

Charles University in Prague
Faculty of Social Science
Institute of Economic Studies

**Selected Challenges of Fiscal Policy in the Czech
Republic**

Doctoral Dissertation

Radka Štiková

Supervisor: **Prof. RNDr. Jiří Hlaváček, CSc.**
Academic year: **2008/2009**

Title: Selected Challenges of Fiscal Policy in the Czech Republic
Author: Radka Štiková
Supervisor: Prof. RNDr. Jiří Hlaváček, CSc.
Institution: Charles University in Prague, Faculty of Social Science,
Institute of Economic Studies
Major: Economics
Academic year: 2008/2009

I, Radka Štiková, hereby declare that this dissertation is my own original work and that all source materials used here have been clearly identified and referenced.

Radka Štiková, undersigned

.....

Acknowledgement

I would like to gratefully thank to Prof. RNDr. Jiří Hlaváček for his guidance and support during my studies and to Štěpán Radkovský, Michal Slavík, Ing. Aleš Bulíř, M.Sc., CSc., Prof. Ing. Vratislav Izák, CSc., Doc.Ing. Tomáš Cahlík, CSc. and anonymous referees for valuable comments and suggestions to my research. Any remaining errors and omissions are my own.

Czech Abstract

Tato disertační práce se skládá ze tří nezávislých studií zaměřených na vybrané oblasti fiskální politiky v České republice, které vnímám jako jedny z výzev pro české veřejné finance.

První stať se věnuje problematice českého penzijního systému. Po úvodním vymezení podstaty penzijních systémů je stěžejní částí simulace budoucího vývoje českého penzijního systému do roku 2050. Z této simulace vyplývá, že případné parametrické změny systému budou mít relativně zanedbatelný dopad na jeho budoucí nerovnováhu, a proto je nutné přistoupit k fundamentální reformě.

Druhá stať se zabývá oblastí politického cyklu, tj. je zaměřena na motivace a ekonomické důsledky chování politiků. Obsahuje popis základních teorií politického cyklu a následně testuje jejich platnost na příkladě české reality. Pozornost je přitom zaměřena zejména na vliv časování voleb a typu vládnoucí politické strany na vývoj vybraných makroekonomických veličin. Současně je naznačen dopad volebního cyklu na fiskální proměnné. Z testování politického cyklu vyplynula částečná platnost oportunistického chování českých politiků.

Závěrečná studie je zaměřena na posouzení dopadů čerpání finančních prostředků z Evropské Unie na českou ekonomiku. Základem je vymezení tzv. čisté pozice ČR vůči rozpočtu EU. Po té jsou aplikovány dva standardní postupy k odhadnutí dopadu čerpání EU fondů na vývoj HDP – modelový přístup a přístup založený na datech. Výsledky obou metod indikují, že příliv zdrojů z fondů EU bude pozitivně stimulovat českou ekonomiku. Vzhledem k tomu, že nárůst čerpání prostředků z EU bude postupný, nelze ovšem z tohoto titulu očekávat výraznější jednorázový šok.

Content

I.	Foreword	7
II.	Challenges of the Czech Pension System – The Foundation of the Pension System and its Simulation in the Case of the Czech Republic	10
	1. Introduction	11
	2. The foundations of the pension system and a simple model of pensions	12
	3. Simulation of the evolution of the Czech pension system	18
	3.1. Assumptions regarding the evolution of the age structure of the Czech population ..	19
	3.2. Assumptions regarding the evolution of the economic activity of the Czech population and regarding the evolution of the number of pensioners	22
	3.3. Macroeconomic scenarios	27
	3.4. Estimate of the future evolution of the pension system and simulation of changes in selected parameters	31
	4. Conclusion	37
	5. References	40
III.	Models of Political Cycles: The Czech Experience	43
	1. Introduction	44
	2. Models of political cycles	46
	3. The method for testing political cycle theories	49
	4. The political cycle in real GDP, unemployment and inflation in the Czech Republic	51
	4.1. Data	52
	4.2. Stationarity testing and the Perron trend stationarity test with a structural break ...	54
	4.3. Testing for a political cycle in the Czech Republic	59
	5. The electoral cycle and public finances in the Czech Republic	62
	6. Conclusions	66
	7. References	68
IV.	Macroeconomic Effects of Absorbing EU Funds in the Czech Republic	70
	1. Introduction	71
	2. The theoretical foundation of redistribution in the European Union	72
	3. Commitment appropriations of EU funds in the Czech Republic and net balance	74
	4. Estimates of the real drawdown of EU funds by the Czech Republic	81
	5. Impact of EU funds drawing on the fiscal balance	85
	6. Estimation of the macroeconomic effects of EU funds drawing	87
	6.1. Data-based approach	87
	6.2. Model approach	90
	6.2.1. Simulation using the QUEST model (2 nd generation)	91
	6.2.2. The CNB's approach	94
	7. Conclusion	96
	8. References	98
	Annex - Fundamental equations of the QUEST model	100

I. Foreword

My dissertation thesis is focused on three Czech fiscal policy challenges – the Czech pension system in the context of population ageing, the influence of the political cycle on the Czech economy and, finally, the macroeconomic impact of absorption of EU funds. All these issues are very closely connected with public finances, and undervaluation of their possible consequences could imply a substantial fiscal imbalance. Avoidance of fundamental pension reform, opportunistic election packages, such as higher social transfers in election years, and insufficient sources for co-financing of EU funded projects could exert upward pressure on the deficit and debt either in the short run or in the long term.

However, as a member of the EU the Czech Republic has undertaken to maintain fiscal discipline and to achieve its medium-term objective (a structural deficit of 1% of GDP) by 2012 at the latest. Actually, it has been quite successful in reducing the government deficit, as this stood at only 1% of GDP in 2007. This trend, however, has been driven more by favourable cyclical developments than by intentional government behaviour. And although several stabilisation measures have already been approved, including a shift from direct to indirect taxation with effect from 2008, additional meaningful reform steps need to follow. My goal is therefore to highlight at least some of the problematic fiscal issues which should be receiving greater attention.

The particular essays are not ordered in terms of importance, as all the topics have their own specific significance in the given horizon. They are ordered chronologically according to when I wrote them.

The first essay, which is focused on the pension system in the Czech Republic (*“Challenges of the Czech Pension System – The Foundation of the Pension System and its Simulation in the Case of the Czech Republic”*), arose as an intersection of two articles published in the economic journal *Politická ekonomie* in 2005. Their titles were: *“The simulation of the future development of expenditure and revenue of the Czech pension security scheme up to 2050”* in *Politická ekonomie* 2/2005 and *“Contribution to discussion on reform of pension system”* in *Politická ekonomie* 3/2005. Both articles were co-authored by Michal Slavík.¹ At that time,

¹ My contribution to both articles was approximately 50%.

the discussion about the necessity for a fundamental pension reform had started to crystallise in the Czech Republic. An Executive Team had been set up to prepare pension system technical documents for the future political debate, which should result in a political consensus on pension reform. The aim of our articles was to contribute to this discussion and emphasise that the problem connected with the ageing of the Czech population is even more relevant in the Czech Republic than in other EU countries.

I have selected what are, in my view, the most interesting passages from the articles for my dissertation. At the same time I have privileged passages which were in particular of my responsibility. Firstly, I briefly explain the foundation of the pension system and describe a simple model of pensions. This is followed by the principal part, with a simulation of the evolution of the Czech pension system, including an assessment of possible parametric changes to the system.

One could argue that the topic is obsolete in some respects (and that it does not cover the latest data), given that the aforementioned Executive Team produced many materials, calculations, analyses and conclusions. But our articles were among the pioneering analyses in this area at the time. The conclusions of the essay, i.e. that the Czech pension system is not sustainable in the long term and more fundamental reforms should be considered, are still valid. The subsequent studies more or less confirmed these findings. So far, however, the government has only made a few parametric changes to the pension system. Those changes do not satisfactory resolve the sustainability problem of the current pension system.

The second essay is devoted to the political cycle issue in the case of the Czech Republic (*“Models of Political Cycles: The Czech Experience”*). It again was a reaction to a topical issue, namely the elections in 2006. The 2006 elections were reflected in the adoption of a series of household-friendly measures (in particular increases in social transfers) and the further postponement of much needed pension and health care reforms. The increased burden on the expenditure side in the form of increased mandatory spending, coupled with a decreasing tax burden, raised the deficit pressures on Czech public finances. Furthermore, the consequences of the government’s behaviour might influence macroeconomic developments.

In accordance with these facts, the paper aimed to find out whether the dynamic behaviour of real GDP, unemployment and inflation is systematically affected by the timing of elections

and by changes of government in the Czech Republic. Two basic models of political cycles (political business cycle models and partisan theories) are tested using the relatively traditional method of Alesina and Roubini (1990). Attention is also focused on the likely impact of the electoral cycle on fiscal indicators, as politicians try to interfere primarily with fiscal variables, which they control directly.

The Czech version of this essay was published as IES Working Paper 2007/18. A shorter English version (excluding the chapter about the electoral cycle and public finances in the Czech Republic) was published in Prague Economic Papers in this year's volume No. 3.

The last essay ("*Macroeconomic Effects of Absorbing EU Funds in the Czech Republic*") is focused on probably the most topical issue connected with our accession to the European Union and our new experience with drawing EU funds. This study is a result of more than two years' examination of the topic (partly in my job at the CNB, where I am responsible for analysing EU-related flows).

Although EU funds have been available to the Czech Republic since its accession to the EU in 2004 and there is a lot of literature devoted to the macroeconomic impacts of absorbing EU funds (i.e. the methodology is quite well developed), few analyses have been carried so far in the Czech Republic. But it is important to remember that transfers from the EU could have a significant impact on the Czech economy, especially in the area of investment activity.

The last paper therefore sets out to complement the so far limited number of analyses in the Czech Republic in this area. The principal part of the paper applies two approaches (model and data-based) to assess the macroeconomic implications of EU fund drawdown in the Czech economy. The overall analysis is based on a detailed evaluation of EU fund drawing, including a data description, which should be the first step when the impacts of EU funds are assessed. As EU fund drawing has significant implications for the government budget balance (because the government is responsible for ensuring co-financing of structural actions), the analysis is enlarged to include the fiscal effects of EU-related financial flows.

II. Challenges of the Czech Pension System – The Foundation of the Pension System and its Simulation in the Case of the Czech Republic

Abstract:

The sustainability of public finances in the context of population ageing is becoming a hot topic in most European countries, including the Czech Republic. Moreover, the Czech population will be one of the oldest in the world according to the projections of various different institutions (UN, OECD etc.). This poses a challenge for the Czech pension scheme. This paper presents Eatwell's work to give some basic intuition of the terms and concepts used in the pension reform debate. It then provides possible future scenarios and illustrates the future fiscal impacts of ageing, assuming preservation of the current Czech pension scheme up to 2050. The analysis is based on a detailed one-year age structure. This allows us to simulate the influence of changes in the component parameters of the current scheme on its future situation (for example changes to the retirement age). The main conclusion is that changing these parameters has a rather small impact on the expected future imbalance of the Czech pension system. Therefore, a more fundamental reform of the current pension system should be considered.

Keywords: ageing, demographic development, pension reform, pension scheme, population projection, public finance sustainability,

JEL Classification: J11, H55, H87

1. Introduction

The Czech Republic is currently undergoing an ageing process, and this demographic trend is set to intensify in the years ahead. Improving mortality rates and a low birth rate are causing a relative strengthening of older generations in the population, mainly at the expense of the youngest age groups. In addition, a systematic decline in the population of the Czech Republic is expected from around 2015 onwards.

Given the adverse outlook for the age structure of the Czech population, the unsustainability of the existing pay-as-you-go (PAYG) pension system, and the need for a fundamental reform of that system, is a hot topic in both the academic and political arenas. Several studies have produced long-term fiscal projections in the context of population ageing (e.g. Bezděk, Dybczak and Krejdl, 2003; Bezděk, 2000; EPC). In addition, numerous authors have analysed the current state and drawbacks of the current pension system in the Czech Republic and have tried to come up with solutions to the impending problems (e.g. Hyzl, Kulhavý and Rusnok, 2004). At the end of 2004, an Executive Team was set up to prepare pension-system-related technical documents as specified by the political parties. The Team's conclusions were meant to form the basis for a political consensus on pension reform. Two years have passed since the Team completed its work. So far, however, the government has only made a few parametric changes to the pension system. Those changes do not satisfactorily resolve the sustainability problems of the current pension system. The following analysis should back up this claim.

The main contribution of this article is that it takes a detailed look at the costs of the pay-as-you-go (PAYG) pension system in the event of significant population ageing. The simulation is based on a comprehensive demographic analysis and uses a detailed age breakdown of the population. This allows us to assess the impacts of changes to individual parameters of the pension system (for example changes to the statutory retirement age, stricter conditions for early retirement, and changes to pension insurance rates). We should point out, however, that the aim of the simulation is not to assess how the pension system will develop in reality (nor is this even possible over such a long time scale, as the system will face exogenous shocks whose occurrence and intensity cannot be estimated *ex ante*), but to illustrate how it would develop if certain assumptions (demographic and economic) were to prevail. The fiscal projection horizon was set at 2050, which is not fully in line with the approach adopted by Eurostat, which recommends extrapolating the horizon to 2075. This shortening of the

horizon, however, is based on the notion that the key movements in age structure and changes in the Czech population number will probably occur before 2050 (Burcin and Kučera, 2003), so there is no need to complicate the commentary and calculations by using a longer horizon.

The simulation of the future impacts of changes to the parameters of the pension system is preceded by a description of the economic foundations of retirement pensions and an account of the broader economic and demographic context.

2. The foundations of the pension system and a simple model of pensions

Ensuring that persons of post-productive age are sufficiently well provided for has long been a major economic and political problem. The advanced nations' current state pension systems – or at least the main component thereof as represented by pillar one of the system – operate on the pay-as-you-go (PAYG) principle, under which the pensions of the post-productive generation are paid contemporaneously from the just-collected contributions of the productive generation. In many countries, this system is supplemented by funded financing (pillars two and three), where individuals accumulate explicit financial claims over their productive lives and then use those claims to finance their economic needs after retiring.

If the age structure remains approximately stationary over time, there are no major net intergenerational transfers in a PAYG system. In other words, what one generation pays to the preceding generation will be returned to it in the form of a transfer from the next generation. However, demographic changes – and in particular dramatic population ageing and a decline in the productive-age population relative to the number of pensioners – lead inevitably to net intergenerational transfers in the sense of a per capita imbalance between what a participant of one generation gives up to the older generation and what he or she will receive in the future from the younger generation. It should be pointed out that this intergenerational imbalance does not depend on the form of financing of the pension system and pertains to both PAYG and funding. Sometimes, however, the current pension problem, caused primarily by demographic factors, is wrongly associated solely with the state PAYG system and its financial imbalance, i.e. a factor of financial (economic) nature. The important thing is that the intergenerational transfer always takes the form of a flow of goods and services, i.e. a proportion of actual consumption which the productive generation gives up to the post-

productive generation. The financial transfer merely acts as an intermediary for this real transfer.

The foundations of the pension system can be presented with the aid of the following simple model (for more details see Eatwell, 2003, pp. 4–5). The advantage of this model is that it provides an insight into the fundamental *modus operandi* of the system. The literature contains numerous far more sophisticated approaches, but these often tend to cloud the issue rather than clarify it.

In Eatwell’s simple model, pensioners are treated as the only dependent group (abstracting from the young and the sick as well as those drawing a widow’s or orphan’s pension). By persons of post-productive age we mean pensioners. Another simplifying assumption is that all savings and taxes are used solely to provide for the flow of goods and services consumed by pensioners (all other uses of savings and taxes are ignored) and pensioners do not create savings. In such an economy, the following relationship describes the intergenerational transfer of goods and services from persons of productive age to persons of post-productive age:

$$P.N = (S+T).Y.W \quad (1)$$

where P is the average pension per pensioner per year, N is the number of pensioners and $P.N$ is therefore the total amount of pensions paid in the economy every year. Pensions are nothing other than the flow of purchasing power which will be used by those of post-productive age to buy the goods and services which have been produced by those of productive age (whose number is denoted by W). Y is the average value of output created by a person of productive age per year. Hence $Y.W$ is the total value of the flow of goods and services created in the economy per year by the productive generation. S is the average savings rate and T is the average tax rate; in this model taxes also include all mandatory contributions to the pension system. The entire right-hand side of the equation thus gives the amount of output being produced and released (i.e. not consumed) by persons of productive age to persons of post-productive age. The left-hand side, i.e. $P.N$, expresses the amount of goods and services going to pensioners.

If we introduce $R = S+T$ as the rate of “release” of output to current pensioners, equation (1) can be rewritten as:

$$N/W = RY/P \quad (2)$$

which expresses the fact that the ratio of the pensioner population to the workforce N/W must be equal to the ratio of value/output not consumed (RY) to the average pension P .

Relationships (1) and (2) can be expressed in terms of growth rates (lower case letters of the original variables) as follows:

$$n - w = r + y - p \quad (1')$$

$$r = s.a + t.(1-a) \quad (2')$$

where $a = S/(S+T)$, n is the rate of growth of the pensioner population (persons of post-productive age), w is the rate of growth of the productive population, y is the rate of growth of productivity, p is the rate of increase in the real average pension and r is a weighted average of the rates of growth of taxes (t) and the savings rate (s).

Equations (1') and (2') take us closer to the heart of the current pension problem. The current demographic trend is causing the post-productive population to grow more rapidly than the productive population, which means $n > w$. So the left-hand side of (1') is positive and the right-hand side must be positive too. This can be achieved by increased savings and taxes (r), or by a higher rate of productivity growth (y), or by a lower rate of growth of the real value of the average pension (p). According to (2'), an increase in r can be achieved in two ways: by increasing the savings rate (s) and/or by increasing taxation (t). In advanced economies, tax ratios are typically higher than savings ratios, so taxes (and contributions to the pension system) are a factor used to reduce the consumption of persons of productive age and to transfer it to pensioners.

Besides changing t , however, there are other ways of balancing equation (1)/(1'). One option is to change the rate of growth of the productive population w which contributes to the pension system. This can be done in practice either by reducing the unemployment rate and by increasing the participation rate of the productive population (i.e. by involving those who do not contribute to output formation despite being of productive age), or by making an administrative change to the retirement age (assuming that those affected remain in the work process – i.e. that there is no impact on unemployment). The last-mentioned factor will have an effect on both n and w . It is important to realize that equations (1') and (2') are defined in terms of growth rates, which implies that one-off measures will not result in a permanent rebalancing of the system of any given equation (1'). Such a rebalancing can only result from a permanent change in the rate of growth of any of the model variables mentioned above.

On the economic level, a “solution” to the pension problem (in a model with an exogenously given rate of change in the post-productive population n) rests on finding socially acceptable values of w , r , y and p which will ensure that (1') applies. On the theoretical level, we can also talk about changing n , if one regards the rate of growth of the number of pensioners not as an exogenous variable, but as a variable that can be affected by, for example, the quality of the health care system. But here we are moving from the economic realm to the ethical and moral level, where the use of economic categories is a highly sensitive matter, so we will not examine it here and instead regard it as being determined exogenously, outside the model.

It is worth noting that equation (1') is an identity, meaning that it will apply in all circumstances. If we fail to set socially acceptable (or optimal) equilibrium values of w , r , y and p , the system dynamics (caused exogenously by growth in n) will set them themselves – either by a government decision, or through the bankruptcy of the pension system (in the sense of termination of the social contract on the redistribution of wealth from those of productive age to those of post-productive age). However, it is highly likely that the problem will be solved by a government decision – the growth in the post-productive population in relation to the productive population will, under the current political system, lead to relatively larger representation of the post-productive section of the population in legislative bodies, thereby indirectly modifying the government's objective to take more account of the interests of the post-productive section of the population. In terms of public choice theory, there will be a shift in the age of the “median voter” towards the interests of the post-productive age electorate, and thus a shift in the government's preferences as well. Termination of the social contract on the intergenerational redistribution of wealth is thus probably only a theoretical consideration.

Using Eatwell's model described above, one can illustrate that the current pension problem is not associated primarily with the pension financing system, but is more a redistributive issue caused by demographic factors (the imbalance between n and w). Even a funded pension scheme would get into difficulties due to population ageing (in the logic of the model the PAYG system can be identified with the aid of variable t and funding with the aid of s). The view is often expressed that a fully funded scheme would solve the current demographic problems. In the light of this model, however, this view does not seem entirely convincing. The nub of the “pension problem” is the redistribution of goods and services between the

productive and post-productive population, i.e. the transfer of purchasing power from those engaged in producing goods and services to those of post-productive age. From the macroeconomic perspective, the mechanism of this redistribution of real goods and services (be it via t or s or a suitable combination thereof) is irrelevant. Under the PAYG system it is based on the constitutional right to security in old age², whereas with funding it is based on a financial contract and the right to performance of that contract.

The advocates of funding usually emphasize the amount of the “pension” in monetary terms and the fact that compound interest results in exponential growth in the stock of financial assets that an individual saves in the system. This ignores the fact that what a pensioner needs in order to procure the necessities of life is not financial assets, but real goods and services. If there is faster growth in the financial assets of the post-productive generation relative to the real assets held by the productive generation, the imbalance will equalize automatically via a change in the price level and a decrease in the value of financial assets. Under a funded scheme, persons of post-productive age use financial assets to “extract” goods and services from persons of productive age; the growth in pensioners’ financial claims that are used to voluntarily “extract” purchasing power must be matched by growth in the savings (foregone consumption) of persons of productive age. If, for some reason, persons of productive age are unwilling to forego real consumption (and save), the pressure among pensioners to exchange their financial claims for real goods and services will generate growth in prices and a fall in the value of their existing financial savings due to inflation. The fall in the real value of financial savings will stop when the real value of pensions (stemming from the “consumption” of financial assets) matches what the productive generation is willing to forego (in the form of saving) from what it has produced. As in the case of the PAYG system, if persons of productive age choose not to reduce their consumption in favour of the rising number of persons of post-productive age (in the form of either greater personal saving or the payment of higher taxes, from which pensions are funded), there must be a real decline in pensions paid.

² Article 30(1) of Act No. 2/1993 Coll., the Charter of Fundamental Rights and Freedoms, states: “Citizens have the right to adequate material security in old age and during periods of work incapacity, as well as in the case of the loss of their provider”.

The marketing magic of the funded system is based on an illusion generated by compound interest and an exogenous real rate of return chosen advantageously *ex ante*.³ With such a positive interest rate a financial asset automatically expands exponentially over the years. But if there is a substantial inflow of new policyholders seeking to provide for their old age by accumulating financial assets in pension funds, there will be growth in the supply of free lendable funds and, in turn, a fall in the average market interest rate on the assets in these funds. Hence, fund savings will, of course, not gain in value at the pace initially assumed by those individuals and the magic of the funded system will vanish. A more detailed discussion of the potential effects of demographic changes on the real rate of return is given, for example, in Bulíř (1998) and Kubíček (2004).

Besides this, the interest paid on assets in a funded scheme shows another difference from that paid, for example, on bank deposits and other relatively liquid financial savings products. The true interest rate paid on funded pension savings can only be determined *ex post* when the savings are withdrawn (i.e. when financial savings are converted into real consumption of goods and services), long after the individual has decided how much to save and how much to consume. The interest credited over the entire saving period is purely fictitious. Its true value (its purchasing power or economic utility for the individual) depends on taxes and other factors and is not determined until the moment of conversion. The main problem is the individual's inability to respond flexibly during the saving phase – which can last more than 40 years – to changing tax conditions or inflation. The limited ability to transfer savings accumulated in pension funds to another (more tax advantageous at that moment) form of savings before retirement without incurring significant penalties is thus a major disadvantage of most of the known funding implementations. An individual who deposits savings in a pension fund has no guarantee over the lifetime of the financial contract that he/she will not be faced with a large tax bill to the state when the time comes for the accumulated savings, including interest, to be paid out.⁴

³ One comes across many studies by renowned authors and institutions whose models feature real interest rates in excess of 5–6% p.a. The key question is whether one can guarantee that the real average long-term return on pension fund assets will attain these levels. In recent years many of the advanced economies have been recording economic growth rates close to zero – in other words, stagnation. The real interest rates achieved in the past – against a background of sharp economic expansion – are not relevant to these economic conditions.

⁴ The problem of future taxation (or other involuntary confiscation of a proportion of financial savings) may not seem significant in the current phase of negligible assets in pension funds in the Czech Republic. But as the funds accumulated in this way expand, and given the limited ability of owners to access them, the desire of the state to tax these funds will grow (as occurs, via indirect taxes, with commodities with a low elasticity of substitution, such as alcohol, petrol and tobacco products). The individual's ability to avoid such a tax will be very limited.

The lack of understanding of the economic foundations of the pension system often gives rise to misleading opinions and proposals that offer no long-term solution to the problem. One should focus on the fact that the point of the pension system is first and foremost to secure a flow of goods and services (i.e. real consumption) for the post-productive generation. It is an issue of redistribution, in the sense that output is split between consumption by those of productive age and those of post-productive age.⁵ Hence, the pension problem is not an issue primarily of a financial nature, although finances act as an intermediary in the redistribution process and the transfer of purchasing power. One often hears people speaking about a “shortage of money for pensions”, which distracts attention from the economic foundations themselves. Such a statement implies that the savings (or foregone consumption) of the productive generation are insufficient to satisfy the desired consumption of pensioners. There are only three possible solutions – reduce the current consumption of the productive generation, reduce the consumption of pensioners, or increase what the productive generation is capable of producing, i.e. enlarge the “cake” that will be divided between the two groups. The consumption of the productive generation can be reduced in various ways: by increasing taxes (and social insurance charges), from which the PAYG system is funded, or by deducting a larger pension fund contribution. The deciding factor should probably be the total transaction and other costs of the various different options (including, for example, the costs of effective state supervision and regulation of private fund managers and the operating costs of the PAYG system). The authorities should seek to minimize these overall costs. When considering whether to make partial modifications or to implement more sweeping reforms of the pension system, it is therefore important not to cave in to pressure from interest groups who stand to benefit from any changes.

3. Simulation of the evolution of the Czech pension system

Following the discussion of the foundations of the pension system and the problems arising from significant population ageing, we now turn our attention to the specific situation that the Czech Republic will face in the future. The simulation of the evolution of the Czech pension system is based on detail analyses of demographic data (i.e. data-based approach). We did not

⁵ Another form of redistribution is often discussed in the context of the pension system, namely redistribution at the level of one age generation (those who pay relatively more into the PAYG system when working will get relatively less from the current system in retirement owing to significant equalization of pensions).

employ any dynamic general equilibrium model (e.g. OLG type model) which should however be the next step of this analysis. Hence the pension system simulation presented thereafter is so called passive simulation as it doesn't cover backward implications for macroeconomic development.

Firstly, the number of pensioners is estimated on the basis of the population projection as well as the assumptions regarding the evolution of economic activity of the Czech population. Then average nominal pension is estimated taking into account the Czech legal framework in this area, the macroeconomic forecast and the difference between the pensions of new pensioners and the pensions of "old" ones. Finally, using both the number of pensioners and the average nominal pension the overall pension expenditure is derived. The revenue of social insurance is in brief estimated on the basis of expected average nominal wage and the number of people employed.

3.1. Assumptions regarding the evolution of the age structure of the Czech population

To define the expected evolution of the Czech population we draw on the conclusions of the Czech Statistical Office's 2003 population projection up to 2050. This projection is compiled using the cohort component method with a one-year projection step. The uncertainty typical of all projections is expressed using three variants for expected demographic behaviour – low, medium and high. The medium variant expresses what is currently the most probable future path, while the high and low variants represent the floor and ceiling from which the actual path is unlikely to diverge. The analysis of the impacts of the ageing of the Czech population on the pension system is based on the medium variant of the population projection, which assumes a gradual rise in fertility, a continued fairly steady decline in mortality and positive net migration over the entire reference period.

The assumption of a gradual rise in fertility is based on the hypothesis that the consequences of the so-called second demographic transition⁶ will disappear in the Czech Republic over the next several years, with the fertility rate increasing and subsequently stabilizing at the level that is currently the norm in Western Europe. This is consistent with a rise in the total fertility

⁶ The second demographic transition is characterized by a rising age at marriage and a rising age of motherhood, causing fertility to decline below the replacement rate. In the advanced nations of Northern and Western Europe this process took place in approximately 1965–1985. In other European countries the tendency emerged later on – in the former Communist countries it did not start until the early 1990s.

rate from its current value of 1.18 (the 2003 figure) to around 1.6 by 2030. Over the following 20 years the projection forecasts that the total fertility rate will stabilize at 1.60–1.62 children, with the peak specific fertility rates being recorded among 28–30-year-old women. Nevertheless, there will be no major rise in the number of children being born during the reference period, as women born in the low-birth-rate 1980s and 1990s will gradually reach peak fertility age in a few years' time. This will have a knock-on effect on the number of people in subsequent generations, so no change in trend can be expected even towards the end of the projection horizon. In line with these conclusions, the medium variant assumes a population projection of a constant decline in the number of children being born from 2008 onwards, with a slight increase around 2040.

Mortality will probably follow the favourable trend seen in the past. The projection therefore assumes further growth in life expectancy at birth for both sexes. The rate of growth, however, will be less than half that recorded in the 1990s.⁷ According to the medium variant, life expectancy at birth should rise from the present 72 years (the figure for 2003) to 78.9 years among males and from 78.5 years to 84.5 years among females by the end of 2050. The improvement in mortality rates, however, will probably not prevent a rise in the number of deaths after 2015 due to the worsening age structure.

It is very difficult to forecast migration, since, unlike the previous two components of demographic reproduction, it cannot be inferred from the existing age structure. Net migration is strongly affected by economic and political factors. The biggest unknown in this respect is the change in migration ratios resulting from the Czech Republic's accession to the EU. Moreover, the evidence on migration itself is patchy. Despite the considerable uncertainty, however, estimating migration is a central part of population forecasting. The medium variant of the population projection assumes mean annual positive net migration of 25,000 people, i.e. a significantly higher figure than was recorded in 1993–2002.⁸ The projection assumes higher net migration primarily because of an extension of the migration statistics to include foreigners with long-term residence status (in line with international recommendations).

⁷ Between 1990 and 2000, life expectancy at birth rose by about 4 years among males and 3 years among females.

⁸ In 1993–2002 net migration fluctuated between 5,500 and 12,300 persons (except in 2001, when it was negative). In 2003 net migration stood at 25,800 persons.

Table 1: Expected evolution of the Czech population number and age structure – medium variant of the projection

	2003 ¹⁾	2010	2020	2030	2040	2050
Population number as of Dec. 31	10,211,455	10,283,042	10,283,929	10,102,433	9,795,118	9,438,334
Population structure in %:						
0-14	15.2	13.6	13.7	12.6	12.2	12.4
15-64	70.8	70.9	66.0	64.5	60.9	56.3
65+	13.9	15.5	20.3	22.8	26.9	31.3
Aged dependency ratio	19.7	21.9	30.8	35.4	44.2	55.7
Economic dependency ratio	41.2	41.1	51.5	54.9	64.2	77.8
Average age	39.5	40.7	43.1	45.4	47.0	48.2

¹⁾ Actual situation;

Aged dependency ratio – number of persons aged 65 years and older per 100 persons aged 15–64 years;

Economic dependency ratio – number of children aged 0–14 years and number of persons aged 65 years and older per 100 persons aged 15–64 years.

Source: Author's calculations based on CZSO data (2003 – Age Structure of the Czech Population; 2010–2050 – Population Projection).

Based on the above mortality, fertility and migration assumptions, the medium variant of the population projection foresees a temporary stabilization of the population number until approximately 2020 and a relatively sharp decline in subsequent years. Even the relatively high expected net migration will fail to offset the natural decline, meaning that the population of the Czech Republic will probably fall below 10 million after 2030. The decline in the population will be accompanied by a worsening age structure, or, more specifically, an acceleration of the demographic ageing process. In the longer term this means a significant absolute and relative decline in the productive and pre-productive populations. The only expanding section of the population will be people in older age categories.⁹

The number of persons of productive age (i.e. aged 15–64 years) will decline between 2003 and 2050 from the present figure of 7.2 million to probably around 5.3 million. The ratio of this age category to the total population will thus decrease from the 70.8% recorded in 2003 to 56.3% in 2050. The productive section of the population will additionally be affected by the demographic ageing process, causing an increase in the representation of older cohorts within this age category. By contrast, the proportion of over-64s will increase sharply as a result of the baby-boom generations crossing over into the post-productive population and owing to improving mortality rates. In the current population this age category contains around 1.4 million people, but by 2050 the figure will be twice as high (almost 3 million) according to the most likely scenario. Given the decline in the population number, their share in the total

⁹ The post-productive age category is usually defined in terms of an age threshold of either 60 or 65 years depending on the purpose of the monitoring. In the case of research into the impact of population ageing on the pension system, the retirement age is the defining threshold for old age. In the Czech Republic the retirement age is currently being raised stepwise to 63 years. However, it can be expected to rise further in the future, so it is appropriate here to regard 65 years as the threshold for old age.

population will increase from 13.9% (the 2003 figure) to 31.3% in 2050, i.e. it will more than double. The post-productive section of the population, too, will see growth primarily in the number of people in the highest age categories. The ratio of over 79s to over-64s currently stands at just 20.6%, but by 2050 this ratio will have reached around 30% and the number of over 79s will have more than tripled. As a result of this trend there will be a significant rise in the aged dependency ratio, i.e. the ratio between the post-productive and productive populations (see Table 1).

3.2. Assumptions regarding the evolution of the economic activity of the Czech population and regarding the evolution of the number of pensioners

In order to estimate the evolution of the number of old-age pensioners (including new inflows of pensioners) we need, in addition to assumptions regarding the expected evolution of the age structure, some assumptions regarding the evolution of the rate of economic activity. The total rate of economic activity¹⁰ is affected on the one hand by changes in the age structure of the population and on the other hand by changes in specific rates of economic activity (i.e. in rates of economic activity by age and sex – for more details, see Rutarová, 2004). At this stage, then, the next step is to estimate the expected trends in economic activity by age (or age category) and sex.

In the Czech Republic the economic activity of females is lower than that of males, regardless of age. In addition, we need to take into account the fact that since the early 1990s there has been a steady decline in the rate of economic activity in the 15–19¹¹ and 65+¹² age categories (and to some extent also in the 20–24 category). The declining rate of economic activity in the 15–19 category reflects an upward trend in the age at which young people start working, due, in turn, to a longer time spent studying. In the case of the 65+ age category, the falling specific rate of economic activity is probably linked with a decline in the artificially maintained high pre-1989 employment rate (i.e. with deregulation of the labour market), with some degree of disincentivization of pensioner work activity in previous years, and with the adverse trend in the unemployment rate.

¹⁰ The ratio of the economically active population over 14 years old to the total population over 14 years old.

¹¹ Between 1993 and 2003 the specific rate of economic activity in this age category declined from 37.9% to 10.4% for males and from 33.1% to 8.4% for females.

¹² Between 1993 and 2003 the specific rate of economic activity in this age category declined from 9.3% to 6.6% for males and from 3.9% to 2.3% for females.

As for the 50–54 and 55–59 categories, by contrast, a rising tendency in the specific rates of economic activity can be observed. These reflect changes in the statutory retirement age. At present (since January 1, 1996) the official retirement age is being raised in steps – for males from the original 60 years to a final 62 years and for females from the original 53–57 years to a final 57–61 years depending on number of children. The changeover to this higher retirement age will have been fully completed by the start of 2007. In addition, a new pension insurance act entered into force on January 1, 2004. Under this new law, the official retirement age will continue to be increased at the same rate (in steps of two months for males and four months for females) after 2007, with the aim of raising it to 63 years for males and 59–63 years for females (again depending on number of children) by 2013. The same act simultaneously restricts the options for early retirement (for example, it abolishes temporary shortening of early retirement). However, since even this planned increase in the retirement age is insufficient in the light of the expected demographics (or, more specifically, the increasing life expectancy), and considering that many advanced nations have a higher retirement age¹³, proposals for a further shift in this age threshold are currently under discussion in the Czech Republic. Policymakers are currently considering eliminating the differences in retirement age between males and females. The phasing-in of a single retirement age for males and females is based on the EU's principle of equal treatment in social security systems, which allows EU member states only a temporary exemption.

In line with the uncertainties regarding the future specification of the minimum retirement age, two baseline scenarios will be considered in the following projections. The first scenario assumes no further increase in the retirement age after 2013. The alternative (Scenario 2 – probably more realistic) is that conversely there will be a further increase in the retirement age to 65 years regardless of sex, with full completion of the transition to this higher retirement age between 2020 and 2030.

Based on the past trends in the specific rates of economic activity described above and on the aforementioned expectations, we can conclude that a higher retirement age coupled with stricter conditions for early retirement will in all probability foster a rise in economic activity

¹³ Under the Lisbon process, the EU in 2000 launched an open coordination method which has so far yielded, among other things, support for greater labour participation among older people and for an increase in the retirement age of 5 years between 2002 and 2010 (see Czech Ministry of Labour and Social Affairs Press Release of May 21, 2003 – *Raising the retirement age*).

among those aged 45–63/64 years. By contrast, the specific rate of economic activity in the lowest age category, i.e. 15–24 years, will see a continuing downward trend due to a general lengthening of the time young people spend studying. No major changes in specific rates of economic activity can be expected for the 25–49 age categories, as they have been flat over the past decade or so. Consequently, we assume flat specific rates of economic activity for the 5-year age categories in the range of 25–49 years at their most recently recorded level (i.e. the 2003 level). Despite the rising retirement age, the economic activity of the oldest individuals (65+) is likely to decline slightly, for several reasons. First, in the post-productive section of the population, the proportion of people in the oldest age category (85+) will increase, and these individuals cannot be expected to be economically active. At the same time, we cannot expect those of pensionable age to have any tendency to contribute to the efforts to resolve the discrepancy in the pension system, for instance by working longer. This claim is backed up by evidence from the turn of the millennium, when the specific rate of economic activity among the over 64s fell steadily between 1996 and 2002 against a background of a rising retirement age (for females to 57–61 years and for males to 62 years by the end of 2006).

The above assumptions regarding the evolution of specific rates of economic activity, combined with the CZSO's assumptions regarding the population trend, are used to derive the total rates of economic activity (by sex) for the two scenarios under consideration. Scenario 2 assumes a greater rise in specific rates of economic activity among the 55–64 age category in 2020 and then a further rise in 2030. The resulting rates of economic activity of the total population are given in the following table.

Table 2: Total rates of economic activity by sex and growth in the economically active population, in % – two retirement age scenarios

	2003 ¹⁾	2010	2020	2030	2040	2050
Males – rate of economic activity						
Scenario 1	68.5	68.2	66.4	63.2	58.7	55.1
Scenario 2	68.5	68.2	66.7	63.9	59.5	55.8
Females – rate of economic activity						
Scenario 1	50.7	50.4	50.0	47.4	43.0	39.9
Scenario 2	50.7	50.4	52.9	51.3	47.1	43.5
Economically active population, total –						
Scenario 1 – cumulative growth from 2003		2.11	0.18	-5.24	-15.26	-23.87
Scenario 2 – cumulative growth from 2003		2.11	3.09	-1.22	-10.99	-20.30

¹⁾ Actual situation;

Scenario 1 – retirement age of 63 years (or 59–63 years for females depending on number of children) from 2013 until end of reference period;

Scenario 2 – minimum retirement age increased to 65 years in 2020–2030 for both sexes (i.e. no preferential treatment of females based on number of children);

Source: Author's calculations based on CZSO data (2003 – Czech Labour Market, Age Structure of the Czech Population; 2010–2050 – Population Projection).

Table 2 shows that the worsening age structure of the Czech population will lead to a significant decline in the total rate of economic activity among both males and females, even if we assume a rise in the specific rates of economic activity in the higher age categories (45–64 years). The effect of the expected decline in economic activity in the 15–24 age category is meanwhile negligible. According to Scenario 1, the rate of economic activity among males will fall by more than 13 percentage points by 2050 compared to 2003; in the same period that of females will decline by just under 11 percentage points. According to Scenario 2 the decline in the rate of economic activity will be slightly smaller for males (12.7 percentage points overall) and significantly smaller for females (7.2 percentage points overall) than in Scenario 1. The large difference in the results of the scenarios for females reflects the expected abolition of earlier retirement based on number of children in Scenario 2. Despite these differences, we can derive fairly similar conclusions from the results of the two scenarios, since even raising the retirement age to 65 years for both sexes will not prevent a significant decline in the economically active population (accompanied by a sizeable decrease in the total rate of economic activity). Compared to 2003, Scenario 2 predicts a 20.3% fall – and Scenario 1 a full 23.9% fall – in the number of economically active persons by 2050.

The above assumptions regarding the evolution of specific rates of economic activity and mortality rates are used to derive the total number of old-age pensioners each year. The inflow of new old-age pensioners each year is also calibrated. The initial data (for 2003) on the numbers and structure of old-age pensioners and their average nominal pensions are taken from the Statistical Yearbook of the Czech Social Security Administration (CSSA).

In this paper the definition of old-age pensioners covers those drawing an independent old-age pension, those drawing a proportional old-age pension, and widows and widowers drawing an old-age pension in combination with a widow's/widower's pension. The number of people drawing some other kind of pension (e.g. a full disability pension, an independent widow's/widower's pension or an orphan's pension) is not modelled explicitly in this paper, because it does not have a clearly interpretable link to the age structure of the population. In addition, however, one needs to bear in mind that the ratio of disability pensioners to the total number of pensioners is linked to some extent with the statutory retirement age. It is likely that as a result of the increase in the retirement age, the ratio of disability pensioners to the total number of pensioners will rise in the 55–64 age category, as a proportion of those unable

to draw an old-age pension will move into the disability pensioner category and not into the economically active section of the population. At the same time, though, it is clear that given the relatively strict rules governing eligibility for disability pensions, the number of disability pensioners in this age category cannot rise too significantly.

In 2003, 74% of all those drawing a pension were drawing an old-age pension (including proportional old-age pensions and old-age pensions in combination with widows'/widowers' pensions) and their share in total pension spending was 78%¹⁴. The share of those drawing a disability pension (including partial disability pensions and disability pensions in combination with widows'/widowers' pensions) was 21% and their share in total pension spending was 19%. The remainder consists of those drawing an independent widow's/widower's pension or an orphan's pension.

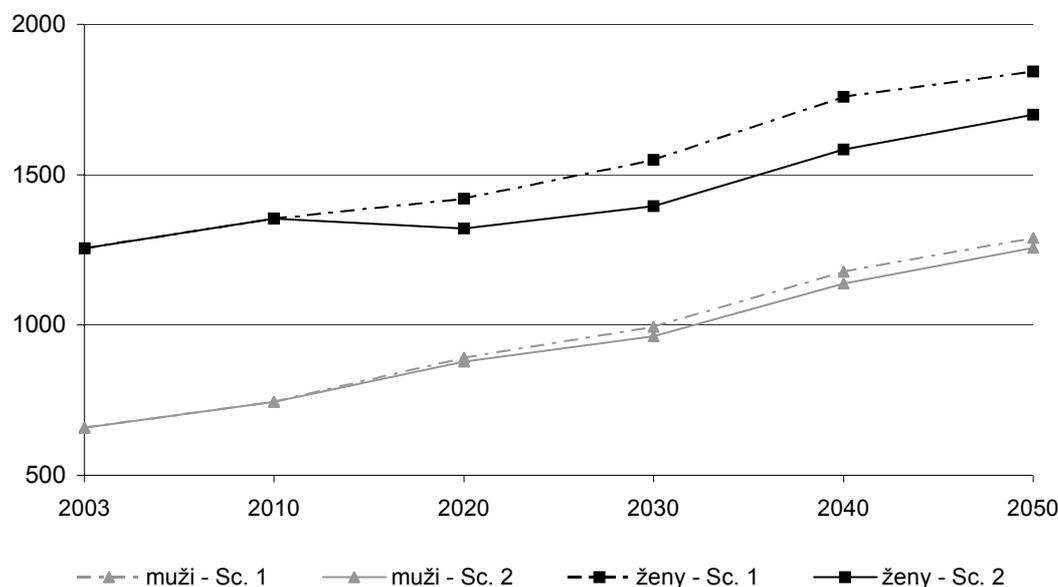
Owing to the increase in the retirement age and the restrictions on early retirement, we assumed a decrease in the share of pensioners in the population within the 50–65 age categories in the case of males and the 45–65 age categories in the case of females, in line with the projected increase in the specific rates of economic activity in these age categories. In the younger age categories we assume a zero number of old-age pensioners (as before), while in the over-64s category we assume that the 2003 ratios remain unchanged.¹⁵

The assumptions stated above, which would, given a stable Czech population¹⁶, result in a decline in the number of old-age pensioners, will not prevent a significant rise in the number of old-age pensioners over the reference period (see Chart 1) as a consequence of the significant ageing of the Czech population (i.e. a non-stable population). By 2050, the total number of old-age pensioners will thus have increased by 63.7% compared to 2003 according to Scenario 1, and by 54.4% according to Scenario 2. In absolute terms that means a rise in the number of old-age pensioners from the present 1.91 million to 3.13 million (Scenario 1) or to 2.96 million (Scenario 2) by 2050.

¹⁴ This also includes the portion of widows'/widowers' pensions that are paid as part of old-age pensions in combination with a widow's/widower's pension, as the CSSA statistics do not contain information on what proportion of the total amount paid is old-age pension and what proportion is widow's/widower's pension.

¹⁵ For a variety of reasons, the number of old-age pensioners in the over-64s category does not equal the number of economically inactive persons of this age. For this age category, the ratio of old-age pensioners to the economically inactive population is around 95% on average, being slightly higher among females than among males.

¹⁶ A stable population is typified by a constant age structure (free of distortion) resulting from constant mortality and fertility rates.

Chart 1: Expected numbers of old-age pensioners by sex, in thousands (two scenarios for change in retirement age)

Source: Author's calculations based on CZSO and CSSA data.

3.3. Macroeconomic scenarios

Pension expenditure and pension insurance revenues and their shares in GDP depend on the country's macroeconomic situation, i.e. on assumptions made about future macroeconomic developments. For this purpose we drew to some extent on the recommendations made at EU level in the EPC¹⁷ to project pension expenditure in the Czech Republic. In the case of the new member states, the EPC has so far only agreed on forecasts for selected macroeconomic indicators, as the current projection exercise¹⁸ did not start until 2004. For some indicators, therefore, this study used the assumptions made in the 2001 projection exercise for the Austrian economy (Part and Stefanits, 2001), which is the closest to the Czech economy in terms of structure among the EU-15. The suggestions and macroeconomic projections of the OECD were also respected. As in the case of the population projection, the original intention was to employ three basic variants – low, medium and high (see Table 3). The medium variant expresses the most probable future path, so it is this that receives the most attention.

¹⁷ Economic Policy Committee (which falls under the Council of the European Union).

¹⁸ This on the one hand updates the 2001 projection for the original EU-15 countries, and on the other hand models projections for the new member states for the first time.

The calculations use key variables expressed in nominal terms (i.e. nominal old-age pensions and GDP at current prices). Many of the previous studies measuring the impact of population ageing on the pension system have used real data, but given that the costs of the pension system are assessed using ratios (to GDP), and if we assume that the CPI and the GDP deflator follow the same path¹⁹, we can expect the price level effect to be eliminated and the calculation will not be complicated by conversion to real values. Moreover, Eurostat itself often publishes such data in nominal terms.

Table 3: Macroeconomic assumptions, three variants

	2003 ¹⁾	2010	2020	2030	2040	2050
Low variant:						
GDP growth at constant prices	3.1	1.6	1.0	0.7	0.3	0.5
GDP deflator growth	1.7	1.5	1.5	1.5	1.5	1.5
CPI growth	0.1	1.5	1.5	1.5	1.5	1.5
real wage growth	6.7	1.8	1.3	1.0	0.5	0.8
nominal wage growth	6.8	3.3	2.8	2.5	2.0	2.3
male unemployment rate	6.1	6.9	6.4	6.0	6.0	6.0
female unemployment rate	9.9	10.0	9.2	8.5	8.5	8.5
Medium variant:						
GDP growth at constant prices ²⁾	3.1	2.6	2.0	1.7	1.0	1.2
GDP deflator growth ³⁾	1.7	2.0	2.0	2.0	2.0	2.0
CPI growth ³⁾	0.1	2.0	2.0	2.0	2.0	2.0
real wage growth ⁴⁾	6.7	3.6	2.5	2.0	1.4	1.6
nominal wage growth ⁵⁾	6.8	5.7	4.6	4.0	3.4	3.6
male unemployment rate ²⁾	6.1	5.9	5.4	5.0	5.0	5.0
female unemployment rate ²⁾	9.9	9.0	8.2	7.5	7.5	7.5
High variant:						
GDP growth at constant prices	3.1	3.6	3.0	2.7	2.0	2.2
GDP deflator growth	1.7	3.0	3.0	3.0	3.0	3.0
CPI growth	0.1	3.0	3.0	3.0	3.0	3.0
real wage growth	6.7	4.6	3.5	3.2	2.7	2.9
nominal wage growth	6.8	7.7	6.6	6.3	5.8	6.0
male unemployment rate	6.1	5.0	4.4	4.0	4.0	4.0
female unemployment rate	9.9	8.0	7.2	6.7	6.7	6.7

¹⁾ Actual situation (CZSO);

²⁾ EPC and ECOFIN projections for Czech Republic;

³⁾ EPC 2001 projections for Austrian economy (Part and Stefanits, EPC 2001);

⁴⁾ derived from productivity growth;

⁵⁾ calculated (real wage growth deflated by CPI)

¹⁹ The CPI and changes in the GDP deflator can differ significantly in the short run due to the different definitions of these two price indices. The CPI tracks the prices of a fixed basket of consumer goods. Import prices are reflected in the prices of these goods in direct proportion (i.e. a rise in import prices causes the CPI to rise, and vice versa). The GDP deflator, by contrast, is a gross value added price index. It can fall in the short run even at a time of rising import prices, since rising prices of imported inputs increase the value of intermediate products, leading to a relative decrease in value added. In the long run, however, the average rates of growth of the CPI and the GDP deflator tend to converge (for example, over 1995–2003 the CPI averaged 5.5%, while the GDP deflator showed average growth of 5.8%). In the following analysis the time windows are set at 10 years (except for the initial period), allowing us to use the simplifying assumption that the CPI and changes in the GDP deflator follow similar paths.

In line with the Austrian projection, the medium macroeconomic variant for the Czech Republic assumes constant 2% exogenous growth in the GDP deflator and the CPI over the entire reference period.²⁰ At the same time it assumes similar real GDP growth in the Czech Republic as in Austria up to 2030; the growth here is assumed to be slightly higher because of the expected modest convergence of the new member states to the EU level, associated with a higher rate of GDP growth than in the EU-15 (based on the EPC's projections). In subsequent years (i.e. after 2030) it assumes slightly lower growth. At any given productivity level, and with falling employment (or a falling number of economically active persons), GDP at constant prices should steadily fall over the reference period to 1.0% between 2030 and 2040 and then rise slightly until 2050.²¹ These trends will be accompanied by a gradual decline in the unemployment rate to its structural level towards the end of the reference period as a result of the decrease in the economically active section of the population. The average real wage profile is set independently of the macroeconomic assumptions of the Austrian projection, as it is not explicitly defined in that projection. Assuming that the wage develops to some extent in line with productivity, average real wage growth is derived from real GDP growth. Average nominal wage growth is then obtained using real wages and the CPI.

The final assumption that needs to be specified at this stage, which, given its relationship to wages and potentially also to the CPI, can be ranked among the macroeconomic assumptions, concerns the evolution of the average nominal pension in the case of old-age pensioners (again for males and females separately).

In 2003, the basic average (nominal) old-age pension, calculated as the weighted average of all the types of old-age pension under consideration²² was CZK 7,999 for males and CZK 6,981 for females. In 1995–2003, the average old-age pension for both sexes went up at approximately the same rate as the nominal average wage (see Chart 2).²³ However, it is important to realize that the growth in the average old-age pension is affected by

²⁰ This assumption is consistent with the inflation target of the Czech National Bank of 2 % for the CPI.

²¹ All three macroeconomic variants work generally with slightly lower GDP growth than assumed in the previous available studies. This slight pessimism is due to the fact that many of the advanced economies (e.g. Japan and Germany) began to encounter economic stagnation at some point and it is possible that the Czech economy will find itself in the same situation in the long run, due, among other things, to its declining population.

²² The independent old-age pension, the proportional old-age pension and the old-age pension in combination with a widow's/widower's pension.

²³ The nominal average wage rose by 10.5% year on year on average in this period, while pensions increased by 10.2% year on year on average in the same period.

“generational turnover”. The average pension would have gone up even if pensions had not been indexed, because at each moment in time, pensions of “older pensioners” are ceasing to exist (as a result of deaths) and these pensions are lower than newly recognized pensions. This is because newly recognized pensions are derived from higher earnings and on the basis of a dynamic pension structure in which the earnings reduction level for the pension calculation is regularly increased. Future nominal pension growth must therefore be calculated from the weighted average of the projected pension level of existing pensioners (i.e. expected indexations) and newly recognized pensions (derived from the current average wage and the current earnings reduction levels).

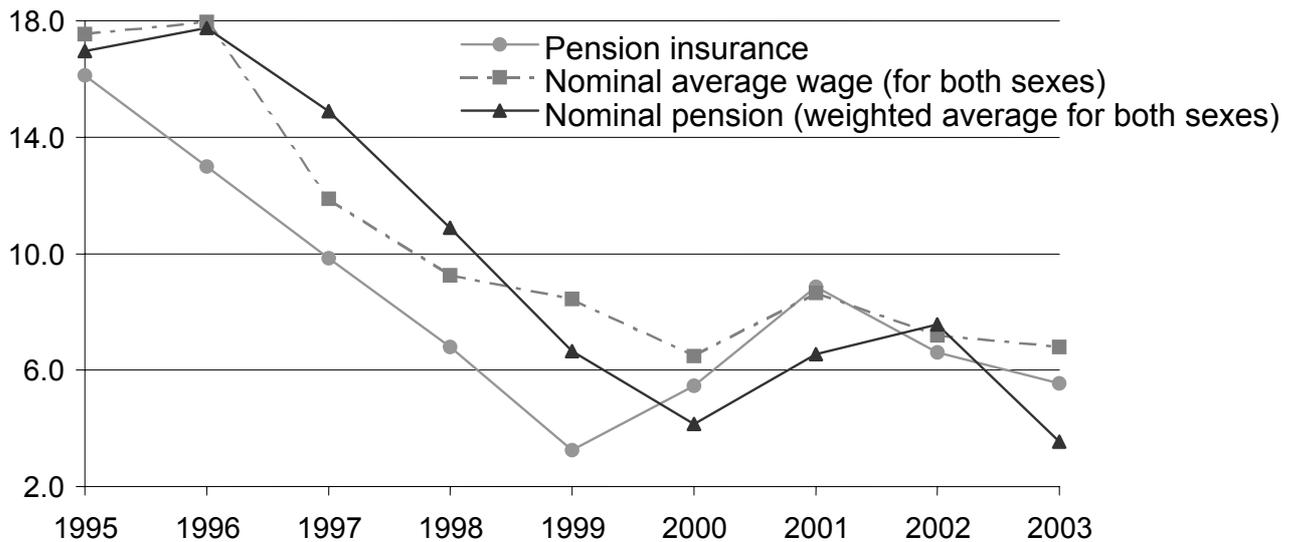
The basic rules for increasing existing pensions are laid down in the Pension Insurance Act. In the past, the increases in pensions of all types were derived from the CPI, while real wage growth also had to be taken into consideration at least once every two years (by at least one-third). Also worth mentioning is the proposed “Main Principles of the Pension System Reform”²⁴, which recommended indexing nominal pensions each year to the growth in the premium actually paid in the previous period, and at least in line with inflation. In other words, this proposal contained a guarantee to at least maintain the so-called real value of recognized pensions. In the longer term, this proposal would thus have led to the existing practice of CPI indexation of pensions, since the volume of pension insurance payments collected will start to decrease as the number of economically active persons declines, and this fall in the rate of growth will probably gradually turn negative, even assuming higher nominal wage growth than CPI growth. Although this proposal was ultimately rejected, it reveals some unwillingness on the part of politicians to permit pension indexation of less than consumer price inflation. Based on this experience, therefore, the following analysis assumes that for existing old-age pensioners the nominal average pension will be indexed to the CPI. In addition, we discuss the variant of indexing existing pensions to nominal wage growth. This second variant, however, is intended more as an extreme solution, representing the probable ceiling for existing pensioners’ average nominal pension.

In the case of newly recognized old-age pensions we will assume for both variants that the current system of calculating pensions in relation to previous nominal income (converted using the relevant coefficients into “current purchasing power”) stays in place. We also

²⁴ Dating from the second half of 2003.

assume that the basic portion of the pension and the amounts used to quantify the assessment base (the “personal assessment base reduction level”) for deriving the level of newly recognized pensions will be adjusted each year so that they comply with the international conventions on minimum pension insurance standards as ratified by the Czech Republic in the past (or at least the less strict ones).²⁵

Chart 2: Nominal wages, nominal pensions and pension insurance revenues (y-o-y changes in %)



Source: CSSA Premium Collection Statistics, CSSA Statistical Yearbook, CZSO Registered Number of Employees and Their Wages.

3.4. Estimate of the future evolution of the pension system and simulation of changes in selected parameters

To assess the evolution of total old-age pension expenditure, most studies use its ratio to GDP. This stood at 6.7% in the Czech Republic in 2003, a figure that can be viewed as pretty much the “norm” on the European scale.²⁶ However, this ratio will increase significantly in the Czech Republic in future years, irrespective of the macroeconomic variant, the method of indexation of existing pensions and the retirement age scenario.

²⁵ The Czech Republic has ratified two ILO conventions relating to minimum pension insurance standards – Convention 128 and Convention 102. Convention 102 and European law require the old-age pension to be 40% of the wage in the year preceding the retirement year. Convention 128 is stricter, requiring a ratio of 45%. The Czech Republic is compliant with these requirements in the case of newly recognized old-age pensions as a percentage of the average nominal net wage in the preceding year.

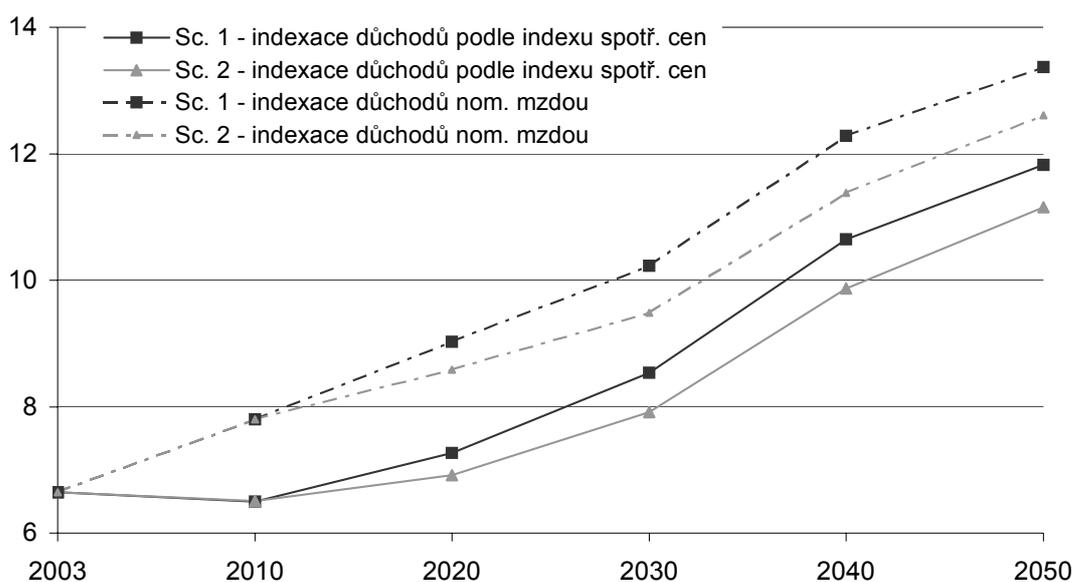
²⁶ The ratio of old-age pension expenditure to GDP in the Czech Republic in 2003 was affected by a revision to the level of GDP (at the request of Eurostat), which led to a slight reduction of this ratio and thus an improvement in the starting position for future developments.

Under the medium macroeconomic variant, and provided that the minimum retirement age stays at 63 years for males and 59–63 years for females (Scenario 1), the ratio of old-age pension expenditure to GDP at current prices will reach 11.8% in 2050 if existing pensions are indexed to the CPI. In the case of indexation to the nominal wage, the ratio will double (to 13.4%) by 2050 compared to 2003.

If the minimum retirement age is raised to 65 years for both sexes (Scenario 2), the growth in the ratio of old-age pension expenditure to GDP at current prices over the entire reference period will be slightly lower (reaching 11.2% by 2050 in the case of CPI indexation and 12.6% in the same period in the case of nominal wage indexation).

Going forward, this ratio implies that the growth (in percentage points) will peak between 2030 and 2040 for all variants, owing to relatively higher growth in the number of pensioners in this period. Thanks to a higher proportion of females in the total number of old-age pensioners (around 60% depending on the year and the variant), their share in total pension spending will be higher despite the fact that their average monthly pension will, as usual, be lower than that of males. This means that in 2050 around 55% of the total pension volume will be paid to females.

Chart 3: Ratio of old-age pension expenditure to GDP at current prices – two scenarios for retirement age (medium macroeconomic variant)



Source: Author's calculations based on CZSO and CSSA data.

The aforementioned results imply that measures to raise the retirement age to 65 have relatively little impact on old-age pension expenditure. The method of indexation of existing pensions has a slightly greater effect. In terms of reducing the costs of the system it is better to index to the CPI, although this leads to a reduction in pensioners' purchasing power, or to a relatively significant reduction in the ratio of the average nominal old-age pension to the average gross nominal wage (from 43.3% in 2003 to 37.6% in 2050). The ratio of the average nominal old-age pension to the average gross nominal wage would thus be below 40% in 2050, i.e. below the threshold the Czech Republic pledged to comply with by ratifying ILO Convention 102. Under this interpretation, however, the ratio must be computed using net nominal wages, because nominal pensions are not currently taxed in the Czech Republic. Switching to net wages in the calculation would increase the ratio above the required level for 2050 as well.

Table 4: Ratio of old-age pension expenditure to GDP at current prices – three macroeconomic variants, two scenarios for retirement age, two methods of indexation of existing pensions, in %

	2003	2010	2020	2030	2040	2050
Low variant:						
Scenario 1: CPI indexation	6.7	6.7	7.5	8.7	10.5	11.5
nominal wage indexation	6.7	7.4	8.4	9.5	11.2	11.9
Scenario 2: CPI indexation	6.7	6.7	7.1	8.0	9.8	10.9
nominal wage indexation	6.7	7.4	8.0	8.8	10.4	11.3
Medium variant:						
Scenario 1: CPI indexation	6.7	6.5	7.3	8.5	10.6	11.8
nominal wage indexation	6.7	7.8	9.0	10.2	12.3	13.4
Scenario 2: CPI indexation	6.7	6.5	6.9	7.9	9.9	11.2
nominal wage indexation	6.7	7.8	8.6	9.5	11.4	12.6
High variant:						
Scenario 1: CPI indexation	6.7	6.2	6.8	7.9	10.0	11.4
nominal wage indexation	6.7	7.8	9.0	10.4	12.9	14.4
Scenario 2: CPI indexation	6.7	6.2	6.4	7.4	9.3	10.8
nominal wage indexation	6.7	7.8	8.6	9.7	11.9	13.6

Source: Author's calculations based on CZSO and CSSA data.

As stated above, old-age pension expenditure accounted for 78%²⁷ of total pension spending in 2003. If we accept the assumption that this percentage will not change in the future, we can easily derive both the future path of total pension spending and its ratio to GDP at current prices. By comparing this with projected pension insurance revenues we can also estimate the

²⁷ This also includes the portion of widows'/widowers' pensions that are paid as part of old-age pensions in combination with a widow's/widower's pension, as the CSSA statistics do not contain information on what proportion of the total amount paid is old-age pension and what proportion is widow's/widower's pension.

approximate deficit between pension system revenues and expenditure (or the pension account shortfall) in the period until 2050.

According to the medium macroeconomic variant, and keeping the ratio of old-age pension expenditure to total pensions constant, the ratio of total spending on pensions of all types to GDP at current prices could be between 14.3% and 17.1% in real terms in 2050 (depending on the statutory retirement age and on the method of indexation of existing pensions – see Table 5). Moreover, these data are still slightly underestimated, because they include only pension insurance benefits and not growth in incapacity pensions, which are also covered out of pension insurance even though they are social security benefits.

As mentioned above, an amendment to the pension insurance act entered into force on January 1, 2004. Besides raising the retirement age and restricting the options for early retirement, this amendment also modified the pension insurance premium rate and changed the rules for determining the premium for self-employed persons. The pension insurance premium rate was increased from 26% to 28% of the assessment base. This change was caused by the transfer of a portion of the contribution collected for the state employment policy to the pension insurance system, which means that the premium rate for the state employment policy was lowered by the same amount (2 percentage points). In the self-employed category, a minimum assessment base for the pension insurance calculation was also stipulated for loss-making individual entrepreneurs. A stepwise increase in the minimum assessment base was simultaneously set for both profit-making and loss-making entrepreneurs.²⁸

Owing to different conditions for levying the premium, the assessment base has to be set separately for employees and for self-employed persons. In the case of employees, the average assessment base for the premium has been around 9% below the average wage over the past five years. In the case of entrepreneurs, it has been substantially lower, at only around

²⁸ Self-employed persons who carry on independent gainful activity as their principal activity must participate in the pension insurance system regardless of their level of income, at a rate of 28% of the assessment base. The minimum assessment base for determining the premium for profit-making self-employed persons will increase during 2004–2006 from 35% to 50% of the difference between income and expenditure. Self-employed persons recording a low or negative profit will be required to pay a pension insurance premium and a contribution to the state employment policy derived from the minimum assessment base – set at 20% of the average wage in 2004, 22.5% in 2005 and 25% in 2006.

25.5% of the average wage. Meanwhile, entrepreneurs accounted for 16% of total employment in 2002 and 17.1% in 2003²⁹.

Given these facts, we assume that for employees (including members of production cooperatives) the current ratio of the average wage to the assessment base will remain unchanged over the entire reference period (i.e. until 2050). In the case of entrepreneurs we assume this ratio will rise to 40% owing to measures stemming from the amended the pension insurance act. We also assume that the share of entrepreneurs in total employment will rise further slightly then flatten out at 18%. The past ten years (between 1994 and 2003) saw a larger increase in the number of entrepreneurs (5.5 percentage points in total), but this was linked with the process of restructuring of the Czech economy, which is now weakening sharply in intensity, so a similar trend cannot be expected in future years. Moreover, the reform of public finances is likely to prevent a major rise in the number of entrepreneurs.

Total social insurance revenues were estimated on the basis of the aforementioned assumptions. In order to derive the impact of the increase in the pension insurance rate, simulations were performed both for the present 28% rate and for an unchanged rate of 26% of the assessment base. To better illustrate the evolution of social insurance revenues in 2003–2050, their ratio to GDP at current prices is used (see Table 5). We should point out here that the given values are somewhat overestimated as a result of not excluding females on maternity leave from the number of employees³⁰ and also as a result of assuming a 100% premium collection success rate in relation to prescribed premiums³¹. However, the numbers are underestimated due to the exclusion of insurance-related fines, penalties and surcharges.

²⁹ The entrepreneurs category comprises employers working on their own account as well as assisting family members. The remaining employment consists of employees and members of production cooperatives.

³⁰ Employee numbers are obtained by calculation from the economically active population, subtracting the numbers of unemployed persons and the numbers of entrepreneurs, but not the numbers of females on maternity leave, who are, however, included in the numbers of economically active individuals. Over the last ten years, females on maternity leave have accounted for around 3% of the economically active population.

³¹ The ratio of total premium collection to total prescribed premiums (including fines and penalties) has been improving in recent years, reaching 99.4% in 2003.

Table 5: Ratios of expenditure on all pensions, total social insurance revenues and the pension insurance account (the difference between pension system revenues and expenditure) to GDP at current prices, in % (medium macroeconomic variant)

	2003 ¹⁾	2010	2020	2030	2040	2050
Expenditure on all pensions (medium variant):						
Scenario 1: CPI indexation	8.5	8.3	9.3	10.9	13.6	15.2
nominal wage indexation	8.5	10.0	11.6	13.1	15.7	17.1
Scenario 2: CPI indexation	8.5	8.3	8.9	10.1	12.6	14.3
nominal wage indexation	8.5	10.0	11.0	12.2	14.6	16.2
A) Social insurance revenues (pension insurance rate = 26% of assessment base):						
Scenario 1	7.9	8.9	9.2	9.0	8.4	7.8
Scenario 2	7.9	8.9	9.5	9.4	8.8	8.2
B) Social insurance revenues (pension insurance rate = 28% of assessment base from 2010 onwards):						
Scenario 1	7.9	9.6	9.9	9.7	9.0	8.4
Scenario 2	7.9	9.6	10.2	10.1	9.5	8.8
Re A) Pension insurance account (difference between pension insurance revenues and pension insurance benefit expenditure):						
Scenario 1: CPI indexation	-0.7	0.5	-0.1	-1.9	-5.3	-7.3
nominal wage indexation	-0.7	-1.1	-2.4	-4.1	-7.4	-9.3
Scenario 2: CPI indexation	-0.7	0.5	0.6	-0.8	-3.8	-6.1
nominal wage indexation	-0.7	-1.1	-1.5	-2.8	-5.8	-8.0
Re B) Pension insurance account (difference between pension insurance revenues and pension insurance benefit expenditure):						
Scenario 1: CPI indexation	-0.7	1.2	0.6	-1.2	-4.6	-6.7
nominal wage indexation	-0.7	-0.4	-1.7	-3.4	-6.7	-8.7
Scenario 2: CPI indexation	-0.7	1.2	1.3	0.0	-3.2	-5.5
nominal wage indexation	-0.7	-0.4	-0.8	-2.0	-5.1	-7.3

¹⁾ Actual situation (author's calculations based on CZSO and CSSA data);

Scenario 1 – retirement age of 63 years (or 59–63 years for females depending on number of children) from 2013 until end of reference period;

Scenario 2 – minimum retirement age increased to 65 years in 2020–2030 for both sexes (i.e. no preferential treatment of females based on number of children);

Source: Author's calculations based on CZSO and CSSA data.

The results presented in Table 5 and Chart 4 show that if the demographic projection prevails and the other parameters of the present PAYG system remain unchanged, the system will run up a sizeable deficit regardless of the retirement age and pension insurance rate assumed. This deficit will expand most significantly between 2030 and 2050, as pension expenditure in this period will show disproportionately high growth in relation to pension insurance revenues. The ratio of pension insurance revenues to GDP at current prices will rise slightly in 2010–2030, but will subsequently tail off.

If the pension system is left in its current form, i.e. a PAYG system and a 28% pension insurance rate with an unchanged retirement age of 63 years for males and 59–63 years for females (after 2013, i.e. Scenario 1, Re B)), and if the given demographic and macroeconomic scenarios prevail, the pension account deficit (defined as the difference between pension

insurance revenues and pension insurance benefit expenditure) will ultimately reach 6.7–8.7% of GDP in 2050, depending on the pension indexation method. Were the minimum retirement age to be increased to 65 years for both sexes, the pension account deficit in 2050 would be around 1.3 percentage points lower, but would still be high. This confirms the conclusions stated earlier that raising the retirement age has relatively little effect in the long term and merely postpones the solution to the problem of the unsustainable current pension system to later years.

Raising the pension insurance rate from 26% to 28% also has a relatively minor effect on the pension account deficit. The simulation of the effect of a change to the pension insurance rate in fact reveals that this impact is roughly twice as small as that of raising the retirement age (around 0.6 percentage point). To balance the pension account the pension insurance rate would have to be raised to around 45% of the assessment base, and that is assuming relatively favourable pension system parameters, i.e. an increase in the retirement age to 65 years and indexation of existing pensions to the CPI. However, such a rise in the pension insurance rate is probably politically unfeasible.

4. Conclusion

The Czech Republic's political representatives are currently faced with the tough task of reforming the pension system, as the existing PAYG system appears to be unsustainable in the light of the projected significant ageing of the Czech population. Moreover, the Czech population will be one of the oldest in the world according to the projections of various different institutions (UN, OECD etc.). Under the assumptions of the current medium variant of the CZSO's population projection, the number of people in the 65+ age category will more than double by 2050 compared to 2003. The number of individuals of productive age will, by contrast, fall substantially. Although all the evidence suggests that the Czech pension system needs fundamental reform, the responsible government representatives are currently disinclined to make the necessary changes. So far, only a few changes have been made to the parameters of the existing pension system, but these will not bring about long-term stability.

True, initial attempts have been made to propose new principles for the pension insurance system, but these have not met with much success. A proposal entitled "Main Principles of the Pension System Reform" was tabled in the second half of 2003 and discussed by the

government in early 2004. This concept proposed a move towards a notional defined contribution (NDC) PAYG pension insurance system. The key element of this proposal was an push to make pensions more dependent on past earnings, or to achieve higher pension insurance contributions. And although it also aspired to deliver a sustainable pension system, it failed to offer an acceptable starting point with regard to meeting the future pension financing costs. This proposal was not adopted at the relevant government meeting in early 2004 and a solution was again deferred. The prospects for the current system as regards sustainability meanwhile give cause for concern, and the likelihood that acceptable parametric changes to the system can resolve the situation is small. Assuming that the retirement age is raised to 65 years for both sexes, and given indexation of existing pensions to the CPI, the pension account deficit will rise to 5.5% of GDP by 2050 if the assumptions of the medium variants of the macroeconomic and population scenarios prevail. A further increase in the retirement age, however, would not bring about any significant decrease in this deficit. To balance the pension account, the pension insurance rate would thus have to rise to an unacceptable 45%.

The next step taken by the government was therefore to set up a team of experts (the “Executive Team”) and a working group (under the Resolution of the Czech Government of June 23, 2004 on the organizational arrangements for the preparation of source documents for the decision on the pension reform in the Czech Republic), which drew up source documents for the decision on the pension reform in the Czech Republic by mid-2005. The starting point of the final report of this working group was that current pension system in the Czech Republic is unsustainable and parametric changes could not solve the problems of the system, i.e. the same conclusion as we got. According to their calculations the pension account deficit will reach 4-5 % of GDP per year in the long run if no pension reform is introduced or substantial parametrical changes are not approved.³² The main part of the report was devoted to simulations of different types of the pension system reforms suggested by parliamentary political parties. These simulations were considered to be the starting point for the following discussion about the pension system reform which should be accepted across the political parties. Nonetheless, no further progress has been made with the pension reform since then.

³² The simulation model of the Bezdek’s executive team was based on work with probabilities (more specifically on probabilities that representatives of given sex and year of birth will draw a pension in given calendar year or will start to draw a pension in given calendar year). Using the probabilities the total number of pensions which are drawn/are starting to be drawn in given calendar year was calculated. Assumption about future development of average pensions was very similar to ours. Hence the executive team also did not employ any dynamic general equilibrium model in order to simulate future prospects of the Czech pension system.

Tackling the pension problem involves more than just balancing pension system revenues and expenditure in accounting terms. It has a wider social context. The notion that there is a relative small and limited number of options for changing the pension system, and that these options can be easily quantified and the best one chosen, is highly simplistic. The number of options is virtually infinite – what we need is not a book quantification of individual model examples, which depend, among other things, on a host of arbitrarily selected assumptions, but a society-wide consensus on the vision for the pension system and a deeper analysis of the institutional aspects of a more sweeping reform of the existing system – covering, for example, what the relationship between old-age pensions and past wages should be, whether the state should assume part of the financial risk, how to guarantee the standard of living of those whose savings are wiped out by pension funds that invest unwisely, what instruments pension funds should be allowed to invest in and what real yields we can expect given current macroeconomic trends in the advanced nations, how yields on pension fund savings should be taxed, what form state regulation should take, and so on.

Pension reform is a complex issue. No clear, simple and quick solution exists anywhere in the world. The option chosen for the Czech pension system should take into account the experience of countries that are further down the road in this area, as well as domestic institutional specificities. It is also important to realize that no matter how good the strategy is, it will not in itself stabilize the pension system. Specific actions and political feasibility are vital.

5. References

Ageing and Employment Policies, Czech Republic. Paris, OECD 2004.

Banks, J., Blundell, R., Disney, R., Emmerson, C.: Retirement, Pensions and the Adequacy of Savings: A Guide to the Debate. IFS London, Briefing Note No. 29, October 2002.

Barr, N.: Reforming Pensions: Myths, Truths, and Policy Choices. IMF WP No. 139, 2000.

Bezděk, V.: O jednom z možných scénářů reformy penzijního systému v České republice (polemika) [*On One of the Possible Pension Reform Scenarios in the Czech Republic (Polemic)*]. *Politická ekonomie*, 2001, No. 2.

Benda, V.: Vliv změny směnných relací na úroveň HDP a jeho deflátor [*The Effect of Change in the Terms of Trade on GDP and the GDP Deflator*]. Contribution to Seminar on External Economic Factors. Prague, CNB, November 2001.

Bezděk, V.: Státní penzijní systém v České republice – současný stav a potřeba reforem [*The State Pension System in the Czech Republic – The Current Situation and the Need for Reform*]. Prague, CNB, March 2000.

Bezděk, V., Dybczak, K., Krejdl, A.: Fiscal Implications of Population Ageing. *Finance a úvěr*, 2003, No. 11–12, pp. 562–591.

Boldrin, M., De Nardi, M., Jones, L. E.: Fertility and Social Security. Cerge-EI macro workshop handout, 4–5 June 2004.

Bulíř, A.: Budoucnost penzijního systému v ČR [*The Future of the Pension System in the Czech Republic*]. *Finance a úvěr*, Issue 48, No. 1, 1988, pp. 1–6.

Burcin, B., Kučera, T.: Perspektivy populačního vývoje České republiky na období 2003 – 2065 [*Czech Population Prospects 2003–2065*]. Faculty of Science, Charles University, Prague, 2003.

Česká republika: hlavní makroekonomické ukazatele [*The Czech Republic – Main Macroeconomic Indicators*]. Prague, CZSO, 2004. (http://www2.czso.cz/csu/redakce.nsf/i/cr:_makroekonomicke_udaje)

Dang, T. T., Antolin, P., Oxley, H.: Fiscal Implications of Ageing Projections of Age-related Spending. OECD Economic Department WP No. 305, Paris, 2001.

Diamond, P.: The Economics of Social Security Reform. NBER 1998 (WP 6719).

Dybczak, K.: Generational Accounts in the Czech Republic.

Economic Policy Committee: Illustrative Long Run Growth Projections for the EU15 and AC10 Countries up to 2050. ECFIN/214/04-EN, Brussels, 2004.

Economic Policy Committee: Reform Challenges Facing Public Pension Systems: The Impact of Certain Parametric Reforms on Pension Expenditure. Brussels, 5 July 2002. (http://europa.eu.int/comm/economy_finance/epc_en.htm)

Economic Policy Committee: Budgetary Challenges Posed by Ageing Populations: The Impact on Public Spending on Pensions, Health and Long-term Care for the Elderly and Possible Indicators of the Long-term Sustainability of Public Finances. Brussels, 24 October 2001.

Eatwell, J.: The Anatomy of the Pensions “Crisis” and Three Fallacies on Pensions. CERF, JIM, 2003.

Eurostat: Classification of Funded Pension Schemes in Case of Government Responsibility or Guarantee. Eurostat news release 30/2004 – 2 March 2004.

Evidenční počet zaměstnanců a jejich mzdy [*Registry Number of Employees and their Wages*]. Prague, CZSO 1995–2003.

Hyzl, J., Kulhavý, M., Rusnok, J.: Možné léčby krize důchodových systémů [*Possible Cures for the Pension System Crisis*]. Euro, 2004, No. 25, pp. 58–64.

Ježek, M.: A Microanalysis of Pension Reform: To Switch or Not to Switch in the Czech Republic? *Finance a úvěr*, No. 11–12, 2003 pp. 510 onwards.

Kubíček, J.: Fondový penzijní systém v konvergující ekonomice [*The Funded Pension System in a Converging Economy*]. Institute for Economic and Environmental Policy, WP No. 1/2004, Prague.

Mora, M.: Pension Policy in the Czech Republic: Lessons from a Comparative Study with Hungary and Poland. Europa-Kolleg Hamburg, October 1999.

Draft Resolution of the Government of the Czech Republic on the “Main Principles of the Pension System Reform”, discussed in January 2004.

Oksanen, H.: Pension Reforms: An Illustrated Basic Analysis. European Commission, Economic Papers, No. 201, April 2004.

Part, P., Stefanits, H.: Austria: Public Pension Projection 2000–2050, EPC 2001. (http://europa.eu.int/comm/economy_finance/epc/documents/a_en.pdf)

Pojistně-matematická zpráva o sociálním pojištění [*Actuarial Report on Social Insurance*]. Prague, Ministry of Labour and Social Affairs, Social Insurance Department, 2004.

Pavlík, Z., Kučera, M.: Populační vývoj České republiky 1990–2002 [*Population Development of the Czech Republic 1990–2002*]. Faculty of Science, Charles University, Prague, 2003.

Projekce obyvatelstva ČR do roku 2050 [*Czech Population Projection until 2050*]. Prague, CZSO, 2004. (<http://www.czso.cz/csu/edicniplan.nsf/p/4020-03>)

Příprava podkladů pro rozhodování o pokračování důchodové reformy v letech 2004 až 2005 (činnost tzv. Bezděkovy komise), <http://www.mpsv.cz/cs/2228>

Rutarová, R.: Populační vývoj a ekonomická aktivita obyvatel České republiky v letech 1993–2002 a výhled do roku 2050 [*Population Development and Economic Activity of the Population of the Czech Republic in 1992–2002 and Outlook to 2050*]. *Politická ekonomie*, 2004, No. 3, pp. 356–374.

Schneider, O.: Dynamický model důchodové reformy v ČR [*A Dynamic Model of Pension Reform in the Czech Republic*]. *Finance a úvěr*, Issue 48, No. 1, 1998, pp. 55–65.

Statistická ročenka ČSSZ za rok 2003 [*CSSA Statistical Yearbook for 2003*]. Prague, CSSA, 2004. (<http://www.cssz.cz/statistiky/rocenka2003/default.asp>)

Statistická ročenka České republiky za roky 1999 - 2003 [*Statistical Yearbook of the Czech Republic for 1999–2003*]. Prague, CZSO, 2000–2004.

Statistika výběru pojistného za rok 2003 [*Premium Collection Statistics for 2003*]. Prague, CSSA, 2004. (http://www.cssz.cz/statistiky/vyber_pojistneho_2003/default.asp)

Trh práce v České republice 1993 – 2003 [*Czech Labour Market 1993–2003*]. Prague, CZSO, 2004. (<http://www.czso.cz/csu/edicniplan.nsf/p/3103-04>)

Věkové složení obyvatelstva ČR v roce 2003 [*Age Structure of the Czech Population in 2003*]. Prague, CZSO 2004. (<http://www.czso.cz/csu/edicniplan.nsf/p/4003-04>)

VÚPSV: Monitoring I: Analýza důchodových reforem z hlediska české důchodové reformy [*Analysis of Pension Reforms with Regard to the Czech Pension Reform*]. May 2003.

Vývoj obyvatelstva České republiky v roce 2003 [*Czech Population Development in 2003*]. Prague, CZSO, 2004. (<http://www.czso.cz/csu/edicniplan.nsf/p/4007-04>)

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

www.csu.cz (Czech Statistical Office)

www.cssz.cz (Czech Social Security Administration)

Závěrečná zpráva, výkonný tým pro důchodovou reformu, Praha 2005.
(http://www.mpsv.cz/files/clanky/2235/zaverecna_zprava.pdf)

III. Models of Political Cycles: The Czech Experience

Abstract:

This paper studies whether the dynamic behaviour of real GDP, unemployment and inflation is systematically affected by the timing of elections and by changes of government in the Czech Republic. Two basic models of political cycles are tested – political business cycle models and partisan theories. Political business cycle models emphasize the opportunistic behaviour of incumbents who strive to get re-elected regardless of party affiliation. On the other hand partisan politicians are faithful to their ideological opinions and therefore attract a specific constituency. The tests partly support the opportunistic motives for the behaviour of Czech politicians. On the contrary, suppositions of partisan motives were not proved.

Keywords: fiscal policy, political cycle, models of political business cycle, partisan theories

JEL: E-32, E-61, E-62, C-22

1. Introduction

2006 was an election year in the Czech Republic. This was reflected in the adoption of a series of household-friendly measures and the further postponement of much needed pension and health reforms. The run-up to the elections saw the approval of “crayon allowances” for first-formers, a hike in maternity grants, a doubling of family allowances, changes to numerous social benefits, an additional rise in pensions, and so on. The increased burden on the expenditure side in the form of increased mandatory spending, coupled with a decreasing tax burden³³, increased the deficit pressures on Czech public finances. Although the final fiscal outcome in 2007 was significantly better than expected due to very high direct taxes collection, this behaviour of former Czech government could be considered as a typical example of failure of fiscal policy performance

The fiscal policy motives of incumbents are dealt with in the “political cycle theories”, which began to be developed in the 1970s. They crystallized into two main groups of theories: the political business cycle theories (also called opportunistic theories) and the partisan theories. Aside from these two main groups of theories, alternative political cycle theories also have started to emerge. Some of the newer approaches, for example, combine selected aspects of the two main theories, because the conclusions of one cannot usually be fully rejected in favour of the other.

As the economic theories of the motives for incumbents’ behaviour have developed, many economists have started to test the theories on empirical data. The first analyses were conducted on post-war data in the USA. A series of similar studies for other developed economies followed. More recently, panel data and suchlike have been applied. Tests have been performed for the presence of political cycles using both macroeconomic variables and fiscal indicators (e.g. public finance deficits, public sector spending, taxes and tax structures). Although the conclusions of such analyses have often been ambiguous, many studies suggest that the partisan motive is stronger. In the case of the new democracies, the presence of political business cycles has also been confirmed using public finance deficits (Brender and

³³ Corporate income tax rates have been falling since 2004. In 2006, the lowest personal income tax rates were also cut, more goods were transferred to the reduced VAT rate, etc. The only exception to the downward trend is excise duties, which are generally rising as a result of harmonization with EU legislation.

Drazen, 2004).³⁴ Such cycles are characterized by growing deficits in election years, although only for a few terms of office following the establishment of democracy.

The political business cycle in the Czech Republic has so far been tested to a very limited extent, usually in panel studies. The sensitivity of macroeconomic indicators to the electoral cycle in the Czech Republic has not been tested at all. This is due to problems with the existing data base, which tends to have short time series subject to frequent major revisions. What is more, the Czech economy went through a period of transformation in the 1990s, a period linked with numerous structural changes and several specific shocks (for instance the 1997 financial crisis). Recent political situation and the adoption of a series populist measures linked with the election year nonetheless indicates a need to look again at the possible motives for politicians' behaviour and the ensuing potential risks. This means more than simply pointing out that most incumbents will probably try to push through popular measures in an attempt to get re-elected. It means examining the extent to which such behaviour affects the Czech economy and the extent to which partisanship can be observed in the behaviour of Czech incumbents.

The aim of this paper is consistent with the aforementioned need to study the extent to which macroeconomic variables (GDP, unemployment and inflation) are systematically affected in the Czech Republic by the timing of elections and by changes of government. Two basic above mentioned models of political cycles are tested using the relatively traditional method of Alesina and Roubini (1990). Attention is also focused on the likely impact of the electoral cycle on fiscal indicators.³⁵ We do not set out to explain the procyclicality of fiscal policy in the Czech Republic, since that is by no means related to the political cycle alone. Before the actual testing of the political cycle theories in the Czech economy, the following section briefly describes the major theoretical approaches to this subject.

³⁴ "New democracies" here means the states that started to establish democratic systems between the late 1970s and the early 1990s. They include the former Soviet-bloc countries (including the Czech Republic). According to Brender and Drazen, manipulation of the business cycle is possible in such countries because voters are inexperienced with electoral politics or lack the information needed to evaluate fiscal measures.

³⁵ We plan to test these in later studies.

2. Models of political cycles

The economic theory contains two main groups of models that variously explain the motives for politicians' behaviour and how this behaviour affects the business cycle of the country in question, namely the political business cycle models (e.g. Nordhaus, 1975) and the partisan models of political cycles (e.g. Hibbs, 1977). The first generation of both types of model was developed in the 1970s, whereas the second dates from the late 1980s and early 1990s. In both generations, the main tool used to express political parties' preferences was the Phillips curve, which plots the negative relationship between inflation and the unemployment rate.

The main difference between the two generations of models, conversely, lay in the nature of the expectations of economic agents. The first generation assumed adaptive expectations (i.e. voters assess incumbents on how output and inflation evolve over their term of office, with the weight of their past observations gradually diminishing over time). The second generation took account of rational expectations (i.e. voters also assess incumbents on their party affiliation, their expected preference between inflation and unemployment – not only at election time – and so on). Following the incorporation of rational expectations these two groups of models were renamed the rational political business cycle models (e.g. Persson and Tabellini, 2000) and the rational partisan models (e.g. Alesina, 1990). In addition, the current theoretical literature dealing with political cycles admits that politicians are guided in their behaviour by a combination of opportunistic and partisan motives simultaneously, i.e. they combine partisan motives with career interests.

The political business cycle (PBC) theories, which are also often referred to as opportunistic models, assume that incumbents attempt primarily to maximize their own popularity and their probability of re-election regardless of party affiliation. Politicians who are in power or have a say in the decision-making process try to manipulate the economy to achieve their goals. Unpopular economic and political measures tend to be introduced very soon after elections, whereas popular measures are planned for just before elections. Incumbents interfere primarily with public spending, which they control directly. These discretionary fiscal interventions in turn affect macroeconomic variables. Every government thus pursues the same policy – stimulating economic performance in the pre-election period (accompanied with upturn in economic growth and lower unemployment), setting off a recession after the elections and preparing favourable conditions for the next pre-election period. The after-

election recession is a result of a monetary policy tightening aimed at cutting inflation which rises around the election time and immediately thereafter (as inflation responds with a lag to the pre-electoral economic expansion).

The incorporation of rational expectations into the political business cycle models (to form RPBC models) modifies voters' decisions in elections in the sense that those decisions reflect expectations regarding the future actions of the parties' representatives. In their expectations, voters also take into account politicians' past actions and party affiliation, i.e. their expected preference between inflation and unemployment etc. To some extent, then, the RPBC models can take account of partisanship in politicians' behaviour. Politicians are interested in their careers but simultaneously usually represent a particular political party, and voters rate them according to this affiliation. Owing to the existence of information asymmetry, under rational expectations one can expect voters to be swayed to some extent by an intentional stimulation of the economy in the pre-election period. However, cycles should be shorter and less regular than in the case of the PBC models. In the RPBC models, the relationship between output and the election date is not entirely clear, as efforts by incumbents to manipulate inflation and unemployment can imply either upswings or downswings in output.

More recent studies examining the RPBC theories emphasize the role of signalling (Rogoff and Sibert, 1988; Rogoff, 1990), adding that the political cycle can be observed more in the evolution of fiscal policy, as the impact on output and inflation is limited. As in the traditional RPBC models, the political cycle in public finances is driven by temporary information asymmetries between politicians and the electorate. The key assumption is that the government has information on its performance (e.g. in the area of public finances) in advance of the voters and can therefore try to "signal" its success before the elections. All depends on the incumbent's ability to exploit the information asymmetry to manipulate rational voters, who have certain fiscal policy expectations and preferences and assess the incumbents' competence.

However, many economists question the hypothesis that incumbents tend to influence the economy opportunistically over the business cycle, and instead emphasize the "partisan" characteristics of their behaviour (the "partisan" theories of the political cycle). The partisan theories (PTs) assume that politicians are faithful to their party's policy goals (expressed, for instance, in terms of a particular combination of the inflation rate and the unemployment rate)

and thus reflect the interests of a specific constituency. It is traditionally assumed that left wing parties are more concerned with tackling unemployment, while right wing parties generally attach more weight to reducing inflation, even at a cost of higher unemployment. The first generation of partisan models assumed that the impacts on output and employment in relation to an incumbent's political orientation are constant over its term of office.

Under the rational partisan theories (RPTs), each voter realizes that different political parties pursue different goals and votes for the party that best reflects his own preferences. Assuming slow wage adjustment, changes in the inflation rate associated with changes of government cause real economic activity to deviate temporarily from its natural level. Following the transitory adjustment period, the level of economic activity should be independent of the government's political orientation. After economic activity returns to its natural level the rate of inflation should remain higher under a left wing government than under a right wing government. Voter rationality thus causes individual deviations in real variables to return to their natural level (although this is not the case with inflation). The government can achieve deviations in real variables only in the short run and only at the start of its term of office. In the longer run, voter rationality prevents such deviations. A change of government towards the right therefore leads to an only temporary fall in output growth. The opposite applies in the case of a left wing government, which is more concerned with supporting economic activity and reducing unemployment at the cost of rising inflation. As a consequence of the left wing government's efforts to generate an economic expansion – an expansion which is, however, only temporary – the economy thus ends up in a sub-optimal equilibrium with higher inflation, while output and unemployment return to their natural levels.

Most models of the political cycle based on the aforementioned theoretical approaches assume that the election date is exogenously given. In formulating their own ideas about the form of political cycles, however, some authors have tried, on the basis of empirical observations, to take the possibility of endogenous election timing into account (Ito, 1990). This assumption means that elections can be called at practically any time and the incumbent thus naturally tries to call them when the economy is on the rise. In other words, the better the state of the economy, the higher the chance of elections being called soon. The basic tenet of these theories is that the government has no control of economic activity but tries to capitalize on spontaneous good economic conditions (where the law of the land allows it to do so).

3. The method for testing political cycle theories

Several approaches can be used to test the political cycle theories. Here we apply the relatively traditional method of Alesina and Roubini (1990), which tracks the impacts of the electoral cycle on real output, unemployment and inflation. The initial assumption is that these variables can be described by an autoregressive process of a particular order.³⁶ One can then add a political dummy to the autoregressive process to represent the theoretical concept being tested. The general model can be formally written as follows:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \dots + \alpha_n y_{t-n} + \beta PDUM_t + \varepsilon_t ,$$

where y_t denotes the time series of one of the tested variables and $PDUM_t$ represents a political dummy. The model used is an AR type model requiring stationary time series. If only non-stationary time series are available, they can be stationarized by making certain modifications (e.g. by applying differences). In the case of small open economies it is recommended to include a proxy for the world economy in the model (expressed, for example, in terms of world growth in real output, world inflation, etc.) to control for the effect of the world economy on the domestic economy.³⁷ Another proposed method for incorporating the world economy into the model is to express each tested variable as the difference between the domestic variable and a proxy for the world average. This solution can also help eliminate any problems with non-stationarity of the time series used.

The specification of the order of the autoregressive model depends on the results of standard diagnostic tests. In the estimated model, the statistical significance of including the political dummy is thus tested. One also needs to verify whether the resulting model is specified in accordance with the theory being tested (i.e. whether the coefficients on the political dummies have the right sign).

³⁶ Application of the autoregressive model in the case of time series which are highly influenced by structural changes is quite problematic. Our primary aim is however not to estimate the best model which could describe development of considered variables. At the same time Alesina and Roubini approach is the traditional method for testing political cycle theories (even in the case of developing countries). Additional possibility is to use panel analysis and just emphasise the differences of the Czech economy. I consider this to be my next analysis of testing for a political cycle in the Czech Republic.

³⁷ Alesina presents two main arguments for incorporating a world variable into the model. First, the partisan or opportunistic goals of the politicians are likely to be defined, in small open economies, in relation to the rest of the world. Second, regardless of the politicians' goals, international trade and financial linkages make economies highly interdependent, hence they cannot be treated as independent economies.

The political business cycle (PBC) models predict a pre-electoral upturn in economic growth and lower unemployment, a rise in inflation around the election time and immediately thereafter and a post-electoral recession, regardless of the incumbent's political orientation. Hence in the case of testing the political business cycle (PBC) hypothesis, the AR models of GDP and unemployment include a political dummy of +1 in the N periods preceding an election and in the election quarter and 0 in all other periods. Any length of N can be chosen, depending on the expected speed of adjustment of the economy. A value in the range of 4–8 is usually recommended, as wage contracts in many countries have a length of 1–2 years (i.e. 4–8 quarters). When testing the PBC theory using inflation, the political dummy is set at +1 in the 4 quarters following an election and in the election quarter and 0 otherwise.

As the partisan theories usually emphasize the direction of the change of government, to test their validity a political dummy is applied that differs in value depending on the direction of the change of government. The change in the dummy associated with a change of government is lagged by 1 quarter from the appointment of the new government to account for the period of adjustment that occurs immediately after the change of regime while the new economic policy is implemented. In the case of unemployment a lag of two quarters is more appropriate, as unemployment reacts rather more slowly to changes in government policy.

It is assumed that right wing party is more focused on low inflation (even at a cost of higher unemployment), while left wing party is concerned with tackling unemployment (and GDP growth). As the rational partisan theories (RPTs) assume that the incumbent's political orientation has only a transitory impact on GDP and unemployment, in the AR models based on these time series the political dummy is +1 in the N quarters following a change of government towards the right, -1 in the N quarters following a change of government towards the left and 0 if the same political party stays in power after the elections.³⁸ In the case of testing the partisan political cycle theories (PTs) that do not incorporate rationality, it is assumed that change of government has a permanent impact on output and unemployment and hence the political dummy is +1 in all periods when a right wing government is in office (including the quarter of the change of government) and -1 in all periods when a left wing government is in office. Both theories consider a permanent reaction of inflation to the change

³⁸ As in the previous case, the length of N is usually chosen from the range of 4–8.

of government, so the political dummy has the same profile as the dummy for GDP and unemployment in the case of testing the partisan political cycle theories.

4. The political cycle in real GDP, unemployment and inflation in the Czech Republic

The Czech Republic is the parliamentary democracy since the fall of the communist regime in November 1989 thus has a relatively short history of democracy. Apart from major political reforms, the country has passed fundamental economic transformation from that time. The Czech economy as a whole underwent significant structural changes for the purpose of reaching a standard market economy (as price liberalization, restitution, privatization, industrial transformation, structural changes of labour market etc.) that are reflected in time series of economic variables.

Parliamentary elections traditionally take place once every four years, during June. The new government takes office approximately one month later (the exception being the most recent parliamentary elections in 2006, when the lag was much longer). Since the independent Czech Republic was established, parliamentary elections have been held in 1996, 1998³⁹, 2002 and 2006. However, in 1993–2006 there was essentially only one change of majority incumbent party – after the elections in 1998. A second such change occurred following the 2006 elections⁴⁰. Both main ruling parties not only implemented their own political programmes, but also had to introduce a series of reforms connected with the transformation of the Czech economy. These reforms were not necessarily fully consistent with the political orientation of the incumbent.

The existence of a political cycle in the Czech Republic has yet to be tested on a broad scale. The aim of this section, therefore, is to apply the methodology described above and to test the hypotheses of the theories presented, using quarterly time series of real GDP, inflation and unemployment in the Czech Republic.

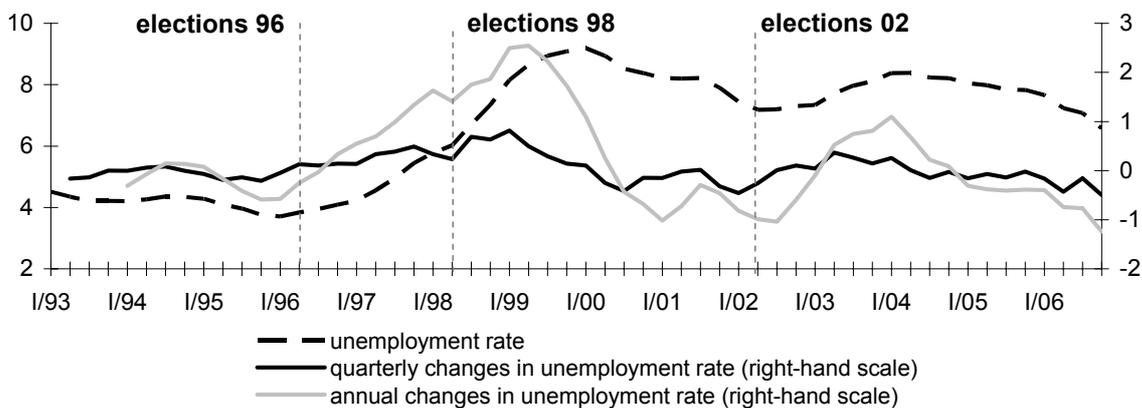
³⁹ Extraordinary elections after the government resigned; a caretaker government headed by Josef Tošovský was in power for six months.

⁴⁰ The government that was in power until 1998 is said to have been broadly right wing, as the main incumbent portrayed itself as a right wing party, whereas in 1998–2006 a broadly left wing government was in power (the main ruling party being the Czech Social Democratic Party, CSSD). The electoral deadlock after the 2006 parliamentary elections led to several months of fruitless negotiations on forming the new government. The new government – composed of representatives of centre-right political parties – wins a vote of confidence until January 2007.

4.1. Data

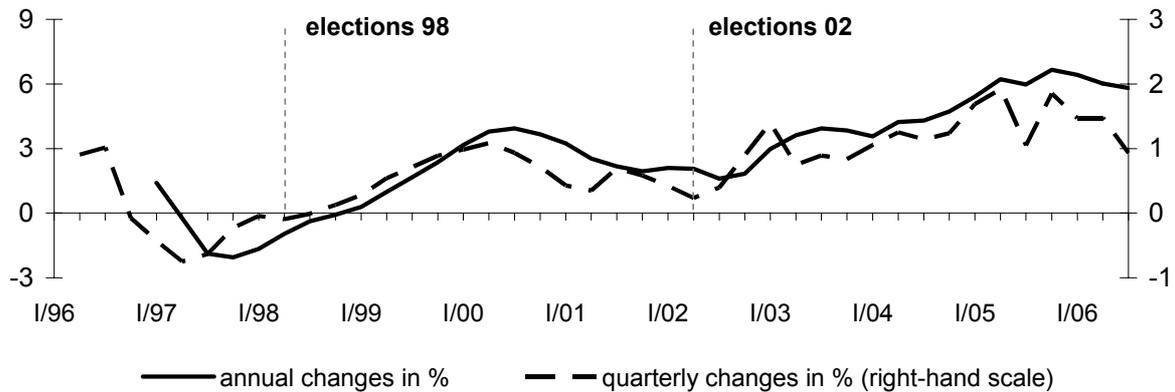
Several facts make it rather difficult to achieve our aim. First, it can be very difficult to define the political dummies in the Czech case, especially for the partisan theories as the Czech Republic has a relatively short history of democracy. The second problem that makes it difficult to test the political cycle theories in the Czech case is that we currently have only short time series of the requisite economic variables. In the cases of inflation and unemployment, data are available starting in 1993, whereas for GDP the series starts as late as 1996. What is more, these variables are affected by the significant structural changes that the Czech Republic experienced in the 1990s. Typical examples include the sharp rise in the Czech unemployment rate between 1996 and 1999 and the gradual fall in inflation from above 20% in 1993 to its current low levels. As the result these economic variables have quite different dynamics in comparison to EU countries. The development of real GDP is at the same time influenced by the process of economic convergence. The general unemployment rate, real GDP and inflation are plotted in the following charts.

Chart 1: General unemployment rate in per cent, annual and quarterly changes in general unemployment rate in percentage points (except for annual changes, data seasonally adjusted by X12 Arima method)



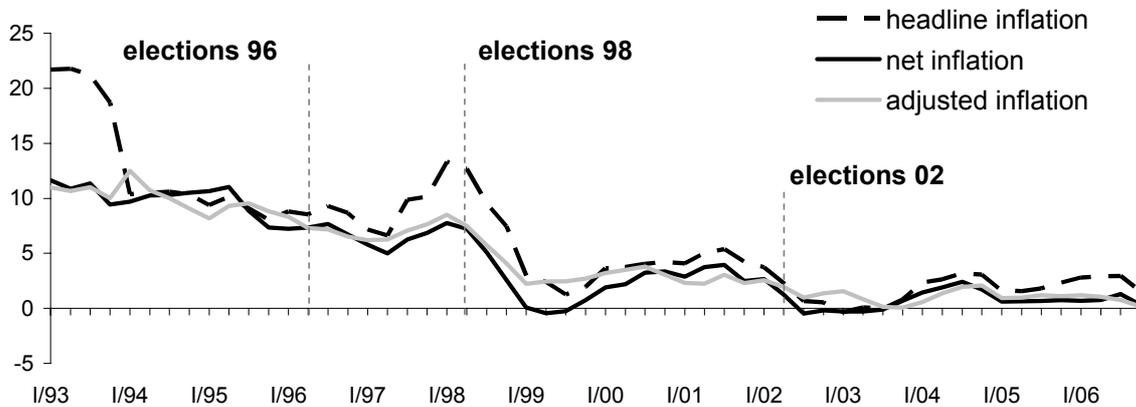
Source: Czech Statistical Office and author's calculations

Chart 2: Annual and quarterly changes in real GDP in per cent (quarterly changes from seasonally adjusted data – X12 Arima method)



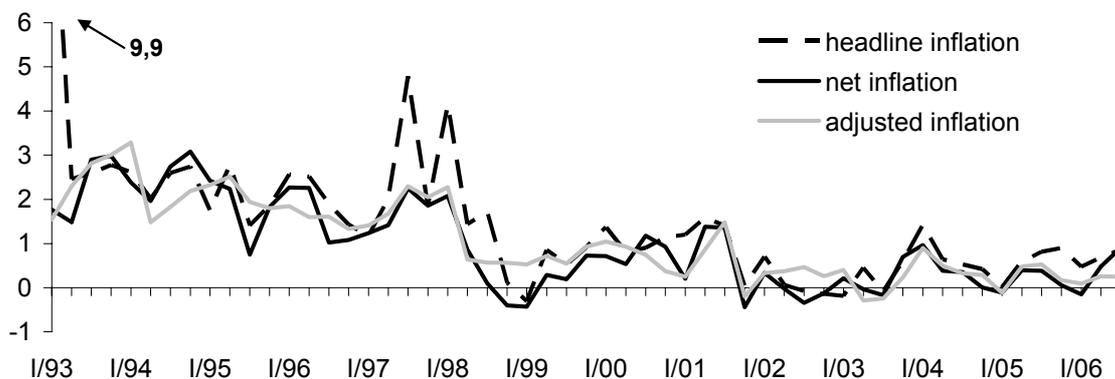
Source: Czech Statistical Office and author’s calculations

Chart 3: Annual headline, net and adjusted inflation (measured by CPI), in per cent



Source: Czech Statistical Office and author’s calculations

Chart 4: Quarterly headline, net and adjusted inflation (measured by CPI), in per cent



Source: Czech Statistical Office and author’s calculations

Real GDP, the unemployment rate and the HICP in the EU-15 were chosen as proxies for the world economy. In the case of the HICP for the EU-15, however, Eurostat provides a

comparable time series from 1996 only; this considerably reduces the number of observations. Given the already relatively short time series in the Czech Republic, this shortening of the time interval is less than ideal, so in the end no world proxy was included in the model for the test of inflation. Unfortunately there is no other proxy routinely available for quarterly inflation in the EU-15 over the entire period under review.

4.2. Stationarity testing and the Perron trend stationarity test with a structural break

As mentioned above, testing the political cycle theories using AR models requires stationary time series. According to the ADF (Augmented Dickey Fuller) test, however, the time series of real GDP, the unemployment rate and the consumer price index appear to be non-stationary.⁴¹ Applying quarterly or annual differences to stationarize the time series does not eliminate the non-stationarity in the cases of real GDP and the unemployment rate.⁴² One reason for this is that they have relatively problematic profiles owing to the ongoing transformation of the Czech economy.

By contrast, the time series of quarterly changes in the CPI (seasonally adjusted by the X-12 Arima method) displays trend stationarity. The inclusion of the trend ensues from the fact that up until 1998 in particular, the transformation of the Czech economy was accompanied by a gradual adjustment of the price level and a gradual decline in the inflation rate. Tests were also performed on the time series of quarterly changes in net and adjusted inflation, which, due to the exclusion of some volatile items⁴³, have less dramatic profiles, especially up until 1999. As with headline inflation, the ADF test rejected the null hypothesis of non-stationarity at the 5% significance level for both these series (although only for the shortened series starting in 1995).

As the problem of non-stationarity of the time series of the first differences of real GDP and the unemployment rate is also present in numerous other countries, several recommendations have been made regarding this issue. One of the proposed solutions is to test the political cycle hypotheses using the time series of the differences in the relevant variables between the

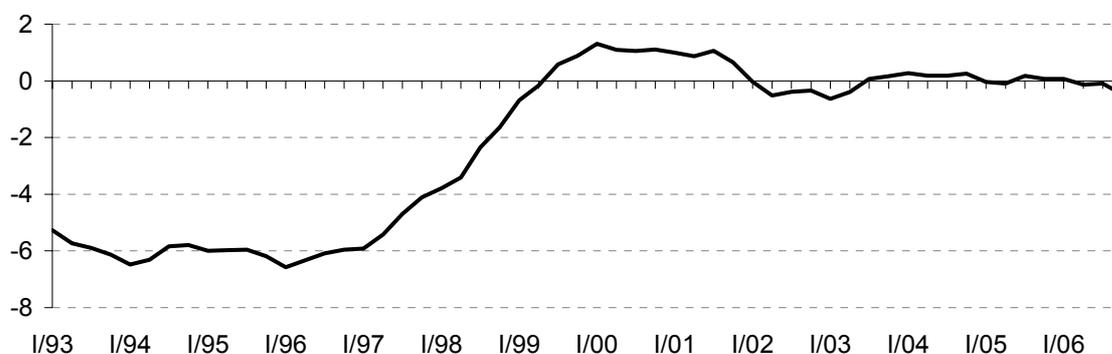
⁴¹ The most appropriate model for testing the null hypothesis of non-stationarity was chosen on the basis of the usual diagnostic tests and criteria.

⁴² Quarterly differences were applied to the series seasonally adjusted by the X-12 Arima method.

⁴³ Net inflation excludes regulated prices and administrative changes (e.g. tax changes). Adjusted inflation is net inflation adjusted for food prices.

country under review and the world average. These differences might show stationarity and moreover are recommended in the present model to control for the effect of the world economy on the variable. In the Czech Republic, these differences were defined as the difference between the Czech variable and the EU-15 average. In the case of unemployment, however, the non-stationarity problem arises even for the time series defined in this way, as it recorded sharp growth in 1996–1999, unlike in the EU-15 (see Chart 5). This result implies an absence of strong links between the labour markets in the Czech Republic and the EU-15, owing to low international mobility of workers. Under these circumstances there is no strong justification for including a world proxy in the model.

Chart 5: Differences between the Czech general unemployment rate and the EU-15 average, in percentage points

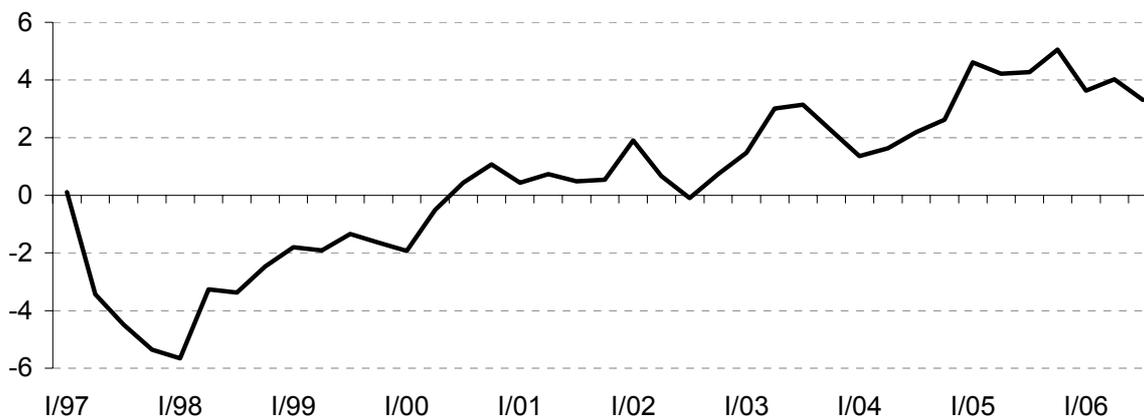


Source: Czech Statistical Office, Eurostat and author's calculations

In the case of GDP, by contrast, the time series of the differences between annual real GDP growth in the Czech Republic and average real growth in the EU-15 is trend stationary at the 5% significance level.⁴⁴ Including the trend in the tested equation is consistent with the hypothesis that the Czech economy is going through a period of economic convergence towards the advanced EU countries, which, however, have recently been experiencing flat or negative growth. From 2000 onwards one can thus see a steady rise in the differences between Czech annual real GDP growth and the EU-15 average (see Chart 6).

⁴⁴ On the basis of the diagnostic tests, the equation excluding the lagged differences containing the trend and the constant was determined as the most appropriate for testing for a unit root using the ADF test.

Chart 6: Differences between Czech annual real GDP growth and the EU-15 average, in percentage points



Source: Czech Statistical Office, Eurostat and author's calculations

Other potential solutions can be tried if we do not want to give up on the idea of testing for a political cycle using the unemployment rate when the application of the usual recommendations for eliminating time series non-stationarity does not help us to identify the stationarity condition. One option is to shorten the unemployment rate time series by excluding periods in which major structural breaks occur. For example, the time series of quarterly changes in the unemployment rate for the period of 1999–2006 is on the verge of rejection of a unit root. Generally, though, we cannot regard the unemployment rate time series defined in this way as unambiguously stationary. Moreover, shortening the time series any further prevents it from being used to test for a political cycle in the way described above.

A further method for overcoming the problem of the presence of a unit root in time series containing a structural break provided Perron (1989). He developed a technique for testing for a unit root of a time series based on an augmented version of Dickey and Fuller's standard method where the alternative hypothesis is trend stationarity of the tested series. The method allows for the presence of an exogenous structural shock in the trend function (in the form of either a shift in its level or a change in its slope). The null hypothesis is that the tested time series $\{y_t\}_0^T$ contains a unit root with drift and that an exogenous structural break occurs at time T_B ($1 < T_B < T$). Because Perron's approach assumes that the structural break is exogenous, the time at which it occurs needs to be determined in advance. The alternative hypothesis is that the series is stationary about a deterministic time trend with an exogenous change in the trend function at time T_B . Perron considered three parameterizations of the

structural break under the null and the alternative. For the null hypothesis he formulated the following three models:

$$\text{Model (A): } y_t = \mu + dD(T_B)_t + y_{t-1} + e_t,$$

$$\text{Model (B): } y_t = \mu_1 + y_{t-1} + (\mu_2 - \mu_1)DU_t + e_t,$$

$$\text{Model (C): } y_t = \mu_1 + y_{t-1} + dD(T_B)_t + (\mu_2 - \mu_1)DU_t + e_t,$$

where $D(T_B)_t = 1$ if $t = T_B + 1$ and $DU_t = 1$ if $t > T_B$. Otherwise $D(T_B)_t$ and DU_t are 0. Model (A) permits an exogenous change in the level of the series, Model (B) allows an exogenous break in the rate of growth, and Model (C) is a combination of both changes. Against this, the following trend-stationary alternative hypotheses were defined:

$$\text{Model (A): } y_t = \mu_1 + \beta t + (\mu_2 - \mu_1)DU_t + e_t,$$

$$\text{Model (B): } y_t = \mu + \beta_1 t + (\beta_2 - \beta_1)DT_t^* + e_t,$$

$$\text{Model (C): } y_t = \mu + \beta_1 t + (\mu_2 - \mu_1)DU_t + (\beta_2 - \beta_1)DT_t^* + e_t,$$

where $DT_t^* = t - T_B$ if $t > T_B$ and 0 otherwise. Model (A) allows for a one-time change in the series trend function occurring at the time of the exogenous shock (T_B), Model (B) permits a change in the slope of the trend function of the series, and finally Model (C) includes a combination of both preceding forms of the exogenous shock to the trend function. The actual unit-root testing under Perron's approach is based on the following models, which represent the intersection of the aforementioned models for the null and the alternative hypotheses and employ the Augmented Dickey-Fuller (ADF) test for a unit root:

$$\text{Model (A): } y_t = \mu^A + \theta^A DU_t + \beta^A t + d^A D(TB)_t + \alpha^A y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + e_t,$$

$$\text{Model (B): } y_t = \mu^B + \beta^B t + \gamma^B DT_t^* + \alpha^B y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + e_t,$$

$$\text{Model (C): } y_t = \mu^C + \theta^C DU_t + \beta^C t + \gamma^C DT_t^* + d^C D(TB)_t + \alpha^C y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + e_t,$$

The null hypothesis of a unit root imposes the following restrictions on the selected parameters of the individual models:

- for Model (A): $\alpha^A = 1, \beta^A = 0, \theta^A = 0$;
- for Model (B): $\alpha^B = 1, \gamma^B = 0, \beta^B = 0$; a
- for Model (C): $\alpha^C = 1, \gamma^C = 0, \beta^C = 0$.

Under the alternative hypothesis of trend stationarity, $\alpha^A, \alpha^B, \alpha^C < 1$; $\beta^A, \beta^B, \beta^C \neq 0$; and $\theta^A, \theta^C, \gamma^B, \gamma^C \neq 0$. At the same time, coefficients d^A and d^C should be close to zero, whereas under the null hypothesis they are assumed to take statistically significant non-zero values. In other words, to accept the alternative hypothesis of trend stationarity of the series under any of the aforementioned models, coefficient α must be “significantly” less than one and the trend variables included in the model and representing the exogenous shock in conformity with the alternative hypothesis must be statistically significant. To assess coefficient α , Perron estimated specific tables of critical values of the t-statistics (for details see Perron, 1989).

Perron’s technique was subsequently developed by Zivot and Andrews (1992). They rejected the assumption of an exogenous breakpoint (as have numerous other authors – see Zelhorst and Hann, 1995) and developed a unit-root test allowing for an endogenous break in the trend function. Their main argument was that visual inspection of the time series plot is not a fully reliable way of determining the time of occurrence of a structural shock and that endogenization of the structural breakpoint determination might have a significant impact on the critical values. In the analysis of unemployment in the Czech Republic, however, the structural breakpoint is relatively plain to see. Moreover, this study is not concerned with comparing the various unit-root testing strategies. Therefore, the original Perron approach to testing for trend stationarity allowing for a structural break is applied here.

The general unemployment rate recorded a structural change during the period 1996–1999, when the unemployment rate gradually rose from around 4 per cent to around 9 per cent. The increase of the unemployment rate was caused by combination of two factors. On the one hand the strong generations of 1970’s joined the economically active population. And at the same time the economic problems in the regions with continuing slump of major industrial sectors deepened (it was attended by sales problems, inconvenient structure of qualification of unemployed people, etc.). Since 2000 the unemployment rate has been fluctuating in the range of 7–9 per cent with a slight downward cyclical tendency. The change after the year

1999 was connected with gradual decrease of labour supply in the situation of stagnant labour demand. The year 1999 (specifically the first quarter of 1999) was therefore identified as the exogenous structural breakpoint.

In the case of the general unemployment rate time series, the results of the Perron trend stationarity tests confirmed the likelihood of the presence of a structural break in the slope of the trend function of this series, but the hypothesis of a one-time change in the trend function was not supported. Model B proved relevant for testing for trend stationarity, as all the tested coefficients on the trend variables defined according to the alternative hypothesis were statistically significant. The test also rejected the presence of a unit root, i.e. it confirmed the alternative hypothesis of trend stationarity at the 5% significance level (see Table 1). However, the strength of this conclusion is reduced somewhat by the fact that the results were not supported by the seasonally adjusted time series. Changing the structural breakpoint from Q1 1999 to Q1 2000 generated very similar results.

4.3. Testing for a political cycle in the Czech Republic

Based on the conclusions drawn in the previous section, the political cycle theories in the Czech case were tested using quarterly changes in the seasonally adjusted CPI, the time series of differences between annual real GDP growth in the Czech Republic and average real growth in the EU-15, and the general unemployment rate. As all these time series show trend stationarity, the Alesina and Roubini autoregression model for political cycle testing was augmented to include the trend (and, in the case of unemployment, the break in the trend).

The political dummies were defined in accordance with the theoretical concepts described in section 2 and specified in detail in section 3. In the case of the political dummies in the RPT and PT models, the quarter of the change of government was regarded as the quarter of parliamentary elections. As parliamentary elections in the Czech Republic are usually held in June and the government is appointed some time later, the third quarter is regarded as the quarter of elections for these variables. Although all the Czech governments to date have concentrated on transforming the Czech economy, a fact which has impaired their ability to implement their own policy programmes, the political dummies used in the models testing the RPTs and PTs were based on how the dominant parties in past governments portray

themselves.⁴⁵ In other words, for the purposes of the analysis ODS governments are regarded as right wing and CSSD governments as left wing.

The same problem does not arise in defining the political dummies for the testing of the opportunistic (PBC) theories, because these theories assume a common goal of re-election among all incumbents regardless of political affiliation. For these political dummies, each quarter during which elections actually took place is considered to be an election period. In the Czech case, elections traditionally take place in the second quarter.

The order of the autoregressive model for each variable tested was determined using the usual diagnostic tests and assessment criteria (Akaike info criterion and Schwarz criterion).⁴⁶ In the case of the models for unemployment, potential slower adjustment of the labour market to new conditions was considered, and so various lag lengths were applied for the political dummies. In most of the models tested, however, the lagged political dummies were not significant. The exception was the one-quarter lag, but applying this generated very similar estimates as the models using non-lagged political dummies.

The results of the models testing the various political cycle theories in the Czech case partially supported the political business cycle hypotheses, which emphasize the opportunistic motives of politicians, with regard to both GDP and unemployment. The inclusion of the PBC political dummy in the models for GDP and unemployment was statistically significant at the 5% level, and the estimated coefficient had a positive sign in the case of GDP and a negative sign in the case of unemployment in line with the theoretical concept being tested. This implies that the economy was stimulated in periods before parliamentary elections, as reflected in higher GDP growth and a tendency for unemployment to fall temporarily.

In the case of GDP, however, this conclusion is not sufficiently strong, because the short GDP time series and the inclusion of an explanatory variable with four lags in the model meant that only the period from Q1 1998 to Q3 2006 was tested. Given that GDP in the pre-electoral period is being evaluated, the aforementioned assessment relates only to the 2002 and 2006 pre-electoral periods. In the case of unemployment, by contrast, the above conclusion is also

⁴⁵ The consequences of the “opposition agreement” between ODS and CSSD are not considered here.

⁴⁶ In the case of GDP, a model with a dependent variable lagged by one and four quarters was chosen; in the case of inflation, lags of one and two quarters were included; and in the case of unemployment, lags of one to four quarters (or one to three quarters) were considered.

supported by developments in the 1996 (or 1998) pre-electoral period.⁴⁷ The estimated equations supporting the validity of the political business cycles hypothesis with regard to GDP and unemployment development have the following form:

$$(1) \text{DIF_HDP} = -8.12 + 0.23*t + 0.36*\text{DIF_HDP}(-1) - 0.39*\text{DIF_HDP}(-4) + 0.66*\text{PBC_8},$$

(-4.45)
(4.56)
(2.72)
(-3.53)
(2.63)

$$(R^2 = 0.94, \text{sigma} = 0.67, F(4.30) = 117.8[0.000]***),$$

$$(2) \text{UNEM} = 0.35 + 0.05*t - 0.06*DT^* + 0.89*\text{UNEM}(-1) + 0.38*\text{UNEM}(-2) -$$

(1.91)
(3.67)
(-3.72)
(6.60)
(2.38)

$$- 0.72*\text{UNEM}(-3) + 0.29*\text{UNEM}(-4) - 0.25*\text{PBC_6},$$

(-4.33)
(2.14)
(-2.94)

$$(R^2 = 0.98, \text{sigma} = 0.28, F(7.44) = 292.7[0.000]***),$$

or:

$$(3) \text{UNEM} = 0.42 + 0.04*t - 0.06*DT^* + 0.82*\text{UNEM}(-1) + 0.44*\text{UNEM}(-2) -$$

(2.14)
(3.35)
(-3.50)
(5.93)
(2.70)

$$- 0.65*\text{UNEM}(-3) + 0.24*\text{UNEM}(-4) - 0.25*\text{PBC_8},$$

(-3.88)
(1.79)
(-2.78)

$$(R^2 = 0.98, \text{sigma} = 0.29, F(7.44) = 287.3[0.000]***),$$

where *DIF_HDP* denotes the difference between real GDP growth in the Czech Republic and average growth in the EU-15, *UNEM* denotes the unemployment rate in per cent, *t* represents the linear trend, *DT*^{*} expresses the structural break in the trend function and *PBC_6* and *PBC_8* represent the political dummy for N = 6 and N = 8 respectively. The magnitudes of the estimated coefficients of the political dummies correspond to results which were found out in the case of other countries (e.g. Alesina, 1990).

In the case of inflation, however, the PBC theory was not supported, as the results of the estimated model imply that the rate of growth of the price level decreased in the periods following the 1996, 1998 and 2002 parliamentary elections, whereas the theory predicts an upswing in inflation as a result of pre-electoral stimulation of the economy. This fact is

⁴⁷ N=8 (or N=6) seemed the most appropriate option for defining the political dummy.

clearly significantly affected by the overall profile of the inflation time series, which has fallen continuously since 1993 to its current relatively low values.

As mentioned earlier, testing the partisan and rational partisan theories of political cycles is very difficult in the Czech case – partly because of the impaired ability of incumbents to implement their policy programmes during the Czech economic transformation, and partly because there was essentially only one change of majority incumbent party in the period under review – after the parliamentary elections in 1998.⁴⁸ Prior to 1998 in particular, the Czech economy went through a transformation process associated with extensive structural changes in numerous macroeconomic indicators. In 1997 it was hit by a financial crisis. In recent years, though, the Czech Republic has been recording a very respectable growth tendency amid relatively low inflation. As a consequence, the results of the tests of the partisan theories are completely opposite to what the theoretical concepts would suggest.

The inclusion of a political dummy representing the RPT proved to be statistically significant for all the indicators studied. However, the signs of the estimated coefficients suggest that the change of government in 1998, when CSSD (which is regarded as a left wing party) came to power, led to temporarily lower GDP growth rates relative to the rest of the world as well as temporarily lower unemployment. A permanently lower price level was also recorded under the CSSD government.⁴⁹ Given the aforementioned arguments, however, these conclusions, which contradict the RPT, cannot be regarded as definitive. It would be better to test the validity of the RPT/PT on the Czech business cycle after several further periods have elapsed, when the policies of the new government – and any future ones – have taken clearer shape.

5. The electoral cycle and public finances in the Czech Republic

The key question associated with testing for a political cycle is to what extent the Czech government is able to influence the performance of the economy and to what extent its efforts ultimately affect macroeconomic indicators. Many economists who have studied political cycles argue that politicians have very limited ability to successfully manipulate the economy to increase their re-election chances (Brender and Drazen, 2004). But this does not mean that

⁴⁸ The effect of the change of government after the most recent elections in 2006 cannot be adequately tested on the data that are currently available.

⁴⁹ However, a permanent impact of the change of government on GDP in accordance with the partisan theory was not confirmed.

incumbents do not use fiscal policy to influence voting before elections, for instance by changing the composition of spending or manipulating transfers. Persson and Tabellini (2002), for example, identified political cycles in public spending, revenue and deficits for a data set encompassing 60 democratic countries. Regardless of the political system, they observed a general tendency to cut taxes before elections, whereas painful fiscal adjustments tended to be postponed until after the elections and were far less in evidence in all the economies tested.

Some economists additionally argue that fiscal policy manipulation of voters need not manifest itself in public sector deficits or spending and revenue levels at all. On a related note, Brender and Drazen (2005) conclude that generating public finance deficits does not increase an incumbent's probability of re-election, regardless of country size, length of democracy and government/electoral system.⁵⁰ In developed democracies, election-year deficits actually reduce the probability of a leader being re-elected. A rational politician therefore tries to target additional government spending or tax cuts to specific groups of voters at the expense of other voters (Drazen and Eslava, 2006). Studying the composition of public sector spending and revenue over the electoral cycle is therefore a vital aspect of investigating political cycles. The presence of a political cycle in this case is linked primarily with asymmetric information between voters and politicians. Rational voters may support an incumbent who targets them with spending before the election even though the spending plans presented in the pre-election period may be due to political opportunism, i.e. efforts to improve the incumbent's chances of being re-elected. The voters simultaneously assume, however, that such plans may partly also reflect the incumbent's actual preferences for this type of spending (Drazen and Eslava, 2005). Thanks to the presence of information asymmetry, fiscal manipulation may therefore be effective.

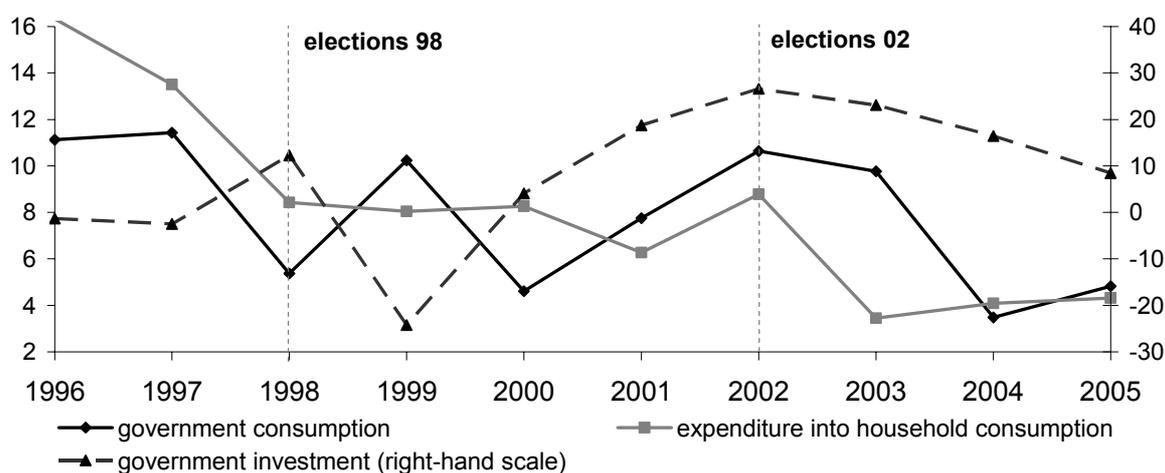
In the Czech Republic, however, a large proportion of public budget financing is predetermined by the legislation. Mandatory expenditures have accounted for around 52% of total state budget spending in the past and are expected to increase to almost 56% in 2007.⁵¹

⁵⁰ The analysis contains evidence from 74 countries differing in terms of level of development and political orientation.

⁵¹ Mandatory expenditures are those whose payment arises under laws or other legal rules and contractual obligations. They include, for example, social transfers, debt service expenditure, state health insurance payments, state contributions to building savings schemes, loans to newlyweds and transfers to international institutions.

Taking into account “quasi-mandatory” expenditures⁵² the respective figures rise to around 75% in the past and 76.2% planned for 2007 (see the State Budget Bill for 2007). The government’s discretionary policy is thus very restricted – in the short run it can be targeted almost exclusively at stimulating investment activity. The adjustment of most other public spending items requires the adoption of new laws and is therefore subject to delays. Politicians should thus try to pass relevant laws that the public will welcome (e.g. rises in social benefits) far enough ahead of parliamentary elections so that those laws take effect by the time of the elections. However, the main ESA 95 public sector expenditure items in the Czech Republic do not clearly show any such tendency (see Chart 7).

Chart 7: Year-on-year changes in government consumption (including wages and salaries), government expenditure into household consumption (mainly social transfers) and government investment under ESA 95 methodology, in per cent



Source: Czech Statistical Office and author’s calculations.

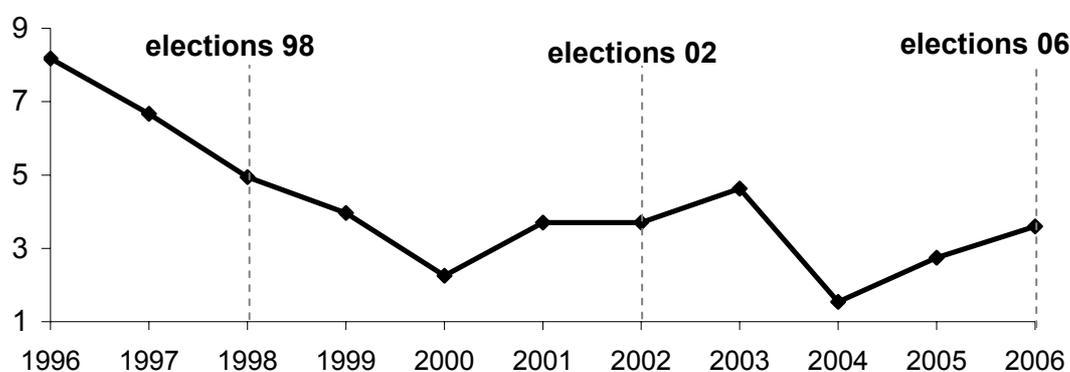
The chart above shows that some link with the electoral cycle can be observed for public sector investment activity, as government investment growth recorded local extremes in the years when parliamentary elections were held. Expenditure into household consumption, which consists primarily of social transfers, showed an upswing in year-on-year growth in 2002 and a subsequent fall, but no such pattern can be observed in 1998. The same can be said for government consumption, which slowed significantly year on year in 1998 and returned to higher growth levels the following year. This may have been due in part to the unusual situation before the 1998 elections, when a caretaker government headed by Josef Tošovský was in power. However, the aforementioned pattern of public sector expenditure

⁵² Quasi-mandatory expenditures include active employment policy spending, defence spending, foreign and humanitarian aid, public sector wages and salaries and investment incentives (for more details see “Bill on the State Budget of the Czech Republic for 2007”).

components in the Czech Republic is not very consistent with the political cycle theories, which suggest an opportunistic change in the structure of government spending in the pre-election period with no impact on the public finance deficit. These theories predict that government and household consumption expenditure should rise before elections, at the cost of a fall in government investment.

However, the commentary above is not necessarily entirely accurate, as it does not take into account the effect of the phase of the business cycle on public finances. Unemployment benefits are generally regarded as the only expenditure item sensitive to the business cycle. By contrast, tax incomes, including social insurance incomes, which make up the main source of public sector funding, are relatively very sensitive to the cycle. Higher expected incomes associated with an expected economic upswing can thus encourage incumbents to spend more, so the business cycle can also indirectly affect public sector spending. The “structural deficit”, i.e. the deficit adjusted for the economic cycle, may thus be more useful for evaluating the additional effect of the timing of elections on public spending (see Chart 8).

Chart 8: The cyclically adjusted public finance deficit under ESA 95 methodology in per cent of GDP, adjusted for extraordinary operations (ESCB method)



Note: The ESCB method for estimating the cyclically adjusted public finance deficit is described in more detail, for example, in Bouthevillain et al. (2001) and more recently in Kremer et al. (2006). The figure for 2006 is a preliminary estimate.

Source: CNB

Chart 8 shows that the structural deficit in the Czech Republic was usually smallest in the middle of the electoral cycle (except for the specific period before 1998), i.e. two years after the elections, and subsequent showed an upward tendency. However, we do not currently

have enough observations to test the hypothesis that the timing of the elections⁵³ – which to some extent can also affect certain macroeconomic indicators – played a role in this pattern in the structural public finance balance.

6. Conclusions

The application of the Alesina and Roubini approach to the testing of the political cycle theories using selected macroeconomic variables in the Czech Republic partly supports opportunistic motives for the behaviour of Czech incumbents, i.e. the political business cycle theories. The test results reveal that partial economic recoveries occurred before parliamentary elections, with a tendency towards higher GDP growth than in the EU-15 and a fall in the unemployment rate. By contrast, inflation contradicted the theory of the political business cycle models. This is probably due to the overall profile of the inflation time series during the economic transformation, which has fallen continuously since 1993 to its current relatively low values. Moreover the impact on the inflation would be softened by an independent monetary policy of the Czech National Bank which operates in regime of inflation targeting.⁵⁴

The probable existence of opportunistic behaviour by incumbents is also evidenced by the movements of selected public budget expenditure items over the electoral cycle and by the cyclically adjusted deficit after 2000. This conclusion is in line with the results of Brender and Drazen (2004), who in their paper demonstrate the presence of political business cycles using public budget deficits in the new democracies. However, the lack of sufficiently long time series of fiscal indicators currently thwarts reliable testing of the influence of parliamentary elections in the Czech Republic on their profile.

Partisanship in the behaviour of Czech incumbents was not supported. This fact, however, is probably a consequence of a limited ability to test the partisan theories in the Czech case, as there has essentially been only one change of majority incumbent party during the period of democracy. Moreover, the macroeconomic trends are strongly affected by the restructuring of

⁵³ For testing for the presence of political cycles on cyclically adjusted public finance deficits, see, for example, Annett (2005).

⁵⁴ The Czech National Bank is considered to be independent on political pressure, sticking to monetary policy based on economic fundamentals (see e.g. Geršl, 2006).

the Czech economy during the 1990s. The economic and political measures adopted have thus been greatly influenced by the need to implement a series of reforms.

It would certainly be interesting to perform further tests for a political cycle using the macroeconomic conditions in the Czech Republic in a few years' time, when a sufficient number of observations are available for all the variables under investigation. Scope is simultaneously opening up to apply alternative methods for testing for political cycles, for instance using fiscal variables. This is linked with a general shift in the current economic literature in this field towards studying political cycles primarily using fiscal variables, as the impact on output, inflation and unemployment is often questioned. One of the arguments for questioning the influence of the electoral cycle on macroeconomic indicators is the ambiguous conclusions of numerous papers on this issue (Rogoff, 1990). On the other hand, in the case of GDP there is support for the hypothesis that higher growth raises the probability of re-election in new democracies, but voters tend to be affected by growth over the entire period between parliamentary elections rather than in the election year itself (Brender and Drazen, 2005).

Besides that, one could focus more on testing for post-electoral restriction, which should be more visible in the movements of fiscal indicators (the post-electoral cycle routinely considered in the partisan theories of political cycles). One could also analyse the structure of public spending in more detail. Similarly, one could also test for political cycles on a panel of transition countries or at regional level (Veiga and Veiga, 2004).

7. References

- Alesina, A., Tabellini, G.:** Voting on the Budget Deficit. *The American Economic Review*, 1990, March.
- Alesina, A., Roubini, N.:** Political Cycles in OECD Economies. NBER WP No. 3478, Cambridge, October 1990.
- Andrikopoulos, A., Loizides, I., Prodromidis, K.:** Fiscal Policy and Political Business Cycles in the EU. *European Journal of Political Economy*, 2004, Vol. 20, pp. 125–152.
- Annett, A.:** Enforcement and the Stability and Growth Pact: How Fiscal Policy Did and Didn't Change under Europe's Fiscal Framework. Paper prepared for Conference on "New Perspectives on Fiscal Sustainability", Frankfurt, October, 2005.
- Bouthevillain, C., Cour-Thimann, P., Van den Dool, G., De Cos, P. H., Langenus, G., Mohr, M., Momigliano, S., Tujula, M.:** Cyclically Adjusted Budget Balances: An Alternative Approach. ECB WP No. 77, September 2001.
- Brender, A., Drazen, A.:** How Do Budget Deficits and Economic Growth Affect Reelection Prospects? Evidence from a Large Cross-Section of Countries. NBER WP No. 11862. Cambridge, December 2005.
- Brender, A., Drazen, A.:** Political Budget Cycles in New Versus Established Democracies. NBER WP No. 10539, Cambridge, June 2004.
- Brender, A., Drazen, A.:** Where Does the Political Budget Cycle Really Come From? CEPR Discussion Papers, No. 4049, 2003.
- Buti, M., van den Noord, P.:** Discretionary Fiscal Policy and Elections: The Experience of the Early Years of EMU. ECO/WKP No. 351, OECD, 2003.
- Czech Statistical Office, www.czso.cz.**
- Drazen, A., Eslava, M.:** Electoral Manipulation via Expenditure Composition: Theory and Evidence. NBER WP No. 11085, Cambridge, January 2005.
- Drazen, A., Eslava, M.:** Pork Barrel Cycles. NBER WP No. 12190, Cambridge, April 2006.
- Eurostat.**
- Gärtner, M.:** The Quest for Political Cycles in OECD Economies. *European Journal of Political Economy*, Vol. 10 (1994), pp. 427–440.
- Geršl, A.:** Political Pressure on Central Banks: The Case of the Czech National Bank. *Czech Journal of Economics and Finance*, 2006, No. 1-2, pp. 18-39.
- Hibbs, D. A. Jr.:** The Partisan Model of Macroeconomic Cycles. *Economics and Politics*, 1994, March.
- Hibbs, D. A. Jr.:** Political Parties and Macroeconomic Policy. *American Political Science Review*, 1977, Vol. 71.
- Ito, T.:** The Timing of Elections and Political Business Cycles in Japan. *Journal of Asian Economics*, 1990, Vol. 1, No. 1, pp. 135–156.
- Kremer, J., Braz, C. R., Brosens, T., Langenus, G., Momigliano, S., Spolander, M.:** A Disaggregated Framework for the Analysis of Structural Developments in Public Finances. ECB WP No. 579, January 2006.

Bill on the State Budget of the Czech Republic for 2007.

- Nordhaus, W., D.:** The Political Business Cycle. *Review of Economic Studies*, 1975, No. 2.
- Paldam, M.:** Political Business Cycles. Handbook of Public Choice. Oxford, Blackwell 1995.
- Perron, P.:** The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis. *Econometrica*, 1989, Vol. 57, No. 6, pp. 1361–1401.
- Persson, T., Tabellini, G.:** Do Electoral Cycles Differ across Political Systems? July 2002.
- Persson, T., Tabellini, G.:** The Economic Effects of Constitutions. What do the Data Say? MIT Press 2003.
- Persson, T., Tabellini, G.:** Political Economics – Explaining Economic Policy. Massachusetts Institute of Technology 2000.
- Rogoff, K.:** Equilibrium Political Budget Cycles. *The American Economic Review*. 1990, Vol. 80, No. 1, pp. 21–36.
- Rogoff, K., Sibert, A.:** Elections and Macroeconomic Policy Cycles. *Review of Economic Studies*. 1988, Vol. 55, No. 1, pp. 1–16.
- Veiga, L. G., Veiga, F. J.:** Political Business Cycles at the Municipal Level. NIPE WP 4/2004.
- Zelhorst, D., de Hann, J.:** Testing for a Break in Output: New International Evidence. *Oxford Economic Papers*. 1995, New Series, Vol. 47, No. 2, pp. 357–362.
- Zivot, E., Andrews, D. W. K.:** Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit Root hypothesis. *Journal of Business and Economic Statistics*. 1992, 10, pp. 251–270.
- Žák, M.:** Politicko-ekonomický cyklus [The Political Economic Cycle]. *Politická ekonomie*, 1998, No. 4, pp. 471–480.

IV. Macroeconomic Effects of Absorbing EU Funds in the Czech Republic

Abstract:

Transfers from the EU could have a significant impact on EU member states' economies, in particular in less developed regions. This paper sets out to investigate the impacts of EU-related financial flows in the case of the Czech Republic, focusing mainly on GDP. Two methods are used to estimate the macroeconomic effects of absorbing EU funds – a model-based approach and a data-based approach. According to both approaches this implies an increase in economic stimulus over the considered horizon of approximately 0.5–1% of GDP in 2013. The expected positive impact on the Czech economy, however, will be highly dependent on the country's ability to draw down EU financial sources for structural actions. The Czech Republic's track record in this area is not very good. Moreover, there is the challenge of ensuring sufficient co-financing within the state budget without compromising existing fiscal policy.

Keywords: EU common policy, EU funds, Czech fiscal policy, macroeconomic simulations

JEL: E17, E62, F36, R58

1. Introduction

There is a relatively large redistribution of resources between individual member states under the EU's common policies. Transfers from the EU can have a significant impact on the member states' economies, in particular in less developed regions. In the long run, such transfers contribute to human capital improvement and better infrastructure and can increase the efficiency of economic units. The more funds a country draws, the greater the effect on its macroeconomic development. A larger impact on the business cycle can also be expected in short run if the drawdown of funds shows significant year-on-year changes rather than recording a gradual inflow. New EU member states from Central and Eastern Europe (CEE) are new to this experience. They have yet to learn how to use the new financial source of EU funds as effectively as possible.

This is a recent experience, so few analyses of the macroeconomic effects of EU funds in CEE countries have been carried out so far. One of the main reasons for this is the limited empirical evidence and problems with data availability. The only other relevant experience the CEE countries have is with the pre-accession funds. On the other hand, the methodology for assessing the effectiveness and impacts of EU funds is quite well developed in the foreign literature.

This paper sets out to investigate the impacts of EU-related financial flows in the case of the Czech Republic and thereby to complement the so far limited number of analyses in this area. Given the size of the EU financial flows and their obvious implications for domestic fiscal policy, it is necessary to examine their impact in a context that includes economy-wide feedbacks and interactions, attempting to account for spillover effects and externalities. For that reason, the principal part of the paper applies a model-based approach to assess the macroeconomic implications of EU funds in the Czech Republic. The main focus is on GDP. The overall analysis is based on a detailed evaluation of the drawing of EU funds, including a data description, which should be the first step in assessing the impacts of EU funds. Since EU fund drawings also have significant implications for the government budget balance, the analysis is extended to the fiscal effects of EU-related financial flows.

The paper is structured as follows. The first section briefly explains what is behind redistribution of the resources in the European Union. The second section provides an

overview of the size and structure of the EU funds available in the Czech Republic (commitment appropriations) and the expected net balance of the Czech Republic vis-à-vis the EU budget until 2013. The next section is focused on estimating the real drawdown of EU funds by the Czech Republic (realised expenditures). Section 4 studies the fiscal implications of EU funds. It is followed by the key chapter of the paper, which deals with the estimation of the macroeconomic effects of EU funds. We estimate the effects using a data-based approach and a model-based approach. The final section summarises and concludes.

2. The theoretical foundation of redistribution in the European Union

General conclusion of the majority of economic and political studies which are focused on fiscal federalism⁵⁵ and fiscal policy in the European Union is that establishment of any monetary union should be connected with a coordination of fiscal policies of participating countries. The coordination would be, in extreme situation, in a form of existence of some multinational fiscal authority. This issue is closely related to the question of centralized redistribution of financial resources (or at least part of them) among individual member states.

The main focus is in this context concentrated on impacts of asymmetric shocks (i.e., idiosyncratic to either regions or countries) on European economies and on limited opportunities of the monetary union member states to react fully to these shocks. As prices and wages are not flexible enough to compensate for the loss of exchange rates and the degree of labour mobility in Europe is very limited, there is a fear that asymmetric shocks will lead to deeper regional recessions and large increases in unemployment, which could create a social burden that is politically unacceptable to many governments (Fatas, Andersen, Martin, 1998). In absence of monetary policy, the adjustment is possible only through fiscal policy instruments. Governments should be able to use countercyclical budgets to stabilize economic fluctuations (within the limits given by the Stability and Growth Pact). This stabilization takes place through inter-temporal transfers. This is not, however, the only possible channel of economic stabilization using fiscal policy. Fiscal (“federal”) system provides tools to reduce the negative consequences of regional fluctuations, i.e. to support weaker regions via

⁵⁵ Fiscal federalism is an economic theory which tries to explain the existence of different sub-central levels of government (Fossati, Panella, 1999). Hence the theory of fiscal federalism is dealing, among others, with the optimization of the government budget on different levels of government units, i.e. the key issue is the allocation of government revenue and government expenditure to the given levels of government units in order to achieve the highest efficiency in production and providing of the public goods.

interregional transfers from fast-growing regions to depressed regions. This contributes to interregional risk sharing.

In this respect, redistributive policy in the European Union is particularly motivated by regional inequalities (e.g. in income, unemployment, standard of living). The redistribution of the financial sources in the EU is thus traditionally justified by economic needs (see e.g. Mattila, 2003) and therefore by allocative, distributive or stabilisation oriented reasons. Only the former two reasons are relevant at the regional level, the latter being more applicable at the national level. The allocative problem is focused on achieving an efficient allocation of economic resources within and between regions. On the other hand, the distributive problem deals with changing the outcome of the market process via redistributive measures such as taxes and transfers or via trying to influence market process continuously. In the case of European Union the redistribution of the resources should be concentrated on situations when integration produces:

- market failure such as poverty traps for regions out of which they cannot escape on their own, or externalities that hurt the conditions-oriented cohesion and require allocative corrections;
- an increase of the regional income differential, that may be regarded as being socially unacceptable and may thus give reason for distributive corrections (Krieger-Boden, 2002). According to this view, the EU acts as a generous policymaker who takes money from the rich member states and provides it to the less developed regions and states in the interest of common good. This is the publicly stated reason for unequal net fiscal flows in the EU. (see e.g. Article 158 of the Treaty Establishing the European Community).

Besides the above mentioned official reason for the EU fiscal transfers, several alternative motivations of the EU fiscal redistribution were formulated. So called national costs/benefits theory (Hix, 1999) emphasizes the role of the EU's single market in the redistribution process. According to this view the EU budget is an equilibrium outcome of intergovernmental bargains. EU budget bargaining is a game in which each government is willing to pay into/take out of the EU budget exactly how much they believe they are gaining/losing from the common policies of the EU (i.e. the redistributive bargain is not about relative wealth of member states but whether a country is a likely gainer or loser from trade liberalization policies).

The next theory of redistribution is also based on bargaining, but in this case the attention is focused on unequal distribution of votes among the member states. It predicts that overrepresented member states will be systematically favored in the distribution of EU net transfers (Rodden, 2002). In the EU case it implies hypothesis that small member states benefit more from the EU fiscal transfers than larger states. Since they are in effect endowed with more votes per capita than larger states, they can offer a good value – more votes can be purchased in exchange for fewer benefits (Rodden, 2002).

Without regard to the real motivation of EU redistributive policy the fact is that the EU budget is very small in the comparison with e.g. the US federal budget (the redistribution on the federal level in the United States). In spite of this fact, the redistribution of the fiscal resources has the significant importance even in the European Union and relevant macroeconomic implications.

3. Commitment appropriations of EU funds in the Czech Republic and net balance

Since it joined the EU in May 2004, the Czech Republic has been allowed to participate fully in drawing on EU funds under the EU's common policies. The "Copenhagen package" specified commitment appropriations for the rest of the relevant financial perspective (up to 2006) for all the new member states that joined in 2004. It also defined budgetary compensation to ensure a positive net balance with the EU for all these countries. The final commitment appropriations for the period 2004–2006 differed somewhat from the initial Copenhagen package. In the case of the Czech Republic they were increased.

EU funds have three main purposes: agricultural and rural support, social and economic cohesion and development of internal market institutions. The final commitment appropriations for all these areas and the amounts of compensation for the Czech Republic for the period 2004–2006 are specified in Table 1.

Table 1: Commitment appropriations for the Czech Republic for 2004–2006 (current prices, conversion to CZK using average CZK/EUR exchange rate)

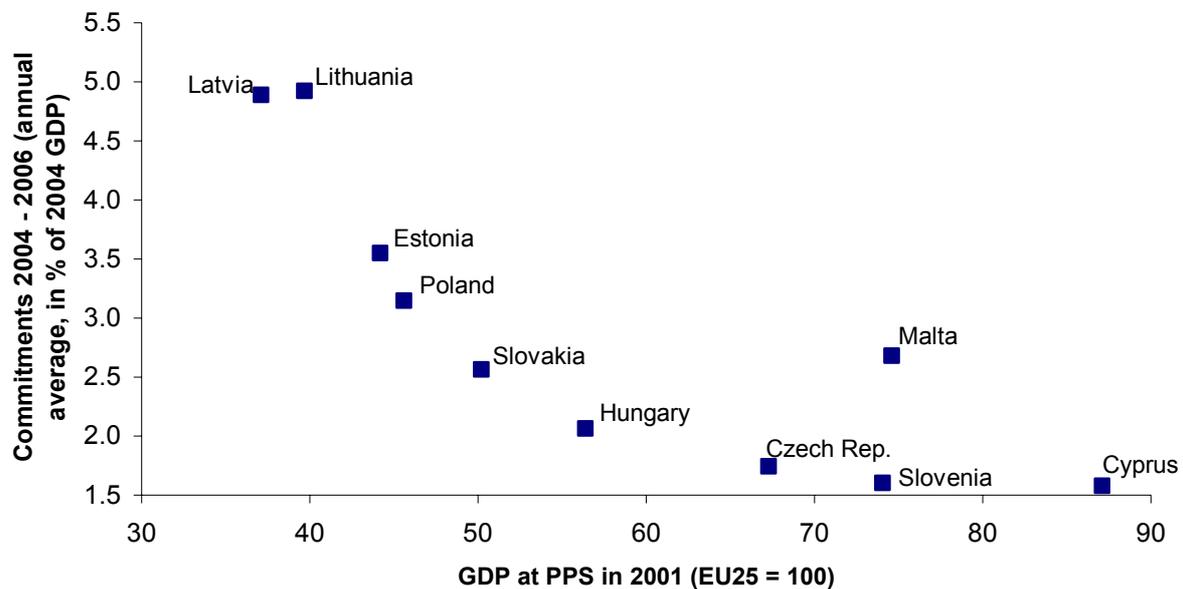
	2004		2005		2006		2004-2006	
	mil. EUR	mil. CZK	mil. EUR	mil. CZK	mil. EUR	mil. CZK	mil. EUR	mil. CZK
1. Agriculture.	169	5375	455	13552	510	14444	1134	33371
1a - Common Agricultural Policy	5	150	273	8128	313	8855	590	17133
Market measures	5	150	64	1907	64	1823	133	3880
Direct payments			209	6221	248	7032	457	13253
1b - Rural development	164	5225	182	5424	198	5589	543	16238
2. Structural actions	729	23267	824	24561	1070	30268	2623	78096
Structural Fund	410	13081	560	16698	714	20210	1685	49989
Cohesion Fund	319	10186	264	7863	355	10058	939	28107
3. Internal Policies	142	4523	139	4142	138	3909	419	12574
Existing policies	122	3898	127	3791	132	3743	382	11432
Institution building	22	692	13	390	7	190	42	1272
10. Compensations	332	10600	330	9834	202	5714	864	26148
Total Appropriations for Commitments	1372	43766	1748	52089	1920	54335	5040	150190
in % of GDP		1.6		1.7		1.7		

Source: Ministry of Finance of the Czech Republic

The overall amount of commitment appropriations for the Czech Republic for the period 2004–2006 was set at EUR 5 billion (which corresponds to around 1.7% of GDP) in financial flows from the EU to the Czech Republic per year. The biggest share of the commitments was allocated to structural actions (52%). Agriculture should absorb around 23% of the funds on average, but is increasing in importance.

Chart 1 shows that the Czech annual average commitment in % of GDP was one of the smallest in comparison with the other new EU member states. However, this is related to a higher degree of real convergence of the Czech economy as measured by GDP at PPS in 2001.

Chart 1: Commitments 2004–2006 (Copenhagen package, annual averages in % of 2004 GDP) and real convergence (2001 GDP at PPS, EU25 = 100) in 10 new EU member states



Source: Ministry of Finance of the Czech Republic and Eurostat

Under the new financial perspective, the classification of EU funds has changed somewhat. Therefore, it might be complicated to compare the commitments before and after 2007. However, in the general items such a comparison is still possible. When comparing 2007–2013 with 2004–2006, there are greater allocations in nominal terms for all the Central and Eastern European (CEE) new member states, the Czech Republic included. The overall Czech average annual commitment exceeds 3.5% of GDP for the financial period 2007–2013. The appropriations for commitments under two main headings – *1b Cohesion for Growth and Employment* (the “former” Structural actions) and *2 Preservation and Management of Natural Resources* (Agriculture) – should amount to around 3% of GDP on average (see Table 2). Additionally, further EU funds could provide 1 p.p. of GDP of financial resources per year at most. This falls under the headings *1a Competitiveness for Growth and Employment*, *3 Citizenship, Freedom, Security and Justice*, *4 EU as a Global Player* and *5 Administration*.⁵⁶

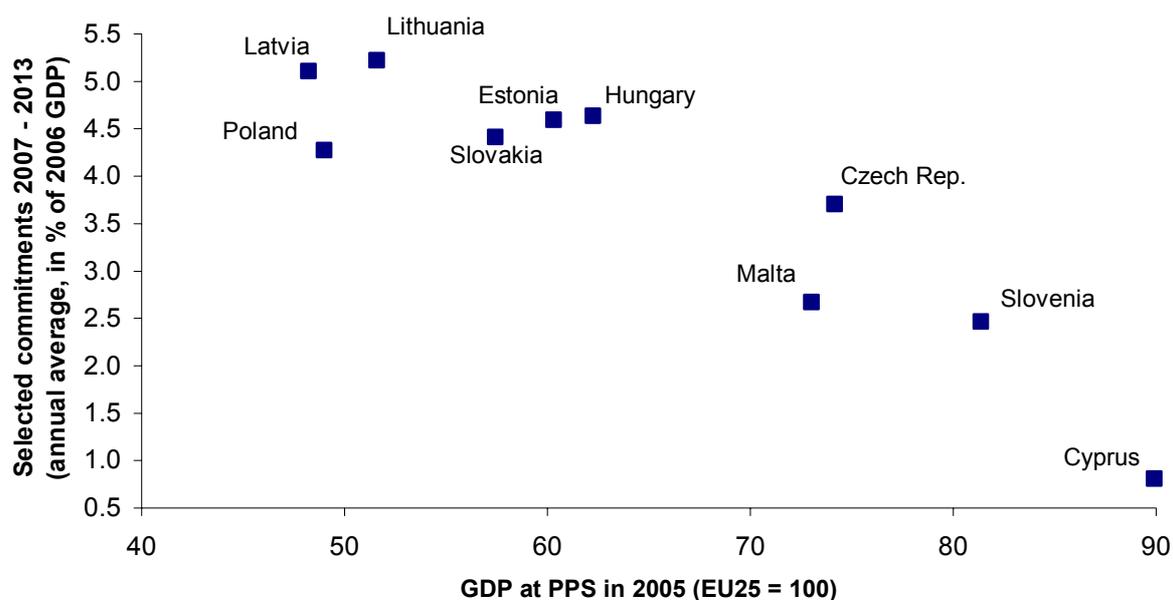
⁵⁶ Unfortunately there is no detailed information on allocations among countries for these headings.

Table 2: Commitment appropriations under headings 1b (“Structural actions”) and 2 (“Agriculture”) for the Czech Republic 2007–2013 (millions of EUR, current prices)

	2007	2008	2009	2010	2011	2012	2013	2007 - 2013
1b Cohesion for Growth and Employment	3320	3480	3641	3809	3978	4146	4317	26692
2. Preservation and Management of Natural Resources	790	871	960	1063	1156	1249	1342	7431
of which: market related expenditure and direct payments	390	475	568	658	745	833	920	4588
rural development	397	393	388	401	407	413	418	2815
European Fisheries Fund	3	4	4	4	4	4	4	27
Total appropriations for commitments - headings 1b + 2	4109	4350	4600	4873	5134	5396	5659	34122
in % of GDP	3.3	3.2	3.1	2.9	2.8	2.7	2.6	

Source: Ministry of Finance of the Czech Republic and www.europa.eu

The Czech appropriations for commitments for the new financial perspective (2007–2013) are relatively high in comparison with the other CEE new member states, especially when one takes into account the higher degree of real convergence of the Czech economy to the EU average (see Chart 2).

Chart 2: Commitments for heading 1b (Cohesion for Growth and Employment) 2007–2013 (annual averages in % of 2006 GDP) and real convergence (2004 GDP at PPS, EU25 = 100) in 10 new EU member states

Source: Ministry of Finance of the Czech Republic, www.europa.eu and Eurostat

The appropriations for commitments, however, do not directly reflect real financial flows from the EU budget to the Czech Republic. The financial flows – particularly in the case of structural actions – are determined by the preparedness of the projects and the absorption capacity of the economy. Therefore, the Czech Ministry of Finance derives the expected real financial flows on the basis of the commitment appropriations specified above and in accordance with a given financial flow methodology.

Furthermore, there are Czech contributions to the EU budget that need to be taken into account when one assesses the overall balance of the country vis-à-vis the EU. The main contributions of the budget, called “own resources”, include gross national product based resources, value added tax based resources, the British rebate, and the EU’s traditional revenue resources collected on its behalf by national governments (such as sugar levies and 75 percent of the tariffs on non-EU imports). The Czech Republic’s total contributions are assumed to be up to one percent of Czech GDP per year.

The financial flows between the Czech Republic and the EU have so far been steady (see Table 3). In 2004, its first year of membership, the Czech Republic’s net balance⁵⁷ vis-à-vis the EU was CZK 7 billion. This was mainly due to the receipt of advance payments for structural operations and comparatively high compensation. There was practically no actual drawdown of EU funds for structural operations that year. In 2005, the country’s net position was only around CZK 1.5 billion. The main reasons for this deterioration were: a decrease in advance payments for structural operations (6% of the total allocation for the programme period 2004–2006, as compared to 10% in 2004), a simultaneous decrease in compensation, an increase in Czech contributions of own resources to the EU and insufficient implementation of structural operations projects.

In 2006, the Czech Republic’s net balance vis-à-vis the EU increased slightly compared to 2005, reaching CZK 6 billion. This was mostly due to higher drawing of financial assistance from the structural funds (SF) and cohesion fund (CF), i.e. for structural operations projects. Overall, however, the drawing on SF and CF funds in 2004–2006 was far below the level allocated to the Czech Republic for structural operations for that programming period. Less than 35% of the above commitment appropriations had been drawn by the end of 2006 (including advance payments).⁵⁸

The net balance of the Czech Republic vis-à-vis the EU improved again in 2007, reaching CZK 15.3 billion. However, the improvement in the net balance was driven mainly by advance payments for the new programming period which the Czech Republic received at the end of 2007 (after approval of the programme documents) and which amounted around CZK

⁵⁷ The net balance is defined as the difference between the country’s total income from the EU and its contributions to the EU.

⁵⁸ The “n+2 rule” ensures that the SF and CF allocation for 2005 can still be drawn in 2007 and that for 2006 can still be drawn in 2008.

15 billion. The Czech Republic's net balance vis-à-vis EU institutions for 2007 Q1–3 was only around CZK 1 billion.

Table 3: Real financial flows between the EU budget and the Czech Republic 2004–2007 (millions of EUR, millions of CZK)

	2004		2005		2006		2004 - 2006		2007	
	mil EUR	mil CZK	mil EUR	mil CZK	mil EUR	mil CZK	mil EUR	mil CZK	mil EUR	mil CZK
Pre-accession aid	157	5010	72	2149	90	2563	320	9722	20	547
Agriculture	91	2895	398	11855	503	14268	992	29018	692	19213
Structural operations	193	6171	212	6317	468	13272	874	25760	995	27608
of which: SF	162	5156	138	4106	252	7148	552	16411	763	21161
CF	32	1014	74	2211	216	6124	322	9349	232	6447
Internal Policies	27	858	60	1772	52	1478	139	4108	63	1757
Compensation	332	10600	300	8934	202	5722	834	25256	0	0
EEA/Norway financial instrument	0	0	0	0	3	0	3	0	3	78
Total revenue from EU	800	25534	1042	31028	1320	37302	3162	93864	1773	49203
Own resources	554	17681	959	28573	1071	30338	2584	76591	1157	32113
Payments to EIB, RFCS etc.	28	885	28	826	34	956	89	2668	64	1762
Total payments to EU	582	18 566	987	29 399	1 104	31 294	2 673	79 259	1 221	33 875
Net balance	218	6 968	55	1 628	215	6 008	488	14 605	552	15 328
Net balance in % of GDP	0,25		0,05		0,19				0,43	

Source: Ministry of Finance of the Czech Republic (original data in EUR; conversion to CZK using average CZK/EUR exchange rate)

Note: The data may be slightly different from the actually realised financial flows because of the application of the average CZK/EUR exchange rate for conversion to CZK.

2007 marked the start of the new programming period 2007–2013. The Czech Republic's national strategic reference framework for this period was approved with a delay at the end of July 2007. It was among the last frameworks submitted to the Commission (at the beginning of March that year). From July 2007 onwards, the operational programmes and documentation were being completed, systems were being prepared and internal audits were being performed at the managing institutions. The first three operational programmes⁵⁹ were approved by the Commission and officially signed in October 2007. Almost all the other operational programmes (five thematic ones, one for Prague and seven regional ones) were approved during December (see Table 4). Hence, one nationwide operational programme (Research and Development for Innovations) has yet to be approved. So far, the accredited operational programmes (thematic, regional and Prague) cover more than 90% of the total Czech allocation for 2007–2013 for heading 1 – *Cohesion for Growth and Employment* (see Table 4). Besides the 17 thematic, regional and Prague operational programmes, there are also 9 operational programmes within European territorial co-operation⁶⁰, but for these

⁵⁹ Human Resources and Employment, Education for Competitiveness and Prague – Adaptability.

⁶⁰ OP Interregional Co-operation, OP Transnational Co-operation, ESPON 2013, INTERACT II, OP Cross-border Co-operation Bavaria – CR, OP Cross-border Co-operation CR – Poland, OP Cross-border Co-operation Austria – CR, OP Cross-border Co-operation Saxony – CR, OP Cross-border Co-operation Slovakia – CR.

programmes the commitment appropriations are not fully specified separately for each particular state.⁶¹

Table 4: Operational programmes – contributions of EU (in billions of EUR and % of total allocation) and time of their approval

			Allocation 2007–2013		Approval by EC
			EUR bn	% of Alloc.	
Thematic OP (8)	OP Transport	OP T	5.774	22.0	10 Dec 2007
	OP Environment	OP E	4.918	18.7	20 Dec 2007
	OP Enterprise and Innovation	OP EI	3.041	11.6	3 Dec 2007
	OP Research and Development for Innovations	OP RDI	2.071	7.9	NOT YET
	OP Human Resources and Employment	OP HRE	1.837	7.0	16 Oct 2007
	OP Education for Competitiveness	OP EC	1.829	7.0	16 Oct 2007
	Integrated OP	I OP	1.582	6.0	20 Dec 2007
	OP Technical Assistance	OP TA	0.248	0.9	28 Dec 2007
Regional OP (7)	NUTS II Northwest		0.746	2.8	3 Dec 2007
	NUTS II Moravia-Silesia		0.716	2.7	3 Dec 2007
	NUTS II Southeast		0.704	2.7	3 Dec 2007
	NUTS II Central Moravia		0.657	2.5	3 Dec 2007
	NUTS II Northeast		0.656	2.5	3 Dec 2007
	NUTS II Southwest		0.620	2.4	3 Dec 2007
	NUTS II Central Bohemia		0.559	2.1	3 Dec 2007
OP Prague (2)	Competitiveness	OPPC	0.235	0.9	20 Dec 2007
	Adaptability	OP PA	0.108	0.4	16 Oct 2007
Total (17)			26.3	100	(14)

Source: The Czech Republic's national strategic reference framework 2007–2013, www.strukturalni-fondy.cz

The first drawdown of EU funds for structural operations from the current allocations for the 2007–2013 programming period is expected to happen in 2008. And hence, under the structural operations, the Czech Republic in 2007 drew allocations only from the previous programming period and received advance payments for the current period.

The Czech Ministry of Finance expects the net balance to increase over the new programming period mainly due to a rise in drawings from the SF and CF (see Table 5). The largest leap in the inflow of finances from EU sources is likely to occur in 2008, when the country's net position vis-à-vis the EU should reach approximately 1% of GDP (in comparison with 0.4% of GDP reached in 2007). Until 2013, the net position should gradually increase to almost 2% of GDP, as revenues from the EU budget will increase and payments to the EU budget will slightly decrease at the same time (in % of GDP). The biggest proportion of financial sources (up to 75% of the commitment appropriation in 2013) should be directed to structural actions.

⁶¹ The allocation is specified only for OP Transnational Co-operation and the Cross-border Co-operational OPs and totals around EUR 0.39 billion.

Table 5: The Czech Republic's expected net balance vis-à-vis the EU (in millions of EUR)

	2008	2009	2010	2011	2012	2013
Agriculture	850	990	1051	1145	1240	1453
Structural Operations	2064	2147	2567	2961	3695	4509
<i>of which: SF</i>	1291	1258	1700	1998	2498	2997
<i>CF</i>	773	889	868	963	1197	1512
Internal Policies	55	51	50	50	50	50
Total revenue from EU	2969	3188	3668	4156	4985	6012
Own Resources	1423	1358	1463	1461	1535	1559
Payments to EIB, RFCS etc.	71	49	11	13	16	18
Total payments to EU	1494	1407	1473	1474	1550	1577
Net balance	1475	1781	2195	2682	3434	4436
Net balance in mil. CZK*	40416	47380	56628	67806	85098	107706
in % of GDP**	1.0	1.1	1.3	1.4	1.6	1.9

Note: * Conversion to CZK using the average CZK/EUR exchange rate – up to 2010 based on the assumptions of the Convergence Programme of the Czech Republic (November 2007, Ministry of Finance); in the remaining period constant appreciation of the CZK/EUR exchange rate by 2% per year is assumed;

** GDP at current prices up to 2011 based on the assumptions of the Fiscal Outlook of the Czech Republic (May 2008, Ministry of Finance); in the remaining period the growth rate of nominal GDP of 2011 is assumed;

Source: Ministry of Finance (working estimates from August 2007) and author's calculations.

4. Estimates of the real drawdown of EU funds by the Czech Republic

The positive net balance, or increased inflow of finances from the EU into the Czech Republic, does not itself necessarily mean that these funds will immediately boost domestic demand, since the financial flows recorded with the EU also include advance payments, which will not necessarily be paid to the final beneficiaries. Hence, the derivation of the macroeconomic effects of absorbing EU funds has to be based on an estimate of the real drawdown of funds and not on the expected financial flows between the Czech Republic and EU.

The need to derive real drawings on EU funds by final beneficiaries arises mainly in the case of structural actions. For the past period we can use the data on realised expenditure⁶² from the programming period 2004–2006 on projects under operational programmes and single programming documents published by the Ministry for Regional Development (in the document “The Course of Drawdown of Structural Funds”).⁶³

⁶² Realised expenditure includes funds applied for in the payment requests submitted by final beneficiaries to the intermediate body.

⁶³ www.strukturalni-fondy.cz

Drawing on structural funds (realised expenditures excluding advance payments) was very low in 2004–2005. Nevertheless, a similar experience was observed in almost all the new member states after their accession. In 2006, the volume of realised expenditures increased significantly (see Table 6). However, this was not followed by an acceleration of drawdown. In 2007, realised expenditures totalled just under CZK 17 billion. As a result, around 40% of the commitment appropriations for the period 2004–2006 remained unspent at the end of 2007. In spite of this fact, a significant improvement in EU fund drawing could be observed in the second half of 2007, after a weaker first half of the year. The main reason for this was a need to exhaust the 2005 allocation by the end of 2007 to comply with the N+2 rule. For some programmes, the drawing of the 2005 allocation was finished in December 2007. A similar effort was seen at the end of 2006 as the deadline for drawing the 2004 allocation approached. We can justifiably expect problems with the drawing of the 2006 allocation this year as well.

Table 6: Drawdown of financing from EU structural funds (“realised” expenditure) in the Czech Republic 2004–2008 (CZK millions)

	2004	2005			2006			2007			2008
	Total	H1	H2	Total	H1	H2	Total	H1	H2	Total	H1
OP	142	690	1387	2077	4340	7891	12232	5721	8153	13874	4933
JPD2+3	0	0	7	7	106	824	930	409	775	1184	520
Total	142	690	1394	2084	4447	8716	13162	6130	8928	15058	5453

Note: OP = drawdown for projects under operational programmes (Objective 1); JPD2+3 = drawdown for projects under single programming documents (Objective 2+3).⁶⁴

Source: Ministry for Regional Development

The drawdown problems during the initial period were mainly due to an inadequate institutional environment and a lengthy project selection process (in other words there was not enough administrative capacity to control projects and to ensure efficient implementation). Rosenberg and Sierhej (2007) concluded that the institutional framework for managing EU funds can fully affect the absorption capacity. Moreover, the initial frameworks in the new member states were over-regulated. Their conclusion is that the absorption capacity is helped by a strong central managing authority. Unfortunately, the Czech Republic has not reacted to this experience and retains its fragmented approach to managing EU funds.

However, a substantial increase in realised expenditure in the case of structural actions is expected in 2008 for two reasons. Firstly, allocations from the previous programming period

⁶⁴ Objective 1 = Supporting development in the less prosperous regions (with GDP below 75% of the EU average; Objective 2 = Revitalising areas facing structural difficulties; Objective 3 = Supporting education, training and employment policies. Objectives 2 and 3 cover regions not eligible under Objective 1.

(2004–2006) will be drawn in 2008. Secondly, drawing of projects accredited under the new programming period (2007–2013) will start.

Total realised expenditures are derived from the reported financial flows under the Czech Republic's net balance vis-à-vis the EU (reported in Table 6). Advance payments for structural actions⁶⁵ as yet unspent to reimburse implemented projects are excluded from the expected financial flows from the EU. At the same time, realised expenditures financed by already obtained advance payments should be considered. We can derive the realised expenditures from the SF for the period 2004–2007 using data included in the above-mentioned document "The Course of Drawdown of Structural Funds". Subsequently, for the period 2008–2010, gradual growth in SF fund drawing is expected. From 2010, the anticipated financial flows will broadly correspond to the realised expenditures. As regards the cohesion fund, it is assumed that the realised expenditures will quite closely match the corresponding financial flows from the EU.

It should be noted that in the case of the SF and CF, EU refunds are only received after documentation has been submitted to and approved by the European Commission (a process which can take up to six months) and hence these flows reflect past economic activity. However, data about the real timing of project realisation is very difficult to obtain. Therefore, an assumption of no lengthy time lag between project implementation and subsequent submission of the payment request by the final beneficiaries is made.

Direct payments in agriculture are by definition delayed by one year. The standard practice in the common agriculture policy area is that direct payments are initially pre-financed from the state budget of the country. Later on, in the following year, corresponding payments are repaid to the member state from the EU budget. The estimate of realised direct payments is for that reason based on a time shift of financial flows of one year. At the same time, rural development support has a precisely specified methodology governing financial flows to final beneficiaries (in EUR). These data are used for estimation of realised expenditures in the case of rural development. There is only a small difference between these estimates and the

⁶⁵ Advance payments from the structural funds in 2004 and 2005 corresponded, respectively, to 10% and 6% of the total allocation approved for the Czech Republic for the programming period 2004–2006. Advance payments were also set for the Czech Republic under the new programming period for the years 2007–2009, and they should reach, respectively, 2%, 3% and 2% of the 2007–2013 total allocation.

volumes which are assumed in the expected financial flows between the Czech Republic and the EU.

For the rest of the EU's financial instruments (pre-accession aid, agriculture market measures, fishing, compensation and internal policies) it is assumed that realised expenditures can be represented by financial flows from the EU. The same rule is applied for estimation of Czech payments to the EU budget in the future. Moreover, it can be assumed that payments to the EU expressed in cash and accrual terms should not deviate significantly.

Table 7: Expected realised net drawings of EU funds in the Czech Republic (CZK millions)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pre-accession aid	5010	2149	2563	547						
Agriculture	9176	14346	16164	21809	25941	27428	29074	30886	32532	34548
Structural Operations	1156	4295	19286	23136	42881	53763	66234	74861	91544	109491
of which: SF	142	2084	13162	16689	21696	30106	43849	50521	61888	72780
CF	1014	2211	6124	6447	21185	23657	22385	24340	29656	36711
Internal Policies	858	1772	1478	1757	1497	1366	1290	1264	1239	1214
Compensation	10600	8934	5722							
Total revenue from EU	26800	31496	45212	47248	70319	82557	96597	107011	125315	145254
in % of GDP	1.0	1.1	1.4	1.3	1.8	2.0	2.2	2.2	2.4	2.6
Total payments to EU	18566	29399	31293	33874	40937	37425	38011	37267	38413	38292
Net drawing	8234	2097	13919	13374	29382	45132	58586	69744	86902	106962
in % of GDP	0.3	0.1	0.4	0.4	0.8	1.1	1.3	1.5	1.7	1.9
Y-Y change in net drawing		-0.2	0.4	-0.1	0.4	0.3	0.2	0.1	0.2	0.2

Source: Author's calculations based on data provided by the Ministry of Finance and the Ministry for Regional Development of the Czech Republic

The final estimate of realised net drawings of EU funds (see Table 7) does not tell a significantly different story than the data mentioned in Table 5, which contained expected financial flows between the Czech Republic and the EU. Net drawings will gradually increase to approximately 2% of GDP in 2013 as a result of growing total revenue from the EU. The highest year-on-year change in net drawing in p.p. of GDP is foreseen in 2008, when it is expected to reach 0.4 p.p. of GDP. But, according to the estimates, the year-on-year change will be almost the same as in 2006, when the Czech Republic experienced a steep start to drawing on structural funds. In accordance with above-mentioned expectation an acceleration of structural and cohesion fund drawing is anticipated in 2008. After 2010 the drawdown of EU funds will increase moderately yet again (annually by 0.2 p.p. of GDP on average). As a result, the general conclusion based on the data above is that no significant asymmetric shock arising from the drawing of financial assistance from the EU is expected in the future.

5. Impact of EU funds drawing on the fiscal balance

The private sector should be the main beneficiary of the structural funds. Large infrastructure projects and environmental protection projects financed from the cohesion fund will, however, be implemented primarily by the public sector, which will also participate to some extent in structural fund projects. In addition, payments to the EU and co-financing of projects under the structural funds and cohesion fund will affect the expenditure side of the public budgets.

Accurate measurement of the impact of EU funds on the fiscal accounts under ESA 95 methodology (which is what ultimately matters for determining a country's compliance with the EU's deficit limits) is, however, rather complicated. Firstly, the primary data are based on cash-based, and not accrual-based, accounting and hence transformation of such data is needed.

Secondly, only funds that end up with government units as final beneficiaries should be recorded as expenditure. In the case of the structural funds, the status of the ultimate user is, however, very uncertain (these data are generally not easily available). Information obtained from some countries suggests that 45% of ERDF, 70% of ESF and 100% of community initiative funds end up in the public sector (Rosenberg and Sierhej 2007). Funds for agricultural support virtually all go to the private sector, while those for internal policies and cohesion go to the public sector.

According to the Ministry for Regional Development, in the Czech Republic 37% of final beneficiaries of structural funds are state and local institutions (municipalities and regions), and 13% of the financial sources go to the non-profit sector and educational and research institutions, including professional associations and interest groups. The biggest share (about 50%) is absorbed by private companies and others (for more details see "The Course of Drawdown of Structural Funds 2004–2006", March 2008).

Besides the above-mentioned methodological problems, there is a further complication with the estimation of substituted spending. Member countries are allowed to use EU funds to substitute almost fully for national spending for some purposes, e.g. agriculture. But in the case of structural actions they have to keep to the so-called additionality rules. Estimation of

the impact of EU funds on public budgets, as well as the overall fiscal impact of EU funds on the Czech economy, therefore, is crucially dependent on getting the amount of additionality right. A simplified assumption could be made that countries substitute domestic spending to the maximum extent possible under EU rules.

Finally, as already mentioned above, the state budget balance influences the co-financing of EU projects. Monitoring of co-financing overwhelmingly relies on budgetary resources. However, there is not a good record of this available.

To sum up, the revenue side of the public budgets is positively affected by at least partial use of SF and CF income for existing national public sector investment projects. The subsidies under the Common Agricultural Policy, which in large part substitute for national agricultural subsidies, also have a favourable effect. In addition, public sector revenues were raised in 2004–2006 by budgetary compensation. By contrast, the public expenditure side will reflect transfers of own resources to the European budget and co-financing. EU funds for private sector projects are neutral in terms of their impact on the public finance deficit, since they are reflected in the same amount on both the revenue and expenditure sides of the budget.

According to our estimates, the effect of financial flows between the Czech Republic and the EU (excluding co-financing) on the public budget balance was probably negative and amounted to around 0.2 percentage point of GDP in the period 2005–2007. In the following years, however, the positive impact of inflows of funds into agriculture and structural operations is likely to slightly exceed the very slowly rising transfers of own resources, and the overall effect on the public budgets will be positive with an upward tendency (from 0.2 p.p. of GDP in 2009 to around 0.5 p.p. of GDP in 2013).

Provided that there is no re-direction of part of the funds from national social cohesion projects to the co-financing of EU projects, additional upward pressure on public expenditure (a rise of 0.4 p.p. of GDP at most) can be expected due to co-financing during the actual financial framework period. If the Czech Republic does not want to create a fiscal loosening, it has to compensate for this co-financing by reducing spending elsewhere.

The overall impact of EU financial flows (which will partly substitute for domestic investments, and possibly subsidies, and thereby contribute to an improvement of the

government balance) and, on the opposite side, of co-financing (which will worsen the government balance) is expected to be negative up to 2008 (at between 0.3 and 0.5 p.p. of GDP), slightly negative or neutral between 2009 and 2011 and slightly positive in the remaining period up to 2013 (between 0.1 and 0.2 p.p. of GDP)

6. Estimation of the macroeconomic effects of EU fund drawing

EU financial flows should stimulate the convergence process in less developed regions. This should be evident more in the medium and long term. In the short run, we may observe an acceleration of GDP growth in particular through the boosting of investment activity. An increase in aggregate demand will imply new job creation and thereby decrease unemployment. On the other hand, there is a negative effect of inflation pressures. In the long term, the drawing of EU funds will influence the supply side of the economy, because it will contribute to infrastructure development, human capital, research, etc., which have a more permanent character.

An assessment of the macroeconomic impacts of EU fund absorption would be of importance not only for EU institutions, but also for the member states. However, there is no uniform methodology for estimating the impact of EU fund drawing. We have found several possible approaches in the literature, ranging from relatively simple data-based approaches to various model simulations using local or more general macroeconomic country models (see e.g. Dias, 2007), VAR analysis or linear regression, or cross-section regression (e.g. Ederveen, de Groot and Nahuis, 2006). Nevertheless, almost all of the available studies focus more or less only on the effect of drawing down structural and cohesion funds, i.e. on structural actions (excluding agriculture etc.). The aim of this section is to evaluate the impact of the overall financial flows between the Czech Republic and the European Union, i.e. not only the structural actions inflows. We apply both a data-based approach and a model approach to estimate the impact of EU fund drawing on GDP growth in particular.

6.1. Data-based approach

A simple approach is a pure expression of the fiscal stimulus using the net balance vis-à-vis the EU in % of GDP. Since net drawings from the EU were positive, it is natural to expect

that they had a positive demand impact (Rosenberg and Sierhej, 2007). Despite this expectation, the task is not as straightforward as it seems. Firstly, it is necessary to take into account only the so-called realised net balance vis-à-vis the EU (see above), i.e. the balance net of advance payments (as they have no relation to economic activity). Additionally, we should consider the time inconsistency between project realisation and project re-financing from the EU, because the demand impact arises at the time of spending rather than upon receipt of the EU refunds. Finally, we have to deal with the question of whether the EU funds are crowding out or augmenting domestic spending.

The demand impact can be defined as:

$$D = \alpha * (T + NC - A) - C ,$$

where D denotes the demand impact, T transfers received from the EU, NC national co-financing of EU funds, C contributions paid to the EU, A advances received and finally α the degree of substitution between EU-related projects and domestic spending that would have happened anyway, and that depends on the implementation of the additionality guidelines. Parameter α can take values between 0 and 1 (full additionality $\alpha = 1$) and is the source of the greatest uncertainty. At least in the agriculture and cohesion areas some substitution occurs and is fully authorised. But in the case of expenditures financed from the structural, pre-accession and rural development funds, they should not replace domestic spending (at least to some extent). And hence it is generally considered that α is probably not equal to 1 but could be around 0.6–0.7.

In the case of the Czech Republic, the fulfilment of the above-mentioned formula is complicated. Besides the standard aforementioned problems with the data, there is a problem with the relatively unclear evidence of EU project repayments. This is mainly caused by the Czech payment system, in which EU contributions are first reimbursed to the final beneficiary from the state budget and subsequently, after certification by the payment authority, the European Commission is requested to make backward reimbursement of already paid-for projects into the state budget. This certification, however, is done not every month, but only three or four times per year. This further complicates the proper determination of the real time of project realisation. Moreover, comprehensive information about co-financing expenditure is not available. Nevertheless, it could be considered (in accordance with the above-mentioned facts) that the time lag between the realisation of projects and the recording thereof as realised expenditures by the Ministry for Regional Development is not significant. In the

case of co-financing, it is possible to estimate its extent on the basis of the supposed average financial contribution of the country to EU projects. For example, it was determined that the co-financing should reach approximately 25% of the project costs in the programming period 2004–2006. Furthermore, the required contribution of the member states was decreased to 15% of the project cost for the current programming period.

The demand effect for the Czech Republic according to the above-mentioned formula can be estimated using the data from Table 7. Net drawing has to be modified only by the expected co-financing. Finally, the sum of net drawing and co-financing has to be multiplied by a coefficient that represents the degree of substitution between EU-related projects and domestic spending. And then contributions paid to the EU have to be taken away.

Table 8: Demand impact of EU fund drawing in p.p. of GDP – data-based approach

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Drawing of EU funds in % of GDP (T-A)	1,0	1,1	1,4	1,3	1,8	2,0	2,2	2,2	2,4	2,6
Payments to EU in % of GDP (C)	0,7	1,0	1,0	1,0	1,1	0,9	0,9	0,8	0,7	0,7
Co-financing in % of GDP (NC)	0,0	0,0	0,1	0,2	0,2	0,2	0,2	0,2	0,3	0,3
Demand effect										
$\alpha = 1.0$	0,3	0,1	0,6	0,5	1,0	1,3	1,5	1,7	1,9	2,2
$\alpha = 0.65$	0,0	-0,3	0,0	0,0	0,3	0,5	0,7	0,8	1,0	1,2
$\alpha = 0.55$	-0,1	-0,4	-0,1	-0,1	0,1	0,3	0,5	0,6	0,7	0,9
$\alpha = 0.3$	-0,4	-0,7	-0,5	-0,5	-0,4	-0,2	-0,1	0,0	0,1	0,2

Note: α = degree of substitution between EU-related projects and domestic spending

Source: Author's calculations based on data provided by Ministry of Finance and Ministry for Regional Development

Rosenberg and Sierhej (2007) recommended setting the value of α at between 0.55 and 0.65. On the basis of the available data about the drawdown of financial sources by the Czech Republic from the EU, a value of α of around 0.6 seems to be reasonable.⁶⁶ For illustration of the full additionality assumption ($\alpha = 1$) and relatively high substitution between EU and national projects ($\alpha = 0.3$), additional estimations of the demand effects with different values of α are shown in Table 8. On the basis of these estimates we can conclude that the demand effect should not exceed 2 p.p. of GDP per year at the end of the horizon considered. According to the most probable scenario it will be approximately 1 p.p. of GDP at that time.

⁶⁶ Unfortunately detailed and reliable information about additionality of the EU funds drawing in the Czech Republic does not exist. At the same time it could be very difficult to decide if some investment project was realised only because of the EU financial support. As was mentioned above, general rule is that expenditure financed from the structural, pre-accession and rural development funds should not replace domestic spending. In the case of agriculture and cohesion areas some substitution can occur and is fully authorised. Hence for simplicity it could be assumed that structural, pre-accession and rural development funds including internal policy projects are additional to the national investment projects. These expenditures amount to around 50-65% of the total realised expenditures during considered horizon (with increasing tendency).

However, as we have already mentioned, in the first two years of EU membership the demand effect was negative in the case of the Czech Republic. According to the estimations of Rosenberg and Sierhej (2007), the Czech Republic and Hungary were the only two countries with a negative impact of EU funds at the time. Also, the Czech Republic was the worst when the impact was expressed in % of GDP. Hopefully, this trend is currently being reversed and we can expect a slight increase in the positive effect of EU fund drawdown in future years. The year-on-year increase in the demand effect (corresponding to the discretionary impact of financial flows from the EU) will reach no more than 0.2 p.p. of GDP.

6.2. Model approach

The macroeconomic impacts of EU fund drawing can be simulated using selected macroeconomic models. Such models can provide important insights into the consequences of drawing EU funds, since, at least in principle, they are able to take into account the substitution, crowding out, multiplier and dynamic effects of policy, thus enabling the net effects over the long term to be estimated.

Several estimations for the Czech economy have been made in the past using the HERMIN⁶⁷ model (see, for example, the National Strategic Reference Framework of the Czech Republic 2007–2013; European Commission, 2007). The same has been done for some less developed EU member states (e.g. Szlachta, 2004; Bradley, 1997; European Commission, 2007). The European Commission also uses the QUEST model (e.g. Röger and in't Veld, 1997) and EcoMod⁶⁸ (European Commission, 2007) for this purpose. A quarterly model (QPM) is used at the Czech National Bank (CNB). Furthermore, the SVAR methodology could be employed (through shocks to government expenditure or revenues). We decided to apply the QUEST model (2nd generation) and compare its results with the model approach of the CNB.

⁶⁷ HERMIN is a macroeconometric model that combines both neo-classical and Keynesian elements to analyse in one framework both short-run (demand) effects and long-run (supply-side) effects. Moreover, as a model specifically designed to measure the impact of cohesion policy, it has a sophisticated system for processing the different forms of spending under cohesion programmes.

⁶⁸ EcoMod is a multi-sector, “recursive-dynamic” computable general equilibrium (CGE) model. It has a detailed representation of the structure of the economy, notably the behaviour and interaction of different sectors, different types of economic agents (households, firms, etc) and different types of economic behaviour (consumption, production, investment, etc). The model is therefore well-designed to capture structural shifts, trade effects and dynamic supply-side gains – a key aim of cohesion policy – but is not suitable for measuring short-term, year-to-year changes.

6.2.1 Simulation using the QUEST model (2nd generation)

The QUEST model is a macroeconomic model of the European Commission. It serves mainly as a tool for simulating and evaluating different types of fiscal, monetary and supply-side shocks. Such simulation analysis illustrates the transmission mechanisms of specific shocks (impacts of the economic policy of one country) to other EU economies in the medium term. The model consists of structural models for each of the “old” EU member states (EU-15), the United States and Japan, while the rest of the world is modelled through smaller trade feedback models (11 additional regions for the purposes of foreign trade incorporation).

The model can be characterised as a New Neoclassical-Keynesian synthesis model which combines dynamic general equilibrium models with features of Keynesian style rigidities. Economic agents (private households and firms) are assumed to optimise their objective functions, which are subject to intertemporal budget constraints. In the short run, the model allows for imperfectly flexible wages and prices, liquidity-constrained consumption, the presence of adjustment costs for investments and other standard Keynesian features. In the long run, there are two major departures from the neo-classical model. Because firms are not perfectly competitive they can charge a price above the marginal cost even in the long run. Therefore, the level of economic activity will be lower than in the case of a model with perfect competition. The second departure is the existence of labour market rigidities connected with the presence of involuntary unemployment even in the long run. Therefore, the model economy will not reach a steady-state equilibrium with full employment. The model covers monetary and fiscal policy in the form of an interest rule⁶⁹ and a debt rule⁷⁰ (for details, see the annex or, for example, Röger and in’t Veld, 1997).

Economic agents are forward-looking, and interest rates and exchange rates are endogenously determined. This leads invariably to public investment crowding out private investment. The demand-side effects should therefore be smaller than in other macroeconomic models (e.g. HERMIN or EcoMod), with the final effects on employment equally small.

⁶⁹ This sets short-run interest rates according to the expected development of inflation and the output gap (under inflation targeting).

⁷⁰ This ensures stabilisation of the government debt (in % of GDP) at a given level. If the government runs a deficit, which implies an increase in the debt-to-GDP ratio, new lump-sum taxes are imposed to return the debt to the desired level.

A fully calibrated and specified structural model for the Czech economy (as a part of the central model) is not yet available. All the new member states are still covered in a trade feedback model for Central and Eastern Europe. Nevertheless, for simulation purposes we obtained some substitute for the Czech model from the Commission in the form of an independent sub-model calibrated for the Austrian economy, which can be considered relatively similar to the Czech economy. This model can be filled by Czech time series, and some of the parameters can be modified. An overall new calibration of the Czech sub-model can unfortunately be done only by the European Commission within the complete system of the QUEST model.

In this modified sub-model we simulated the macroeconomic impacts of drawing EU funds through an increase in net current transfers from the rest of the world (NTR) and government investment (including co-financing) to the extent of the expected realised net drawing of EU funds in the considered period up to 2013.⁷¹ Government investment directly influences aggregate demand, while net current transfers from the rest of the world are a component of net foreign assets, which influence financial wealth and hence private consumption.

Government investment was increased by EU fund drawing by government institutions net of payments to the EU budget and co-financing. The government sector participates primarily in projects that are financed from the cohesion fund and partly from the structural funds. At the same time, the government receives financial sources for direct payments to agriculture as well as part of the sources for rural development. In the 2004–2006 period, the government also received so-called compensation. All other financial flows are considered as revenues to the private sector in the form of net current transfers from the rest of the world.

Simulations of the macroeconomic impacts of EU fund absorption were run for the period 2004–2013. For this period, the fiscal rule was switched off, because otherwise higher government expenditures (investments) would imply an increase in lump-sum taxes on households to stabilise the debt at a given level. Considering that almost all additional government investments would be financed from EU funds and the co-financing is assumed to be at least partly financed using sources previously allocated for national priorities, an increase in the deficit (or debt) would not necessarily be observed. One possible approach to

⁷¹ The pattern of the simulation was discussed with the relevant EC staff.

avoid an increase in lump-sum taxes on households is to switch off the fiscal rule and relax the debt increase above the desired level at least for some period. The second possibility would be to offset the higher investment expenditure by decreasing other government expenditures or by increasing standard taxes. Both solutions have some disadvantages by way of incorporating some additional effects into the model solution which should not be generated by EU fund drawing. Higher taxes and lower social transfers influence the optimisations of economic agents. A decrease in government consumption has a negative impact on GDP growth. On the other hand, switching off the fiscal rule (i.e. relaxing the debt increase) augments the interest costs connected with debt management. We should emphasise that without switching off the fiscal rules the final outcome would be quite similar, because according to the government reaction function the government's reaction is very slow. Consequently, this situation combines two negative effects – additional tax burdens on economic agents and higher interest payments. As a result, we decided to choose the least damaging solution for economic agents and to switch off the fiscal rule.

The expected effects of EU fund absorption on government investment and on NTR in % of GDP for the considered period 2004–2013 are listed in Table 9. The simulation results can also be found there. The first simulation was run only for the past period (2004–2006). The second one was done also for the outlook up to 2013. The third simulation offers an alternative (upper benchmark) to the second simulation. It assumes that all EU sources imply an increase of investment only (e.g. the transmission channel through NTR was not considered, unlike in the second simulation).

Table 9: Expected increase in government investment and net current transfers with the rest of the world as a result of drawing EU funds (in % of GDP) and results of the simulations of EU fund drawing – impact on GDP growth (deviations from the baseline in p.p.)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Government net position	0.0	-0.2	0.0	-0.1	0.2	0.5	0.5	0.6	0.8	1.0
Co-financing	0.0	0.0	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Total government investment	0.0	-0.1	0.2	0.1	0.5	0.7	0.8	0.9	1.1	1.3
Net current transfers	0.3	0.3	0.5	0.5	0.5	0.6	0.8	0.8	0.9	1.0
Simulation 1	0.0	-0.1	0.0							
Simulation 2	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.5
Simulation 3	0.2	0.0	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.8

Note: Simulation 1 considered an increase in government investment and NTR in the period 2004–2006; simulation 2 considered an increase in government investment and NTR in the period 2004–2013; simulation 3 considered an increase in government investment (to the extent of all EU fund flows) in the period 2004–2013.

Source: Author's calculations based on data provided by Ministry of Finance and Ministry for Regional Development

The results of the simulations (see Table 9) show that there is no significant difference between simulation 2 and simulation 3, i.e. the channel through which additional sources from EU funds are incorporated into the QUEST model is not so important (with exception of 2013). Drawing EU funds stimulates economic activity (represented by real GDP growth) to the extent of 0.1–0.8 p.p. of GDP with an upward trend. From the year-on-year point of view it can be concluded that the increase in EU fund drawing will be relatively gradual. The aforementioned simulations, however, include the endogenous reaction of the monetary authority according to the given monetary policy rule.

The QUEST model incorporates strong assumptions about the crowding-out effect, so the boost to demand from EU fund spending could be interpreted as relatively modest. Instead, there is a slow build-up of supply-side improvements, although these are reflected mainly in productivity gains, since the model assumes the job content of growth to be negligible.

The results of similar simulations performed by the European Commission using HERMIN and EcoMod are considerably different. Both of these models imply a higher impact of EU fund drawing on GDP. However, it should be noted that according to the European Commission's conclusions the QUEST model results correspond better with the evidence of recent years in many of the new member states (for more details, see European Commission, 2007).

6.2.2. The CNB's approach⁷²

The CNB derives the economic impulse from flows of EU funds on the basis of the volumes of additional income that the private sector has drawn or is expected to draw from the EU funds beyond the funds included under public sector expenditure.⁷³ The reason for not taking into account the additional demand effect of the public sector is that EU fund drawing by the public sector is already included in the baseline of the CNB's forecast (specifically in the fiscal forecast) and the CNB only assesses the potential risks of the baseline.

⁷² The author is involved in carrying out these simulations at the CNB. For more details, see "Analýzy stupně ekonomické sladění České republiky s Eurozónou 2007" CNB, 2007.

⁷³ The additional income of the private sector from EU funds includes SAPARD and PHARE pre-accession instruments, funds for support of agriculture, a major part of the income from the structural funds and funds for internal policies. By contrast, it does not cover income from the Cohesion Fund and the ISPA pre-accession instrument, which is considered to be included under government investment (as these funds are aimed at large infrastructure projects and environmental protection projects mainly applied for by the state). Compensations that represent direct revenue to the state budget are also not taken into account.

For the purposes of calculating the economic impulse, the additional income from the EU does not comprise actually reported financial flows under the Czech Republic's net balance vis-à-vis the EU, but only includes realised expenditure. The forecast for realised expenditure for the future is an expert estimate by the CNB. The calculations also consider the potential non-existence of a long lag between project implementation and the subsequent submission of the payment request by the final beneficiaries.

The macroeconomic effects of flows from the EU funds are simulated using the CNB's quarterly prediction model. The model is a version of what has been called a "gap" model, because the task attempted is to explain the dynamics of disequilibrium paths and, in particular, how "gaps" or deviations from equilibrium values develop and are dissipated over the medium to long term.⁷⁴ Simulations of the macroeconomic effects of EU fund absorption are carried out by covering the additional impulse from the inflow of EU funds in the output gap equation as a residual (this equation already includes the standard fiscal impulse connected with fiscal policy assessment).

The final value of the impulse (expressing the effects of additional income from the EU on annual real GDP growth in percentage points) is derived using the same procedure as in the calculation of the fiscal impulse in the CNB's forecasting system, i.e. the year-to-year change in the additional income from the EU as a percentage of GDP, multiplied by an estimated multiplier. The simulation of the macroeconomic effects of the additional income from the EU takes account in particular of the short-term and medium-term demand impacts of the newly identified impulse arising from the inflow of funds from the EU. Impacts on the supply side of the economy are expected to show up in the long term. It is also assumed that the drawdown of EU funding is already anticipated in general and therefore will not affect the exchange rate in terms of conversion of EUR into CZK.

⁷⁴ For general information on the CNB's quarterly prediction model, see "The Czech National Bank's Forecasting and Policy Analysis System", 2003 (chapter 4). The original model has, however, changed over time. The latest version is used for the simulation in this paper.

Table 10: Expected financial flows resulting from the Czech Republic's EU membership (in CZK billions) and estimated impacts of drawdown of EU funds by the private sector on the economy

	2006	2007	2008	2009	2010	2011	2012	2013
Net balance vis-a-vis EU (CZK billions)	6.1	17.2	41.1	48.3	64.2	69.4	87.3	110.4
Net balance vis-a-vis EU (in % of GDP)	0.19	0.49	1.08	1.18	1.47	1.48	1.72	2.02
Impulse in pp of GDP	0.15	0.03	0.12	0.09	0.10	0.03	0.06	0.07
Inflation in pp (deviation from baseline)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 M PRIBOR in pp (deviation from baseline)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Output gap in pp (deviation from baseline)	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
CZK/EUR (deviation from baseline)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0

Note: Deviations from the baseline scenario of the CNB's July 2007 forecast

Source: CNB

According to the most recent CNB simulation results (September 2007)⁷⁵ the impact of inflows of EU funds on inflation, the interest rate (3M PRIBOR), GDP and the CZK/EUR exchange rate will be insignificant until the end of the new programming period (i.e. 2007–2013). Both inflation and the interest rate path will move in line with the baseline scenario. Very modest impacts can also be expected in the case of the output gap and the exchange rate. The largest impact of EU fund drawing on GDP (0.1 p.p.) is expected in 2008–2009. The main reason for this foreseen development is the very gradual increase in the drawdown of EU funds which is expected during the period, with relatively small y-o-y changes as a % of GDP. The rate of growth of these flows will not diverge substantially from the rate of growth of nominal GDP (i.e. the year-on-year change in these flows of EU funds for the private sector, expressed as a percentage of GDP, will be low).

7. Conclusion

The Czech Republic ranks among the less developed countries within the European Union in terms of the level of GDP relative to the EU average. Therefore, it could have been assumed that it would be a net receiver from the EU budget immediately after its accession. However, because of its limited preparedness (particularly in the case of structural actions) the Czech Republic's net balance vis-à-vis the EU was only slightly positive during the previous financial period 2004–2006, reaching approximately 0.2% of GDP per year (and less than 0.1% of GDP in 2005). In 2007, this net receiver position improved somewhat, increasing moderately to 0.4% of GDP. A similar development also happened in the so called “*realised net balance*”, defined as the difference between payments to the EU and revenues from the EU already transferred to final beneficiaries (i.e. it does not cover advance payments and

⁷⁵ A revision is expected during September 2008 (publication in November 2008).

should take into account the time inconsistency between realisation of the project and realisation of the financial flow).

However, for the current programming period a significant increase in EU fund drawing is assumed. This should provide an additional stimulus to the Czech economy, most probably in investment activity in particular.

A number of studies have analysed the impact of EU fund drawing on different EU economies, but few have looked at the case of the Czech Republic. There is no uniform methodology, hence the literature dealing with the macroeconomic impacts of absorbing EU funds is rather inconclusive. Furthermore, there are several issues which complicate such an analysis – in particular data availability.

This paper employed two standard methods for estimating the macroeconomic impacts of EU fund absorption – a data-based approach and a model approach, which was partly confronted with the CNB approach. According to the simple data-based approach, the so-called demand effect connected with EU flows will gradually increase (from initial negative values) and will reach approximately 1% of GDP in 2013. On the other hand, a simulation done using the QUEST model showed that the economic stimulus due to EU funds would increase at a slower pace. This implies that EU funds will contribute some 0.5–0.8 p.p. to GDP growth at the end of the horizon considered (2013). According to the CNB's approach, the impact will be even smaller. This partly corresponds to the different model framework the CNB uses, as well as to the fact that it only analyses the impacts which EU funds have on the private sector. The paper has illustrated that the results depend to a large extent on the approach used.

Having said that, one clear conclusion can be drawn. The positive impact on the Czech economy will be highly dependent on the country's ability to draw down the EU funds available for structural actions, which so far has not been very impressive. In addition, there is the challenge for the government budget to ensure the necessary co-financing without compromising fiscal policy (i.e. without generating a government deficit). It would be desirable to establish greater transparency in the EU fund drawing process, as this could make it easier to assess the absorption of EU funds.

8. References

Analýzy stupně ekonomické sladěnosti České republiky s Eurozónou 2007. CNB, Prague 2007.

Czech Statistical Office (www.cszo.cz)

The Czech National Bank's Forecasting and Policy Analysis System. CNB, Prague 2003.

Beugelsdijk, M., Eijffinger, S. C. W.: The Effectiveness of Structural Policy in the European Union: An Empirical Analysis for the EU-15 in 1995–2001. *JCMS*, Vol. 43, No. 1, pp. 37–21, 2005.

Beutel, J.: The Economic Impact of Objective 1 Interventions for Period 2000–2006. Report to the Directorate-General for Regional Policies, University of Constance, Constance 2002.

Bradley, J.: Aggregate and Regional Impact: The Cases of Greece, Spain, Ireland and Portugal. Office of the Official Publications of the European Communities, Luxembourg, 1997.

Bradley, J.: Evaluating the Impact of European Union Cohesion Policy in Less-developed Countries and Regions. *Regional Studies*, Vol. 40, pp. 189–199, April 2006.

Bradley, J., Mitze, T., Morgenroth, E., Untiedt, G.: An Integrated Micro-Macro (IMM) Approach to the Evaluation of Large-scale Public Investment Programmes: The Case of EU Structural Funds. Working Paper, CEFRA, Muenster 2005.

Brunila, A., Buti, M., in't Veld, J.: Fiscal Policy in Europe: How Effective are Automatic Stabilisers? EC Economic papers No. 177, September 2002.

Casella, A.: Redistribution Policy: A European Model. NBER Working Paper No. 9258, Cambridge, October 2002

Dias, A. M.: The Macroeconomic Impact of EU Structural Funds on the Portuguese Economy. Presentation for OECD, Instituto Financeiro para o Desenvolvimento Regional, Lisbon, 21 May 2007.

Ederveen, S., de Groot, H. L. F., Nahuis, R.: Fertile Soil for Structural Funds? A Panel Data Analysis of the Conditional Effectiveness of European Cohesion Policy. *KYKLOS*, Vol. 59, No. 1, pp. 17–42, 2006.

http://ec.europa.eu/regional_policy

European Commission: Growing Regions, Growing Europe: The Fourth Report on Economic and Social Cohesion. Office for Official Publications of the European Communities, Luxembourg, 2007.

Eurostat (<http://epp.eurostat.ec.europa.eu>)

Fatas, A., Andersen, T. M., Martin, P.: Does EMU Need a Fiscal Federation? *Economic Policy*, Vol. 13, No. 26, Apr., 1998, pp. 165-203.

Hix, S.: The Political System of the European Union. McMillan, Basingstoke 1999.

Horvath, A.: Absorption Problems in the EU Structural Funds; Some Aspects Regarding Administrative Absorption Capacity in the Czech Republic, Estonia, Hungary, Slovakia and Slovenia. National Agency for Regional Development of Slovenia.

Krieger-Boden, Ch.: European Integration and the case for Compensatory regional policy (Paper to be presented at the 42nd European Congress of the European Regional Science

Association, August 27th – 31st 2002, Dortmund). Preliminary paper, The Kiel Institute of World Economics, Kiel, May 2002.

Martin, R., Tyler, P.: Evaluating the Impact of Structural Funds on Objective 1 Regions: An Exploratory Discussion. *Regional Studies*, Vol. 40, pp. 201–210, April 2006.

Mattila, M.: Fiscal Redistribution in the European Union and the Enlargement. Department of Political Science University of Helsinki, Helsinki 2003.

Ministry of Finance (www.mfcr.cz)

National Strategic Reference Framework of the Czech Republic 2007–2013

Průběh čerpání ze strukturálních fondů 2004–2006, MMR (www.strukturalni-fondy.cz).

Rodden, J.: Strength in Numbers? Representation and Redistribution in the European Union. *European Union Politics*, 3, 2002, pp 151-175.

Röger, W., in't Veld, J.: Some Selected Simulation Experiments with the European Commission's QUEST Model. EC Economic Papers No. 178, October 2002.

Röger, W., in't Veld, J.: QUEST II - A Multi Country Business Cycle and Growth Model. October 1997.

Rosenberg, C.: Presentation on EU Funds in the New Member States: Opportunities and Challenges. *Joint ICEG – IMF Workshop*. IMF, Budapest 2006.

Rosenberg, C., Sierhej, R.: Interpreting EU Funds Data for Macroeconomic Analysis in the New Member States. *IMF Working Paper WP/07/77*. IMF 2007.

Rostoucí regiony, rostoucí Evropa: Čtvrtá zpráva o hospodářské a sociální soudržnosti, Evropská komise, květen 2007.

Sosvilla, R., Simón, J., Bajo-Rubio, O., Diaz-Roldan, C.: Assessing the Effectiveness of EU's Regional Policies: A New Approach. CentrA Working Paper No. E2004/29, February 2004.

Szlachta, J.: The Role of the Structural Funds and Cohesion Fund in the Stimulation of Sustained Economic Growth in Poland. Tiger Working Paper No. 69, November 2004.

Annex - Fundamental equations of the QUEST model**Private Consumption:**

$$C_t = (1 - \lambda) * \delta(\theta, p, \sigma, r_t)[H_t + F_t] + \lambda * Ydis,$$

where λ is the share of liquidity-constrained consumption, δ is the marginal propensity to consume out of total wealth, which is a function of the rate of time preference θ , the probability of death p , the intertemporal elasticity of substitution σ and the real interest rate r . H_t is human wealth, F_t is financial wealth and $Ydis$ is current real disposable income.

Production by private sector (Cobb-Douglas CES production function):

$$YPO T_t = \left(\left[a K_t^{-\rho} + (1-a) E_t^{-\rho} \right]^{-1/\rho} T_{Kt} \right)^{(1-\alpha)} (L_t T_{Lt})^\alpha,$$

where the inputs are capital K_t , energy E_t and private sector employment L_t . The variable T_{Kt} represents an efficiency index for the fixed capital stock and the variable T_{Lt} represents labour-augmenting technical progress.

Investment:

$$I_t = J_t \left(1 + (\phi/2) \left(\frac{J_t}{K_t} \right) \right) \frac{PI_t}{P_t},$$

where J_t are investment purchases, ϕ is the adjustment cost parameter, K_t is the capital stock and PI_t/P_t denotes the price of investment goods relative to the GDP deflator.

Labour market:

$$W_t = \frac{(1-\beta)}{(1-tl)} Z_t + \beta \left\{ (\alpha + \eta(1-\alpha)) \frac{Y_t}{L_t} + \frac{prob(.)vc_t}{q(.)} \right\},$$

where β is the relative bargaining strength of workers, tl the labour income tax rate and Z_t the reservation wage (unemployment benefits). The last term in brackets reflects the probability of finding and quitting a job for an unemployed/employed person and the vacancy costs incurred by the firm, and this is assumed to depend on labour market tightness (the unemployment rate).

Government (reaction function):

$$T_t = T_{t-1} + \psi_1 \left(\frac{B_t}{Y_t} - b_0 \right) + \psi_2 \Delta \left(\frac{B_t}{Y_t} \right),$$

where T_t are lump sum taxes, ψ_i are adjustment parameters, B_t is public debt, Y_t is GDP and b_0 is the targeted level of the debt to GDP ratio

Monetary policy rule:

$$rs_t = rr^{eq} + \text{inf}_{t+1} + a(\text{inf}_{t+1} - \text{inf}^{target}) + bGAP,$$

where rr^{eq} is the equilibrium real rate, which is taken from the steady state model solution, a and b are the weights given, respectively, to expected inflation (inf_{t+1}) and to the output gap (GAP) and inf^{target} is the inflation target.