else.

Regarding other major regulatory weaknesses, the assets of pension funds' shareholders are not segregated from the assets of participants, which should be a cause of concern and subject to correction soon. Most importantly, a stifling regulatory framework pushes pension funds into overly safe investments that generate lower investment returns in the long run. A recent relaxation of investment restrictions is a sign of improvement, but the most intricate hindrance to a desired portfolio rebalancing towards higher-yielding instruments are annual guarantees of returns and they still remain, making a major enhancement of performance unlikely.

All these render the scheme incapable of strengthening pension provision in the country and some suggestions for improvement have been presented. Since, however, extremely high social security contributions in the Czech Republic are likely to crowd out voluntary savings in pension funds strongly, I believe that the only measure that could prevent a major deterioration of pension provision and make it more robust against the whims of demography is a systemic pension reform. Such a profound reform of social security would also bring more efficiency into labor and capital markets. We have shown that the importance of pension funds as institutional investors would increase dramatically if they assumed responsibility for a part of mandatory social security. Relative to the traditional pay-as-you-go scheme, they should be

able to provide superior retirement benefits to future pensioners and economic rationale tells us that a systemic pension reform should be conducted soon. But given its high short-run costs, however beneficial it may be in the long run, the ultimate decision will be political.

8 References

Act No. 42/1994 Coll. on State Contributory Supplementary Pension Insurance and its amendments – Czech Republic.

Association of Pension Funds of the Czech Republic (2003), *Supplementary Pension Insurance with State Contribution 1994 – 2002*.

Barberis, N., Thaler, R. (2002), *A Survey of Behavioral Finance*, NBER Working Paper 9222.

Baxter, M., Jermann, U. (1997), The International Diversification Puzzle Is Worse than You Think, *American Economic Review*, vol. 87, pp. 170-180.

Bezděk, V. (2000), *Penzijní systémy obecně i v kontextu české ekonomiky (současný stav a potřeba reformy)*, CNB Working Paper No. 25, Czech National Bank, Prague.

Bikhchandani, S., Sharma, S. (2000), *Herd Behavior in Financial Markets – A Review*, IMF Working Paper No. 00/48.

Blake, D. (1997), *Pension Funds and Capital Markets*, discussion paper PI-9706, The Pensions Institute, Birkbeck College, University of London.

Blake, D., Orszag, J. M. (1997), *Portability and Preservation of Pension Rights in the UK*, Report of the Director-General's Inquiry into Pensions, Volume 3, Office of Fair Trading, London.

Blommestein, H. (2001), *Ageing, Pension Reform, and Financial Market Implications in the OECD Area*, Working Paper No. 9, OECD.

Boersch-Supan, A.H., Winter, J.K. (2001), *Population Aging, Savings Behavior and Capital Markets*, NBER Working Paper 8561.

Brooks, R. (2000), *What Will Happen to Financial Markets When the Baby Boomers Retire?*, IMF Working Paper No. 00/18.

Burcin, B., Kučera, T. (2003), *Perspektivy populačního vývoje České republiky na období 2003 – 2065*, DemoArt, Prague.

Chlon-Dominczak, A. (2003), *Evaluation of Reform Experiences in Eastern Europe*, in: International Federation of Pension Fund Administrators, *Pension Reforms: Results and Challenges*, Santiago, Chile, 2003.

Clark, G.L. (2000), *Pension Fund Capitalism*, Oxford University Press.

Corbo, V., Schmidt-Hebbel, K. (2003), *Macroeconomic Effects of the Pension Reform in Chile*, in: International Federation of Pension Fund Administrators, *Pension Reforms: Results and Challenges*, Santiago, Chile, 2003.

Davis, E. P. (2003a), *Pension Funds and European Financial Markets*, Brunel University, UK.

- Davis, E. P. (2003b), *Is There a Pensions Crisis in the UK?*, Brunel University, UK.
- Davis, E. P. (2003c), *Institutional Investors, Financial Market Efficiency, and Financial Stability*, Brunel University, UK.
- Davis, E. P. (2002a), *Prudent Person Rules or Quantitative Restrictions? The Regulation of Long-Term Institutional Investors' Portfolios*, Brunel University, UK.
- Davis, E. P. (2002b), *The European Pension Management Industry*, Brunel University, UK.
- Davis, E. P. (2001), *Portfolio Regulation of Life Insurance Companies and Pension Funds*, discussion paper PI-0101, The Pensions Institute, Birkbeck College, University of London.
- Davis, E. P. (2000), *Pension Funds, Financial Intermediation and the New Financial Landscape*, Brunel University, UK.
- Davis, E. P. (1995), *Pension Funds, Retirement-Income Security and Capital Markets, An International Perspective*, Oxford University Press.
- Davis, E. P., Li, C. (2003), *Demographics and Financial Asset Prices in the Major Industrialized Economies*, Brunel University, UK.
- Davis, E. P., Steil, B. (2001), *Institutional Investors*, MIT Press.
- Demirgüç-Kunt, A., Levine, R. (1996), *Stock Market Development and Financial Intermediaries; Stylized Facts*, World Bank Economic Review 10, 291-321.
- Directive 2003/41/EC of the European Parliament and of the Council on the Activities and Supervision of Institutions for Occupational Retirement Provision.
- Fischer, K. (1998), *A Discrete Martingale Model of Pension Fund Guarantees in Colombia: Pricing and Market Effects*, Working Paper No. 98-02, Laval University, Canada.
- Friedman, B. (1995), *Economic Implications of Changing Share Ownership*, NBER Working Paper 5141.
- Goetzmann, W. N., Li, L., Rouwenhorst, K. G. (2001), *Long-Term Global Market Correlations*, NBER Working Paper 8612.
- Galati, G., Tsatsaronis, K. (2001), *The Impact of the Euro on Europe's Financial Markets*, Working Paper, Bank for International Settlements.
- Havel, J. (1998), *České kapitálové trhy – iluze a hořká skutečnost*, *Finance a úvěr (Czech Journal of Economics and Finance)*, vol. 48, No. 10.
- Havlíčková, K., Illich, M., Schneider, O., Valenčík, R. (2003), *Důchodová reforma metodou komplementární konverze*, in Matějů, P., Schneider, O., Večerník, J. (eds.), *Proč tak těžko...?*, Institute for Social and Economic Analyses, Prague, 2003.
- Hull, J. C. (2003), *Options, Futures and Other Derivatives*, Prentice Hall.

Iglesias, A. (2003), *Strengthening the Private Voluntary Pension Scheme in the Czech Republic*, mimeo, prepared for the World Bank.

International Federation of Pension Fund Administrators (2003), *Bi-Annual Report No. 14 (First Version)*.

Jelínek, T. and Schneider, O. (1999), An Analysis of the Voluntary Pension Fund System in the Czech Republic, in Müller, K., Ryll, A. and Wagner, H. (eds.) *Transformation of Social Security: Pensions in Central-Eastern Europe*, Physica-Verlag, New York.

Ježek, M. (2003), A Microanalysis of Pension Reform: To Switch or Not to Switch in the Czech Republic?, *Czech Journal of Economics and Finance*, vol. 53, No. 11-12.

Karlinger, L. (2002), *The Impact of Common Currencies on Financial Markets: A Literature Survey and Evidence from the Euro Area*, Working Paper 2002-35, Bank of Canada.

Kohout, P. (2001), Některé chyby v systému penzijních fondů v České republice, *Finance a úvěr (Czech Journal of Economics and Finance)*, vol. 51, No. 10.

Kraus, T. (2001), *The Impact of EMU on the Structure of European Equity Returns: An Empirical Analysis of the First 21 Months*, IMF Working Paper 01/84.

McMorrow, K., Roeger, W. (2002), *EU Pension Reform – An Overview of the Debate and an Empirical Assessment of the Main Policy Reform Options*, Directorate-General for Economic and Financial Affairs, European Commission, Brussels.

Mejstřík, M. (2000), Makroekonomické a finanční aspekty rozvoje eurozóny, *Finance a úvěr (Czech Journal of Economics and Finance)*, vol. 50, No. 6.

Ministry of Finance (2003), *Annual Report for the Year 2002 (Supplementary Pension Insurance)*, Office of the State Supervision in Insurance and Pension Funds.

Ministry of Labor and Social Affairs (2002), *Pojistněmatematická zpráva o sociálním pojištění*, Department of Social Insurance.

Mitchell, O. (1996), *Administrative Costs in Public and Private Retirement Systems*, NBER Working Paper 5734.

Mitchell, O., McCarthy, D. (2002), *Annuities for an Ageing World*, NBER Working Paper 9092.

Musílek, P. (2003), *Postavení penzijních fondů na kapitálových trzích*, a paper presented at the Conference of the Leadership Forum in Prague in November 2003.

Müller, K. (2003), *The Making of Pension Privatization in Latin America and Eastern Europe*, in: Holzmann, R., Orenstein, M. A., Rutkowski, M. (eds.), *Pension Reform in Europe: Process and Progress*, World Bank.

Orenstein, M. A. (2003), *Mapping the Diffusion in Pension Innovation*, in: Holzmann, R., Orenstein, M. A., Rutkowski, M. (eds.), *Pension Reform in Europe: Process and Progress*, World Bank.

Organization for Economic Cooperation and Development (2002), *“Prudent Person Rule” Standard for the Investment of Pension Fund Assets*, Working Party on Private Pensions.

Palacios, R. (2003), *Pension Reform in Latin America: Design and Experiences*, in: International Federation of Pension Fund Administrators, *Pension Reforms: Results and Challenges*, Santiago, Chile.

Poterba, J. M. (1998), *Population Age Structure and Asset Returns: An Empirical Investigation*, NBER Working Paper 6774.

Rocha, R., Vittas, D. (2001), *The Hungarian Pension Reform: A Preliminary Assessment of the First Years of Implementation*, working paper (not numbered), World Bank.

Samuelson, P. (1958), An Exact Consumption-Loan Model of Interest with or without the Social Contrivance of Money, *Journal of Political Economy*, vol. 66, pp. 467 – 82.

Santillán, J., Bayle, M., Thygesen, C. (2000), *The Impact of the Euro on Money and Bond Markets*, Occasional Paper Series No. 1, European Central Bank.

Schieber, S.J., Shoven, J.B. (1994), *The Consequences of Aging on Private Pension Fund Saving and Asset Markets*, NBER Working Paper 4665.

Schimmelpfennig, A. (2000), *Pension Reform, Private Saving, and the Current Account in a Small Open Economy*, IMF Working Paper 00/171.

Securities Commission of the Czech Republic (2001), *Analýza příčin nerealizování primárních emisí akcií v ČR*, Prague.

Shoven, J.B. (1999), *The Location and Allocation of Assets in Pension and Conventional Savings Accounts*, NBER Working Paper 7007.

Součková, A. (2003), *Správa a řízení společností se zaměřením na penzijní fondy*, dissertation thesis, Charles University, Prague.

Srinivas, P.S., Yermo, J. (1999), *Do Investment Regulations Compromise Pension Fund Performance? Evidence from Latin America*, World Bank Latin American and Caribbean Studies – Viewpoints, Washington, DC.

Vittas, D. (1996), *Pension Funds and Capital Markets*, FSD Note No. 71, February, World Bank.

Whitehouse, E. (2000), *Administrative Charges for Funded Pensions: An International Comparison and Assessment*, Working Paper No. 0016, Social Protection Discussion Paper Series, World Bank.

www.apfcr.cz (Association of Pension Funds of the Czech Republic)

www.cssz.cz (Czech Social Security Administration)

www.czso.cz (Czech Statistical Office)

www.fiap.c1 (International Federation of Pension Fund Administrators)

www.mfcr.cz (Ministry of Finance of the Czech Republic)

www.mpsv.cz (Ministry of Labor and Social Affairs)

9 Annex

9.1 Implicit Rates of Return in a Sustainable Pay-As-You-Go Scheme

We conserved the current pay-as-you-go formulae, thus assuming that the level of redistribution in the scheme remains unchanged. Bezděk (2000) showed that if the scheme is to be financially sustainable, the average replacement rate²³⁴ has to fall from the current 44 % to 38 %, i.e. by 14 %. In addition, the total pension contribution rate must increase from 26 % at that time to 30 % together with an increase in the retirement age to 65 for both genders, a reduction in early retirements by 50 % and a reduction in disability and survivors' pensions by 10 %. Thus, for the sake of simplicity, we calculate pension benefits by using the old formulae, but reducing the results by 14 %. Also, since only over 70 % of total pension contributions are earmarked for old-age pensions, the rest going towards disability and survivors' pensions, we assume a 21.5% contribution rate for old-age pensions. Non-old-age pensions are not included in the calculations, the resulting implicit rates of return concern only the provision of pensions for old age.

Based on the above, we use the following parameters in the calculations:

- men aged 23 and women aged 27 (due to maternity leave) enter the labor market in 2005; both genders retire at the age of 65
- the life expectancy of men is 83 years, that of women is 87 years, i.e. a five-year increase in the current values is assumed
- since a maternity leave is included in the vesting period, 42 years of participation are entered in the benefit formulae for both genders
- the real wage growth rate is 2.5 % p.a.
- the basic flat benefit is CZK 1,310 and the first and second reduction limits are CZK 8,000 and CZK 20,000, respectively, in 2005 and they all grow at the rate equal to the growth of wages

The resulting implicit real rates of return are summarized in the following table:

²³⁴ I.e. the ratio of the average pension benefit and the average gross wage in the economy.

Wage	Men	Women	Wage	Men	Women	Wage	Men	Women
7000	3.74 %	4.59 %	26000	0.89 %	1.74 %	45000	-0.64 %	0.24 %
8000	3.65 %	4.50 %	27000	0.78 %	1.63 %	46000	-0.70 %	0.19 %
9000	3.40 %	4.25 %	28000	0.68 %	1.53 %	47000	-0.76 %	0.13 %
10000	3.15 %	3.99 %	29000	0.58 %	1.43 %	48000	-0.82 %	0.08 %
11000	2.92 %	3.76 %	30000	0.48 %	1.33 %	49000	-0.87 %	0.03 %
12000	2.72 %	3.56 %	31000	0.39 %	1.24 %	50000	-0.92 %	-0.02 %
13000	2.54 %	3.38 %	32000	0.30 %	1.16 %	60000	-1.39 %	-0.47 %
14000	2.37 %	3.21 %	33000	0.21 %	1.07 %	70000	-1.77 %	-0.83 %
15000	2.22 %	3.06 %	34000	0.12 %	0.99 %	80000	-2.08 %	-1.13 %
16000	2.09 %	2.92 %	35000	0.04 %	0.91 %	90000	-2.35 %	-1.38 %
17000	1.96 %	2.80 %	36000	-0.03 %	0.83 %	100000	-2.58 %	-1.59 %
18000	1.84 %	2.68 %	37000	-0.11 %	0.76 %	150000	-3.36 %	-2.33 %
19000	1.73 %	2.57 %	38000	-0.18 %	0.69 %	200000	-3.83 %	-2.77 %
20000	1.63 %	2.47 %	39000	-0.26 %	0.62 %	250000	-4.15 %	-3.06 %
21000	1.51 %	2.35 %	40000	-0.33 %	0.55 %	300000	-4.37 %	-3.27 %
22000	1.38 %	2.22 %	41000	-0.39 %	0.49 %	350000	-4.54 %	-3.42 %
23000	1.25 %	2.09 %	42000	-0.46 %	0.42 %	400000	-4.67 %	-3.54 %
24000	1.12 %	1.97 %	43000	-0.52 %	0.36 %	450000	-4.78 %	-3.64 %
25000	1.00 %	1.85 %	44000	-0.58 %	0.30 %	500000	-4.87 %	-3.72 %

Table 24: Implicit rates of return in a sustainable pay-as-you-go scheme based on the wage upon entry into labor force in 2005

Source: Own calculations

9.2 Parameters Used for the Calculation of Minimum Wages with which It Pays to Contract out of the Pay-as-you-go Scheme

Using the above parameters for the calculation of pay-as-you-go benefits, we compare them with those attainable through saving in a pension fund. While the pay-as-you-go scheme offers longevity insurance automatically, it generally needs not be so in the funded scheme. Based on the work of Mitchell and McCarthy (2002), we assume that the cost of this insurance via a purchase of an annuity is 7 % of the accumulation.²³⁵ Concerning labor force entrants, men are again assumed to start working and contributing at 23, women only at 27. Among young age cohorts, only workers with low wages might be better off remaining in the pay-as-you-go scheme. Since these low-income and predominantly low-skilled workers usually enter the labor market before reaching the age of twenty, some room for unemployment spells during the working life is provided, thus compensating for our less realistic assumption of uninterrupted contributions from entry into the labor market until retirement.

²³⁵ They compare the present values of expected annuity payouts with the prices of annuities in a range of developed countries, using the population mortality tables. They conclude that “a typical member of the population could anticipate receiving at least 90 percent of his premium from the single life annuity. The results also imply that adverse selection as well as loadings and administrative charges must be below ten percent of the purchase price” (p. 14).

With these parameters, we obtain wages with which workers are indifferent between the two alternatives. We let only those workers contract out whose wage exceeds the ‘indifference level’ at least by 2 % and when applying these results on labor force data for the purpose of further calculations, they were additionally rounded upwards to the nearest thousand. It might be argued that for instance lower-earning individuals would be more risk-averse, requiring a greater ‘wage premium’ in order to contract out. However, I believe that the omnipresent threat of the introduction of a notional defined contribution pay-as-you-go scheme is a strong counterbalancing factor for these workers, since this would sharply reduce their expected pay-as-you-go benefits via elimination of redistribution. By contracting out, these workers would diversify their pension portfolio, thus reducing their overall risk exposure. Workers of all age categories can contract out only in exchange for a proportionate reduction in their pay-as-you-go benefits. If they are allowed to divert 5 percentage points of their pension contribution rate to pension funds, we reduce their pay-as-you-go benefits by 25 %. If it is 7 percentage points, the reduction is 35 %, and if it is 10 percentage points, the reduction is 50 %.

9.3 Simulation of the Dynamics of Assets Accumulation in Pension Funds after a Systemic Pension Reform

The following parameters were used in the simulations:²³⁶

- the average wage in 2005 is CZK 18,900²³⁷
- the average real wage growth rate is 2.5 % p.a.
- men - the average wage as a multiple of the economy-wide average wage is 1.125²³⁸
- women - the average wage as a multiple of the economy-wide average wage is 0.839
- men (20-65) – the labor force participation rate is 85 %
- women (20-65) – the labor force participation rate is 70 %
- men – unemployment rate is 9 %²³⁹
- women – unemployment rate is 11 %

²³⁶ For the sake of simplicity as well as to avoid an arbitrary choice of the parameter dynamics, we abstract from the effects of economic convergence that are to take place especially in the first half of the period. Simplifying assumptions are made throughout, but I believe they have little effect on the value of our predictions.

²³⁷ Author’s own projection.

²³⁸ This was so in 2002 (Czech Statistical Office) and for simplicity we conserve it for the whole period 2005-2065. The same applies to women.

²³⁹ Conserving the status quo; the same for women.

- the GDP in 2005 is CZK 2.65 trillion²⁴⁰
- the real GDP growth rate is 2.3 % p.a.²⁴¹
- the coverage of social security is 98.5 %
- men – the proportion of the self-employed is 15 %
- women – the proportion of the self-employed is 10 %
- the average contribution of the self-employed as a proportion of that of employees is 40 %²⁴²

We assume that all participants withdraw their accumulation upon retirement as a lump sum. Then they purchase an annuity from an insurance company, but that is irrelevant in these simulations since the assets are no longer in pension funds. In each of the three following scenarios, all workers expect a given rate of return and contract out accordingly. Then this rate of return is really attained by pension funds in the period 2005-2065.²⁴³

²⁴⁰ Author's own projection.

²⁴¹ I do acknowledge the arbitrariness of the differential between the wage growth rate and the GDP growth rate. However, I decided to set this slight difference in order to symbolically account for the fact that in the process of population ageing, the shrinking labor force is going to drive the marginal product of labor up. Along that path, product growth would be exceeded by wage growth.

²⁴² Unlike employees, the self-employed are given some room for the determination of the level of their social security contributions. The fact that they currently contribute only over a quarter of what employees do may clearly show that they rationally choose other means of retirement saving than the pay-as-you-go scheme (perhaps pension funds with attractive state subsidies and hopefully better investment performance in the future; however, no data available to confirm this hypothesis). A systemic pension reform is likely to provide incentives for the self-employed to increase their contributions, so the assumed 40 % may still be rather underestimating.

²⁴³ The results presented are in CZK, although entry into the Economic and Monetary Union is expected early in the period for which the simulations were carried out. Of course, the choice of currency units has no effect whatsoever on the outcomes of the simulations.

9.3.1 Expected Real Rate of Return 3 % p.a.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
5% contribution rate	13,0	27,3	43,0	60,1	78,7	98,8	120,7	144,3	169,7
Relative to GDP	0,5%	1,0%	1,6%	2,1%	2,7%	3,3%	4,0%	4,6%	5,3%
7% contribution rate	18,2	38,3	60,2	84,1	110,1	138,4	168,9	202,0	237,5
Relative to GDP	0,7%	1,4%	2,2%	3,0%	3,8%	4,7%	5,6%	6,5%	7,5%
10% contribution rate	26,1	54,7	86,0	120,2	157,3	197,7	241,4	288,5	339,3
Relative to GDP	1,0%	2,0%	3,1%	4,2%	5,4%	6,7%	7,9%	9,3%	10,7%
	2014	2015	2016	2017	2018	2019	2020	2021	2022
5% contribution rate	196,9	226,1	257,2	290,4	325,7	363,4	400,7	440,2	481,9
Relative to GDP	6,1%	6,8%	7,6%	8,3%	9,1%	10,0%	10,8%	11,5%	12,4%
7% contribution rate	275,7	316,5	360,0	406,5	456,0	508,7	561,0	616,3	674,7
Relative to GDP	8,5%	9,5%	10,6%	11,7%	12,8%	14,0%	15,1%	16,2%	17,3%
10% contribution rate	393,8	452,1	514,3	580,7	651,4	726,7	801,5	880,4	963,9
Relative to GDP	12,1%	13,6%	15,1%	16,7%	18,3%	19,9%	21,5%	23,1%	24,7%
	2023	2024	2025	2026	2027	2028	2029	2030	2031
5% contribution rate	526,2	572,7	621,2	671,7	724,0	777,5	831,5	886,6	942,7
Relative to GDP	13,2%	14,0%	14,9%	15,7%	16,6%	17,4%	18,2%	18,9%	19,7%
7% contribution rate	736,7	801,8	869,7	940,3	1013,6	1088,5	1164,1	1241,3	1319,8
Relative to GDP	18,5%	19,6%	20,8%	22,0%	23,2%	24,3%	25,5%	26,5%	27,6%
10% contribution rate	1052,4	1145,4	1242,4	1343,3	1448,0	1555,0	1663,0	1773,3	1885,5
Relative to GDP	26,4%	28,1%	29,8%	31,4%	33,1%	34,8%	36,4%	37,9%	39,4%
	2032	2033	2034	2035	2036	2037	2038	2039	2040
5% contribution rate	999,3	1056,0	1111,4	1165,2	1216,6	1263,9	1303,7	1338,6	1371,8
Relative to GDP	20,4%	21,1%	21,7%	22,2%	22,7%	23,0%	23,2%	23,3%	23,4%
7% contribution rate	1399,1	1478,4	1555,9	1631,2	1703,2	1769,4	1825,2	1874,0	1920,5
Relative to GDP	28,6%	29,5%	30,4%	31,1%	31,8%	32,3%	32,5%	32,6%	32,7%
10% contribution rate	1998,7	2112,0	2222,8	2330,3	2433,1	2527,8	2607,4	2677,2	2743,6
Relative to GDP	40,8%	42,2%	43,4%	44,5%	45,4%	46,1%	46,5%	46,6%	46,7%
	2041	2042	2043	2044	2045	2046	2047	2048	2049
5% contribution rate	1403,4	1433,7	1462,0	1489,8	1522,1	1556,6	1590,2	1624,4	1657,1
Relative to GDP	23,4%	23,3%	23,2%	23,2%	23,1%	23,1%	23,1%	23,1%	23,0%
7% contribution rate	1964,8	2007,2	2046,8	2085,8	2131,0	2179,2	2226,3	2274,2	2319,9
Relative to GDP	32,7%	32,7%	32,5%	32,4%	32,4%	32,4%	32,3%	32,3%	32,2%
10% contribution rate	2806,8	2867,4	2924,0	2979,7	3044,3	3113,1	3180,4	3248,8	3314,1
Relative to GDP	46,7%	46,6%	46,5%	46,3%	46,3%	46,2%	46,2%	46,1%	46,0%
	2050	2051	2052	2053	2054	2055	2056	2057	2058
5% contribution rate	1687,8	1719,7	1752,7	1784,7	1819,0	1851,7	1884,7	1922,0	1959,4
Relative to GDP	22,9%	22,8%	22,7%	22,6%	22,5%	22,4%	22,3%	22,2%	22,2%
7% contribution rate	2363,0	2407,6	2453,8	2498,5	2546,6	2592,4	2638,5	2690,9	2743,1
Relative to GDP	32,0%	31,9%	31,8%	31,7%	31,5%	31,4%	31,2%	31,1%	31,0%
10% contribution rate	3375,7	3439,4	3505,5	3569,3	3638,0	3703,5	3769,3	3844,1	3918,7
Relative to GDP	45,8%	45,6%	45,4%	45,2%	45,1%	44,8%	44,6%	44,5%	44,3%
	2059	2060	2061	2062	2063	2064	2065		
5% contribution rate	2005,6	2059,2	2117,3	2176,4	2236,8	2299,3	2361,7		
Relative to GDP	22,2%	22,2%	22,4%	22,5%	22,6%	22,7%	22,8%		
7% contribution rate	2807,8	2882,8	2964,2	3047,0	3131,5	3219,1	3306,3		
Relative to GDP	31,0%	31,1%	31,3%	31,5%	31,6%	31,8%	31,9%		
10% contribution rate	4011,2	4118,3	4234,5	4352,9	4473,6	4598,7	4723,3		
Relative to GDP	44,3%	44,5%	44,7%	44,9%	45,1%	45,4%	45,5%		

Table 25: Simulation of the dynamics of assets accumulation in pension funds in 2005-2065 (billions CZK; 2005 prices) – real rate of return expected to be 3 % p.a.

Source: Own calculations based on population forecasts of the Charles University Faculty of Natural Sciences (Burcin and Kučera 2003)

9.3.2 Expected Real Rate of Return 4 % p.a.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
5% contribution rate	19,8	41,8	65,9	92,6	121,7	153,5	188,3	226,0	266,9
Relative to GDP	0,7%	1,5%	2,4%	3,3%	4,2%	5,2%	6,2%	7,3%	8,4%
7% contribution rate	27,7	58,5	92,3	129,6	170,4	215,0	263,6	316,4	373,7
Relative to GDP	1,0%	2,2%	3,3%	4,6%	5,9%	7,2%	8,7%	10,2%	11,8%
10% contribution rate	39,6	83,5	131,9	185,1	243,4	307,1	376,5	452,0	533,8
Relative to GDP	1,5%	3,1%	4,8%	6,5%	8,4%	10,3%	12,4%	14,5%	16,8%
	2014	2015	2016	2017	2018	2019	2020	2021	2022
5% contribution rate	311,1	358,7	409,8	464,6	523,4	586,4	650,2	718,1	790,3
Relative to GDP	9,6%	10,8%	12,0%	13,3%	14,7%	16,1%	17,4%	18,8%	20,3%
7% contribution rate	435,5	502,1	573,7	650,5	732,8	821,0	910,3	1005,3	1106,4
Relative to GDP	13,4%	15,1%	16,9%	18,7%	20,6%	22,5%	24,4%	26,4%	28,4%
10% contribution rate	622,2	717,3	819,5	929,2	1046,9	1172,8	1300,4	1436,1	1580,6
Relative to GDP	19,1%	21,6%	24,1%	26,7%	29,4%	32,2%	34,9%	37,7%	40,5%
	2023	2024	2025	2026	2027	2028	2029	2030	2031
5% contribution rate	867,3	948,3	1032,8	1120,8	1211,9	1304,7	1398,7	1495,0	1593,4
Relative to GDP	21,7%	23,2%	24,7%	26,2%	27,7%	29,2%	30,6%	32,0%	33,3%
7% contribution rate	1214,2	1327,6	1445,9	1569,1	1696,7	1826,6	1958,2	2093,0	2230,8
Relative to GDP	30,4%	32,5%	34,6%	36,7%	38,8%	40,9%	42,8%	44,7%	46,6%
10% contribution rate	1734,6	1896,6	2065,6	2241,6	2423,9	2609,4	2797,4	2990,0	3186,8
Relative to GDP	43,5%	46,5%	49,5%	52,5%	55,5%	58,4%	61,2%	63,9%	66,6%
	2032	2033	2034	2035	2036	2037	2038	2039	2040
5% contribution rate	1693,0	1793,0	1891,5	1987,8	2080,5	2166,8	2240,5	2305,6	2367,8
Relative to GDP	34,6%	35,8%	36,9%	37,9%	38,8%	39,5%	39,9%	40,2%	40,3%
7% contribution rate	2370,2	2510,2	2648,1	2782,9	2912,8	3033,6	3136,8	3227,8	3314,9
Relative to GDP	48,4%	50,1%	51,7%	53,1%	54,3%	55,3%	55,9%	56,2%	56,4%
10% contribution rate	3386,0	3586,1	3783,0	3975,6	4161,1	4333,6	4481,1	4611,1	4735,6
Relative to GDP	69,2%	71,6%	73,8%	75,8%	77,6%	79,0%	79,8%	80,3%	80,6%
	2041	2042	2043	2044	2045	2046	2047	2048	2049
5% contribution rate	2427,5	2485,1	2539,3	2592,5	2653,5	2718,0	2780,6	2844,1	2904,0
Relative to GDP	40,4%	40,4%	40,4%	40,3%	40,3%	40,4%	40,4%	40,4%	40,3%
7% contribution rate	3398,5	3479,2	3555,0	3629,5	3714,9	3805,3	3892,9	3981,7	4065,6
Relative to GDP	56,6%	56,6%	56,5%	56,4%	56,5%	56,5%	56,5%	56,5%	56,4%
10% contribution rate	4854,9	4970,2	5078,6	5184,9	5307,0	5436,1	5561,3	5688,1	5808,0
Relative to GDP	80,8%	80,9%	80,8%	80,6%	80,6%	80,7%	80,8%	80,7%	80,6%
	2050	2051	2052	2053	2054	2055	2056	2057	2058
5% contribution rate	2959,8	3017,7	3077,9	3135,9	3198,4	3258,2	3318,4	3387,0	3455,6
Relative to GDP	40,1%	40,0%	39,9%	39,7%	39,6%	39,4%	39,3%	39,2%	39,1%
7% contribution rate	4143,7	4224,8	4309,0	4390,2	4477,8	4561,4	4645,8	4741,8	4837,8
Relative to GDP	56,2%	56,0%	55,8%	55,6%	55,5%	55,2%	55,0%	54,8%	54,7%
10% contribution rate	5919,6	6035,4	6155,8	6271,7	6396,9	6516,3	6636,9	6774,1	6911,1
Relative to GDP	80,3%	80,0%	79,8%	79,5%	79,2%	78,9%	78,5%	78,4%	78,1%
	2059	2060	2061	2062	2063	2064	2065		
5% contribution rate	3541,1	3640,7	3749,1	3859,9	3973,3	4091,1	4209,2		
Relative to GDP	39,1%	39,3%	39,6%	39,8%	40,1%	40,4%	40,6%		
7% contribution rate	4957,5	5097,0	5248,7	5403,8	5562,7	5727,6	5892,9		
Relative to GDP	54,8%	55,1%	55,4%	55,8%	56,1%	56,5%	56,8%		
10% contribution rate	7082,1	7281,4	7498,2	7719,7	7946,7	8182,2	8418,4		
Relative to GDP	78,3%	78,7%	79,2%	79,7%	80,2%	80,7%	81,2%		

Table 26: Simulation of the dynamics of assets accumulation in pension funds in 2005-2065 (billions CZK; 2005 prices) – real rate of return expected to be 4 % p.a.

Source: Own calculations based on population forecasts of the Charles University Faculty of Natural Sciences (Burcin and Kučera 2003)

9.3.3 Expected Real Rate of Return 5 % p.a.

	2005	2006	2007	2008	2009	2010	2011	2012	2013
5% contrib. rate	24,8	52,4	83,1	117,0	154,4	195,4	240,5	289,7	343,4
Relative to GDP	0,9%	1,9%	3,0%	4,1%	5,3%	6,6%	7,9%	9,3%	10,8%
7% contrib. rate	34,7	73,4	116,3	163,8	216,1	273,6	336,7	405,6	480,7
Relative to GDP	1,3%	2,7%	4,2%	5,8%	7,4%	9,2%	11,1%	13,1%	15,1%
10% contrib. rate	49,6	104,9	166,2	234,0	308,7	390,9	480,9	579,4	686,7
Relative to GDP	1,9%	3,9%	6,0%	8,2%	10,6%	13,2%	15,8%	18,6%	21,6%
	2014	2015	2016	2017	2018	2019	2020	2021	2022
5% contrib. rate	401,7	464,8	533,0	606,7	686,2	771,8	857,9	949,8	1048,0
Relative to GDP	12,4%	14,0%	15,7%	17,4%	19,3%	21,2%	23,0%	24,9%	26,9%
7% contrib. rate	562,3	650,7	746,3	849,4	960,7	1080,6	1201,1	1329,7	1467,2
Relative to GDP	17,3%	19,6%	21,9%	24,4%	27,0%	29,7%	32,2%	34,9%	37,6%
10% contrib. rate	803,3	929,6	1066,1	1213,5	1372,4	1543,7	1715,8	1899,6	2096,0
Relative to GDP	24,7%	27,9%	31,3%	34,9%	38,5%	42,4%	46,0%	49,8%	53,7%
	2023	2024	2025	2026	2027	2028	2029	2030	2031
5% contrib. rate	1153,3	1263,9	1379,2	1498,7	1621,9	1745,8	1870,9	1999,2	2130,5
Relative to GDP	28,9%	31,0%	33,0%	35,1%	37,1%	39,0%	40,9%	42,7%	44,5%
7% contrib. rate	1614,6	1769,5	1930,9	2098,2	2270,7	2444,1	2619,2	2798,9	2982,7
Relative to GDP	40,5%	43,3%	46,2%	49,1%	52,0%	54,7%	57,3%	59,8%	62,3%
10% contrib. rate	2306,6	2527,9	2758,4	2997,5	3243,8	3491,6	3741,7	3998,4	4261,0
Relative to GDP	57,8%	61,9%	66,1%	70,2%	74,2%	78,1%	81,8%	85,5%	89,0%
	2032	2033	2034	2035	2036	2037	2038	2039	2040
5% contrib. rate	2263,2	2396,0	2528,3	2659,9	2789,4	2913,4	3024,5	3124,2	3220,7
Relative to GDP	46,2%	47,8%	49,3%	50,7%	52,0%	53,1%	53,9%	54,4%	54,8%
7% contrib. rate	3168,4	3354,4	3539,6	3723,8	3905,1	4078,8	4234,3	4373,9	4509,0
Relative to GDP	64,7%	67,0%	69,1%	71,0%	72,8%	74,3%	75,4%	76,2%	76,8%
10% contrib. rate	4526,3	4792,0	5056,6	5319,7	5578,8	5826,8	6049,0	6248,5	6441,4
Relative to GDP	92,4%	95,7%	98,7%	101,5%	104,0%	106,2%	107,8%	108,8%	109,7%
	2041	2042	2043	2044	2045	2046	2047	2048	2049
5% contrib. rate	3314,3	3405,6	3492,7	3577,7	3673,0	3772,5	3868,1	3963,8	4053,6
Relative to GDP	55,2%	55,4%	55,5%	55,6%	55,8%	56,0%	56,2%	56,3%	56,2%
7% contrib. rate	4640,0	4767,9	4889,8	5008,7	5142,2	5281,5	5415,3	5549,3	5675,0
Relative to GDP	77,2%	77,6%	77,8%	77,9%	78,1%	78,5%	78,6%	78,8%	78,7%
10% contrib. rate	6628,6	6811,3	6985,4	7155,3	7346,0	7545,0	7736,2	7927,5	8107,2
Relative to GDP	110,3%	110,8%	111,1%	111,2%	111,6%	112,1%	112,3%	112,5%	112,5%
	2050	2051	2052	2053	2054	2055	2056	2057	2058
5% contrib. rate	4136,4	4222,6	4312,5	4399,4	4493,4	4583,6	4675,0	4779,1	4883,6
Relative to GDP	56,1%	56,0%	55,9%	55,7%	55,6%	55,5%	55,3%	55,3%	55,2%
7% contrib. rate	5790,9	5911,6	6037,5	6159,2	6290,8	6417,0	6545,0	6690,7	6837,1
Relative to GDP	78,5%	78,4%	78,2%	78,0%	77,9%	77,7%	77,4%	77,4%	77,3%
10% contrib. rate	8272,7	8445,2	8625,0	8798,8	8986,8	9167,2	9350,0	9558,2	9767,2
Relative to GDP	112,2%	112,0%	111,8%	111,5%	111,3%	111,0%	110,6%	110,6%	110,4%
	2059	2060	2061	2062	2063	2064	2065		
5% contrib. rate	5014,0	5166,1	5332,2	5502,8	5678,4	5861,5	6046,3		
Relative to GDP	55,4%	55,8%	56,3%	56,8%	57,3%	57,8%	58,3%		
7% contrib. rate	7019,5	7232,5	7465,1	7703,9	7949,8	8206,1	8464,9		
Relative to GDP	77,6%	78,1%	78,8%	79,5%	80,2%	81,0%	81,6%		
10% contrib. rate	10027,9	10332,2	10664,4	11005,6	11356,8	11723,0	12092,7		
Relative to GDP	110,8%	111,6%	112,6%	113,6%	114,6%	115,6%	116,6%		

Table 27: Simulation of the dynamics of assets accumulation in pension funds in 2005-2065 (billions CZK; 2005 prices) – real rate of return expected to be 5 % p.a.

Source: Own calculations based on population forecasts of the Charles University Faculty of Natural Sciences (Burcin and Kučera 2003)