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EDITORIAL

SCIENTIFIC ARTICLES / VĚDECKÉ STATĚ

SCIENTIFIC REPORTS / VĚDECKÁ SDĚLENÍ

Editorial
Editorial

MOJMÍR HELÍSEK

Dear Readers,

Prior to presenting the contents of this issue of the scientific journal ACTA VŠFS, I wish to share some important developments with you. We have received very good news from the Standing Committee for the Humanities of the European Science Foundation. As of 6 February 2015, our journal has been included in the prestigious database of journals managed by the aforementioned Foundation. The database is known as ERIH PLUS – i.e. the European Reference Index for the Humanities and the Social Sciences.

Therefore, we have climbed one step above the list of non-impact reviewed journals, as composed by the Czech Research and Development Council (RVVI). It is an important acknowledgement of the professional level of our journal.

And now to the contents of this issue.

The article of Václav Žďárek "A Robust Search for Determinants of Price Convergence in European Union – Known 'Suspects' or New 'Villains'?" is one of the winning papers of the Prof. František Vencovský Award. The paper focused on the search of determinants affecting the comparable price levels in the EU while applying the Bayesian Model Averaging. The empirical results corroborate the importance of "traditional" determinants, such as cost of labor and output gap, as well as of broadly defined environment, including a monetary policy regime.

In her article "Integrational Models and Forms of Inter-State Public-Private Partnership: Aspects of Financial Convergence", Alina Kulai sums up the main models and forms of public-private partnerships. She explains their role in terms of the development of social-economic relations as well as the deepening of financial convergence of countries participating in such partnerships.

In his article "Risks of Mortgage Loans in the Czech Republic", Jaroslav Tichý searches for correlations between the development of risk and the development of interest rates, also verifying relations between risk and development of the real estate collateral value. The paper also comprises a detailed analysis of the internal factors of revenue, competition, and distribution.

Jaroslav Vostatek, member of the Expert Committee on Pension Reform with the Ministry of Labor and Social Affairs of the Czech Republic, analyzes the social and provision models for pensions in his article "Social and Provision Models of Pension Insurance and Savings". The paper also concentrates on individual pillars of the Czech pension system that have recently undergone a number of reforms; however, usually with no improvement in their efficiency. All the pension pillars in the Czech Republic are thus in need of a major reform.

In the "Scientific Reports" section, Vladislav Pavlát and Otakar Schlossberger inform about the 7th annual Financial Markets conference that took place at the University of Finance and Administration this past spring.

We hope you will find the research results presented in our journal interesting and continue reading our journal.

Mojmír Helísek
Executive Editor
University of Finance and Administration

Vážení čtenáři,

dříve, než Vás seznámím s obsahem tohoto čísla vědeckého časopisu ACTA VŠFS, Vám chci sdělit důležitou novinku. Dobrá zpráva přišla ze Stálé komise pro humanitní obory, pracující při Evropské nadaci pro vědu (European Science Foundation). Ke dni 6. 2. 2015 byl náš časopis zařazen do prestižní databáze časopisů, spravované touto nadací. Databáze je známá pod zkratkou ERIH PLUS, což znamná The European Reference Index for the Humanities and the Social Sciences.

Dostali jsme se tak o jednu příčku nad seznam recenzovaných neimpaktovaných periodik, který sestavuje česká Rada pro výzkum, vývoj a inovace (RVVI). Jde o významné ocenění odborné úrovně našeho časopisu.

A nyní k obsahu tohoto čísla časopisu.

Článek Václava Žďárka Na stopě proměnných ovlivňujících cenové úrovně v Evropské unii – staří "známí" nebo noví "hříšníci"? je jedním z článků vítězů soutěže o Cenu prof. Františka Vencovského. Článek se zaměřil na hledání proměnných ovlivňujících srovnatelné cenové úrovně v EU. Použity jsou přitom Bayesovské metody (Bayesian Model Averaging). Empirické výsledky potvrzují význam jak „tradičních" determinant jako jsou náklady práce a mezera produktu, tak široce definované prostředí včetně režimu měnové politiky.

Alina Kulai ve svém článku Integrační modely a formy spolupráce veřejného a soukromého sektoru: aspekty finanční konvergence shrnuje hlavní modely a formy partnerství veřejného a soukromého sektoru. Vysvětluje jejich roli při rozvoji sociálních a ekonomických vztahů a při prohloubení finanční konvergence členských zemí partnerství.

Jaroslav Tichý v článku Rizika hypotečních úvěrů v České republice hledá korelace mezi vývojem rizika a vývojem úrokových sazeb a ověřuje vztahy mezi rizikem a vývojem hodnoty zástav nemovitostí. Detailně je proveden rozbor interního faktoru výnosů, faktoru konkurence a také faktoru distribuce.

Člen Odborné komise pro důchodovou reformu při Ministerstvu práce a sociálních věcí České republiky Jaroslav Vostatek v článku Sociální a správní modely důchodového pojištění a spoření analyzuje sociální a správní modely penzí. Zaměřuje se také na pilíře českého penzijního systému, které prodělaly v posledních letech řadu reforem, jež ale nevedly ke zvýšení jeho efektivnosti. Zásadní reformu proto vyžadují všechny české penzijní pilíře.

V sekci „Vědecká sdělení" informují Vladislav Pavlát a Otakar Schlossberger o sedmém ročníku konference Finanční trhy, která proběhla letos na jaře na Vysoké škole finanční a správní.

Věřím, že Vás výsledky výzkumu, prezentované v našem časopise, zaujmou a zůstanete nadále našimi čtenáři.

Mojmír Helísek
výkonný redaktor
Vysoká škola finanční a správní, z.ú.

A Robust Search for Determinants of Price Convergence in European Union – Known "Suspects" or New "Villains"?

Na stopě proměnných ovlivňujících cenové úrovně v Evropské unii – staří "známí" nebo noví "hříšníci"?

VÁCLAV ŽĎÁREK

Abstract

The article sheds some light on the problem of determinants of comparative price levels in the EU. A thorough search for determinants is carried out with help of the Bayesian approach (Bayesian model averaging). This state-of-the-art econometric approach allows researchers to deal with problems such as model uncertainty and open-endedness. Consequently, these cause problems with empirical modelling when using 'classical' approaches (e.g. cross-sectional estimations). We utilize dataset consisting of a broad range of variables both already utilized in empirical studies and new ones associated with broadly defined institutional environment and covering the period 1997–2011 for EU-26. Our benchmark results confirm the importance of some 'traditional' determinants such as labour costs and output gap and broadly defined environment (institutional factors) including a monetary regime. An extension of the basic model so that a potentially differentiated impact of determinants in old and new EU member states can be accommodated does not provide sufficient evidence for differentiated effects of individual price level determinants in new and old EU member states.

Keywords

comparative price level (CPL), new EU Member States, determinants, Bayesian methods

Abstrakt

Článek se zaměřil na hledání proměnných ovlivňujících srovnatelné cenové úrovně v EU. Použity jsou přitom Bayesovské metody (Bayesian Model Averaging). Tento nový ekonometrický přístup umožňuje řešit problémy spojené s nejistotou volby modelu a tzv. otevřeností. Ve svém důsledku jsou právě ony příčinou problémů při použití klasických (frekvencionistických) přístupů (např. průřezové odhady). V tomto textu jsou použity jak již dříve využívané proměnné, tak nové popisující institucionální prostředí za období let 1997–2011 a 26 členů EU. Empirické výsledky potvrzují význam jak „tradičních" determinant jako jsou náklady práce a mezera produktu, tak široce definované prostředí (institucionální faktory) včetně režimu měnové politiky. Odhady rozšířeného modelu reagujícího na možnost existence odlišností v determinantách cenových úrovní mezi novými a starými členy EU však nepotvrzují tuto hypotézu.

Klíčová slova
srovnatelná cenová hladina, nové členské země EU, determinanty, Bayesovské metody

JEL Codes
E31, F15, F31, P22, O11

Introduction

There have been many attempts to analyse factors (determinants) of price convergence across Europe, mainly during first years of the existence of euro. Since then a general interest has faded out. The on-going financial crisis has revealed many problems and aspect of a common currency and indirectly highlighted the importance of an adequate price-productivity ratio that seems to be a key to the success. Prices are one of the two key mechanisms that allow individual economies taking part in a monetary union to deal with both internal and external shocks. Therefore, there are several research questions that can and should be explored. In this paper we try to shed some light on the process of nominal (price) level convergence in EU countries due to the on-going integration process.

Nominal (or price) convergence is inextricably intertwined with real convergence both from a theoretical and an empirical point of view. As income levels of individual countries tend to grow over time, their internal (and external) price level(s) change. One of the stylized fact is that the less developed a country is, the faster the growth of GDP (income convergence) and price changes can be expected. This economic phenomenon rests upon theoretical contributions from the 1930's/1960's/1980's (mainly the so-called Harrod-Balassa-Samuelson effect). An important characteristic of the European Union (and the Euro area) is that not only some EU members, but also some current euro area members have not achieved their 'steady state' which means that income growth and price (level) adjustments will definitely take place in the foreseeable future (apart from 'natural adjustments' reflecting day-to-day changes in the surrounding economic environment).

The importance of price convergence seems to have been confirmed by the on-going Sovereign Debt Crisis (ESDC) in the Euro area (EA). A high level of convergence of business cycles and converged price levels are essential in a monetary union. Even though the single European currency has enabled easier and quicker comparisons across EA/EU countries, it has also revealed huge differences between individual countries (and markets). More than 14 years have not been enough to close existing gaps. Similar business cycles and price levels are main building blocks pinning down potential inflation pressures and asymmetric impacts stemming from one-fits-all monetary policy of the ECB. The existence of countries with different inflation rates in a monetary union (e.g. a group of converging countries) poses a problem regarding both the effectiveness and impacts of the single monetary policy. In addition, a recent experience has clearly shown implications of inflation differentials for countries using one currency in terms of REER differentials and consequently competitiveness. A loss of competitiveness seems to be at the heart of the on-going Sovereign (Debt) Crisis in several EA countries, together with financial (banking) sector.

Empirical illustrations have become an integral part of any piece of research work. Good empirics is rather a challenging task given a large number of problems, starting with a choice of the methodology, over model settings to a selection of variables and criteria for model selection. At the end of such an exercise the best model is selected and inference and/or forecasting are done. However, due to complexity of the real environment, a choice or a particular model may not fully reflect the reality (the underlying uncertainty is simply ignored or put aside). Therefore, an approach trying to deal with uncertainty has been gaining ground, putting emphasise on a full evaluation of all possible models for a particular application, the so-called model averaging.

There have been many applications of model averaging, mainly in highly 'controversial' fields of modern economics such as economic growth or (international) finance. The essential problem of them is related to so-called open-endedness – they do not possess a house-resembling structure, i.e. some parts can coexist and a rejection or unconfirmability does not affect the validity of others. As a result, empirical testing of hypotheses within such fields typically follows a strategy when a set of standard variables is used together with a set of some problem-related (specific) ones. Alternative (other) combinations are usually not taken into account in the exercise.

A very similar case to the economic growth literature is the nominal (price) convergence with the literature that highlights few important determinants (for example real income) along a large set of 'auxiliary' variables stemming from various theoretical contributions. Therefore, it is an 'ideal' candidate for an application of model averaging techniques (such as Bayesian Model Averaging, BMA or its alternatives) capable of dealing with the model uncertainty. The novelty in this paper is that we applied the BMA approach to price convergence in an economic-growth-studies manner compared to a vast amount of studies based on the frequentist approach (e.g. Blatná (2011); Čihák, and Holub (2005); Dreger et al. (2007); Wolszczak-Derlacz, and De Blander (2009); Wolszczak-Derlacz (2010)). We search for determinants of this dynamic process and therefore, all the problems can be present that have been described.

The remainder of this paper is structured as follows: Section 2 reviews basic definitions, and some stylized facts related to nominal (price) convergence. Section 3 briefly outlines main characteristics of the Bayesian approach. Section 4 presents and discusses results of our analysis. Finally, Section 5 concludes and offers some guidance for further research.

1 Price Convergence – Some Theoretical Notes

Comparative price level (CPL) is a price level that is expressed as a fraction of the price level of a country or an integration group. In the case of European countries, CPL can be based on the average of EU-27 (it will be EU-28) or for analytical purposes also as the average of EU-15 countries or various Euro area averages. CPL in year t for country i (expressed against a country/a group of countries j) is given as[1]:

$$CPL_{t,i} = \frac{ER^{PPP}_{t,i}}{ER_{t,i}} = \frac{\frac{P_{t,i}}{P_{t,j}}}{ER_{t,i}} \quad (1)$$

where $ER^{PPP}_{t,i}$ is the PPP exchange rate for country *i* in year *t*, and $ER_{t,i}$ is the spot exchange rate in year *t* for country *i* (both with respect to a country-group *j*; values of CPL for the same reference (benchmark) country are thus directly comparable). If the CPL value is above 100, it indicates that the country is relative more expensive compared to an average and vice versa.

Most commonly used macroeconomic indicators of price convergence are those calculated in international comparison programmes (ICP) of prices and values of the World Bank that has a long tradition[2] or its European part (ECP) organized by Eurostat and OECD. Both these projects are aimed at obtaining (calculating) volume and value indicators that are comparable over time and across countries.[3] Such data are more robust compared to those from comparisons based on spot exchange rate calculations affected by many determinants.

Theoretically, adjustments of price levels can be attributed to changes of two main economic variables (i.e. they occur via two main so-called channels). Therefore for a country with any type of floating exchange rate regime holds: first, the so-called *price channel* represents higher inflation rates in the country compared to a 'reference' country (or a group of countries) and secondly, through exchange rate appreciation/revalvation (the so-called *exchange rate* channel). A problem for catching-up countries or countries under-

1 *CPL is a relative measure since it expresses the price level for a particular good/service ('basic heading') in terms of the reference country; here we keep the EU-15 average = 100 (=j) and as it is usual, the subscript j is omitted for readability.*

2 *Since the late 1960's the ICP had been guided by the Statistical Division of the United Nations (UNSD) as a part of the global initiative with the aim of providing of worldwide comparable GDP data; since 1993 it has been carried out by the World Bank (for the history of the project see e.g. WB, 2005). Results for the most recent ICP Round (2011) have been released recently.*

3 *While the WB publishes internationally comparable indicators in PPP (ICP), its European counterparts (Eurostat/OECD) publish indicators in PPS (ECP); Purchasing Power Standard is equivalent to PPP but it is based only on averages of prices for European countries (now EU-28), while PPP can be based on the average prices of OECD countries or the US prices.*

going structural adjustments would be the existence of a common currency that closes completely one of the previously mentioned channels (e.g. in catching-up countries for example (some) Mediterranean countries, Slovenia or Slovakia). An implication can be a long-run surge in inflation rates (both officially measured and/or hidden ones) with repercussion for competitiveness – changes in relative prices (and consequently unit labour costs) and real effective exchange rate. These seem to be one of the reasons for the current turmoil in the Euro area (mainly in Mediterranean countries) and they create challenges for monetary policy. Nevertheless, even for some candidate countries with pegged/fixed exchange rate regimes (such as *currency boards* in Bulgaria or Lithuania) implications are similar up to the point that they still have the (outside) option to adjust their exchange rate to alleviate any potential pressures through a change of its parity.[4] Having stated that, it is obvious why nominal convergence and analyses of nominal convergence process have been, are and will be interesting for a wide range of policy-makers: prediction of demand and supply determinants of nominal convergence make inflation forecasts more reliable, enable to estimate potential pressures stemming from prices and other nominal values, and allow to assess effects on real exchange rates and competitiveness.

1.1 A Brief Review of Determinants

Changes of price levels in the EU can be measured in many alternative ways. Since the aim is to study wants to study price levels across European countries, a proxy is utilized – the so called comparative price levels (CPLs), see above. Changes of CPLs in a national economy (denoted *i*) can be simply written with help of an equation as (see Lewis, 2007):

$$\Delta CPL_{t,i} = ER_{t,i} + \pi_{t,i} \tag{2}$$

where $ER_{t,i}$ is the change in the exchange rate and $\pi_{t,i}$ is the rate of domestic inflation of country *i* for given year *t*.[5] The relative importance of both channels depends on the regime of exchange rate in a given country. If there is a fixed type of exchange rate arrangement, any adjustment is carried out through the inflation channel (i.e. a positive/negative inflation differential), in the case of a floating type of exchange rate arrangement, total changes of CPLs are given by a mixture of both channels and thus, their individual (relative) proportion and importance may vary. If there is any type of inflation target set by a monetary authority (being the case in the Czech Republic, Hungary and Poland in NMS or Euro area countries), it is simultaneously determined an upper limit for inflation channel for a year (at least weakly due to possibility of not meeting a target in a year).[6]

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4 However, it is a question whether they would do so since repercussions of such a step are hard to predict and potentially 'lethal'.

5 Having observations for a country, the equation (2) does not hold true. It is due to changes of methodology and existence of mismeasurement (a discrete approximation of a continuous process). Therefore, for most of empirical studies using real data it is supposed that the exchange rate term takes into account not only changes of exchange rate, but also errors occurring by measurement; for details see Žďárek (2013).

6 A decomposition of real CPL changes is thus possible; an illustration for two NMS countries is presented in Figure 1A in the Appendix C. Consequences of fixing/not fixing the exchange rate can be clearly seen both in the size of individual bars and total changes of CPLs that can be mitigated or magnified (e.g. in 2007 in Estonia or in 2008 in the Czech Republic).

This decomposition shows that there are two main determinants of CPLs and their changes: the so-called price channel that affects the comparative price level in an economy and reflects a higher/lower annual rate of domestic inflation. This results from changes of economic structure (for example so-called selective inflation in case of the HBS effect), demand and supply factors, on-going process of deregulation of administered prices, changes of taxes (for example changes due to harmonization within the EU), etc. The other channel, the so-called exchange channel affects the comparative price level is given by changes (appreciation) of exchange rate. However, changes of exchange rate may be influenced by both short-lived (i.e. temporary) and long-lived (i.e. fundamental) factors. While transitory factors may lead to temporary disturbances and changes of exchange rate (for example set interest rates in economy resulting in important interest rate differentials), fundamental factors are supposed to be more relevant (for example changes of labour productivity). Differences of labour productivity by sectors are supposed to be resulting from the Harrod-Balassa-Samuelson effect (a supply side effect) well established in the neoclassical economic theory.

Nevertheless, theoretical explanations why price level in one economy grows include a host of determinants. Apart from already mentioned productivity differences, other concepts focus on factors associated with changes of real income of an economic subject due to different price of elasticity of consumption stemming from levels of disposable income and their changes (see e.g. Bergstrand, 1991) or more broadly on the domestic (country-specific) environment including inter alia macroeconomic policies, a phase of a business cycle, etc. (see Čihák, and Holub, 2005; Égert, 2007), effects due to a relative endowment of inputs in a country ('factors of production', i.e. their relative abundance or relative scarcity, see e.g. Bhagwatti, 1984). There are a large number of other variables which (may) have impact on national price level (so-called structural factors) discussed and often empirically tested in the literature (see Čihák, and Holub (2005)[7]; Kleiman, 1993[8]; Nestić (2005)[9]).

Further effects can be related to the on-going integration process or external environment. The latter being associated with e.g. preparations for an EU accession or the Single Market Programme), the former include effects of outsourcing, offshoring, reallocation of production (changes in production chains) within and outside the EU, see Alho et al. (2008) or the effects of monetary integration (see ECB, 2002; Mathä, 2003). Other explanations put forward linkages to broadly defined institutional environment e.g. anti-monopoly policy (regulations trying to restore free markets for as many goods and services as

7 The empirical testing of determinants of the national price level based on ECP dataset show that the highest relative importance has level of real income, taxation, labour productivity, etc.

8 Taxation may give rise to increasing prices in domestic economy (in case of shift of tax burden to consumer while having accommodative monetary policy). Influence of government expenditures on prices is supposed to be given by the necessity to finance higher government expenditures either by higher taxes and/or higher ineffectiveness of government' production and distribution of goods and services in comparison with private sector.

9 Data stemming from European part of ICP for 1999 confirmed the importance of government revenues and expenditures and labour productivity as the most important factors for determining comparative price level in the economy.

possible), consumers' preferences, 'searching & matching costs', cost of transport services, packaging, distances, localization, the size of a market, etc. that are in most of the day-to-day situations pre-determined (consumers' tastes, *home bias* in consumption, level of technology, etc.). A hypothesis has even been put forward that increasing intra-EU trade will mitigate or even reverse price (nominal) convergence, and therefore it will lead to more diverse national prices (price levels), see Baldwin (2006). In addition, one should not forget the influence of factors such as the economic integration process, or these linked to the on-going financial crisis (ESDC).

However, changes of CPLs may reflect changes in their individual components, very broadly linked to tradable and non-tradable goods and services.[10] While changes ('adjustments') of individual prices, price ratios/relations and price levels are a widely observed economic phenomenon, in converging economies across countries, especially for so-called tradable goods (for some evidence in the EU see empirical studies for example *Dreger et al., 2007*)[11], evidence for the non-tradable part is scarce and rather mixed. It cannot be a surprise that the European Commission has kept their eyes on price changes in the EU.[12]

1.2 A Brief Review of Literature

Theoretical and empirical studies focused on price (nominal convergence) have used two main sources of information about price movements – macroeconomic indicators such as CPLs or microeconomic indicators (individual prices); both of them have advantages and disadvantages ('biases'), for a review see e.g. Dreger et al. (2007). Because of a large number of studies, this review is primarily aimed at reviewing studies related to European (Union) reality and mainly `macro' views on price changes and their determinants. Another 'problem' is that studies listed below have utilized traditional approaches when examining changes in prices and they are thus not directly comparable with results of this study shown below.

A study by Dreger et al. (2007) investigated effects of an EU enlargement and its consequences for prices. Comparative price levels (CPL) indices for 1999–2004(2005) and 25 EU countries were utilized in a panel regression employing factors obtained from Principal Component Analysis (a proxy for 'catching-up' and another for 'competition'). Main conclusions are that competition and real convergence matter most, however, effects differ among old and new member states, commodities and in the period before and after the

10 *Those goods and services whose prices (price levels) are mainly determined by domestic determinants such as taxation (mainly VAT, indirect taxes), wages, regulation and trade barriers are usually characterised as nontradables. However, there is no exact definition of tradable and non-tradable which may thus offer a potential explanation for those results. For example the World Bank uses the label non-tradable for goods and services including energy, housing, public utilities, services and transport (see WB, 1991). These are a result of natural characteristics, trade restrictions and/or trade costs, etc.*

11 *There have been also studies that have cast doubt on nominal convergence even for some of these goods (such as car prices) or for rates of inflation of EU countries, see Buseti et al. (2006).*

12 *A large number research projects and regular price assessments have been carried out by the European Commission (EC) since the early 2000s (for example personal cars, see below). An updated version of such an assessment is EC (2006) that lists a number of problems and shows room for further price convergence.*

enlargement. Similarly, Allington et al. (2005) focus on first effects of the Euro adoption on price convergence (changes in CPL) for EU-15 countries between 1995 and 2002. A change in the convergence process was found and it was attributed to the euro.

Schwartz (2012) focuses on price dispersion (mean square error and standard deviation) using microeconomic dataset from the EIU City Data as well, but only for a sample of 'European' and some CIS countries over the period 1990–2009. It is tested whether entrepreneurship (and thus entrepreneurial activity) helps explain existing price differentials among cities if other standard determinants (such as boarder) affecting price differentials are accounted for. Since institutional quality may be of importance (quality of institutions) for making the existing price differentials more or less attractive for potential arbitrageurs, WGI (Worldwide Governance Indicators) is used as a proxy for the institutional quality in individual countries. If WGI was employed in a regression together with distance and population density in cities (a proxy for a degree of market competition), all variables turned to be statistically significant. It may be that this additional variable (WGI) captures some unexplained variance in prices or a part of the variance attributed to the boarder effect.

Similarly, Wolszczak-Derlacz, and De Blander (2009) analyse price dispersions of both individual and aggregated prices (double-weighted) for EU-15 countries and three selected NMS (their capitals – Budapest, Prague and Warsaw) in 1995–2006. σ-convergence is confirmed for 31 out of157 individual prices for NMS. The impact of the 2004 EU enlargement is analysed as well, however, no results are shown due to a rather short time span. Nevertheless, they considered the enlargement as a gradual process starting in mid-1990 and for this hypothesis price convergence is confirmed.

Finally, Blatná (2011) analyses price convergence of EU countries with the help of methods for cluster analysis (the Ward method, Euclidian distances). Using data for CPL (1995–2008) and other thirteen economic indicators four clusters are identified: the Czech economy belongs to the third cluster together with seven other countries. Another finding confirms a previously known fact (see e.g. Žďárek, 2008) that old and new EU member states respond differently and an empirical analysis should account for that.

2 Search for Price Determinants

2.1 Empirical Problems and Theoretical Responses

A potentially serious problem of empirical studies on determinants of price levels (price levels growth), i.e. explanatory variables for conditional models (similar to economic growth models though) is both the choice of a particular model and/or a selection of variables to use. The inability to refute one concept against its competitors has resulted in a large number of empirical studies based on different approaches utilizing zillions of variables ('kitchen-sink' estimations) with results having not given any better answer to the problem yet (i.e. 'open-endedness', see Brock, and Durlauf (2001) that seems to be of a general nature in (and not exclusively) the still expanding economic growth literature, but not only there).

The problem of choice of variables (determinants) for a model can be plainly illustrated with the help of equation (3):[13]

$$y_t = \xi M_t + \zeta A_t + \upsilon_t \tag{3}$$

where M_t is the set of 'standard' variables (regressors) usually included in an empirical exercise, A_t is the set of 'additional' (candidate) variables (regressors) employed by a researcher when conducting research.

However, there are only very few situations (empirical applications) where a researcher would have a prior (i.e. theoretically founded) as to what variables should be included in each of these groups.[14] One particular problem of this approach is that the researcher may not be convinced about the 'value added' of a variable (variables) included in M_t but there is the 'necessity' for utilizing them (any possible reason). Depending on the employed method (and assuming A_t fixed), either an estimator produces ξ and a distribution depending on the data generating process (DGP, i.e. frequentistor also classicalapproach) or a posterior density of ξ given the data, the prior supplied by the researcher and assuming a correct specification (in our example a linear model) is calculated (i.e. Bayesian approach). For a particular choice of a model $(L_\tau \in \mathcal{L})$, available data (D), a posterior pr can be specified as $pr(\xi|D, L_\tau)$. While there will be many theoretical arguments about what should be included in A_t, the key problem for any statistical inference – ξ or $pr(\xi|D, L_\tau)$ – will remain given the existence of uncertainty about the one 'true' (correct) model.

13 *An example of this 'composition method' can be found in Sala-I-Martin (1997). Implications of a random (naïve) choice of explanatory variables.*

14 *For example in the case of economic growth it seems almost natural to assume that a growth will depend upon an initial GDP level. Nevertheless, there are as many as 145 variables that have been found significant in various models over past decades (for an overview see Durlauf et al., 2008) and a choice of other variables is (almost in all cases) subjective. Moreover, only a smaller number of them can usually be employed in empirical studies including BMA. For example Ciccone, and Jarociński (2010) use 67 variables. A potential set of variables for price convergence may be somewhat smaller though.*

Another problem associated with the equation (1) is the existence of a `natural limit' for the number of cross sections (firms, countries, regions) and therefore, the inability to address these issues in ways the micro-econometric studies (empirical literature) have done. This could also be the reason why most studies apply more than one method when trying to find robust results.

As a result of this so-called model uncertainty, methods applying various forms of model averaging have started gaining the ground.[15] In this study we will utilize a method that belongs to the Bayesian approach, the so-called Bayesian model averaging (BMA).[16] There are some important advantages of BMA (see e.g. Horáth, 2011 or Amini, 2012): a number of potential (candidate) variables can be utilized at the same time reducing the omitted variable bias and allowing to test alternative hypotheses at the same time (there is a limit for their number though – number of cross-sectional units, e.g. firms or countries that can be partially alleviated in panel settings that use both spatial and time dimension); it offers a systematic (consistent) way of summarising results of individual estimations (averaging procedure), and it provides a `unique number' (posterior inclusion probability, PIP) that is the estimate of probability that a particular variable is included in the `correct model'.

Since we are interested in determinants of price convergence (and their importance), that is, the aim is to estimate a linear model such as (4) (so it is similar to Eq. (3)) the key issue emerges – the 'right' choice of $\boldsymbol{X}_\tau \in \mathcal{X}$ (i.e. the set of variables/regressors/determinants):

$$z = \mathbf{1}\iota_\tau + \Gamma_\tau X_\tau + \vartheta_\tau \tag{4}$$

where ι_τ is a constant (a constant intercept across all models), $\mathbf{1}$ is a vector of n ones, $\boldsymbol{X}_\tau$ includes a list of K potential determinants for example of price levels $(\boldsymbol{X} = (x_1, \ldots, x_K))$, for each model L_τ there will be $K \geq K_j \geq 0$ determinants (regressors) that are centered: $X_\tau \mathbf{1} = \mathbf{0}$ without any unfavourable effect(s) since only the constant ι_τ is shifted, see Liang et al. (2008), $\Gamma_\tau \in \mathcal{R}^{K_j}$ is a set of the relevant coefficients, and the error term

15 *There are three main components of the model uncertainty (see e.g. Amini (2012)): a) uncertainty about theory (which determinants are essential?), b) uncertainty about heterogeneity (are parameters identical across observations?), and c) uncertainty about functional form (which variables do enter linearly and which non-linearly in the model?). Apart from model uncertainty, there are many issues: parameter heterogeneity, outliers, measurement error, missing data, cross-section dependence, etc. see e.g. Durlauf et al. (2009) or Durlauf et al. (2011). Methods of dealing with parameter uncertainty (such as EBA – Extreme Bound Analysis – that reports an upper and lower bound for estimates of parameters (usually two standard deviations, i.e.* $< \hat{\beta}_{v,i} \pm 2\sigma_v >$*) or an alternative comparing the left and right side of a distribution (CDF's) for a particular* β_v *see Sala-I-Martin (1997)); however, both are subject to criticisms due to (1) their relative 'strictness' (a high rejection probability), (2) a relatively high likelihood of non-identification of 'true' determinants, or stepwise estimated models based on comparisons of selected statistical tests, for details see e.g. Durlauf et al. (2011). The Bayesian approach seems to be a logical extension.*

16 *There are many versions of BMA, broadly classified as `full' BMA and `pseudo' BMA (such as BACE or BAMLE) depending on actually used procedures for calculations. There are also methods suggested for the classical approach making use of averaging technique, such as Frequentist model averaging, see Amini (2012) or Amini, and Parmeter (2012).*

(ϑ_τ) is assumed homogeneous and independently distributed: $\vartheta \sim \mathcal{N}[\mathbf{0}, \sigma^2 \boldsymbol{I}]$. Formal treatment of the BMA approach can be found in appendix A.

There have been applications of BMA in many fields in order to verify old results and/or to offer 'a more realistic' ('systematic') picture for example regarding determinants of economic growth (such as Sala-i-Martin et al., 2004's BACE, Fernández et al., 2001, full BMA by Feldkircher, and Zeugner, 2012) or growth of European regions (Crespo-Cuaresma et al., 2009) or an attempt to assess effects of the on-going financial crisis (Feldkircher, 2012); for a more recent list of applications see e.g. Moral-Benito (2012a).[17] Nevertheless, to our best knowledge, there has not been any similar study for prices or price level determinants and/or including effects of the on-going financial crisis.[18]

2.2 Choices and Problems of BMA

There are two main choices that have to be made and that affect results obtained from an application of BMA approach – a choice of parameter priors and model priors (their overview is in Appendix A). A particular choice of both expresses what type of beliefs, expectations or information a researcher possesses before actually working with their data. Priors affect so-called marginal likelihood (see Appendix A) and their choice is subject to discussion in the literature (see e.g. Feldkircher, and Zeugner, 2009). In order to show robustness of results, various priors are employed (some usually following recommendations in a similar study, others may `deviate' being a choice out of at least 12 priors (g priors) known in the literature, see Eicher et al., 2011). In the economic growth literature (and many further applications) such information is rather limited. That leads to the use of so-called uninformative priors (such as Unit Information Prior, UIP) and uniform model priors in empirical studies (see Horvath, 2011). Some authors (e.g. Feldkircher, and Zeugner, 2012) recommend using so-called hyper-g priors that are more flexible and robust and reflect data that are used. Regarding model priors, there are two main priors – uniform and random binomial – that characterise the way of treating individual models in estimation procedure. In our application we follow abovementioned rules and employ various priors (both g and hyper-g and two model priors).

Despite its advantages in many regards, there are some potential pitfalls related to the use of BMA. Durlauf et al. (2011) or more recently Henderson et al. (2012) explicitly list issues of BMA models. Some of them have already been described (a choice of a prior and a model prior), others include conditional independence assumption (a problem of collinearity arises when different specifications of one variable (determinant) are in the set X, solvable via reweighting), more generally described as redundant variables. Its solution and seriousness depend on a particular measure and a set of proxy variables (rather similar or dissimilar). One suggestion regarding ways of dealing with the issue (model uncertainty) in a systematic way can be found in Brock et al. (2003).

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17 An excellent introduction to (or a refresher of) the methodology is an article by Hoeting et al. (1999) or Raftery et al. (1997).

18 However, our model specification does not allow us to model effects of the ESDC explicitly and a full evaluation is left for future research.

Another critique focuses on BMA's sensitivity to data (revisions) for 'agnostic' type of priors, which leads to rather significant changes in PIP, i.e. whether a determinant helps to explain the data. For example for the Sala-i-Martin et al. (2004)'s set of growth determinants Ciccone, and Jarociński (2010) carry out robustness checks and Monte Carlo Simulations confirming the presence of this problem even for moderate perturbations in the underlying dataset. This critique has been moderated by Feldkircher, and Zeugner (2012) who show evidence that most of the results' 'fluctuations' was due to change in the sample size (a reduction) of their PWT dataset and a specific type of utilized priors. Therefore, they propose employing hyper-g priors that are. Their study supplements Durlauf et al. (2011) that highlights two possible ways of dealing with that: (a) methods less sensitive to such quite likely-to-observe patterns possibly via a new prior or (b) directly taking into account measurement errors.

Thirdly, the standard (full) BMA method does not account for potential endogeneity of regressors. As a result, some alternative in the pseudo-Bayesian approach have been suggested in the literature: they range from 'doing nothing' over using various lagged values of variables to a few modifications of BMA (FMA approach) allowing both for model uncertainty and endogeneity; for example in a panel context such as LIBMA (see Chen et al., 2011) or BAMLE (see Moral-Benito, 2012), for a summary see Moral-Benito (2012a). However, there has not been reached a consensus between BMA and FMA on these issues so far, mainly because of pitfalls associated with the identification of endogenous variables and choice of instruments, comparability of likelihoods across models, etc. for details see *ibid*. Another problem may be heteroscedastic errors and/or the presence of outliers in a sample (mainly in the context of economic growth analyses or applications for financial markets). Doppelhofer, and Weeks (2011) have proposed a robust BMA allowing for parameter heterogeneity and outliers that makes use of a flexible mixture of distributions (encompassing normal distributions) creating 'fat tails'.

Fourthly, a potential problem when using BMA approach is a choice of sets of variable. This problem is often neglected though – 'jointness' of variables that can be tested via two statistics (see Błazejowski, and Kwiatkowski, 2013) – , i.e. whether two sets of variables are substitutes, complements or are not related at all in the model space. In addition to that in dynamic applications it is associated with the choice of lag lengths of variables.[19] Therefore, some authors have tried to bypass this by using a 'standard (frequentist) model' first to determine the 'right lag lengths' or by utilizing various lag lengths in an arbitrary (context-dependent) fashion sequentially (e.g. Babecký et al., 2012). Therefore, due to previously listed reasons (and due to our focus on inference and not on forecasting) in

19 *There have emerged several issues (Babecký et al., 2012a): (1) multicolinearity issues since BMA does not distinguish between lags of one variable when maximizing the objective function with implications for inference of such models, (2) an objective reason related to an increasing number of models in a model space (r variables with q lags), and (3) non-existence of a sequential procedure that would help select among models estimated with different lag lengths of one variable at a time.*

our application no lags are included in the model and we leave this extension for further research.[20]

2.3 Our Basic Model

Since our dataset is rather limited both dimensions (both time and country dimension) given the composition of the EU and historical events (such as the establishment of independent NMS countries in the early 1990's), we decided to apply BMA in a panel data fashion (following a growing body of studies for economic growth, such as Feldkircher, 2012). Even for the panel setting, we cannot (and will not) apply a standard 'growth' approach to search for determinants. The reason being the non-existence of growth-like dynamics (patterns) in our empirical application since there are 'natural' boundaries as to how far price levels can grow before a new monetary system has to be introduced. In addition, we apply three-year averages of flow variables and stock variables are measured at the beginning of each period, i.e. we freely follow a recommendation of Moral-Benito (2012).[21] This gives us several non-overlapping periods and allows us to try to 'capture' an impact of the SDC (indirectly) even in this framework.

Having described the BMA methodology above and its potentially weak parts that seem to be a natural part of this relative new technique, we proceed to our model specification(s). As there has not been any only price-convergence-dedicated study that would have used this particular approach to date (no prior information), we will follow Feldkircher (2012) in his suggestions regarding choices of a prior and a model prior. The argument for this choice seems to be trivial – changes in comparative price levels (price convergence) share some similarities with economic growth that is they are affected by a host of determinants and our sample size (n) can be considered between small and medium. We would like to have a model answering our question (price convergence determinants) for a researcher who is rather 'agnostic' a priori, however, given problems of 'too agnostic' approaches shown in the literature (e.g. Ciccone, and Jarociński, 2010). Our choice of a prior will go towards a robust one that takes into account noise in the data. We also try to address (at least some) of aforementioned issues, however, some will remain an open research question due to our specific problem and dataset. Since main focus of this chapter is on determinants of price convergence, a linear regression model with fixed effects (FE) in the style of (5) is utilized. In order to avoid dealing with potential

20 *In addition, some authors have already argued in favour of including non-linear expressions in BMA models to improve inference and predictions. However, such an extension would rely on a choice of its functional form a priori, i.e. a relativisation of the 'agnostic' approach (for details see e.g. Henderson et al., 2012). These authors (op. cit.) do this extension, however in the context of distribution free non-parametric methods (the conditional mean and the error term) – Local-Constant Least-Squares (LCLS) and Local-Linear Least-Squares (LLLS).*

21 *We prefer shorter time averages given our rather limited time span since we focus on a problem of roughly similar nature to growth studies; there have been used four-year, five-year and ten-year averages in the economic growth literature. Moreover, five-year averages would leave us with only three observations (data for 2012 mostly not available, the same does hold for 1995 and before), when using lagged variables only with two.*

endogeneity and serial correlation no lagged dependent variable is included. The panel data (BMA) model takes the form:[22]

$$cpl_{ij,\Delta_t} = \mathbf{1}\iota_\tau + \Gamma_\tau X_\tau + \vartheta_\tau \quad (5)$$

where cpl_{ij,Δ_t} represents the relative percentage difference of comparative price levels for each period Δ_t over the time span (i.e. 1997–1999, …, 2009–2011), the set of explanatory variables includes both 'growth' variables (those that are flow variables, see description of variables in Appendix) and 'level' variables (i.e. stock variables, we use the first year of each subperiod). Following the growth literature, one could split up the $\Gamma_\tau X_\tau$ into a 'benchmark' and an 'auxiliary' part but there is no main theory (such as the neoclassical growth model) and its alternatives *sensu stricto* as to what determinants should belong to each of them. Moreover, since we include *j* time fixed effects T_j our model reads:

$$cpl_{ij,\Delta_t} = \mathbf{1}\iota_{\tau'} + \Gamma_\tau X_\tau + T_j + \vartheta_{\tau'}. \quad (6)$$

where the variables have the same meaning like those in the equation (5)[23].

This particular approach is expected to help us to find out relative importance of price level determinants in the EU. It can be argued – using the logic explained above – that individual studies may not have captured the 'true' determinants due to *model uncertainty* (because of a rather short time span as well). A set of 103 potential variables ('determinants') of price levels has been identified, consisting both from previously used in literature or newly suggested. In addition, a set of dummy variables is utilized as well. However, there are fewer 'real' determinants since some of our variables are simple transformations of one determinant, for example a proxy for openness. In addition, we follow a recommendation by Moral-Benito (2012) and other authors not to include too similar proxy variables for one potential determinant of price levels (such as different various determinants for fiscal policy or the HBS effect); some tests have been proposed to deal with this problem, see below. Therefore, our estimation was done only for 38 determinants (33 'core' vari-

22 *There are several possible specification of the 'y' (CPL) variable: an average growth over a period, a (average) change over a period, a relative change over a period or simple a level. Because of limitations (sample size), the focus is on convergence (a dynamic process), we will not use the last one. Because of our case is similar to economic growth models, we decided to use a similar approach to the estimation of growth determinants.*

23 *Some studies have already employed different estimators for example IV type for growth regressions such as 2SLS by Durlauf et al. (2012), a RE estimator by Moral-Benito (2012), a reversible jump Markov chain Monte Carlo (RJMCMC, see Kopp et al., 2012), the two-stage BMA (2SBMA, with rather strict assumptions, see Lenkoski et al., 2012) or its modified version – IVBMA (based on a conditional Bayes factor, see Karl, and Lenkoski, 2012). Another possibility is to run BMA in two separate stages or to check BMA results with a GMM-style estimation that would be somewhat difficult in our environment (26×5) though and its results may not be robust (we do not present them). Moreover, there has not been reached a consensus on this issue to date given rapid development in this area. Since we are very well aware of potential issues, determinants that could potentially lead to problems with endogeneity were excluded (for example bilateral exchange rates and price indices); for details see e.g. Žďárek (2013). This extension of our empirical research is left for future research.*

ables + five dummy variables) + time effects in our benchmark model.[24] As a result, there are $2^{42}=4.4\times10^{12}$ models in total to be evaluated. To reduce this immense computational burden, the MC^3 sampler is utilized with 3×10^6 draws following a burn-in phase of 1×10^6 iterations which gives us a good approximation (correlation) of exact and MC^3 PIP (≈0.99). Moreover, our prior is that the actual number of determinants is moderate (is equal to11 regressors – a larger number given the inclusion of time effects (a panel); an alternative specification with nine regressors does not have significant effects on our results), i.e. similar to the realm of GDP growth determinants – for example a (cross-sectional) growth model of Sala-i-Martin et al. (2004) use model size equal to seven.[25]

In the case of model (6), the Bayesian method require a prior for ι, Γ_τ and σ^2 that is of key importance – the prior before employing data $(cpl_{.}, X)$ is assumed to follow $\mathcal{N}[\mu, \sigma^2]$ with specified values for mean (often conservative 0) and variance (depending on the data), following the Zellner's g definition (see Zellner, 1986). We will follow one of recommendations and place improper priors on the constant and the error term (its variance), that is they are assumed to be evenly distributed mirroring our lack of knowledge (complete prior uncertainty instead of the natural-conjugate approach for example à la Chipman et al., 2001):

$$pr(\iota_\tau) \propto 1 \tag{3}$$

$$pr(\sigma) \propto \sigma^{-1} \tag{4}$$

As regards a model prior, a potentially large number of possible models hint at the use of an uninformative prior on the model space. In addition, a prior for Γ_τ (slope coefficient) has to be chosen. In the line with the literature, the standard formulation (a centered normal distribution, around zero) for BMA is chosen: $\sigma^2 = ((g)^{-1}X_\tau' X_\tau)^{-1}$, where *g* expresses the level of uncertainty about values of the coefficients (large *g* being a sign of a great deal of uncertainty that they are zero):

$$\Gamma_\tau | L_\tau, \sigma^2, g \sim \mathcal{N}\left[0, \sigma^2 = ((g)^{-1}X_\tau' X_\tau)^{-1}\right] \tag{7}$$

In our empirical exercise the hyper-g prior is utilized (two possibilities – UIP and BRIC with random (binomial) model priors) of Feldkircher, and Zeugner (2009) that is not fixed but estimated from our dataset. As a result, any inference conducted in models under this prior should be more robust (Feldkircher, and Zeugner, 2012). Moreover, a g prior (BRIC, uniform model prior, à la Fernández et al., 2001). In addition, we include results of a *g* prior

24 A full description of variables and their transformations is included in the Appendix D.

25 Our choice was also driven by the dimensions of our panel specification and availability of data. Since we were aware of problems with variable sets mentioned above before running BMA we checked the correlation matrix of our variables and so that the BMS procedure would not stop due to non-singular matrices (collinearity). We also used 'jointness' tests described in Błazejowski, and Kwiatkowski (2013) and coded for gretl to check for variables that could be considered as strong substitutes/complements (in their description) that reduced our large set of variables.

(BRIC, random model prior) and *g*-HQ prior (mimicking the Hannah-Quinn criterion, see ibid.) as a robustness check.

Apart from labelling variables as very robust or robust (their PIP>0.5, equivalent to |t-stat|≈1), their coefficient precision is evaluated following the suggestion in Masanjala, and Papageorgiou (2008) – it relates posterior mean to posterior standard deviation. For those in absolute value over 1.3 an asterisk (*) is added in Table 1 and they can be viewed as 'effective' following their approach.[26]

3 Results

Our results for the basic model are summarized in Table 1 (see below).

Table 1: Price level determinants – BMA results I., EU-27, 1997–2011

	Model I			Model II			Model III		
variable[a)]	PIP	Post M	Post SD	PIP	Post M	Post SD	PIP	Post M	Post SD
ncomp	1.000	0.645*	0.104	1.000	0.624*	0.110	1.000	0.624*	0.110
dINFTarg	1.000	0.058*	0.011	1.000	0.056*	0.012	1.000	0.056*	0.012
ogp	0.684	0.004*	0.035	0.633	0.004	0.003	0.630	0.004	0.003
island	0.553	-0.021	0.000	0.558	-0.022	0.023	0.562	-0.022	0.000
f_business	0.376	0.000	0.001	0.373	0.000	0.001	0.375	0.000	0.001
tnt	0.274	0.082	0.149	0.272	0.076	0.143	0.272	0.076	0.143
f_corruption	0.189	0.000	0.000	0.195	0.000	0.000	0.193	0.000	0.000
f_investment	0.158	0.000	0.000	0.214	0.000	0.000	0.215	0.000	0.000
govfunc	0.142	-0.010	0.028	0.170	-0.011	0.030	0.169	-0.011	0.030
f_financial	0.172	0.000	0.000	0.169	0.000	0.000	0.176	0.000	0.000
tt	0.103	-0.066	0.229	0.140	-0.086	0.258	0.137	-0.084	0.256
cvx	0.083	-0.129	0.517	0.118	-0.170	0.583	0.120	-0.175	0.590

*Note: model I (g prior BRIC, uniform), model II (hyper-g BRIC, random), model III (hyper-g UIP, random). Only first 12 determinants shown; full results are presented in the Appendix E. * represents |t-stat|>1.3, i.e. variable is 'effective'. a) Time dummies are highly significant but not shown. Post M – posterior mean, post SD – posterior standard deviation. Source: own calculation using R package bms.*

26 *Another approach has been proposed by Kass, and Raftery (1995). It distinguishes: weak, positive, strong or decisive effect of a variable based on its PIP: 50-75%, 95-95%, 95-99% and >99% respectively; however, there is no justification for either of them in the statistical / econometric literature that should be borne in mind by a user.*

Those determinants whose PIP>0.5 are shown in bold.[27] Three model specifications are employed (labelled as *Model I–Model III*); however, results do not change significantly. This is confirmed by a model comparison shown in the Appendix E. Across all models the same patterns can be seen (our preference is for model # *II*):[28]

- a differential impact of subgroups of countries in the EU-27 is represented by the significance of a dummy for island economies (island such as Malta), and there is some link to countries whose central banks conduct inflation targeting `dINFTarg`, however, the former cannot be viewed as very strong (' effective');
- there are two 'key' determinants according to our results, one being nominal compensations `ncomp` that represent both supply and demand factor (also viewed as a 'catching-up factor') and indirectly the importance of economic growth is highlighted by the relatively high value of output gap (`ogp` , i.e. a proxy for demand factors);
- among twelve determinants shown in the table are also a four variables being a proxy for various aspects of a country's institutional environment, mainly related to the business environment in a country and the easiness of conducting business in such environment, i.e. they captures aspects relevant for competition forces (a part of the Heritage foundation's Index of economic freedom: freedom for business activities `f_business`, financial freedom `f_financial`, freedom from corruption `f_corruption`, and investment freedom `f_investment`);
- conversely, our results do not much support (low values of PIPs) for traditional determinants of price levels found across the empirical literature such size and structure of markets, size of an economy or the effect of productivity growth, and government policies (such as tax revenues or expenditures or a measure of fiscal stance – only the variable for government expenditures `govfunc` is among the first twelve according the PIP) or a very limited for terms of trade (tt) or a measure of volatility (coefficient of variance, `cvx`) of exchange rate (`NEER`). In addition, there is no variable that would 'directly' represent for example GDP growth, a measure of openness or capital stock, wealth effects or differences between old and new EU members.
- It is rather difficult to compare our results with other empirical studies since there have been only few explicitly focused on determinants of price levels in the EU environment

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27 R package bms is employed since it is more versatile (offers a larger set of potential specifications as regards priors on parameters and model priors). In addition, it shows better 'characteristics' according to Amini, and Parmeter (2012) compared with other BMA packages for R. Model I follows a suggestion by Fernández et al. (2001) (g-prior = 'BRIC' and the uniform model prior), Model II a suggestion by Sala-i-Martin et al. (2004) (hyper-g prior = 'UIP', the random binomial model prior with imposed a prior model of size seven), and Model III follows the same specification as the Model II only with hyper-g prior = 'BRIC'. We also utilized g-HQ prior = 'EBL' and uniform model prior and g-prior (BRIC, random model prior) – not shown in tables but available upon request from author. We report the MCMC coefficients in our tables (in the analytical way for 5000 retained models are available upon request from author – those values are slightly higher compared to MCMC results; some authors prefer it to the former, e.g. Fernández et al. (2001); for details see e.g. Zeugner (2012).

28 Since there were rather high correlation between some variables in our sample, we run a robustness check for the same specification without these variables (household assets hhfa and bank lending to non-residents blnr). Both results do not differ significantly (both PIPs and their potential classification as 'effective') and therefore, we report only our full specification (results upon request from author).

to date and none of them has utilized the Bayesian approach. Moreover, some of them aimed at estimating the speed of convergence (or half-life) and did not explicitly examine the question of determinants. Nevertheless, one of these studies (Dreger et al., 2007) found three main determinants (PCA method utilized) for price levels a proxy for real convergence (catching-up) including compensations, openness and regulation. While results on catching-up factors were significant (similar to our results), those for the other two factors were rather mixed. No proxy (determinant) for wealth effects of financial markets, etc. was used. A study by Nestić (2005) includes real GDP, tax burden, government expenditures, labour productivity and apart from tax burden (mixed evidence), the remaining determinants are found significant. In our case effects of taxation (in broad sense) are not found to be a significant (important) determinant similarly to variables capturing government expenditures (more significant as measured by their PIP [**PIP** < 0.5] though) or changes in fiscal policy (structural deficit, capb). However, that may be due to high correlation of fiscal variables (revenues and expenditures) so that some of them could not be utilized at the same time (e.g. total revenues and expenditures); all results are shown graphically in Appendix E (models comparison showing robustness of our results is in Figure 3A).

3.1 BMA Analysis – an Extension

Since previous analysis has pointed out, perhaps somewhat surprisingly, the (insignificantly) different behaviour in NMS (a very low PIP for our NMS variable), in this section we try to shed more light on determinants and their possibly differential effects for price level convergence. A 'natural candidate' for this purpose is the inclusion of interactions in our model. However, the issue with interaction effects in BMA context is associated with differences between the Bayesian and frequentist approach, i.e. the very existence of many potential models with combinations of parameters. That may lead to problems as shown for example in Chipman et al. (2001). Crespo-Cuaresma et al. (2009) suggest one possibility how to deal with interaction terms, however, this particular approach leads to the inclusion of interacted terms ('siblings') without their 'parents' and vice versa, which goes against the recommendation for the use of this model approach (see for example a classical study on this topic by Brambor et al., 2006). Therefore, a modification – so-called Heredity prior – has been proposed by Feldkircher (2012) to deal with this and other potential problems (see Appendix B). This method is also utilized in the exercise. Our results with interaction terms are presented in Table 2 (see below).

Table 2 summarises main results for the same three model specifications as in the previous case but now with additional interaction terms for NMS countries (as defined above). There are no significant differences as regards individual determinants – their structure, significance (inclusion probability, PIP) are very similar to previous models without interactions; some have become less significant (for example island) and output gap `ogp` variables has lost its 'effective' status). Interactions have a lower inclusion probabilities (PIP<0.5), only one is just on the frontier of 0.5 (`ncomp#NMS`) in model III and some other are in the range of 0.4-0.5. However, this is not a surprising result given the fact tha tour estimation technique is quite 'demanding' in terms of the chance of an interaction to be included in a model. Our five most 'significant' are: the same four across specifications for nominal compensations, direct

taxation (dirta), gross fixed capital formation (gfcfl), private savings (gspriv) and one alternating – our proxy for the HBS effect (tnt) and net current transfers (nct). BMA method thus does not provide much support to a differential impact of individual determinants on old and new EU countries. There are some explanations such as the length of our time span, availability of variables that limit our analysis (for example most of the 'different years' in the 1990's cannot be included). As regards our second set of results and a comparison, the situation is even worse than in the first case. Empirical studies usually utilize a simple dummy variable for NMS countries and do not explore this aspect further. Since our results are rather close to 'inconclusive' than strongly in favour of any conclusion.[29]

Table 2: Price level determinants – BMA results II., EU-27, 1997–2011

	Model 1			Model 2			Model 3		
variable[a)]	PIP	Post M	Post SD	PIP	Post M	Post SD	PIP	Post M	Post SD
ncomp	1.000	0.647*	0.102	1.000	0.640*	0.106	1.000	0.665*	0.105
dINFTarg	1.000	0.057*	0.011	1.000	0.055*	0.011	1.000	0.056*	0.011
ogp	0.712	0.004*	0.003	0.602	0.004	0.003	0.551	0.003	0.003
island	0.544	-0.021	0.021	0.506	-0.019	0.021	0.479	-0.018	0.021
f_busin	0.386	0.000	0.001	0.359	0.000	0.001	0.348	0.000	0.001
tnt	0.270	0.082	0.150	0.228	0.067	0.138	0.203	0.062	0.135
f_corr	0.179	0.000	0.000	0.149	0.000	0.000	0.130	0.000	0.000
dirta#NMS	0.437	-0.086	0.107	0.464	-0.048	0.060	0.498	-0.052	0.062
ncomp#NMS	0.404	-0.047	0.064	0.414	-0.085	0.115	0.415	-0.085	0.114
tnt#NMS	0.396	-0.192	0.245	0.191	0.024	0.055	0.189	0.024	0.055
gfcfl#NMS	0.350	0.050	0.073	0.171	0.108	0.262	0.187	0.118	0.272
gspriv#NMS	0.278	0.212	0.363	0.163	0.006	0.013	0.162	0.006	0.013

*Note: model 1 (g prior BRIC, uniform), model 2 (hyper-g BRIC, random), model 3 (hyper-g UIP, random). Only first 12 determinants shown (PIP>0.5); full results are presented in the Appendix. * represents |t-stat|>1.3, i.e. variable is 'effective'. a) Time dummies are very significant but not shown. f_corr is the variable f_corruption, f_busin is the variable f_business. Post M – posterior mean, post SD – posterior standard deviation. Source: own calculation using R package bms.*

3.2 Are there Implications for Policy-makers?

Regarding determinants of price levels (and therefore their adjustments), there are both same old 'suspects' and also some new ones. While effects compensations of employees are confirmed, variables being a proxy for size, development such as GDP, population or taxation are not or rather weakly. Similarly, openness as it is traditionally measured (a

29 *Due to only negligible differences in results of this and previous exercise and space considerations, both our full and analytical results are available upon request from author.*

fraction of GDP) do not have a very significant impact either (PIP<0.5). Likewise, the importance of exchange rate movements, no matter how important theoretically, does not seem to find its (direct or indirect) empirical counterpart.

There seems to be a set of possible explanations why our results are somewhat surprising (different) compared to the literature:

- our period is rather short and therefore, no stable linkages of determinants and price level may exist (compared with economic growth determinants); moreover, our period includes only partially the 1990's (transformation and opening-up phase) that may explain some findings.[30] In addition, it includes the 2000's that are affected by the ongoing financial crisis and other events;
- our study is not a cross-sectional or a standard panel data estimation and there are no lagged variables included in our model;
- our methodology is more general compared to standard (frequentist) approaches trying to limit some of main weaknesses of classical approach (omitted variable bias), our set of determinants is broader and the aim of this exercise is different;
- exchange rate movements only reflect 'deeper' changes in structural characteristics of individual economies that are approximated by some well-known economic indicators. However, when using those directly, the real link and not its approximation maybe revealed. The same may hold for real income that is usually viewed as a capturing-all proxy for various effects;
- regarding rather mixed results in case of effects of trade – it may be given by the fact that it may have lost its impact over years (a justification would point out an increase in the 1990's during the 'opening-up' period that did not continue on the same scale in the 2000's – measures of openness are practically flat after 2000 for a majority of EU-27 countries) or its impact is important for catching-up countries in the EU-27 but it is dissolved (not confirmed by our results though);
- the HBS effect (productivity differentials) – our results are more or less in the line with cross-sectional, time series or panel studies – some of them do find support for the effect, some do not or weak (due to a large number of factors – mainly, there may be a problem with the definition of tradable and non-tradable sector which varies in the literature). Therefore, it seems to be a very similar case with openness.[31]

On the other hand, there is some evidence (not very significant) that the broadly defined institutional environment matters, mainly in the form of administrative and bureaucratic activities that can easily hinder competition and its forces and/or create barriers for price convergence. Conversely, restrictions as regards transactions between domestic and foreign subjects are not found significant – either they were already removed (which could be the case in most of the EU-27 countries) or they are in the form that does not affect price changes (non-distortionary). Monetary policy has a limited scope here apart from

30 It may be the case for openness since significant dynamics in NMS was observed during the 1990's and the early 2000's and rather stable `oscillations' around achieved levels since the EU entry.

31 A support for our vanishing hypothesis is given by Égert (2007). Contemporaneous effects can be weak and since there are no lags in our model that may explain low PIPs of some of determinants.

affecting stability of financial environment in an economy and possibly via indirect linkages other parts of the economy.

Moreover, we can add some further comments on the BMA approach utilized. Firstly, our empirical part was carried out for linear models only so there is still a lack of knowledge if one assumed non-linear linkages among a set of determinants (that could be investigated for example in the FMA approach). Secondly, our model did not contain any lagged variables (in spite of theoretical assumptions of mostly contemporaneous effects in our model environment – it seems to be plausible to assume that adjustments are realised within a year). However, as describe in the main text, this extension is associated with many not-easily-remedied problems. Thirdly, given a large number of potential determinants and mainly their possible specifications (for example variables capturing effects of foreign trade or productivity growth), it is not possible to include all of them into a set of determinants for a BMA application. Fourthly, we investigated a one particular specification for the dynamic type of dependency, i.e. there is still some scope left for alternative specifications of our dependent variable for future research.

Conclusions

Changes in price levels are a part of the process of structural changes in the economy and is (inextricable) intertwined with on-going business cycle fluctuations. It shares some characteristics such as convergence/divergence with economic growth but it is also a specific process with its own specifics given 'natural' limitations for changes of prices/price levels). Main focus of this paper was on determinants price levels in the European environment. Its importance was well documented by the on-going Great Recession (or European Sovereign Debt Crisis) with some authors finding its roots in price level differences.

Our empirical illustrations were done for the EU and selected member states. This choice was intentional since it enables a researcher to investigate great many topics related to an integration group consisting of economies (independent countries) of different income levels – more and less advanced countries including the Czech economy. Moreover, this integration group has gone through various steps of integration that has not finished so far, for example some of NMS countries are still expected to take part in the monetary union in the future and such an analysis as ours may help to tailor a country-specific path. In addition, it has been exposed to great many shocks and external effects. It also offers a reasonable basis of economic data that can be utilized.

Given a large amount of uncertainty as to what indicators (variables) should be used in an empirical study (model uncertainty problem), the Bayesian approach (BMA) was applied to the dataset. BMA is specifically aimed at this particular type of empirical analysis with great many potential determinants. It can be argued that the Bayesian approach is more robust, equipped to deal with many potential problems the other (frequentists) approach faces and offers 'better' estimates for many problem where the true model (and its parameterization, choice of variables, etc.) is not known. However, it is also affected by many assumptions and a particular chosen path and still deals with some issues since it is a relatively new approach.

The utilized set of determinants consists of variables (subsets) capturing both economic-related processes and those pertaining at least partially to non-economic determinants such as the institutional environment (broadly defined). To summarize, some determinants had already been identified and utilized in the literature (nominal compensations as the catching-up factor), while others not or not completely (for example variables trying to capture wealth effects). Our results confirm that the model uncertainty is a problem in this particular type of empirical exercises (price convergence) since we found only limited support for some traditional determinants (such as economic growth and labour costs) or any support at all (trade-related, productivity-related, etc.). As regards a broad institutional environment, inflation targeting and perhaps the existence of limited accessibility (island economies). A variable for NMS or many institutional aspects of an economy's environment were rather weakly significant measured by their PIPs. In addition, we tried to add another layer to the exercise by adding interaction dummies for NMS to address the question of differentiated impact of common variables on these states. Our results did not show a clear support to this hypothesis. Since we used several specifications for priors (both parameter and model) to verify robustness of our results. In this regards our results passed this extensive sensitivity analysis.

There are some limitations of our analysis and its results that one should keep back in their mind when thinking about implications or future work on this topic. Our results can be interpreted as a first attempt that either shows a lack of explanatory power of standard variables and the need to search for alternative variables and/or their definitions or that one will have to use a different approach in order to model the link between price levels and their determinants. The possibility cannot be ruled out that it may have been due to our limited time span (including missing observations for some countries, etc.). Our results also show that some of the individual time effects are very significant (i.e. 'effective', for the second period that bears results of the '11/9' event and the last period that is affected by the ESDC) and their PIP are equal to one. They may reflect the effect of the on-going financial crisis or various shocks affecting European economies in the past or simply specific circumstances in the case of European integration process. Therefore, we prefer leaving this 'door' ajar, i.e. the question of price level determinants is very likely to be addressed in the future again.

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Appendix

Appendix A) Bayesian Model Averaging – theoretical backround

A 'direct' approach would utilize one linear model encompassing all potential determinants, which does not seem to be feasible because of multicollinearity and a limited number of observations in our dataset. Bayesian approach deals with the model uncertainty in a (canonical) regression model differently: the correct model is modelled as an uncertain (and unobservable) variable. BMA makes use of all possible combinations of explanatory variables and produces results that are in the form of a weighted average over all of them.

Since there are many possible combinations of parameters for models, a model L_τ (τ=1,…,2*K*, where *K* is the number of variables (regressors)) is determined by a set of parameters ψ_τ which allows us to define explicitly the posterior for such parameters applying the Bayesian logic:

$$pr(\psi_\tau|z,X,L_\tau) = \frac{pr(z|\psi_\tau,L_\tau)pr(\psi_\tau|L_\tau)}{pr(z|L_\tau)} \tag{A1}$$

where $pr(.|z,X,L_\tau)$ is the posterior probability and $pr(.|\psi_\tau L_\tau)$ is the likelihood and $pr(\psi_\tau|L_\tau)$ is a (model) prior.

For a model L_τ, being one particular model out of the model space *L*, one can write the posterior model probabilities (PMP) following the Bayes rule:

$$pr(L_\tau|z,X) = \frac{pr(z|L_\tau,X)pr(L_\tau)}{pr(z|X)} \propto pr(z|L_\tau,X)pr(L_\tau), \tag{A2}$$

In the Bayesian approach one of the key parts of the entire sequence of steps (chain) is attributed to the marginal likelihood (also called integrated likelihood, for explicit derivations see e.g. Koop, 2003) that is necessary in (A.2):

$$pr(z|L_\tau,X) = \int p\,r(z|\psi_\tau,L_\tau)pr(\psi_\tau|L_\tau)\mathrm{d}\psi_\tau \tag{A3}$$

A transformation of (A.1) expressing explicitly the posterior probability and consequently, the model weighted posterior distribution for the statistics (ψ) is then:[32]

$$pr(\psi|z,X) = \sum_{\tau=1}^{2^K} p\,r(\psi|L_\tau,z,X)\frac{pr(L_\tau|X,z)pr(L_\tau)}{\sum_{r=1}^{2^K} p\,r(L_r|z,X)pr(L_r)} \tag{A4}$$

32 *The first and second moment for ψ (posterior mean and variance) can be also specified when applying E(.) operator.*

or equivalently

$$pr(\psi|z,X) = \sum_{\tau=1}^{2^K} p\, r(\psi|z,X,L_\tau) pr(L_\tau|X,z) \tag{A.5}$$

When looking for an answer whether a model L_τ generated the observed data, that is whether this model belongs to a set of models $(L_\tau, \tau = 1, \dots, 2^K)$. Given our observations, the probability that L_τ is the true model is reflected in the posterior model probability (PMP). In calculations, BMA uses weights stemming from particular posterior model probabilities $(pr(L_\tau|z,X))$ conditional on data *(z,X)* and these 'normalised' probabilities lead to the following:

$$pr(L_\tau|z,X) = \frac{pr(z|L_\tau,X)pr(L_\tau)}{pr(z|X)} = \frac{pr(z|L_\tau,X)pr(L_\tau)}{\sum_{r=1}^{2^K} p\, r(z|L_r,X)pr(L_r)} \tag{A.6}$$

In order to compare individual models, both the Bayes factors and the posterior odds are employed. The calculation of the Bayes factors (A.7) represents a comparison of two marginal likelihoods for two competing models, for example L_h and L_τ: $(pr(z|L_h)pr(z|L_\tau))$, based on a comparison of their relative weights. The probability (posterior) odds $B(L_\tau: L_h)(pr(L_\tau)pr(L_h))$ summarize the comparison (pairwise) of two chosen models (A.8) taking into account the Bayes factors and the prior odds:

$$B(L_\tau: L_h) \equiv \frac{pr(z|X,L_\tau)}{pr(z|X,L_h)} \tag{A.7}$$

$$\frac{pr(L_\tau|z)}{pr(L_h|z)} = \frac{pr(z|L_\tau,X)}{pr(z|L_h,X)} \cdot \frac{pr(L_\tau)}{pr(L_h)} \tag{A.8}$$

For interpretation of BMA results, one key characteristic is the posterior inclusion probability (PIP) of a regressor. It is defined as follows:

$$PIP_s \equiv \sum_{L_v: l_s=1}^{2^K} p\, r(L_\tau|z) \tag{A.9}$$

where $l_s = 1$ is the sign that a regressor s belongs in the model. There are recommendations as to which variables can be considered to be very robust (PIP→1), simply robust (PIP≥0.5) and which gives very little information (low PIP, often for PIP<0.5) that a particular variable is not included in the true model or can be seen as a piece of evidence against that variable.

Since the sum in equation (A.4) or (A.5) increases (exponentially) with the number of included variables (*K*), Two solutions have been suggested to deal with increasing model space (see e.g. Amini, 2012) – a) the Occam's window algorithm and b) Markov chain Monte Carlo. The former has not gained too much popularity since its algorithm may

result in biased results (for details see op. cit.) and therefore, the latter has become a standard tool. Algorithms such as MCMC (Markov chain Monte Carlo) are considered as a good approximation of the original problem (sampling happens from the same distribution (a Markov chain) whose characteristics tend to the equilibrium distribution with increasing number of steps; convergence may be slow depending on a utilized sampler (such as the Metropolis-Hastings algorithm), see Fernández et al. (2001) or for a brief review Amini (2012); Zeugner (2012)). Since our database consists of many variables collected from previous empirical studies and our newly defined variables (in total there are as many as 103 variables including additional dummy variables, however, the actually used number of variables is lower, see below), which means searching through all subsets of these variable amounting to the necessity to estimate 2^k models (potential combinations) in the full model space; that leads to the use of MC^3 of Madigan, and York (1995) to reduce this immense computational burden.[33]

The marginal likelihood represents the probability of the data given the particular model L_τ, the prior (also the prior model probability, $pr(L)$) should reflect prior beliefs. It has to be evoked by a researcher since it embodies the probabilityof the model L_τ before utilizing any type of available data. If there is no prior, a solution is based on an uniform prior giving an equal probability to each model $p(l_\tau) \propto 1$; alternatives commonly used in the literature are: 'simple' priors such as BRIC or 'mixtures of g-priors such as Zellner's g prior, see below. Functional forms of the posterior and marginal likelihoods depend on a particular estimation (cross-section vs. panel setting, etc.).

BMA choices – priors on parameter

Since a particular choice of parameter *g* from a parameter space affects the number in a model included parameters (both their number and their size), there have been suggested many alternatives of treating *g* in the literature. Below we draw upon a summary shown in (Liang et al., 2008) that distinguish the following:[34]

- *unit information prior (g~UIP)*: for linear models is defined as *g=N*, i.e. the amount of information in the prior and in one observation is equal; Liang et al. (2008) show that Bayes factors resembles the Bayesian information criterion (BIC) for two selected model (for example L_v nad L_w) as n increases *($n \to \infty$)*;
- *risk inflation criterion (g~RIC)*: sets the rule as $g=K^2$, which uses for example Foster, and George (1994)'s study for calibration of the posterior model probability;

33 *An alternative approach has been proposed by (Magnus et al., 2010) who distinguish between 'key' (focus) variables and 'auxiliary' (doubtful) variables in a model. They use the so-called WALS method (a Weighted-Average Least Squares estimator) and Laplace priors for parameters and non-informative priors for the model that significantly reduces the amount of necessary computations; essentially, this estimator creates a Bayesian combination of frequentist estimators.*

34 *An early review of utilized specifications of g-prior (twelve in total) can be found in Eichler et al. (2011).*

- *benchmark prior (g~BRIC)*: defined as $g = max(n, K^2)$ stems from Fernández et al. (2001)'s study, whose proposal is to utilize the best combination of *g*~UIP and *g*~RIC for predictions;[35]
- *local empirical Bayes (g~LEB)*: where g=arg max $p\,r(z|L_\tau, X, g)$ that can be viewed as obtaining a particular *g* for each model (= locally). Some authors (e.g. George, and Foster, 2000) emphasise its role for *g* as utilizing information from the data *(z,X)* (for derivation see Liang et al., 2008), however, Feldkircher, and Zeugner (2009) point out its counterintuitive impact on a prior because of the *g*'s data dependency and problems with consistency of BMA;
- *global empirical Bayes (g~GEB)*: where only one *g* is utilized for all models, estimated as an across-all-models-calculated average of the marginal likelihood of the data; however, it can be used only via numerical optimization George, and Foster (2000) (no close form solution exists).

An alternative – mixture of priors (hyper-*g* priors)

Hyper-*g* prior takes the form: $\varphi(g) = \frac{a}{a-2}(1+g)^{a-2}$ where φ(*g*) will now represent the prior on *g* (potentially depending on dimension of *n*). This prior is recommended to use for g>0, a>2 (a represents priorbeliefs). If the *g* prior is fixed, the posterior mean of Γ_τ (in equation (4) for a particular model *g* represents a linear shrinkage estimator given a shrinkage factor $\frac{g}{1+g}$; adaptive data-driven shrinkages exist for mixtures of *g* (see Liang et al., 2008).[36] A hyper-*g* prior leads to a mixture of normal distributions with fatter tails for the prior on the vector of coefficients (Ley, and Steel, 2012). Therefore, a reformulation of the hyper-*g* prior gives rise to shrinkage factors such as $\frac{g}{1+g} \sim Beta[1, \frac{a}{2} - 1]$, i.e. a Beta prior and appropriate beliefs on the hyperparameter *a* enable to replicate fixed-*g* cases (for example *a*=4 leads to prior shrinkage that is uniformly distributed between 0 and 1); for further discussion see e.g. Ley, and Steel (2012).

Main advantages of the hyper-*g* prior are outlined in (Feldkircher, and Zeugner, 2009): (1) the availability of its posterior distribution in closed form (for details and derivation see *ibid*. and it allows the data to 'choose'), (2) a reduction of sensitivity of the prior *g* to posterior mass, (3) *g* is adjusted towards less noisy data (the model specific g_τ and shrinkage factors do change during an estimation; more noisy data will result in lower *g* and more even distribution of PMPs),[37] (4) the room for a researcher to formulate any prior beliefs is not affected, and (5) the supermodel effect is non-existent (mass of posterior reflect only the best performing models generated by the data).

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35 Another alternative is a prior $g=k^2$ suggested by Foster, and George (1994) that shrinks to g=max (n, K^2) under certain circumstances – possibly in growth regressions as for those studies do hold k>>n – or a prior resembling the Hannah-Quinn information criterion (H-Q) where g=(ln n)³

36 The shrinkage factor affects PMPs and how much differences in R_τ^2 are reflected in differences between PMPs and PIPs. Flexible g priors (in hyper-g priors) lead to shrinkage factors to bearound 0.95 on average.

37 A hyper-g will offer less evidence for a particular model given the data compared to a fixed g that would offer a model-'winner' even under these circumstances.

Model priors

The other important factor affecting BMA analysis is the choice of a model prior. Obviously, that choice will depend on a problem and possibly on a researcher's prior. Often a uniform model is chosen that assigns the same weight to any model L_τ, i.e. $pr(L_1) = pr(L_2) = \cdots = pr(L_\tau) = \frac{1}{L}$ (which has two implications: the 'inclusion probability' a variable in the true model is $pr = 12$ and the probability that one variable is included in a model does not affect the 'inclusion probability' of other variables). An alternative that has been used in the literature are random Binomial priors (e.g. Sala-i-Martin et al. (2004) assume $p < 12$ while preserving the other characteristics of the previous one) or Beta-Binomial priors (e.g. Ley, and Steel, 2009) or dilution priors dealing with the problem of previous priors assigning equal weights to all similar regressors in a set of utilized variables (Moral-Benito, 2012a).

Appendix B) Interaction terms – Heredity prior

Following the recommendation of Brambor et al. (2006), in our model only those interaction terms are used when a particular model encompasses both original variables and interaction terms. Formally, let us assume that for simplicity there are only two variables (determinants) – X_1, X_2. A model can then consist of one orthree variables or their combinations (X_1, X_2 and the linear combination X_1X_2):

$$Prob(\beth_{X_1X_2}|X_1, X_2) = \begin{cases} pr_{00}, = \text{if } (\beth_{X_1}\beth_{X_2}) = (0,0) \\ pr_{01} = \text{if } (\beth_{X_1}\beth_{X_2}) = (0,1) \\ pr_{10} = \text{if } (\beth_{X_1}\beth_{X_2}) = (1,0) \\ pr_{11} = \text{if } (\beth_{X_1}\beth_{X_2}) = (1,1) \end{cases} \quad \text{(A.10)}$$

where $Prob(\beth_{X_1X_2}|X_1, X_2)$ is the probability of inclusion for the linear interaction and it depends on the inclusion of both its components. A structure is chosen via p that determines which combinations are used in the analysis. In this application the so called 'strong heredity principle' is used that leads to the inclusion of interaction ('siblings') terms only with their 'appropriate parents'. This eliminates all possibilities when one or both are missing. For further details see e.g. Feldkircher (2012).

Appendix C

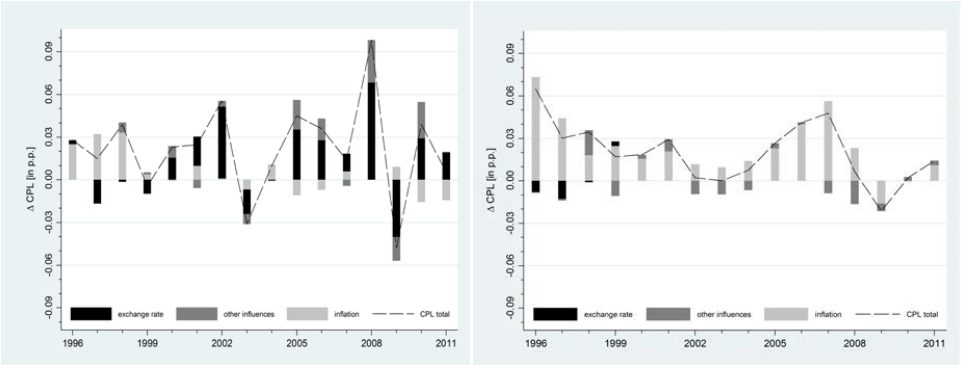
Figure 1A shows changes in comparable price levels for GDP that have been broken down into price development and effects of other factors (i.e. changes of exchange rate and other influences) for the Czech and Estonian economy utilizing the modified formula (2).[38] Our choice was driven by the idea of showing effects of different currency arrangements but with some similarities in both countries (small open economy, high level of openness, etc.). These countries were chosen as `good examples' of the former or the latter type of CPL adjustments. In the case of the Czech economy, inflation differentials did significantly contributed to nominal convergence (i.e. a growth of the CPL value) from 1996 to 1998. After 1999, disinflation policies (under a newly introduced inflation targeting framework in 1998) of the CNB modified the form of nominal convergence and they have resulted in

38 For details regarding their construction we refer to Žďárek (2013)

observing rather small positive or even negative inflation differentials compared to the Euro area and in most years positive contributions of exchange rate which confirms the prevailing importance of the exchange rate channel for price convergence in the Czech economy. So far the only exceptions to the rule were years 2003, 2004 and 2009 (for many reasons exceptional year). Conversely, in the case of Estonia, in an overwhelming majority of years only effects of the price channel can be seen (basically since 1999). It was due to the Estonian choice of fixed exchange rate at the beginning of their transformation process (a currency board arrangement – based on *Deutsche Mark* – followed by the Euro adoption in January 2011). This means that without changes of the fixed parity (in our case including methodological changes as well) the entire adjustment of CPL must go through the inflation channel. As a result, the Estonian economy showed price convergence based on relatively high inflation differentials

Figure 1A: An example of CPL for GDP decomposition, 1996–2011 (in p.p., EA-12 = 100)

a) Czech Republic b) Estonia



Note: for explanations see text. Source: Žďárek (2013).

Appendix D) BMA – data sources and definitions

Our choice of determinants cannot follow the existing literature completely since many empirical studies have utilized individual prices of goods and services (e.g. the EIU City-Data) and a corresponding gravity-type model or different model approaches such as PCA. Therefore, we split up possible determinants into several groups covering main parts of an economic environment both already included in empirical studies (in some form such as exchange rate volatility) and new variables in an attempt to explore the potentially large set of determinants that may have impact on price convergence (for details and full description of variables see Žďárek, 2013):[39] (a) **Economic development**; (b) **Demand factors;** (c) **Market (space) factors**; (d) **Sectoral determinants**; (e) **Government determinants**; (f) **Finance and wealth**; (g) **Open economy determinants**; (h) **Institutional environment/degree of competition**.

39 Definitions of variables follows from the ECFIN database AMECO, see EC (2013a).

In addition to previously listed determinants, there is also a set of regional and 'effects-related' dummies: a dummy for NMS countries – all states in the region, EU dummy and a dummy for the Euro adoption, i.e. EMU entry[40] and finally, a dummy for countries with inflation targeting.[41] There is no separate dummy for the on-going financial crisis as it will be captured by time effects (due to the structure of our panel). In addition, a 'spatial' dummy island is used as a proxy for being an island.[42] The dataset covering period 1995–2011 and 26 countries of the EU (Luxembourg was omitted due to its time series being outliers) was obtained from various EUROSTAT databases, DG ECFIN (AMECO database, EC, 2013), IMF IFS database (IMF, 2013) and World Bank database (WB, 2013; WB, 2013a). Due to missing observation for some countries and some variables (mainly at the beginning of our analysed period) our panel is unbalanced.

Since some time series in our database show signs of heteroscedascity we applied natural logarithm transformation and in case of outliers (we are suspicious of typing typos), mainly in the 'financial group' and financial flows, we use a Stata routine bacon to identify them together with Box-and-Whisker (plot) graphs. Identified outliers we used one rule to limit them (based on the interquartil range):

$$x_{high} = x_{0.75} + (1.5(x_{0.75} - x_{0.25})) \text{ and } x_{low} = x_{0.25} - (1.5(x_{0.75} - x_{0.25})).$$

These values were approximately equal to the 90% (or in some case 95%) quantile.

Table 1A: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
cpl	0.03	0.06	-0.08	0.26	130
ogp	0.36	2.79	-9.91	8.66	130
rgdig	0.03	0.03	-0.05	0.11	130
gdpg	0.03	0.03	-0.05	0.10	130
gdpgg	0.05	0.03	-0.05	0.14	130
gdpgl	4.99	1.52	1.64	7.72	130
popg	0	0.01	-0.03	0.02	130
popl	15.98	1.36	12.83	18.23	130
gdp_ppskm	-0.45	1.09	-2.30	2.13	130

40 Two different approaches can be utilized: a simple dummy $d_i \in <0,1>$ (dEU, dEMU) that is used in the text or an alternative specification of a dummy variable representing the number of years being an EU or an EMU member (y_{EU}, y_{EMU}).

41 This variable is created on the basis of Debelle et al. (2012), Roger (2010), and own updates. Finland, Spain and Slovakia had started using inflation targeting framework but they stopped when joined the Euro area. Other countries are (in the chronological order) the United Kingdom, Sweden, the Czech Republic, Poland and Hungary.

42 Because of a rather short time span it was not possible to split the period into two parts such as one for the period before the Euro was introduced (1995–1998) and with the Euro in circulation (1999 onwards). However we tried to control for 'Euro effect' by inclusion of dummies for individual phases – its creation in 1999, the inclusion of Greece (1999) and new member states such as Slovenia (2007), Cyprus, Malta (2008), Slovakia (2009) and lastly Estonia (2011).

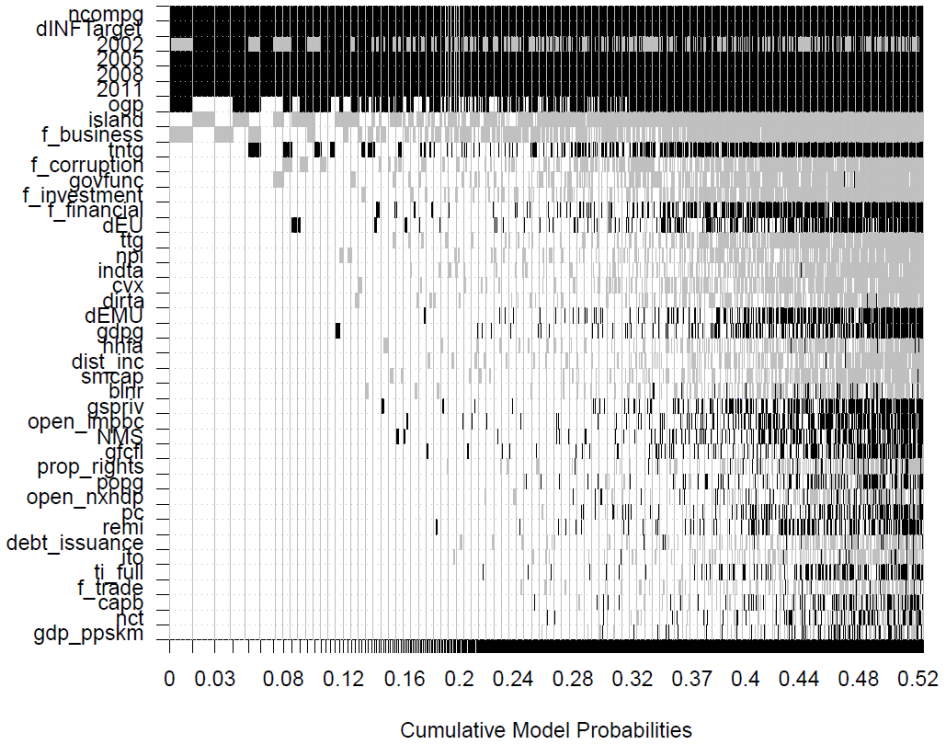
Variable	Mean	Std. Dev.	Min.	Max.	N
gfcfg	-0.01	0.05	-0.23	0.12	130
gfcfl	3.06	0.18	2.43	3.58	130
gfcg	0	0.06	-0.22	0.25	130
gfcl	3.09	0.21	2.32	3.67	130
tntg	-0.01	0.03	-0.07	0.12	127
hhfa	4.87	0.6	3.43	5.76	121
gfa	3.5	0.41	2.57	4.74	123
ncompg	0.05	0.05	-0.05	0.24	130
ulcg	0.03	0.04	-0.06	0.24	130
ervol	0.02	0.02	0.00	0.14	130
cvx	0.00	0.00	0.00	0.03	130
neerg	0.00	0.06	-0.49	0.09	130
ttg	0.00	0.01	-0.02	0.06	130
openbc	1.02	0.38	0.47	1.85	130
open_impbc	0.52	0.19	0.22	0.94	130
open_nxhdp	0.01	0.07	-0.19	0.19	130
npi	-1.7	3.34	-17.38	3.39	130
nct	0.04	1.54	-2.26	5.5	130
indta	2.58	0.15	2.18	2.93	130
dirta	2.37	0.39	1.56	3.42	130
taxbc	3.58	0.17	3.25	3.95	130
totrev	3.73	0.16	3.41	4.08	130
totexp	3.73	0.15	3.28	4.03	130
govfunc	3.8	0.15	3.44	4.11	126
ito	1.81	1.15	-1.17	2.44	130
prop_rights	71.08	18.23	30.00	90.00	130
f_corruption	62.05	20.06	28.00	100.00	130
f_fiscalf	60.35	15.18	30.3	89.40	130
C_government	38.17	18.11	0.00	70.80	130
f_business	76.21	10.16	54.2	100.00	130
f_labor	62.61	13.79	34.7	100.00	78
f_monetary	79.73	10.62	0.00	90.70	130
f_trade	80.64	6.82	46.8	87.60	130
f_investment	71.42	12.73	30.00	90.00	130
f_financial	69	14.67	30	90.00	130
dist_inc	4.7	0.77	1.9	5.71	130
pc	4.16	0.79	1.85	5.57	122
smcap	3.39	1.17	-3.51	5.51	129
sec_privatef	2.39	1.71	-1.97	5.34	109
sec_publicf	1.57	1.44	-2.41	4.09	124
debt_issuance	2.98	1.21	0.43	5.45	124
bdeposit	4.04	0.59	2.32	5.46	123
blnr	3.45	1.03	1	6.03	130
remi	0.09	0.32	-0.34	1.95	130
ti_full	-3.52	0.75	-5.81	-2.23	130
capb	-2.86	3.06	-17.44	4.76	130
gspriv	0.19	0.04	0.09	0.34	129
dINFTarget	0.17	0.38	0.00	1.00	130

Variable	Mean	Std. Dev.	Min.	Max.	N
dEMU	0.46	0.50	0.00	1.00	130
NMS	0.46	0.50	0.00	1.00	130
island	0.15	0.36	0.00	1.00	130
dEU	0.26	0.44	0	1.00	130
dcrisis	0.20	0.40	0.00	1.00	130

Note: all values. Source: own calculation based on sources given in previous text

Appendix E) BMA – outputs

Figure 2A: BMA – model inclusion for 5000 best models



Note: columns in the figure denote individual models; all variables are listed according to their PIP (posterior inclusion probability) in descending order. Black colour = the variable is included and the estimated sign is positive, grey colour = the variable is included and the estimated sign is negative, and 'no colour' (white) – the variable is not included in the model. The horizontal axis measures the cumulative posterior model probabilities.

Model with hyper-g prior (BRIC, [Model II]). f_corr is the variable f_corruption, f_busin is the variable f_business, f_financ is the variable f_financial. Post M – posterior mean, post SD – posterior standard deviation. a) Time dummies not shown.

Source: own calculation using R package bms.

Integrational Models and Forms of Inter-State Public-Private Partnership: Aspects of Financial Convergence

Integrační modely a formy spolupráce veřejného a soukromého sektoru: aspekty finanční konvergence

ALINA KULAI

Abstract
In the article we examined the main models and forms of public-private partnership, their role in the socio-economic development and deepening of financial convergence of countries-participants of the partnership. The attention was paid to decentralization of inter-state forms of public-private partnership as the basis of cross-border and transnational partnership. The scientific research, described in this publication, have found their practical application in the realization of the project within Euro-region "Bug". This project has founded a joined Ukrainian – Polish institution of labor migration administration and also of granting necessary permissions for realization activities within Ukraine.

Keywords
partnership, state and private partners, migration, cross-border and transnational co-operation, convergence, taxes, financial systems

Abstrakt
V článku jsme zkoumali hlavní modely a formy vztahů veřejného a soukromého sektoru, jejich role v socio-ekonomickém rozvoji a zvyšování finanční konvergence mezi spolupracujícími zeměmi. Pozornost byla věnována decentralizaci mezistátních forem kooperace jako základu přeshraniční a nadnárodní spolupráce. Vědecký výzkum, popsaný v tomto článku, našel praktické uplatnění při realizaci projektu „Bug" v rámci Euro-regionu. Tento projekt založil ukrajinsko-polskou spolupráci v oblasti migrace pracovních sil a také udílení nezbytných povolení k realizaci aktivit na území Ukrajiny.

Klíčová slova
spolupráce, státní a soukromí partneři, migrace, přeshraniční a nadnárodní spolupráce, konvergence, daně, finanční systémy

JEL Codes
F5, F15, F22

Introduction

The basis of socio-economic relationship that is formed on the base of production, sharing, exchange and consumption of social product is a question of ownership. In this case, under conditions of inevitability of globalization of world economics its market model

needs implementation of modern institutional models of state administration that is oriented at interaction of a state and private partners – body corporates and individuals, whose participation in formation of social product has to promote improvement of well-being and social protection of citizens. At the same time, structural non-reformation of management system of economics of some countries doesn't facilitate strengthening of their national economics, and accordingly does not provide social standards with financial resources which are applied in in many developed countries. Available asymmetries of convergent development of some countries lead to deepening of negative influence of financial and economic crisis – reducing citizens' level of life, aggravation of socio-political situation and other negative phenomena. In this question Ukraine is not an exception, unsatisfactory modernization and high level of shading of economic sector, absence of effective reformation of country management system cannot fully ensure a quite wide range of state social insurance arrangements with their own financial resources. Under these conditions searching of new models and forms of inter-state public-private partnership has quite an important or even determining meaning in wide understanding of this notion.

Analysis of the studies of the problem. The question of integration models of PPP and state-private partnership (SPP) is an object of scientific studies of R. Baro (USA), V. Varnavskiy (Russia), P. Druker (USA), H. Etzkowitz (USA), K. Ohmae (Japan), B. Danylyshyn, I. Zapatrina, E. Libanova, D. Lukyanenko, V. Mamutova, A. Poruchnyk, I. Storonyanska, O. Simson, V. Chuzhykov (Ukraine) and others.

Aim and tasks of the article are to consider the main models of inter-state public-private partnership, to analyze their role on the modern level of development of socio-economic relations. According to the results of scientific studies, practice of legal regulation and materials of the own research of realization of the inter-state project about creating the trans-border infrastructure of the control of labor migration within euro-region "Bug" we proposed more effective forms of such partnership, which will create conditions for reducing the level of illegal labor migration and increasing positive effect onto the state of national financial systems.

Main scientific and theoretical methods of the research: the method of systematic and logical analysis, the method of comparison, the method of structural modelling, the method of logical approach and others.

Methodology of the research. According to scientific researching and statistic data of international and public organizations we studied active systems of SPP and their interaction, and an effect onto the state of public financial resources.

1 Partnership of Public and Private Sectors of Society as Forms of Cooperation

Events of the latest years that were connected with consequences of world financial crisis have substantially changed approaches to affectivity of socio-economic relations in Europe and the world. In conditions of all-rising globalization of world economy the prob-

lems of competition, unemployment and keeping of proper level of social guarantees and social protection of citizens make governments of states and management bodies of over-national associations look for new approaches concerning priority of directions of development of integration processes not only at national and over-national levels, but also at a regional level.

One of such orientations is a partnership of public and private sectors of society as one of the forms of cooperation. Such form of cooperation has already been realized in many countries for more than 100 years. World leaders of public-private partnership are considered to be USA, Great Britain, France, Germany. Partnership is successfully realized in Spain, Italy, Greece, Ireland, Austria and other countries of Europe and South-Eastern Asia. In different countries of the world, cooperation that has partnership in its foundation obtains different models and forms of national and transnational scales.

P. Rozenau considers that state-private partnership appeared as a juridical form of cooperation that can eliminate "failures" of both market and state, and combine the best features of both sides in order to receive synergetic positive effect (Moro and Buriola, 2007, p. 6). Combination of interests of both independent from each other sectors – state (public) and private has to promote coordination of behavior of participants of such cooperation for the purpose of obtaining synergetic effect[1], and thereafter decreasing entropy[2], as a phenomenon that characterizes a level of uncertainty or chaos to which a lot of attention is paid for the last time while studying conditions of financial processes (Grabchuk, 2011).

Increasing of synergetic effect and accordantly decreasing of a level of entropy in the process of creating distribution and re-distribution of social product can be reached as the result of implementing of effective methods of management that lie in combining of interests of a state and a private sector.

In 20th century an American scientist Peter F. Druker studying the essence and role of management in business, state institutions and non-commercial organization mentioned that for reaching the effectiveness of partnership of real partners they can be joined into one united economic chain of interests (Druker, 2004, p. 117). In present conditions any

1 ***Synergetics*** *– research area that studies connections with the elements of the structure (subsystems) that are creating in open systems thanks to intensive exchange of substances and energies with the surrounding, in dis-balance conditions. In such systems we may observe agreement of behavior of subsystems, as a result a level of its regulation increases, this means entropy reduces [Big Encyclopedia Dictionary, Moscow, 'Soviet Encyclopedia", 1991, part 2, p.351].*

2 ***Entropy*** *– (from Greek – turn, change, transformation) at first it was scientifically proved that entropy is a thermodynamic function that characterizes condition of thermodynamic system and its possible changes (notion of entropy was introduced in 1865 by Yu. U. Klauzis). With the development of statistic physics L. Boltsman proved that entropy is a measure of thermodynamic probability of macroscopic condition of a system [Ukrainian Soviet Encyclopedia, Kyiv 'Main Issue of Ukrainian Soviet Encyclopedia, 1986, part 1, pp.588-589]. In scientific research G. Gelmgolts (1883) determines entropy as a measure of disorganization that in further studies of economic processes is applied as a measure of chaos, quantity of undefined movement in the system that lost its vector nature as a result of chaotic state of this movement. It is applied as a measure of indetermination of condition of entrepreneurship, financial resources, etc.*

state of the world is unable to please constantly raising needs of society at the expense of budgetary funds and that is why unification of efforts of state (public) and private partners is possible in their economic relations under conditions of consolidation of economic interests of the participants of the partnership in accordance with legally regulated conditions and rules. The main aim of such mutual activities is searching the ways of involving investments, saving budgetary funds, getting profit, fair sharing of risks, social and other aspects of partnership.

2 Relationships of State and Private Sectors of Society. Subjunctive State of the Relations of these Two Sectors

Taking into account that the basis for socio-economic relations in market conditions is an effective balance of ownership not only of created social product, but also of other spheres of social life, there is still an important problem of regulation of the relations (of partnership) of private and public sectors of the society.

For more thorough studying of the problem it is important to discover a structure of subjects of these relations of both sectors. Public sector includes subjects of state form of ownership (state institutions, enterprises, companies and organizations), municipal form of ownership (local authorities and their associations, enterprises, organizations and institutions in local (municipal ownership). The private sector includes private entrepreneurs and legal entities, which are based on the private form of ownership. Stefan Linder (Harvard Law Review) treats state-private partnership as an institutional agreement that implements such agreement about cooperation of state organizations and private sector in which a state has one or more private partners (Pidgayets', 2011).

Economic and legal relations of a state (local government administration) and a private partner don't have the only determination and use for today. The analysis of development of public-private partnership and scientific studies on the question give us grounds to the conclusion that organizational function of setting up of partnership with the private sector belongs to a state, the essence of which lies in formation of economic common profitable legal environment of partnership implementation, using and developing different models and forms of such cooperation. A special direction of public-private partnership is a wide conception of partnership in scientific and innovational spheres that first of all is connected with a new state function that becomes in a direct sense more "a partner" than "a regulator" in that meaning that one-side influence foresees. In Simson's opinion a state appears in state-private partnership not as a subject of authority, but as an equal partner, as an entrepreneur who is ready to share the risks of innovative activity (Simson, 2011, p. 227). At the same time the role of the state in SPP is quite understated, as this is the body of State Authority who determines the legal frames of any activity in the state, together with local governments and public organizations they guarantee the observance of rights and freedoms of citizens, that's why the possibilities of the activity of private sector are limited by legal frames and other causes. In most of public-private partnerships the main aim of cooperation is pooling of great amounts of financial resources of a state and business for realization of important investment projects. At the same time,

on the present stage of socio-economic development of most countries, including highly developed ones, there is a question of partnership at decentralized level in social sphere where a state has to appear not only as a financial partner concerning business, but as a customer of social services that are guaranteed by a state or determined by local government administration. From the position of role priority and importance of a state in the partnership with a private sector, to our mind, in the practice of many countries terminology of state-private partnership is applied.

At the same time, taking a look at the composition of subjects of partnership relations, a public component of a concept includes subjects of jural relationships of state and municipal (communal) ownership. It is necessary to point out that subjects of municipal ownership don't belong to state sector and are a special social (community) form of ownership or common ownership of territorial community of villages, settlements, towns, communes and other administrative-territorial units. In spite of considerable changes of these categories in practice the term "state-private partnership" is used most of all where authorities of local governments are equal to state partners.

3 The Essence of the Terms "Public-Private Partnership" and "State-Private Partnership"

At the same time, paying attention to the essence of terminology, in an English equivalent "Public-Private Partnership" a word "Public" is interpreted a little bit wider than just a simple complex of authorities that perform authoritative functions. It includes not only central and local government authorities, judicial authority, law and order authorities, armed forces, but also cultural, educational, academic and other organizations, also social institutions that play informal and very important role in the development of social process (Varnavskiy, 2011, p. 45).

In Ukrainian legal reality they use the term "state-private partnership" that was caused by traditionally big role of a state in social relations. Usage of the word combination "public-private partnership" not only reflexes participating of subjects of public and private law in partnership, but also is a proof of interaction of interests – both public and private. From this point of view usage of the term "public-private partnership" is more specific (Simson, 2011, p. 230).

According to the law of Ukraine "About state-private partnership" that was passed by Verkhovna Rada of Ukraine on July 1, 2010, the Autonomous Republic of Crimea and territorial communities as local government administration are referred to state partners even though they are not state institutions. To our mind one of the reasons of such generalization is the fact that territorial community cannot be an independent unit of public-private partnership as it doesn't possess all necessary instruments of law realization for local self-government. Such situation can be explained by nonreformation of the institute and model of local self-government that existed at the time of resolving Constitution of Ukraine that are characterized by preserving of mechanisms of centralization of authoritative powers and resources.

In Ukraine for a quite long time there are projects of Conception of introduction of changes to Constitution of Ukraine and Conception of reforming of local self-government and territorial authorities in Ukraine with the participation of representatives of state institutions, public organizations of local self-government and scientific organization. These documents provide strengthening of juridical, organizational and material capacity of territorial communities and local government administrations of district and regional levels, conducting their activity with adherence to principles and stipulations of European Charter of local self-government – realization, regulation and management of considerable part of social affairs that belong to their competence considering interests of local population[3] within the law that will give us possibility of wider usage of public-private partnership.

European developed countries have a positive practical experience of project realization of public-private partnership, where similar projects has been being applied since 80s of 19th century in a wide range of economic activities: building and airport exploitation; automobile roads, ports and railways; housing and communal services; providing administrative services; health care; education and sport; jails servicing, etc. To our mind German experience is very useful, where since the second part of the 80s of the previous century for replacing of previously applied projects, they have started the introduction of huge ones of renewing and rebuilding urban infrastructure of the land of North Rhine-Westphalia with participation of private partners and projects from cooperative building.

Nowadays on both European and national levels in Germany they discuss the question in what way state-private partnership can be defined and which rules of regulation there should be in this field.

On European level they refused the limited definition of state-private partnership that had existed by this time: the Conception of state-private partnership doesn't have clearness in interpretation on the co-partnership level. The term usually refers to forms of cooperation between state authorities and private companies for the purpose of financing, building, reconstruction, management and keeping infrastructure or service providing (Europäische Kommission, 2004).

4 Models and Forms of Public-Private Partnerships

The experience of implementing public-private partnership of the USA and European countries and analysis that was conducted by Eastern Europe Fund that was provided by USA Agency for International development within the project of "Local investments and national competitive ability" and studies of leading Ukrainian and foreign scientists show that different models and forms of public partnership are implemented for capital raising for modernization and development of economic and social sectors. In most European countries the model of cooperation of private and public sectors is public-private partnership, in France – "concession" and others. The model of creation of state-private

3 Materials of council-seminar of All-Ukrainian association of local government administrations and Ukrainian association of district and regional councils (2013). Sudak, October 17-20.

partnership by means of project financing of public infrastructure with private funds was developed with participation of governments of Australia and Great Britain at the end of 1980 - "Private finance initiative" that was widely used in Australia, Great Britain, Spain and different variants of this model are used in many other countries as a part of wider neo-liberal program of privatization and financing that are caused by increasing need of accountability and effectiveness for state expenses (Barlow, Roehrich and Wright, 2010).

According to the information of British Government they realize about 80 projects of PFI in the country annually that guarantee 17% of saving of country's budget. With the usage of PFI they built a tunnel under the English Channel, Sidney port tunnel, Confederation Bridge in Canada, airports in Hamburg and Warsaw, New York Central Park, projects of Ministry of Defense of Great Britain (barns, buildings of headquarters, training of pilots and sailors, air services of in-flight refueling, etc.). Private capital raising for supply of municipal activity is quite widespread. According to the information of National Council Public-Private Partnership in the USA for basic kinds of municipal activities (water supply system, sewerage system, scavenging, school education, exploitation of parking lots, etc.) an average city uses private companies for 35% (Cabinet of Ministers of Ukraine, 2013).

The practice of European countries proves that for the last decades the most common form of public-private partnership has been the investing of a private sector into municipal activity – building, reconstruction and modernization of the infrastructure and providing with social services. Scientists V. Babayev, T. Momot, Ye. Shevchenko have analyzed and generalized studies of British (Partnership UK) and international experts of the World Bank, European Bank of Reconstruction and Development and as a result they distinguished four main groups of partnership:

1. Management and Leasing Contracts in the form of a management contract;

2. Concessions in the forms of:
   - Rehabilitation, operation, transferring;
   - Rehabilitation, leasing or rent, transferring;
   - Building, rehabilitation, operation, transferring;

3. Greenfield (new) projects in the forms of:

   - Building, leasing, transferring;
   - Building, operation, transferring;
   - Building, ownership, operation;
   - Commercial project;

4. Partial privatization of assets – purchasing a part of a block of shares of an enterprise that is in state or communal ownership (Babayev, Momot and Shevchenko, 2012).

At the same time European Commission mainly distinguishes two forms of state-private partnership:

• Contractual state-private partnership where a partnership exists between a state and a private sector and occurs between independent legal entities;

• Institutional state-private partnership where cooperation occurs between state and private sectors within a separate subsection[4].

Taking into account that state and municipal partners belong to a public sector of society European Commission defined the forms of state-private partnership that are considered to be a main model of public-private partnership.

At once, the practice of implementing of public-private partnership of the last decade proves the necessity of usage of the third model of partnership – mixed that is wide spread in the countries of Central-Eastern Europe which are members of the EU in 2004 and 2007. By 2008 private-public partnership in Poland had been regulated by separate legal acts: about railway transport, roads, tax on individual income, public transport, organization of agricultural markets, etc. In December 2008 Parliament of Poland passed the law "About Public-Private Partnership" that determines the significance of public subject of partnership:

1. Organizations of public financial sector according to legislation about public finances;

2. Other legal entities except for organizations of public financial sector that are founded by organizations of public financial sector that don't have industrial or marketing aim of foundation, directly or by means of other subjects;

3. Relations of subjects defined in points 1 and 2 (Kancelaria Sejmu, 2008).

The characteristic peculiarity of the law is that partnership subjects are admitted to be legal entities that have a right to dispose public finances according to legislation and also their relations. The law also regulates the participation in public-private partnership of private partners – legal entities, participants of property and financial deposits of public and private partners. All mentioned above has a possibility of usage of public-private partnership according to the practice of its applying by the EU. Concerning applying public-private partnership in its country the legislation of Poland gives a great possibility to state jurisdictions and local government administration as the main subjects of such partnership to use different models and forms of cooperation including so-called mixed ones.

According to the law of Poland "About public-private partnership" they considerably exaggerated the legal framework concerning the possibility of participating in the partnership on the rights of participants of not only public and private partners, but also contributors of property deposits and proprietary interests that are defined by the civil code, to carry out payments by means of participation of public and private partners in charges or financing after-payments to services through a public partner. The relations of public partners are defined as a separate subject of public-private partnership that broadens possibilities of cooperation in information providing, usage of common data bases that are necessary for realization of projects of public-private partnership.

4 Vgl. Europäische Kommission (Fußn. 1), 9.

In addition in present conditions more and more attention is paid to researches oriented at the applying of mixed forms of partnership in a social sphere that are mainly decentralized, with the help of which on the local level it is possible to make influence on specific problems of service providing, to widen and to improve variety of products in an innovative way (Piontkowski and Steidle, 2007). Such form of partnership can be useful for Ukraine, but for its full implementation there is a necessity of most social services that are guaranteed by a state to pass the fulfillment to local councils and to leave state control over observance of legally established standards.

No matter what models and forms of partnership will be applied in every specific project where the main aim is increasing the final product (services amount) and receiving the income as a result of contractual relations of not only state, municipal and private partners, but also a huge role in these relations belongs to public organizations and charitable trusts. Mostly according to the valid legislation the role of these subjects of partnership is limited, insufficiently attention is paid to scientific developments and studies of this question. At the same time public organizations and charitable trusts, taking an active part in all spheres of social life of all countries, de facto are direct participants of such partnership that exceeded the national bounds of such cooperation and under conditions of globalization has the signs of dimensions and internationalization that is the process that foresees exceeding something that used to be only internal out of its initial limits; or cooperation of action of couple of subjects of the world economy and politics around generalized for them tasks, aims, kinds of activities (Voloshyn, 2010). Internationalization of public-private partnership includes cooperation of such partners as a state, local self-government, private sector, science, banking sector, the public through public organizations, law enforcement and judicial authorities, migration services, statistics authorities, media, etc.

According to the most wide-spread definition of scientists, globalization is an internationalization of economic life that takes a form of transnationalization, of mutual entering economics, and global measures. At the same time it is also a universalization, homogenization of life when under the influence of exchange of people, goods, capitals, culture values the world strives for uniform standards, principles, values (Kolesov and Os'mova, 2000, p. 6). Internationalization of public-private partnership foresees not only the creation of common international, multinational goods manufacturing and service providing companies, but also international associations that carry out socio-beneficial functions for modern global problems solving.

A striking example of transnational public-private partnership can be quite recently established in 2000 The Global Alliance for Vaccines and Immunization (GAVI Alliance). Donors of the Alliance are public and private participants from more than 20 counties of the world as USA, Canada, Germany, France, Japan, Russian Federation, etc. and also the EU. Among the international funds and private persons the famous sponsors of the Alliance are charity trusts of the head of the Microsoft Company and his wife Melinda Gates (The Bill and Melinda Gates Foundation), OPEC Fund for International Development (OFID), Lions Club International Foundation (LCIF), the Children's Investment Fund Foundation (UK).

The Alliance carries out the charity work that is oriented at solving of the global problem of life protection and children's health by means of vaccination and immunization. At the GAVI's conference that was held in London in June 13, 2011 they discussed the questions of financing of purchasing of vaccines against diarrhea and pneumonia. According to the conclusions of the conference this problem is the main threat to lives of 240 millions of children from the developing countries that is why the Alliance sponsors' donations added up 4,3 instead of planned 3,7 million US dollars for realization of this global project. In the structure of financial resources of GAVI's public-private partnership for the period of establishment of the Alliance 2000 – 2012, 71% are the deposits of governments of countries-participants, 29% - from the funds, corporations and individuals. Deposits from the private sector become a significant component of any GAVI's financing strategy[5].

Modern globalization processes define the new era, changes which lie in the fact that people mostly depend on regulations that exist on the world market (Ohmae, 1990) that are characterized by free investment flow and labor force. Changes in the world economy together with urgency of structural reforms of state and municipal administration demand deep convergence of national economies and financial systems. Convergence of economies of countries of the world constantly changes national economic relations, an important part of which is migration processes that are closely connected with international economic relations. In this context the most serious point for many countries became questions of employment, overcoming unemployment, competition on the world labor market, combating illegal labor activity, etc. Increasing of citizens' welfare and a citizen's right for decent working conditions are connected with possibilities of realization of own working potential by citizens both in a native country and abroad.

According to the data of the Department of Economic and Social Affairs of United Nations Organization general number of migrants in the world equals 215,8 million people that is 3,2% of the general number of citizens. For the last 30 years (in comparison with 1980) the number of migrants doubled (International Labour Organization). The downfall of the USSR had a significant influence on migration dynamics in the world, most of the former Union republics couldn't use the possibility of realization of effective structural changes and modernization of economics and as a result the level of the value in a produced product, reward for work and level of social guarantees stayed much lower than in the EU countries and other developed countries of the world. These and other reasons caused the growth of unemployment. At the same time citizens are employed abroad by getting right for free movement outside the native country.

Current socio-economic situation in Ukraine is similar to many others states, especially former-socialist that in a short-term perspective doesn't let predict fundamental changes on the domestic labor market and reducing the number of citizens who are working or are looking for a job abroad because of economic reasons. Only in European countries there are hundreds of thousands of registered working labor migrants from Ukraine (Lukyanenko, 2008), and according to different sources their total number equals from 1,5 to 6 million people. Migration processes that occur on the world labor market are an important factor of formation of gross domestic product and national budgets of the countries of job

5 *Gavi Alliance, [on-line], Available at: http:// www. gavialliance.org*

placement, and annual money remittance to Ukraine is an important source of income of social security of their families and incomes to the budget.

Taking into account the urgency of solving the existing problems the Cabinet of Ministers of Ukraine adopted an order "About approval of a plan of activities about integration of migrants into Ukrainian society for the years 2011-2015" (Cabinet of Ministers of Ukraine, 2011). Mostly the order concerns refugees, foreigners of non-Ukrainian origin who are willing to integrate into Ukrainian society. Concerning Ukrainian labor migrant who came back to Ukraine the order has a regulation about providing with help in employment, professional training, retraining, professional development, informing migrants about employment, entrepreneurial activity, social security and health care; and psychological support by employment centers. At the same time all these activities are not enough, as in order to return labor migrant from abroad it is necessary to create more favorable conditions of employment in Ukraine than they have abroad and more possibilities of self-actualization in the domestic market. Otherwise labor migration will have one-sided character and will be more oriented towards constant emigration from Ukraine.

To our mind the state direction of activity is more promising that is aimed at regulation of processes of labor migration from the position of circulation (Migrazione circolare) – system of rules and procedures in which migrants move periodically between the country of birth and a country of destination and give knowledge and experience achieved abroad at the disposal of their own country. Within a circle of European politics they often cite one of possible measures for reducing the negative phenomenon of "brain drain" (Etzkowitz, 2008, p. 71). This direction of activity in integration context is much more effective for the countries with a high level of migration that foresees approaching of labor conditions, salaries to European standards. This makes possible to speed economics reforming and providing benefits for all subjects of the process of labor migration.

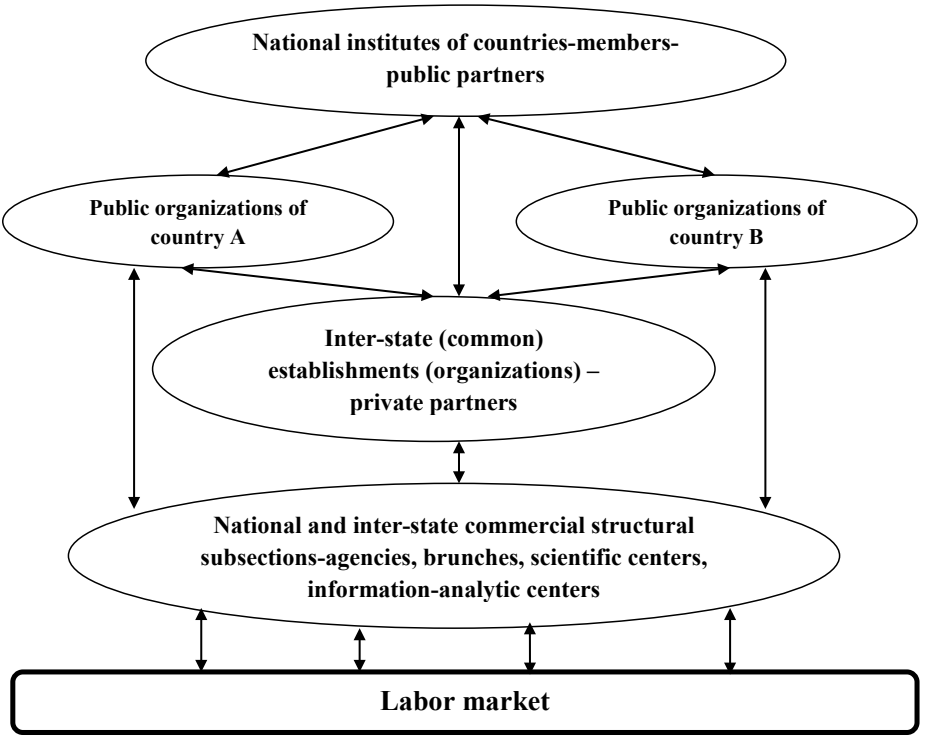
Such area of activities in realization of the national programs of migration politics corresponds to the global aims of the United Nations Organization and the program of the International Labor Organization concerning the fight against poverty by means of ensuring citizens with worthy job that foresees equal possibilities for men and women for productive work and ensures freedom, equality, security and human dignity (International Labour Organization). For a quite small period the Conception of a worthy job became a steady system of regulations, standards, indexes and gradually becomes one of the main field of activity of international institutions of separate countries and public organizations in the sphere of labor and social politics. Signing in 2006 of the Ministerial Declaration on ensuring of complete and manufacturing employment and decent work by Economic and Social Council of United Nations Organization started the transformation of the Conception of decent work into a new global aim. For the development of the ideas of this Declaration in 2007 they signed the agreement about cooperation between the Program of development of United Nations Organization and International Labor Organization according to which decent job must become the central element of the programs that are passed by United Nations Organization in member-countries (author translation) (Lukyanenko, Poruchnyk and Stolyarchuk, 2013, pp. 148-149), including labor migration.

In 1999 European Council adopted "the Tampere plan" (European Parliament, 1999) that defines the main courses and priorities of migration politics. In Chapter 1 of the plan "Partnership with countries of origin" it says about the necessity of complex approaches to migration processes for the purpose of fighting against poverty, improving living conditions and possibilities of employment, preventing conflicts and strengthening of democratic principles of countries, securing human rights, especially rights of minorities, women and children. Realization of "Tampere Plan" has to guarantee justified attitude to migrants and giving to them rights and duties the same as for citizens of a country of their employment. The stress is made on strengthening of non-discrimination in economic, social and cultural life.

A huge hindrance in receiving of worthy job of citizens is illegal labor migration that is caused in many countries by applying discriminating working conditions to illegal labor migrants by employers, by paying them a salary that is in several times less, depriving them of decent living conditions and social security, etc. Considering the current state of labor migration processes in the system of the world labor market there is still an important question about the effectiveness of methods of management of these processes on inter-state level. One of these courses, that is foreseen by Ukrainian legislation, is international cooperation in the sphere of securing of social protection of citizens who work abroad, securing of cooperation of the central executive agency that realizes state politics in the sphere of public employment and labor migration, market participants who provide mediation services in employment, other employment intermediaries in employment sphere and establishments of social, professional and labor rehabilitation of disabled persons, centers of social services for the youth and others. Such form of cooperation can be effective under conditions of its implementation on the terms of public-private partnership with the usage of mixed (hybrid) model of partnership that foresees participation of besides public and private partners also funds and public organizations on the rights of subjects.

Socio-demographic disbalances of the countries lead to forced and spontaneous, uncontrolled forming of labor migration, the result of which can become a total immigration with a further change of nationality. This is the loss of able-bodied population for the country, brain drain, creating corruptible structures of labor migration administration and as a result there is total nakedness of citizens abroad (Kulai, 2014). That's why it is evident that the solving of the mentioned problems is possible only with a help of making collective decisions, which are regulated with the norms of international law. Only in such way countries-members of integral unions and countries which are not involved to them, will control the administration of labor resources of migrants. With the growth of globalization processes that are taking place on the labor market the role of cross-border and transnational cooperation increases aimed at implementation of a coordinated management system of labor market that should have in its basis inter-state public-private partnership and its institutional environment built in accordance with mechanisms of state-public partnership and trans-border infrastructure of labor circulation administration, that can be fulfilled only by a state, international institutes, business and public organizations (see Figure 1).

Figure 1: Project model of the institutional environment of labor migration administration in conditions of interstate PPP (author's building within a pilot project).



The essence of such cooperation lies in coordination of activities of state authorities that provide realization of state politics in the sphere of population employment and regulation of migration process, and private structures concerning conducting of socio-oriented activity aimed at observance of right and interests of labor migrants in case of their employment abroad, formation of favorable business environment through the widening of existing national and international institutions and public organizations.

The special role in this relationship is played by the international institutions: EU Institutions, the United Nations, international financial organizations, public consumption funds and so on. The activity of the International Migration Organization (IMO), the mission of which has been working in Ukraine since 1996, purposes to develop the understanding of possibilities and problems of migration in the Ukrainian context, to increase these possibilities and to minimize the problems caused by the migration movements, to resist the human traffic, to give Ukraine the help in improving its administration system of migrations processes and so on. At the same time the mission of the IMO in Ukraine takes part in studying and stimulating the formations of legal channels of job placement for the Ukrainian migrant workers, using the potential of development of migration and integration of migrant workers, popularizing the cultural variety and opposing the xenophobia

and intolerance. For last 18 years of the activity in Ukraine the IMO has helped more than 300 000 migrants, the potential migrants and people who suffered from human traffic and other vulnerable groups directly or through their representatives/partners in the projects. Nowadays the very actual point is using the international models and forms of the international public-private partnership in the sphere of labor migration considering the military incident in the East of Ukraine caused by the intervention of Russia.

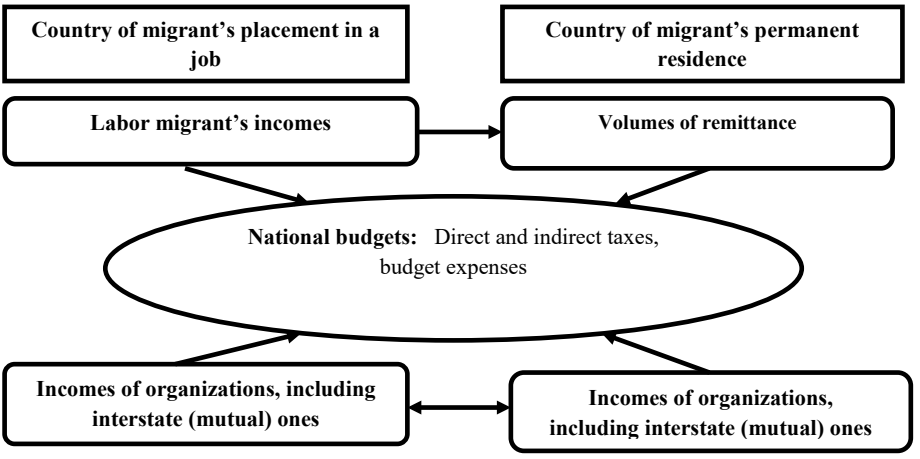
In Volyn region of Ukraine they established a pilot project about creation of such infrastructure on terms of state-private partnership within cross-border cooperation of European region "Buh" and separate provinces of the Republic of Poland.

The cross-border infrastructure of a project includes public organization and international unions, independent economic structures including joint Ukrainian-Polish companies and organizations with the share of community property of separate territorial communities. The implementation of a mixed form of public-private partnership in the project foresees cooperation on a contractual basis with Ukrainian and Polish state institutions in the field of employment of population concerning setting up and using common informational portals of national labor markets that will let us implement the employment of citizens abroad according to terminal trilateral agreements which provide the terms of labor migrant's staying abroad and define payment and labor conditions, parameters of social protection and social welfare. An extinctive network of structure subsections will give the opportunity to legalize gradually financial flows, which are connected with job placement and waging of labor migrants through the payment of tax from the activity.

The essence of effectiveness of the introduced project lies in harmonization of the activity of state and non-state institutions and in legalization of financial flows which are connected with labor migration. The introduced system of contract relations of an employer and a labor migrant creates new conditions for legal activity of appropriate inter-state private organizations, and thereafter for getting profit in the country of their location and paying taxes to budget. Besides it isn't less important to fix in the contract the terms of payment for a migrant's work in the country of his stay, it makes the process of job placement and registration and taxation of such income be clear. In the country which a migrant left for employing there is a question of his registration in state authorities of social security in order to determine grounds and amounts of giving social benefits to the members of his family in their country of residence. The project stipulates concluding labor contracts before starting to place a labor migrant in a job in the country of his permanent residence, this gives an opportunity for close cooperation with local Authorities of Social Security and Migration Services about the time of migrant's staying outside the country of his permanent residence in the period of placing in a job. The scheme of financial interrelations of inter-state public-private partnership about points of labor migration is shown on the Figure 2.

For this purpose under the Project they plan to organize in Ukraine re-education of main labor professions of citizens who wish to work in both Poland and Ukraine under programs and standards of the EU. To realize this task in Ukraine it is foreseen to create the International Educational Center of re-education and adaptation of personnel on the terms of joint property of founders from Ukraine and Poland and local councils.

Figure 2: Project model of financial interrelations of inter-state public-private partnership about points of labor migration (author's building within a pilot project).



Conclusions

World experience of applying models and forms of public-private partnership proves their effectiveness in case of absolute following fair and mutually beneficial terms of partnership of all its participants in a long-term outlook. An important direction of development of inter-state public-private partnership is spreading decentralized forms of cooperation in a social sphere using a mixed form that foresees financial participation of a state (local government administration) and a private partner, co-financing expenditure responsibilities of public authorities by private partners and common informational and analytical, legal and other servicing of such projects. Projects oriented at employing labor migrant in the future will let us partially regulate migration processes that are connected with illegal labor migration in the European area, improve the condition of observing the rights and freedoms of labor migrants, their level of social security. Pooling of industrial and technological and scientific potential, financial and labor resources of participants of inter-state public-private partnership is a real step to solving existing economic and social problems and to increase the effectiveness of functioning of national financial systems.

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Risks of Mortgage Loans in the Czech Republic

Rizika hypotečních úvěrů v České republice

JAROSLAV TICHÝ

Abstract

Indebtedness through mortgage loans is dominant of household debt in the Czech Republic. The gradual increase in the household debt level may also entail increasing credit risk assumed by banks in connection with their credit exposure to this sector. The objective of the paper is to verify the risk and identify factors that affect the credit risk development in the Czech Republic. We look for correlation between the risk development and the interest rate development. Furthermore, we verify links between the risk and the development of real estate collateral value. The paper does confirm that there are real risks associated with the potential increase in interest rates. No significant risks have been confirmed with regard to the current development of the residential property value. The paper also strives to provide an identification and verification of risks stemming from individual banks' internal processes. It features a detailed analysis of the internal factors (aspects) comprising revenue, competition, as well as distribution.

Keywords

mortgage loans, credit risk, real estate/property prices, interest rate, commission, competition

Abstrakt

Hypoteční úvěry mají dominantní podíl na dluhu domácností v České republice. S postupným růstem zadluženosti domácností se může zvyšovat úvěrové riziko, které podstupují banky ve vazbě na svoji úvěrovou angažovanost do tohoto sektoru. Cílem příspěvku je ověření rizik a identifikace faktorů, které ovlivňují vývoj úvěrových rizik v České republice. Jsou hledány korelace mezi vývojem rizika a vývojem úrokových sazeb. Dále jsou ověřovány vztahy mezi rizikem a vývojem hodnoty zástav nemovitostí. Článek potvrzuje, že existují reálná rizika plynoucí z potenciálního růstu úrokových sazeb. V oblasti aktuálního vývoje hodnoty rezidenčních nemovitostí nejsou zásadní rizika potvrzena. Dalším popsaným výstupem je identifikace a potvrzení rizik, která jsou generována z interních procesů jednotlivých bank. Detailně je proveden rozbor interního faktoru výnosů, faktoru konkurence a také faktoru distribuce.

Klíčová slova

hypoteční úvěry, úvěrové riziko, ceny nemovitostí, úroková sazba, provize, konkurence

JEL Codes

G21, G28

Introduction

Research relating to credit risks in the Czech Republic was conducted in the period of 2013 through 2015. It also comprised a research probe using questionnaires and guided interviews. The investigation focused on the practices of banks in the Czech Republic in the area of credit risk as well as on the prediction of their practices in this area going forward. Managers of selected financial institutions were the primary target of the inquiry, with members of the academia being approached on a secondary basis. Overall, 37 completed questionnaires were collected and subsequently assessed. The guided interviews were conducted prior to the research probe, in order to formulate questions, as well as after the questionnaire survey. The subsequent interviews were to specify and clarify the identified risks. The research has resulted in an information set that is presented and further verified.

One of the main findings of the conducted research was the identification of concerns of some respondents about potential future credit risk in the area of mortgage loans to the household sector. Hypotheses, formulated as output of the preceding investigation, are verified as part of the follow-up activities. The main hypothesis examined is the claim that the primary source of risks consists in the potentially adverse development of interest rates and property prices. This part of the research follows up on past research projects, already conducted in the Czech Republic in the area of systemic risk of interbank services and bubbles relating to the development prices of the residential real estate. Furthermore, the research aims to verify the hypothesis that other significant risks stem from internal activities of individual financial institutions. For the purpose of the hypothesis verification, these risks were classified and categorized within individual aspects that affect potential development of risk in the area of mortgage loans. This concerns the following factors: revenue, competition, and distribution.

1 Empirical Literature

The research follows up on numerous studies conducted in the area of credit risk. In this regard, it is necessary to mention some studies and publications that are fundamental for the general direction of the conducted research.

In the area of the interest rate development, it concerns studies by Cho (2009), Magri and Pico (2010), Hatchondo, Martinez and Sánchéz (2011). With regard to older sources, we can mention Fernald, Keane and Mosser (1994), for example. The aforementioned studies analyze and confirm credit risk resulting from interest rate increases. In addition to efforts aimed at generalizing specific rules in connection with post-2008 practice, the studies also deal with prediction of potential risks. The conducted research generally applies the findings presented in the aforementioned studies. It results in a fundamental analysis of the interest rate development in the area of mortgage loans for the household sector in the Czech Republic.

The research of credit risks associated with the development of property prices and potential development of bubbles follows up on the study by Komárek and Kubicová (2011), and it is also partially affected by the study of Brunnermeier and Oehmke (2012). With regard to other sources that had previously dealt with the issues of credit risk relating

to loan collaterals (with their output/results being applied within the paper), we should mention studies by Hlaváček and Komárek (2009) Eger and Mihajlek (2008), Quagliariello (2007), Himmelberg, Mayer, and Sinai (2005), Helbing and Terones (2003), or Bordo and Jeanne (2002). In this part of the research, fundamental analysis of the development of residential property prices in the Czech Republic was carried out in connection with the aforementioned studies/papers.

With regard to the internal risk factors, the study is a follow-up on the study of Frait and Komárková (2011), as well as the paper by Brunnermeier (2009) in the area of pro-cyclical conduct of financial institutions and interbank relations. The part of the study that deals with the identified distribution factor has been inspired by a study of Vlachý (2010). Furthermore, this part of the research draws information particularly from results of the questionnaire survey and guided interviews. In general, it is safe to say that no specific measures have been adopted by the regulator to cope with such risks until 2015. The first clearly formulated indication of internal risk factors in connection with mortgage loans to the household sector is only included in the last Financial Stability Report 2014/2015, as published by the Czech National Bank on 16 June 2015[1].

Various documents presented by a number of international institutions serve as an important source of information and data in the area of mortgage loan regulations. This mainly concerns the International Monetary Fund (IMF Working Paper 04/2011 and IMF Working Paper 12/2011), the Bank for International Settlements (BIS - Quarterly Review, 09/2013; BIS - Working Paper 11/2013). Moreover, documents of the following institutions and authorities have been used: The Reserve Bank of New Zealand (Consultation Paper 02/2013), Hong Kong Monetary Authority (02/2011), and BBVA Research (01/2014). Individual types of measures applied in the area of global regulation or mortgage loans provided to the household sector have been verified pursuant to the material by Cerruti, Dagher, and Dell'Ariccia (IMF Staff Discussion Note - June 2015).

2 Methodology and Data

The research objective is to prepare information set relating to credit risk and also to identify potential threats concerning mortgage loans to the household sector in the Czech Republic. The research objective can be described as a combined functional/object goal. The method applied can be described as generally scientific, explanatory type. The applied methods are empirical and generally theoretical. Information has been collected through empirical data collection with a follow-up study of written resources. Furthermore, a research probe in the form of questionnaires and guided interviews has been applied. The collected data are further analyzed within the context of the aforementioned studies and documents. In order to compare the collected information and to analyze data, we have mainly used publicly available information from selected banks and financial intermediaries. The Czech Statistical Office and the Czech National Bank also served as another public

1 *The information presented by the Czech National Bank in the current Financial Stability Report 2014/2015 corresponds to the conclusions of independent research presented herein.*

source of information. In order to verify various trends, the data were processed in the form of charts and tables.

2.1 Research Probe

The main input for the risk identification comprises data collected via the empirical research probe, conducted in the form of questionnaires and guided interviews. In conducting the questionnaire survey, a combined method for the delivery and return of the questionnaires was used. The questionnaire coves several topics (the so-called omnibus inquiry was used). The first part of the questionnaire maps the loan process, including the identification of risk and prospective parameters for the loan provision in the Czech Republic. The second part of the questionnaire focuses on respondents' views regarding the future of the banking sector. The questionnaire also comprises questions relating to the respondents' opinions about the interest rate development in the area of mortgage loans to the household sector as well as the development of residential property prices. Furthermore, the questionnaire also inquired whether respondents expect the credit standards for individuals to tighten in the future. Answers were collected from 3 November 2013 to 6 March 2014. A list of potential respondents was prepared during the preliminary stage. Overall, the list comprised 70 individuals, mostly bank managers in charge of approving active transactions. It concerned managers from Komerční banka, Hypoteční banka, Česká spořitelna, UniCredit Bank CR, Československá obchodní banka, Raiffeisenbank and Modrá pyramida – stavební spořitelna. In the survey, 4 bank economists and 4 academicians with long-term experience within the banking sector were inquired as well. Respondents were addressed in a combined manner – with the combination of direct (personal) contacts and email contacts, with email delivery of the questionnaire or link to the SURVIO online platform. The platform was used for automatic collection of information and assessment of basic outputs. In assessing the data collection, 65 questionnaire visits were identified. Overall, 37 respondents completed the questionnaire. The overall questionnaire completion rate amounted to 56.9%. The result can be seen as satisfactory, in spite of the limited number of received responses.

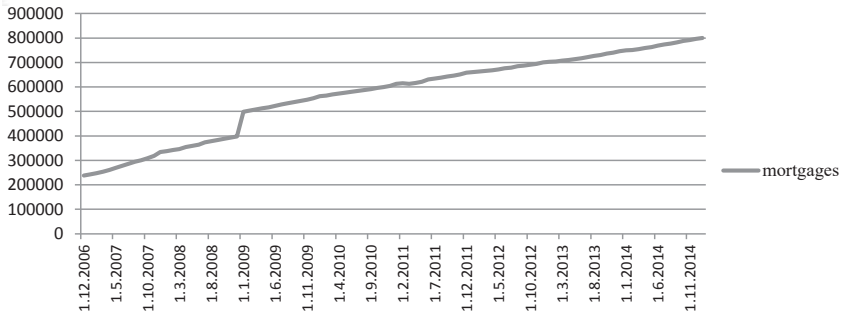
The questionnaire survey was followed by guided interviews, conducted in the form of an in-depth interview. In total, 19 interviews took place. The objective was to identify risks in connection with the questionnaire results that the respondents considered crucial for the future development of credit risk in the Czech Republic. The risk associated with the future development of interest rates was mentioned in virtually all cases. The area of mortgage loans to the household sector was presented as an area with the highest potential risk. The potential risk of future development of the collateral value relating to such loans was also mentioned in this area. Representatives of large banks (Komerční banka, Česká spořitelna and Hypoteční banka) also mentioned significant pressure on business results (revenue retention) and increasing their market share within the segment of mortgage loans to individuals. Representatives of the said banks also mentioned increased competitive pressure of new small banks as well as complications associated with the acquisition of new business via financial intermediaries (so-called third parties) in connection with mortgage loans to the household sector.

3 Development of the Household Debt Level

Housing-related loans have the highest share in the household debt volume. According to most interviewed bank managers, the exposure of commercial banks in the area of household mortgage loans represents a significant risk that has to be monitored and regularly assessed[2]. The follow-up research confirms the importance of monitoring of risks arising from such exposure. Figure no. 1 presents an increasing trend of the housing loans – from 2006 to 31 January 2015. The volume of the provided mortgage loans for residential housing has exceeded CZK 800 bn.

The empirical research compares information received from bank managers with data mainly available from the resources of the Czech National Bank. The latest reports that deal with household debt in relation to housing suggest that the significant volume of new mortgage loans does not pose such risk for the banking sector as it might seem[3]. This information relies on the assertion that predominant share of loans that are reported as new housing loans concerns refinancing of existing loans with new interest rate fixation. The credit risk associated with such loans should be lower due to proven loan repayment and also expected improvement of the real LTC[4] ratio (loan partially repaid to the bank) and also improvement of the LTV[5] ratio for some loans. More accurate data relating to the identification of volumes of refinanced and new mortgage loans to households are only presented in the latest Financial Stability Report 2014/2015 of the Czech National Bank of 16 June 2015.

Figure 1: Development of household mortgage loans in the Czech Republic (CZK mil.)



Source: Own chart based on data received from the Czech National Bank

2 Overall, 15 of 17 respondents mentioned the risk associated with the banks' exposure to household mortgage loans during the guided interviews.

3 Czech National Bank. 2014. Financial Stability Report 2013/2014.

4 LTC ratio (Loan-to-Cost) indicates the ratio of the loan amount to the property purchase price.

5 LTV ratio (Loan-to-Value) indicates the ratio of the drawn mortgage loan to property valuation (sometimes also referred to as LVR).

4 External Risks in the Area of Mortgage Loans

4.1 Risk of the Interest Rate Development

The Czech National Bank also presents that the impact of a sharp interest rate increase on the household debt level would be relatively minor[6]. However, the research conducted by VŠFS confirms that bank managers view the risk arising from a sharp interest rate increase as significant. Taking into account the aforementioned potential disagreement, the view of the Czech National Bank is further verified in the research study. Based on the follow-up basic analysis of the publicly available information and data, it is safe to state that if any interest rate increase is associated with corresponding increase in household income, the said change should not generate significant risks for the banking sector. Otherwise the risk would increase considerably. Data of the Czech Statistical Office have been used for the purpose of the informative assessment, with the household gross adjusted disposable income used as the basic parameter[7]. This parameter has been increasing since 2008. To ensure more accurate description of potential risks, it would be beneficial to perform detailed comparison/analysis for the household debt development trend and the trend for the nominal interest rate development in connection with the household disposable income development using various ratios. However, the basis verified data and trends currently do not indicate any major problems.

The current mortgage loan interest rates are at all-time lows. Figure no. 2 shows the analysis of the interest rate development in the Czech Republic. In order to verify the claim, we have used the statistics of the Czech National Bank[8] as the primary source. Moreover, the company Fincentrum[9] is used as a secondary information source. The average interest rate went down to 2.51% p.a. in February 2015. According to Fincentrum, the average mortgage loan interest rate went down to 2.27% p.a. in February 2015 (Fincentrum already reported the average interest rate of 2.51% p.a. in October 2014). The difference between the CNB data and the Fincentrum data stems from their different form as well as different data collection and assessment methods.

In order to further verify the identified risks, it would be necessary to perform detailed analysis of the situation pertaining to individual financial institution. There are currently no accurate data and information available on the provided mortgage loans in terms of average interest rates and share of mortgage loans provided at high LTV levels.[10] Furthermore, no accurate data are available regarding mortgage loans provided to higher-risk clients. Such information could probably be derived from individual banks' internal data in connection with assigned rating. Unfortunately, the data are normally not available; moreover, it is unlikely that such data would allow identification of specific reasons for

6 *Czech National Bank. 2014. Financial Stability Report 2013/2014.*

7 *Czech Statistical Office, Macroeconomics, household gross adjusted disposable income, 20 February 2015.*

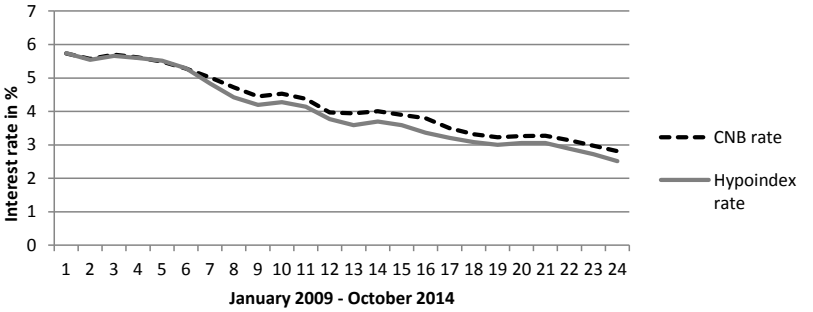
8 *Czech National Bank. 2015. Interest rates for CZK loans provided by banks to households – new loans (%).*

9 *Fincentrum. 2015. Hypoindex.cz.*

10 *The guided interviews suggest that mainly Komerční banka, a.s. and Hypoteční banka, a.s. have a more significant share of household mortgage loans with LTV at 100%.*

assigning the respective ratings. However, we can generally confirm that a sharp interest rate increase may particularly affect low-income households. This fact is also corroborated by the Czech National Bank, as it included household stress tests in its regular Financial Stability Reports for the Czech Republic. For the purpose of basic understanding, we can mention a model example verified within the research – with an interest rate increase from 2.39% to 6% for a loan amounting to CZK 2 million with a 20-year maturity. In this case, a monthly payment would increase by up to CZK 4 thousand. The difference could pose a major threat to low-income households (this risk would be considerably higher if the real interest rate increase is not associated with an increase in real income).

Figure 2: Development of mortgage loan interest rates in the Czech Republic



Source: Own chart based on data received from the CNB and Fincentrum

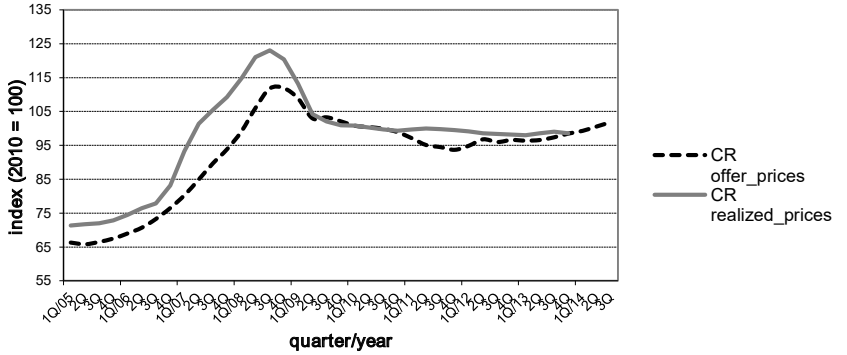
4.2 Risk of the Collateral Value Development

We believe one of the most significant risks for banks identified in the course of the research is the risk of declining property value. Collateral in the form of real estate serves as the basic security in terms of the provided mortgage loans. Historical development of property values (apartments, houses, land) has documented that the value of such security may in fact fluctuate. Client's default may actually result in a situation, where the proceeds generated from a sale of the given property may be insufficient to cover the client's debt to a bank.

Post-2008 experience in the United States as well as adverse effects of the declining collateral values in Ireland and Spain corroborate the fundamental importance of the collateral value in the area of credit risk. Property values in the Czech Republic also came down after 2008. The data of the Czech Statistical Office are used as the primary information source for the verification of the situation and risks prevailing in the Czech Republic. In order to update data and verify information presented earlier, trend curve analysis for the bid prices as well as the actual selling prices of apartments in the Czech Republic was used in the course of the presented research. The basic information about the development of apartment prices is presented in Figure no. 3 below. Another benchmark analysis was carried out in the area of price development for individual regions. No significant overvaluation of apartments, houses, or land is identified for any of the regions of the Czech Republic.

In order to assess the situation in the area of price/real-estate market development, with potential imp act on credit risk, the so-called financial ratios are normally used. The ratio of property price to rent amount (P/R, price to rent) or of property price to income (P/I, price to income) may be used for detailed analyses. "An increase in the P/R ratio may indicate overvaluation of property prices. However, the said indicator does not take into account interest rates that are associated with availability of loan financing."[11] The said parameter is not applied in the course of the verification. The reason for this is the situation currently prevailing in the Czech Republic. Low interest rates and positive approach of individual banks offer the most beneficial conditions to debtors. Application of the P/I ratio may bring more accurate information. However, this information may be distorted by different income level within individual regions of the Czech Republic. Overall, it is safe to state that a detailed analysis of such data does not currently have any significant benefits for the credit risk assessment. Moreover, having performed the analyses, we can say that the development in the area of property prices does not currently indicate the formation of the so-called bubbles.

Figure 3: Development of apartment prices in the Czech Republic in the period of 2010 - 2014 (index, 2010 = 100)



Source: Czech Statistical Office

Developments in some other countries corroborate the effectiveness of direct measures, with impact on property prices stabilization, etc. The trend towards applying regulatory restrictions related to the LTV indicator can recently be observed in developing economies in particular. However, this practice has been more and more common in OECD countries as well. For example, Canada, Sweden, and Israel have all applied some form of restrictions relating to the LTV indicator in the past. International experience confirms that restrictions relating to the aforementioned indicator slow down the real increase in loans and property prices during booms. Furthermore, definition of such limits increases banks' stability by increased stability and resistance of debtors. Several studies have confirmed that the application of stringent standards in the area of LTV reduces households' sensitiveness with regard to price shocks (BIS, CGFS, 2012). Canada has been an example of successful application of regulatory measures (Brunnermeier, 2009). The practice in Sweden is

11 Komárek, L.; Kubicová, I. (2011), p. 164.

often presented as well. In the course of the research, the practice from New Zealand, Hong-Kong, South Korea, Singapore, Israel, and Norway has been verified. It would also be worthwhile to verify the situation in Hungary as well as the initial results of the current regulation introduction in Poland and Slovakia.

5 Internal Risks

The performed empirical research has identified risks that are referred to as internal risks for the purpose of further examination. These risks arise from internal actions and own decisions of individual banks. In general, these risks should be controllable via internal bank processes. In case of insufficient management of such risks, incorrect decisions may significantly affect the stability and results of the given financial institution. The basic indications corroborating the existence of the said risks came from the feedback during the questionnaire survey in 2013 - 2014. For the purpose of verifying and validating the actual threat of such risks, the risks are classified within 3 subgroups in the course of the research, specifically the revenue factor, the competition factor, and the distribution factor. According to the performed survey, the said aspects affect individual banks' credit risk development in the area of mortgage loans in the Czech Republic. The projection of internal factors within credit risk is carried out via the conduct of relevant managers and applied business strategies. Until the end of 2014, the area of the aforementioned internal factors had not been discussed much publicly. The information sources identified earlier within the research only contain comments on the risk mainly generated from the area of insurance intermediation. In terms of the presented research outputs, the given risks can definitely be described as significant.

5.1 Revenue Factor

"During good periods, financial institutions and clients may start underestimating various risks associated with their economic decisions, or – as a result of higher competition – may even be exposed to strong stimuli, thereby increasing the scope of assumed risk."[12] The basic factor that is currently taking effect in the area of internal risks is the revenue factor. Economic results of financial institutions confirm the findings from the questionnaire surveys and guided interviews. The identified assertions may be accepted, taking into account the fact that the results of the largest financial institutions have recently put potential pressure on the relevant managers in terms of compensating the reduction of operating revenue and generated profit. The amount and trend of revenue generated by the relevant organizational units are significantly reflected in the remuneration of the respective managers. Therefore, one of the leading motivational factors is the revenue increase. This factor is further affected by increase in client deposits with the selected and examined banks, with the valuation of such deposits recently being considerably affected by low price of funds on the financial market.[13] Moreover, we can corroborate the initial claim of managers in terms of expecting sharp decline in the cost of risk. Such decline may also lead to the so-called moral hazard. In spite of the positive impact of lower costs

12 Frait, J.; Komarkova, Z. (2011), p. 98.

13 See the discount rate and the 2W repo rate at 0.05% (source: CNB).

on adjustments, the reduced cost of risk may generate higher pressure on managers, consequently resulting in lower providence in assuming risks when providing loans to selected client segments. To ensure better understanding, Table no. 1 shows year-to-year comparison of performance for the largest banks in the Czech Republic. The performance comparison primarily comprises the period of 2012 and 2013, when the survey took place. Even with extraordinary items considered, with effect on economic results, the presented data may be accepted for reference assessment of bank managers' claims, which followed the overall results of individual banks reported at the time. The data were collected from the presentation of results and annual reports of Česká spořitelna (ČS), Československá obchodní banka (ČSOB) , and Komerční banka (KB).[14] Only the basic indicators are shown for the purpose of uniform comparison of available parameters. The information relating to the development of loans is shown as an aggregate for all market segments. No separate analysis of mortgage loans for the household sector is performed. According to information received from the respondents/managers, the reason for this consists in an effort to compensate the declining interest rate and service margins by increase the number of loans and loan volume, irrespectively of the segment type.

Table 1: Year-to-year comparison of economic indicators (2012/2013)

	ČS	ČSOB	KB
Net operating revenue	-5%	-6.30%	-3.20%
Operating costs	-4%	-3.50%	-2.50%
Gross operating profit/(-)loss	-6.10%	-7.90%	-4%
Cost of risk	-10.10%	-8.60%	-7.10%
Net profit – allocated to shareholders	-6.20%	-11%	-5.60%
Loans to clients (total)	4%	5.70%	4.80%
Clients' deposits	4%	4.90%	12.10%

Source: Own analysis of annual reports by ČS, ČSOB, KB 2012, 2013

5.2 Competition Factor

Another factor identified in the area of mortgage loans and mentioned in the questionnaire survey results is the competition factor. Dynamic development in the activity of new financial institutions has also been recently reflected in the competition in terms of the available housing financing products. Higher competition is one of the factors that significantly affect the interest rate development, as described in Chapter 1.2 hereof.

14 Calculation of basic indicators published according to the International Financial Reporting Standards (IFRS).

Mainly the following banks currently offer mortgage loans in the Czech Republic: Hypoteční banka, Česká spořitelna, Československá obchodní banka, Equa bank, GE Money Bank, Komerční banka, LBBW Bank CZ, mBank, Oberbank AG, Raiffeisenbank, UniCredit Bank CR, Sberbank CZ, FIO banka, and Wüstenrot hypoteční banka. The latest data available confirm that Hypoteční banka had the largest market share in terms of the Czech mortgage loan market in 2014, followed by Česká spořitelna and Komerční banka[15]. Higher competition translates into higher pressure on individual banks and relevant managers in the area of profitability. Arrival of small banks also forces large banks to implement marketing campaign with special offers and promotions (loans with no fees and reduced interest rates). Further pressure in the area of interest rates and fees may be anticipated in connection with the planned offer by Air Bank and ZUNO bank.

5.3 Distribution Factor

The last internal factor is the distribution factor. Originally, the primary distribution channel comprised loans offered and negotiated via financial institutions' own distribution networks. In this case, fundamental risks associated with the offering method as well as the credit risk assessment are under full control of the given institution (in this case, the institution is in full control when it comes to distribution costs).

The situation is different for commission-based sales via third-party intermediaries. Each transaction is subject to remuneration in this case, whereas the commission structure must consider two requirements. "On the one hand, it is necessary to set down such terms and conditions that the expected margin generated by the acquired transaction covers the cost of the commission paid. On the other hand, however, it is necessary to properly motivate dealers, whose actions are strongly determined by economic stimuli."[16] The influence of such third-party financial intermediaries continues to increase. There are currently several groups of these advisors operating in the market. The empirical research has confirmed the influence and significance of such entities. Managers of approached banks confirm considerable relations with such entities. Commissions are paid out for arranging individual deals. Such commissions may amount up to 1.5% of the mortgage loan volume (and exceptionally even 1.8%) for the most prominent entities. At the same time, there are certain maximum limits to such commissions; however, these limits are usually relatively high, often up to CZK 100 thousand.

The share of transactions carried out via such third-party intermediaries varies for individual banks. Česká spořitelna has a relatively good position in terms of the so-called primary production, due to its history of service to individual clients. However, it also actively cooperates with intermediaries. The guided interviews have revealed that the current share of deals acquired via external networks amounts up to 70% of all provided mortgage loans for some banks[17]. Once again, the payment of commissions in the area of mortgage loans significantly affects profitability and credit risk. Credit risk of such transac-

15 Data on mortgage loan market shares are published in annual reports of ČS, ČSOB, and KB.

16 Vlachý, J. (2010), p. 65.

17 50%+ share of intermediated mortgage loans to individuals (new and refinanced loans) were reported by mangers of Hypoteční banka, Komerční banka, UniCredit Bank CR, and Raiffeisenbank.

tions is assessed as higher, because the financing/information collection process partially takes place outside of the bank. However, all banks aim to mitigate such risks via their internal verification processes. It has been confirmed during the interviews that all inquired managers perceive the higher risk level for such intermediated loans.

For the purpose of verifying the importance of this factor, the primary production of selected intermediaries has been identified. The companies OVB, Swiss Life, Partners, ZPF, Fincentrum, and Broker Consulting are affiliated within the Union of Financial Intermediary and Consulting Companies (USF) and the Association of Financial Intermediaries (AFIZ). The performance of these companies amounted to CZK 10.8 bn. in terms of the intermediated loan volume in 4th quarter of 2013[18]. Another group comprises the companies EUROHYPOTÉKA, Bonnet.cz, FINEO Group, GEPARD FINANCE, HYPOASISTENT, M&M reality holding, OPEN FINANCE and BROKER TRUST. These companies are affiliated within the Association of Mortgage Loan Brokers (AHM). The performance of the Association amounted to CZK 35 bn. in terms of the intermediated loan volume in 2013[19]. In addition to the aforementioned entities, Fincentrum is also important. According to company information, the volume of loans intermediated by the company amounted to CZK 10.3 bn. in 2013[20].

Another important activity of the aforementioned entities is their activity in the area of mortgage loan refinancing by other banks, for the purpose of ensuring the most beneficial conditions for their clients. Accurate data have not been available so far in the Czech Republic. However, the data published since 2014 suggest that less 50% of all new housing loans are truly new. The rest of these loans are re-fixed[21] and refinanced loans.

6 Recommendations of the Czech National Bank

Following the completion of the presented research, the Czech National Bank published its recommendations within the Financial Stability Report 2014/2015; these recommendations focus on limiting credit risks in the area of mortgage risks. The recommendations confirm the risks identified and strongly correspond to the results of the research that has been carried out since 2013, independently of any activities of the Czech National Bank.

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18 Association of Financial Intermediaries. 2014. Production of AFIZ and USF ČR members in 4Q 2013. [access: 2014-12-07]. Available at: http://www.afiz.cz/produkce-clenu-afiz-a-usf-cr-4-q-2013/.

19 Association of Mortgage Loan Brokers. 2014. Members of the Association of Mortgage Loan Brokers arranged mortgage loans valued at record-high 35 billion Czech crowns in 2013 [access: 2014-12-07]. Available at: http://www.ahmcr.cz/aktuality-a-clanky/item/21-clenove-ahm-zprostredkovali-hypoteky-za-35-mld-kc.

20 Fincentrum. 2014. Fincentrum increased its turnover by 13% to CZK 1.375 bn. in 2013 [access: 2014-12-07]. Available at: http://www.fincentrum.com/pro-media/detail/437/Fincentrum-zvysilo-v-roce-2013-obrat-o-13-na-1-375-miliardy-Kc.

21 Re-fixed loans refer to loans, where clients change their bank upon the expiration (fixation) of the originally agreed interest rate.

The current recommendations of the Czech National Bank comprise the following basic points, with ties to the presented research outputs. Recommendation A: Share of newly provided loans with an LTV of more than 90% should not exceed 10% of the total amount of such loans provided in any given quarter; maximum LTV ratio should not exceed 100%, furthermore, institutions should not circumvent this recommendations through the concurrent provision of unsecured consumer loans. From the perspective of the performed research, the recommendation corroborates the treatment of potential risks with regard to the development of property prices. Recommendation B: Banks should cautiously assess client's data in terms of their ability to service loans from their own funds and withstand increased stress – e.g. by setting limits on the LTI (Loan to Income)[22] or DSTI (Debt-Service-to-Income) ratio[23]. This point may be put into context with the identified risk of future interest rate fluctuations. In case of interest rate increase, the interest rate will increase upon the new fixation, with subsequent increase in the loan payment. This increase may pose a threat to the so-called low-income households. Recommendation E: Banks should apply prudent approach to loans provided in cooperation with loan intermediaries. These loans should be monitored separately. The aforementioned recommendation follows up on the identified internal risk factor of distribution.

Conclusions

The research has confirmed the defined hypotheses that follow up on the performed questionnaire surveys and guided interviews. The identified risks in the area of mortgage loans have been corroborated through examination. Based on the performed research, the materiality of these risks can be particularly confirmed in the area of future development of interest rates, provided an interest rate increase is not coupled with an increase in household income. Mortgage loan interest rates offered to individuals were at all-time lows at the time the research was completed. One area, where the research has not proven the risk so far, is the property value development. The current stabilization of property prices, slight increase in developers' new activity and construction indicate that – with the exception of specific locations – property prices will not significantly decline. These assertions rely on various data available from the Czech Statistical Office and the Czech National Bank. According to the basic research results, the stabilization of the property prices will also be affected by the expected restriction imposed on the mortgage loan availability for clients with no own funds. One area, where credit risk has been confirmed, is the area of internal risk relating to the distribution factor. In addition to the aforementioned recommendation of the Czech National Bank, the risk is also indirectly verified by the fact that the given area is very likely to be subject to regulation. In compliance with the expected harmonization of consumer protection across the EU, there are indications of intervention with financial intermediaries' activities. There are currently reports of potential regulation relating to the payment of commissions and particularly to the certification of such intermediaries. Based on other results of the research, it is safe to assume that these measures will also have a positive effect on the area of credit risk.

22 LTI ratio (Loan-to-Income) indicates the ratio of the loan amount to the loan applicant's income.

23 DSTI ratio (Debt-Service-to-Income) indicates the debt services to the loan applicant's income.

The research largely verifies the defined hypotheses and potential basic risks in the area of mortgage loan funding to the household sector in the Czech Republic. The research results do not represent accurate empirical analysis. The basic output is the confirmation that it is a significant source of risk in the area of mortgage loans. We can state that no sufficient data are currently available in the Czech Republic that would allow more accurate empirical/econometric analysis of the risk. This is why alternative approach has been selected.

Moreover, some areas have been identified that would deserve additional attention. Mainly the verification of further dynamic development of competition and the application of the Basel III rules seem to be the significant ones. It is safe to state that, to verify other risks, it would be beneficial to perform detailed comparison/analysis for the household debt development trend and the trend for the nominal interest rate development in connection with the household disposable income development using various ratios. The results of such analyses could probably be used to indicate potential risks in the area of mortgage loans for the household sector. It is also beneficial to perform further investigation in the area of potential effects concerning the regulation of the mortgage loan provision in connection with the clients' own funds. Another suitable direction for continued research could be a more detailed verification of effects of loan restrictions in connection with the LTV parameter under mortgage loan financing in countries where such regulation had taken place in the past.

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Social and Provision Models of Pension Insurance and Savings

Sociální a správní modely důchodového pojištění a spoření

JAROSLAV VOSTATEK

Abstract

The social models (welfare regimes) typology makes it possible to understand the basic pension scheme concepts, key role of social policy in this regard, determined on the basis of public choice. However, pension provision systems also play a significant role in practice; provision model of a pension pillar or tier may considerably affect the results of application of the relevant social model. Analyses confirm the failure of annuity markets – not even government regulation could successfully reduce annuity costs to a sustainable level in any country, comparable to the provision of public pensions. Therefore, the private sector can only offer pensions savings, moreover with crucial government regulation. Occupational schemes converge to either mandatory or quasi-mandatory schemes throughout the world, or transform to workplace pensions as a new provision model that represents a soft compulsion neoliberal system in combination with auto-enrolment.

In addition to analyzing social and provision models from the general perspective, with key emphasis on representative countries' experience, the paper concentrates on individual pillars of the Czech pension system that have recently undergone a number of reforms, usually resulting in no improvement in their efficiency. All pension pillars in the Czech Republic are thus in need of a major reform.

Keywords

retirement pension, welfare regimes, pension savings, occupational pensions, administration, annuity markets, financial intermediaries

Abstrakt

Typologie sociálních modelů umožňuje porozumět základním koncepcím penzijních systémů, klíčové úloze sociální politiky v tomto směru, o níž rozhoduje veřejná volba. Podstatnou roli v praxi ale hrají i správní systémy poskytování penzí; správní model v penzijním pilíři či jeho složce může podstatně ovlivnit výsledky aplikace příslušného sociálního modelu. Analýzy potvrzují selhání anuitních trhů, ani státní regulace zatím v žádné zemi nesnížila náklady anuit na únosnou míru, srovnatelnou s poskytováním veřejných penzí. Soukromý sektor tak může nabídnout pouze penzijní spoření, a to ještě se zásadní státní regulací. Zaměstnanecké penze ve světě směřují buď k povinnému či kvazipovinnému systému, nebo k transformaci na penze spojené s pracovními místy (workplace pensions) jako novému správnímu modelu penzí, který v kombinaci s automatickým zahrnutím do systému (auto-enrolment) představuje "jemně" povinný neoliberální systém.

Vedle analýzy sociálních a správních modelů penzí v obecné rovině, se zásadním důrazem na zkušenosti reprezentativních zemí, se příspěvek koncentruje i na pilíře českého penzijního systému, které prodělaly v posledních letech řadu reforem, jež ale po většině nevedly ke zvýšení jeho efektivnosti. Zásadní reformu vyžadují všechny české penzijní pilíře.

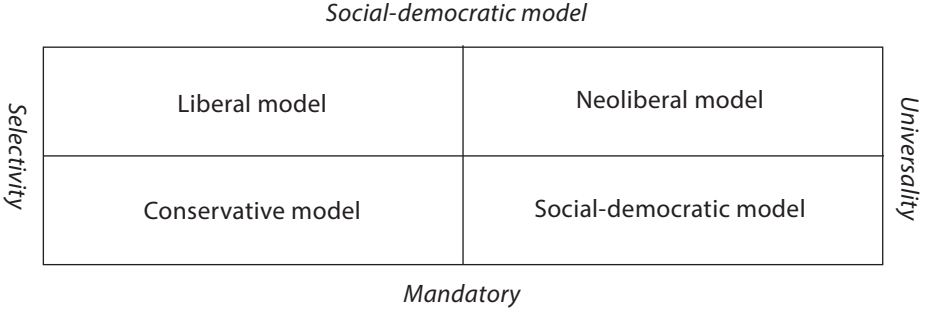
Klíčová slova
starobní penze, sociální modely, důchodové spoření, zaměstnanecké penze, správa, anuitní trhy, finanční zprostředkovatelé

JEL Codes
H55, G22, J26, H53

Introduction
Many different pension savings / insurance systems have formed throughout the world, resulting from the historic social and economic policy development in the respective countries. It is possible to trace several characteristic systems that may be considered the application of the basic social models or welfare regimes, as appropriate, as defined by Esping-Andersen (1990). Therefore, we distinguish liberal, conservative, and social-democratic social models. The pension model range is also completed with a neoliberal social model that has evolved, using the typology of Bovenberg and Ewijk (2012), while adhering to the terminology of Esping-Andersen. We rely on the fact that the selection of one of the social models results from public choice in terms of the modern public policy. Ideally, each pension system should thus stem from one of the aforementioned social models.

The objective of this paper is to elaborate a typology of the contemporary decisive provision pension savings / insurance models and to describe their ties to the given social models. An impetus for this paper has been the discussion on the so-called second pension pillar in the Czech Republic both prior to and after the implementation thereof, as these discussions have disclosed fundamental differences even between the proposed private pension savings concepts. Current discussions on the third pension pillar in the Czech Republic have also disclosed key differences within the pillar in its existing form, associated with different provision models being applied. The issues relating to the second and the third pillars greatly overlap and coincide. Therefore, we aim to make at least some contribution to the given pillars' reform in our country.

Figure 1: Typology of social models



Source: Own elaboration, inspiration from Bovenberg and Ewijk (2012)

1 Social Models

Each pension model features "its" social-political concept that has been evolving with the development of economy and of the entire society. At this point, we focus on the key pension model characteristics and their transformations in typical countries, also taking into account the principle parameters of such systems.

1.1 Liberal Social Model

As logic dictates, the standard liberal social model is very simple, because it refuses any significant government interventions in the social area – and consequently does not comprise public pensions, promote occupational pensions, or motivate people to arrange personal pensions. In principle, classical liberals do not feel the need to occupy their mind with the issues relating to pension security. After all, old-age itself is not detrimental. Under this model, only general means-tested pecuniary benefits are acceptable, if they are provided to all municipality residents incapacitated for work, or benefits in kind (food, accommodation or other services), as appropriate. The classic liberal pension model does not currently exist in any OECD country.

The modern liberal model already recognizes special means-tested old-age pensions; it is not viewed as social assistance benefits, but instead as a public expenditure program of the government (i.e. not municipalities). An example of the means-tested old-age pension is the "Age Pension" in Australia that provides – together with means-tested supplements and rent assistance – income exceeding the poverty at risk line used in the EU (60% of the income median) even to the poorest senior citizens! Such significant means-tested old-age pensions cannot be found in any other country. However, several advanced countries feature considerable universal (flat-rate) old-age pensions that is viewed as a sign of the modern liberal pension social model. An exemplary universal pension is the "Superannuation" in New Zealand, tax-financed and providing income exceeding the OECD poverty line (50% of the income median). Similar universal benefits are not paid out in other social situations in New Zealand. From this perspective, "NZ Super" may be viewed as a special "basic income" – solely for seniors; basic income projects are designed as benefits for all people (Van Parijs, 2004).

In literature, the modern liberal social model is most frequently associated with the liberal Beveridge or the 1942 Beveridge Committee Report that became the basis of the British post-war social policy. The Beveridge model relies on the existence of universal benefits, at the social minimum, provided in case of old-age, disability, illness, unemployment, maternity, etc., supplemented by social assistance system and financed through universal (not earnings-related) national insurance contributions. The amount of benefits should have been identical for all main loss of income situations: unemployment, disability, and old-age. The overall system was declared as a plan of insurance – providing benefits in return for contributions, up to the accepted social minimum level, as a right, without any means-testing – i.e. individuals can further build on this (Beveridge, 1942). According to Beveridge, the primary social security method was private insurance. Beveridge advocated the "tripartite" financing of the national insurance – In addition to contributions by

both employees and employers, there were supposed to be significant contributions of the government – by reason of the redistribution from the rich to the poor. Employers' contributions were substantiated, among others, by the companies' interest in the social security of employees (Seely, 2013). The system of the "national insurance" universal benefits was implemented in 1948. Universal pensions were at 15 to 20% of national average wage. The national insurance contributions were designed and paid collectively for the entire national insurance, without distinguishing national insurance branches.

The Beveridge model may be viewed as a modern liberal model, mainly in reference to the existence of flat-rate pensions and other universal benefits. However, the post-war level of these benefits was relatively low, in any case compared to the current universal pension level – not only in New Zealand. This alone co-generated pressure on the establishment of other pension pillars. The development of the British pension system was significantly controversial during the following decades; however, let us limit our deliberations to the reform currently under way in this context. The British "basic state pension" will be relatively increased in 2016, to about 25% of the average nationwide wage – as part of a pension reform that is to simplify existing state pensions and supplements thereto.

Flat-rate pensions have existed in a number of other countries. They represent the basic alternative of today's solidary pension pillars, in combination with housing benefits, for example. Other pension pillars were formed in the course of practical applications in liberal countries; however, they cannot be considered a part of the modern liberal model. These other pillars apply a complete range of products and concepts, originating from different social models: public insurance pensions, occupational schemes – voluntary, mandatory, and quasi-mandatory – as well as personal and workplace pensions with hard or soft compulsion.

The pension systems in the following countries tend to be described as Beveridgean pension systems: Australia, Canada, Denmark, Ireland, Japan, Netherlands, New Zealand, Switzerland, United Kingdom, and United States (Conde-Ruiz and González, 2014). This is a relatively extensive interpretation of the "Beveridgean" model, with the existence of a significant solidary pension pillar being the key factor. The list also shows Switzerland and the United States that feature earnings-related public pensions, officially described as insurance; however, with prevailing solidarity principle. With this approach, the list should also include the Czech Republic.

Today, the modern liberal model is substantially modified – due to the existence of a range of "subsidiary" pension pillars. Nevertheless, the core of the model – i.e. significant solidary pension pillar – remains and has even been gaining ground. Hujo (2014) states that one of the two significant trends in pension reform after the Second World War is the rapid growth of universal noncontributory pension programs as the preferred public policy tool for alleviating poverty among older populations in both developing and transition countries.

1.2 Conservative Social Model

The conservative (corporatist) pension model is another important social model that includes a wide range of models (concepts) for individual social groups. The social stratifica-

tion is fundamentally reflected in these individual concepts or models, as appropriate – as well as in different methods of funding.

The first social group, which received privilege old-age security, included civil servants. The increasing number of basically poor clerical classes within civil service – instead of previous noblemen, materially secured by revenue from their respective estates – results in the need of their security at old-age as well as in other cases of loss of civil income. State security is formed during the period of stabilization of absolutistic monarchies. Conceptually, this system is part of the civil service relations of such officials; this was also reflected in the name of these pensions: they were referred to as, for example, retirement compensation (Ruhegeld), not as pension. This tradition has survived in German, for example: civil servants get "Pension", while the same officials in the private sector collect "Rente". These are public expenditure programs funded from the government budget, without employees' contributions (on a model basis). Following the Second World War, these expenditure programs were converging, to a certain point, with other pension systems in relevant countries. However, privileges in the relative amount of civil servants' pensions remained – otherwise, these separate systems would no longer make any sense. As of today, 13 (of 25) OECD countries feature separate pension systems for civil servants, 12 countries have an integrated system – similarly as all post-communist economies (Whitehouse, 2014). Nowadays, it is necessary to take into account the fact (among others) that civil service is no longer a lifelong employment. Civil servants' pensions may thus consist of two components, for example: pension paid out to civil servants (e.g. 2% of annual pay in the United States) and pension paid out to private sector employees (e.g. strongly solidary system in the United States) or to public sector employee (not at a civil servant position). In a "conservative" Germany (per model), the annual civil servant pension rate went down to 1.79375%, with maximum of 71.75% of the last salary after 40 years.

The most significant conservative pension model is the segmented social pension insurance. Its origination is associated with the German Chancellor Bismarck and the Blue-Collar Pension Insurance Act, effective from 1891. Conservative policy was also applied in respect of elite employees within the private sector; after all, it is not a coincidence that these schemes were established much earlier in many countries (including the Czech Republic) than the pension schemes for the working class. It is not just about the commencement date, but also about the construction and amount of benefits. For example, widows of these elite employees had to be eligible for unconditional widow's pension for the sole reason that – due to their status – they could not make their living through their own work. These approaches are still being applied in a number of developed countries, though in a reduced form, and are typical not only for pensions, but also for the relevant social model as a whole, typically (fittingly) referred to as a conservative model. It covers an attempt to conserve/preserve the entire, significantly socially differentiated model. This model is usually implemented through social insurance, typically segmented according to social groups or even individual professions. At the same time, the segmentation may also reflect the specifics of individual professions, e.g. their physical or other difficulty (miners, ballet, etc.).

Occupational pension schemes came into existence in a similar manner. Originally, there were efforts to apply "loyalty" dimension of this type of pensions as well. Following the

Second World War, occupational pensions significantly expanded in many countries, up to nearly nationwide fully funded schemes. Exceptionally; however, there are occupational schemes with book reserves only – for example, this is the most frequent funding method of occupational pensions in Germany. Tax deductions and similar constructions were crucial for the development of occupational schemes in individual countries. Today, a lot of emphasis is put on the transferability of such arising pension claims. This is best accommodated by fully-funded occupational pension schemes.

One extreme example can be found in the Netherlands, with more than 90% of employees taking part in occupational pension schemes on the basis of collective bargaining agreements – for this reason, this system tends to be referred to as quasi-mandatory. It is a fully-funded scheme, usually with relatively high replacement ratio at 70% of income. In addition to this, the Netherlands has universal pensions at the level of 30% of average nationwide wage. In 2012, the total net replacement ratio (on a model basis) – for both pillars – amounted to 104% for employees with median income! (OECD, 2013). Occupational pension schemes of all types contribute to the pension security segmentation, particular on a voluntary basis; this is how the trade unions' policy is often shaped. At the same time; however, these schemes allow adaption of pension schemes to specific workings conditions of individual branches or sectors. In terms of the social models, it is about the pension scheme degree – i.e. whether it is basically universal or segmented. Specifics may also be taken into account within a universal scheme, in the form of its superstructure.

Bismarck was at the birth of the blue-collar social insurance scheme, as one of the conservative social model segments. As a principle, the pension schemes of this type are separated from the government budget; they are funded from pension insurance premium, paid equally by employees and employers. This funding is in line with the ideology that was at the birth of the scheme. It was also associated with fully-funded plans and pension calculation on the basis of insurance period and last salary. In more than 100 years of its existence, the "Bismarckian" scheme has been subject to many changes. In Germany as well as other countries with comparable systems, two primary social pension insurance schemes – i.e. blue-collar and white-collar schemes – have been integrated. The integration processes have also made the subsiding of fully-funded schemes possible. In Germany, the basic social pension insurance scheme currently comprises more than 85% of wage-earners. Additional 9% are civil servants, with their separate pension scheme. Some self-employed individuals take part in the social pension insurance, others have their special social insurance scheme, and some are taking part in the voluntary "Rürup" pension. Separate systems are also available for farmers, miners, railway workers, and sailors. Overall, we can distinguish about 10 different systems. Therefore, segmentation – so typical for the conservative pension model – still persists. Austria, on the other hand, that had featured a similar pension scheme, consolidated all schemes as of 2005, converting to a universal social pension insurance scheme managed by a single pension institution.

Means-tested pensions often complement conservative pension schemes, usually not really robust, at the level of social assistance benefits.

The "Bismarckian" schemes tend to be perceived as schemes with earnings-related pensions in many specialized papers, as a counterpart to "Beveridge" schemes. In this regard,

Bismarckian pension systems tend to include the following countries: Austria, Belgium, Finland, France, Germany, Greece, Italy, Luxembourg, Norway, Portugal, Spain, and Sweden (Conde-Ruiz and González, 2014). The problem is that some of the aforementioned countries also feature significant solidary insurance pillars. From this shallow perspective, Bismarckian countries could also include the Czech Republic – if for nothing else than just for the fact that "pension insurance" is the primary pension pillar in the Czech Republic.

1.3 Social-democratic Social Model

A social-democratic social model tends to be characterized by the dominance of universal benefits. In this regard, this social model is very often referred to as a universal model. Universal (flat-rate) pensions, as the basic pillar of the social-democratic regime, would actually be in line with this characteristic. This had originally been the case in countries with social-democratic orientation. In this regard, we could formulate the classic social-democratic model as a model utilizing universal pensions with higher pension level in relation to average nationwide wage or median income, as appropriate.

The modern social-democratic policy largely focuses on the middle class. After all, modern social schemes in advanced countries basically provide for the needs of poor population groups, particularly in old-age. They usually differ in the form and degree of using more or less graduated social assistance benefits. In case it was the priority or objective (as appropriate) of the social-democratic policy to provide workers with higher than basic universal old-age security, it was only possible through earnings-related pensions. Goals of the social democracy electorate will most easily be enforced (on a model basis) through uniform, universal social insurance. In practice, this translates into increase of pensions under blue-collar schemes to the level of their white-collar counterparts. However, the key component of modern social-democratic pension schemes is also a robust solidary pillar – in contrast to the conservative pension model.

In 1913, Sweden introduced two-tier public pensions: means-tested basic pension for all residents and supplementary pension that was determined by insureds' contributions. The 1945 reform replaced the two pensions with a universal state pension (folkspension). Housing benefits were introduced in areas with higher costs of living (Palme and Svensson, 1999). High-level universal pensions may be viewed as an original social-democratic pension model.

In 1959, implementation of mandatory supplementary old-age insurance – as proposed by blue-collar unions and the social-democratic party – was passed by a referendum vote in Sweden. As of 1960, the „general supplementary pension" (ATP) became the essential pension pillar, providing rather generous pensions to population 65 years and over. The pension calculation was associated with an amount of national universal pensions. ATP contributions were paid by employers, at 13% of wage in 1994, without any limit to earnings. Nine years later, the system was supplemented by tested supplementary pensions.

The Swedish pension reform, implemented as from 1999, mainly significantly modernized the universal social old-age insurance by implementing an NDC (notional defined contribution) product, referred to as "income pension" (inkomstpension), with the system being

completed with a robust "guarantee pension" that increases low (and zero) NDC pensions. Therefore, the Swedish modernization of the social-democratic regime consists partly in more emphasis on universal social insurance, and partly in implementing automatisms for adapting pensions to demographic and economic developments. Sweden still has a system of quasi-mandatory occupational pensions – in excess of the social-democratic pension model, whereas a (mandatory) fully-funded universal social insurance scheme has been introduced, with individual investments possible, referred to as "premium pension" (premiepension).

The modern social-democratic pension model may particularly be characterized as a mix of universal social insurance and solidary pensions, either universal or tested to income from social pension insurance. On a model basis, the universal social pension insurance premiums are paid by employers. In principle, the senior housing benefit is also in line with the model. The existence of quasi-mandatory occupational pensions reflects the situation on the labor market that must be respected by social-democratic parties, as union members are mostly voters of these parties.

1.4 Neoliberal Social Model

The neoliberal model relies on the fact that the private sector should provide anything it can – as it is more effective, yet in principle. Therefore, the operating universe of the public sector is only reduced to solidary pensions. The Chilean pension reform, carried out since 1981, became a template for this pension theory and policy. "The Chilean pension model is a comprehensive alternative to the social collectivism initiated by … Bismarck at the end of the 19th century, which was the model for the welfare states of the 20th century. By cutting the link between individual contributions and benefits – that is between effort and reward – and by entrusting governments not only with the responsibility but also with the management of these complex programs, the Bismarckian pay-as-you-go pension system turned out to be the central pillar of the welfare state, in which the possibility of winning elections by buying votes with other people's money – even with the money of other generations – led to an inflation of social entitlements, and thus to gigantic unfunded, and hidden, state liabilities" (Piñera, 2001, p. 3). Factually, we must point out to our liberals, among others, that Bismarck is not associated with pay-as-you-go public pension schemes in any way. Moreover, it is not true that the Bismarckian government managed 41 self-governing institutions of mandatory blue-collar pension insurance. Other than that, Piñera's Chilean pension model represented a "world pension revolution" – as Piñera himself put it.

The Chilean, neoliberal pension model refuses contributions by employers – stating that pensions represent employees' personal claims. The Chilean government replaced existing employers' contributions with higher gross wages, while preserving the same net wages. Contributions to old-age pensions amount to 10% of wage; in addition to this, people may pay up to 10% of wage on their own. Moreover, people pay contributions to disability and survivor pensions, as well as overhead fees, determined by a wage percentage. All these payments represent pension funds' revenue; these funds purchase disability and survivor insurance from life insurance companies. After completing the savings phase, clients may select the following: purchase of old-age (or family) annuities from a life insur-

ance company; regular withdrawals of funds from their personal pension fund accounts; or the combination of the aforementioned alternatives. From 2009 the employers pay a (partial) contribution to disability pensions in the amount of 1.49% from wages in average.

Experience with the Chilean pension reform, as interpreted by its authors, were taken over by the World Bank and elaborated in its fundamental publication in 1994, which became the textbook of neoliberal pension theory and policy (James et al., 1994). This "new pension orthodoxy" requires radical detachment of solidary elements within the "first", public pillar. The newly designed "second" pillar should serve solely as a private fund-based system, built on the equivalency principle. The theory characterizes the pillar as mandatory private savings; however, in Chile, such savings are only mandatory for young employees, coming to the market for the first time. Others could enroll voluntarily; however, without the possibility to return to their previous social pension insurance scheme; this was the so-called opt-out – I.e. one of the forms of soft compulsion. Therefore, the original neoliberal pension model comprises two characteristic pillars: private pension savings or insurance (with hard or soft compulsion) and some of the solidary pillar forms (universal pensions, means-tested pensions, or government guaranteed minimum pension from the private pillar).

Partial reforms of the Chilean pension model have been taking place almost continuously since 1981 – the original system relied on self-regulation of the private sector (free market), whereas the government had gradually come to realize the need for implementing and reinforcing regulation. Major concentration has taken place within the pension fund sector; originally, 27 companies had been established, with only 6 companies currently remaining.

Esping-Andersen (1996) revealed the economics of the neoliberal pension model very soon after the release of the World Bank's "new pension orthodoxy": "Chile´s shift to a private individual retirement account system has necessitated huge public subsidies and, hence, the net effect is a de facto subsidization of private welfare. Also, operating costs appear to be prohibitively high. … The principal advantage of the system is that it is financially solvent, and that its huge savings help capital markets" [p. 22]. The relative financial solvency of the neoliberal systems is mainly due to the transfer of the investment risk to the clients of the defined contribution systems.

In practice, the generation of substantial (additional) public debts during the privatization of public pension schemes based on the 1994 World Bank concept led to the fact that the privatization was only reduced to partial privatization. This practice was, (particularly) in Poland, elaborated in the form of a theory, according to which it is optimal to perform the privatization from 50%, under the motto "Security through Diversity". It has been implemented – literally – in Slovakia only. Other countries, nearly all post-communist countries, were "more modest": they detached lower funds from the government budget, with a plan for their gradual increase. With "assistance" of the economic crisis, contribution rates under the private savings pillar were also being reduced, even with annulment of the pillar. In the Czech Republic, private pension savings on the basis of an opt-out were implemented as of 2013, the scheme should be terminated in 2016 or 2017. The "diversified" neoliberal pension model consists of two pension or savings pillars, one being a public (mandatory)

and the other one being private (soft or hard compulsion), and of a solidary pillar. The highly solidary Czech public "pension insurance" was not divided into a solidary pillar and an insurance pillar during the great pension reform as of 2013. Voluntary private pension savings or insurance represents another pension pillar in all modern pension models.

Individual pension social models have their own systemic logic that may either be recognized or not recognized; however, in principle, this logic cannot be scientifically defended or rebuffed, due to high degree of generality of all social model concepts. Nevertheless, our analyses have revealed that it makes sense to distinguish four basic pension social models: liberal, conservative, social-democratic, and neoliberal. Also remarkable is the structuring of individual pension models – emphasis placed on individual pension pillars. Expert activities of the World Bank were beneficial in this regard, as the World Bank attaches major importance to the conceptual "purity" of public pension pillars: they should be either purely insurance or saving (equivalence principle), or consistently solidary (social solidarity principle). The overall social and economic development in OECD and EU countries has resulted in a significant role of solidary pillars: they are included not only in the liberal regime, but also in the social-democratic and liberal models; a solidary pension pillar is also gaining ground within the conservative model. Therefore, these pension social models mainly differ – from a practical point of view – by the emphasis they place on earnings-related pensions and the form thereof: the liberal model could get by without them; however, one or another savings / insurance pillar is already used in practice of virtually all relevant countries. The neoliberal model envisages a private savings or pension pillar on the hard or soft compulsion basis. The social-democratic model accentuates universal social insurance and respects quasi-mandatory pensions. The conservative model is less and less resisting the trend towards universal social insurance and promotes occupational and personal pensions of different nature. The key lesson we should learn is the need to divide the existing Czech "pension insurance" to a solidary pillar and an insurance pillar, while rigorously analyzing other pillars. Each model pension pillar is also associated with a corresponding funding system, with significant impact on, among others, the labor cost level.

2 Provision Models

Each pension social model is associated with a different mix of the public and private sectors as well as different forms of products that are reflected in resulting annuities or pension savings. In this regard, costs and margins of pension institutions (as well as participants and contribution payers) represent an important factor; at this point, we will limit our deliberations to insurance and savings products and pillars. In the subsequent analysis, we will primarily distinguish two ultimate provision models: the public pension provision model and the traditional private life insurance provision model.

2.1 Public Pension Provision Model

Pensions and pension savings provided by public social administration are usually mandatory. (Voluntary pension insurance for some insured groups is irrelevant for our analysis.) The costs of public pension institutions roughly amount to 1% of the sum of expenditure

on pensions and on administration. In case this pension pillar uses funds, the costs of such funds' administration should also be taken into account. From the technical perspective, and consequently from the cost perspective, the most convenient solution is for public pension funds to invest in government bonds, as is the case of the basic public pension system in the United States – asset management costs are negligible; however, the government bond yields – and consequently the capital revenues of the given pension system – are also very low in this case. Pension insurance / savings funds may also be invested in financial markets – either directly by a public insurance company (e.g. in the Swedish NDC scheme) or by private financial institutions based on a tender (e.g. TSP in the United States or NEST in the United Kingdom). The average administration fees for NDC reserve funds in Sweden were as follows in 2013: 0.08% (operating costs), 0.07% (fixed management fees), 0.03% (performance-based fees), and 0.02% (transaction costs) – i.e. 0.2% of assets in total. NDC clients do not (directly) pay these reserve funds administration fees. In 2013, clients were charged a fee of 0.03% on their NDC account balances; this administrative fee corresponds to the relevant costs. At the same time, fees of 1% on insurance premiums would correspond to 0.04% of assets (Ehnsson, 2014).

In Sweden, "Premium Pension" has been used as a third tier of national pensions since 2000; globally, it is passed off as the "second" pension pillar according to the World Bank classification. It is a mandatory scheme with personal accounts that are managed by a national pension institution in line with clients' instructions; contributions amount to 2.5% of wage. At the end of 2013, clients could choose one of 850 pension funds managed by 104 different companies; the management is anonymous ("blind accounts") – these companies are not familiar with their "clients'" names. Most of new participants use funds of the national pension institution, also due to the existence of a default fund that collects funds of passive clients. (Under the original concept, there had been efforts to provide fund-related information to all clients to ensure their qualified investments; however, this approach was abandoned after several years and the national default fund is used instead that absorbs over 90% of all clients; however, more than 50% of all today's clients are in private funds, with significant "contribution" of participant inflow during the first concept operation.) The national pension institution is an exclusive provider of pensions under this scheme; it is possible to select different annuity alternatives: single or joint annuities, standard guaranteed annuity with profit sharing (bonuses) or variable annuity (a unit-linked product) – in two different versions. Average fees of the scheme amounted to 0.41% of assets per year in 2013, including management fee at 0.10% and average fee paid to individual funds at 0.31% of assets (Ehnsson, 2014). The "price" paid for the use of private funds and higher flexibility (freedom of choice) is the reduction of resulting pensions by about 9% – compared to about 1% under a full social administration system.

In principle, the public pension provision model is fully functional. Efforts aimed at privatizing public pensions were motivated by aspirations to change the social model – i.e. to convert to the neoliberal model. In many countries, practical experience with neoliberal reforms has not only resulted in stronger public pension pillars (e.g. solidary pillar in Chile), but also in the use of public insurance companies within the "second" pillar according to the World Bank classification. This is not just about low administration costs

of large public pension institutions, but also about respecting the behavior of the given system's participants.

2.2 Life Insurance Provision Model

Pension insurance is one of the life insurance branches – for example, according to the classification used in the EU for the purpose of forming a common insurance market. From the technical point of view, life insurance has been fully mastered long ago; actuarial mathematics has its undeniable place in life and pension insurance. In spite of all efforts to ensure actuarial-mathematical equivalency and application of demography to project mortality tables, the insurance premium calculations also involve exogenous variables – parameters such as reductions and surcharges – that considerably affect the "calculated" level of insurance premium and the insurance premium amount in each specific case. The resulting insurance premiums offered to clients are, in principle, market premiums, although it cannot be negotiated much in practice with insurance companies.

Specialized literature talks about the failure of annuity markets. On the most general level, such failure results from information asymmetry between a seller and a buyer of annuities and from the associated adverse selection on the part of a client. In this case, information asymmetry tends to be interpreted as follows: annuities are more likely purchased by those who live longer. "Adverse selection within annuity markets is given by the logical reasoning that it is very careless to purchase lifelong annuity if we subjectively do not expect high life expectancy" (Cipra, 2012). This factor itself does not necessarily represent a market failure – it depends on whether it is an empirically significant phenomenon that would justify the provision of pensions by the government, for example (Rosen and Gayer, 2010). Introduction of public pensions may lead to "crowding out" of private pensions. In addition to this – or actually mainly for this, as appropriate – the pension market failures in a wider sense (i.e. pension markets are not used) result from the behavior of prospective clients, e.g. myopia, where people prefer their life today and tomorrow, with only minor attention given to old-age security. Moreover, many clients generally do not trust financial institutions and the financial market as a whole.

The entire insurance market is characterized by severe bilateral information deficiency, with negative financial impact on both parties to an insurance transaction (Ducháčková, Daňhel et al., 2012). The pension insurance market, and thereby basically the entire life insurance market, is far from an ideal market. Most people have aversion to risk, let alone to longevity risk, the coverage of which is (should be) the main purpose of pension insurance. While social pension insurance or even universal pensions cover this risk ideally – old-age pensions are drawn for the rest of one's life – other aspects and interests (or lack thereof) of prospective clients are reflected in their approach to private pension or life insurance. Naturally, all this on condition that such private insurance is voluntary. (Mandatory insurance or mandatory annuitization of mandatory savings, as appropriate, represents a separate issue.) Pension insurance markets also vary considerably across individual countries.

Under (relatively) liberal conditions, private pension markets have not been really successful. In New Zealand, not one insurance company currently offers annuities. Annuities

are only used in the residual occupational pension market. This is rather interesting in the light of the fact that there were 9 annuity providers in New Zealand in 1993, down to three in 2003, with only one annuity provider left in 2009 – this provider only arranged 17 annuities with clients 65 years and over (St John, 2009). The "cause" of this annuity market collapse in New Zealand apparently was their liberal pension policy in the period from 1988 to 2006, barring direct or indirect government subsidies of any pensions!

Pension insurance sold by life insurance companies is usually constructed and sold similarly as other life insurance segments. This also applies to the Czech Republic. Almost no data are available on this insurance segment in the Czech Republic. The Czech Insurance Association does not publish anything, and neither does the Ministry of Finance. The Czech National Bank states that premiums written for "pension insurance" amounted to CZK 1.8 bn. in 2013, i.e. 2.5% of total life insurance premiums (ČNB, 2014). More detailed data are not published. The significance of pension insurance is basically marginal; moreover, we can assume that the relevant insurance policies include provisions on the possibility of one-off settlement instead of pensions (capital option) at the end of the period of regular insurance premium payments. It is safe to assume that clients commonly take advantage of this option.

The aforementioned information on pension insurance only relates to conventional pension insurance that meets characteristics of a defined benefit product, with a fixed annuity amount negotiated (with potential bonuses on the top of it). Unit-linked pension insurance is not classified as a life insurance branch in the EU; it is only a unit-linked life insurance component. In a typical case, this product may also be terminated with a one-off settlement in the Czech Republic. There is nothing more written about it. Analysts may only compare product simulations. The following conclusion may roughly be drawn based on such simulations: unit-linked pension insurance is not significant on its own – comparisons are made for "general" unit-linked life insurance with other domestic products.

The standard private life insurance provision model is associated with a wide product portfolio of individual life insurance branches and types, which are difficult to navigate for clients. In addition to this, there is the aforementioned underestimation of importance of most life insurance plans. In the given situation, the sale of most life insurance plans requires qualified, broad-spectrum consulting – i.e. the solution consists in standard sales force networks, remunerated through commissions. This provides ground for mis-selling with a view to get commission at virtually any price. It is not a coincidence that there were extensive mis-selling campaigns in the 1980s and 1990s – after implementing the possibility of double opt-out – originally, a universal social pension insurance (SERPS) was implemented with potential replacement with occupational scheme in the relevant company, whereas the Cabinet of Thatcher then motivated employees of opt-out of occupational schemes into a personal pensions pillar. The second opt-out was not beneficial for many employees; nevertheless, dealers were very successful in mis-selling personal pensions.

Commissions can also work their magic in our country – the client "re-coverage" is a widely known mis-selling practice; it consists in the fact that an adviser convinces clients to withdraw from an older life insurance policy and take out new, allegedly more beneficial life insurance policy. All this is motivated solely by (another) commission gaining. Clients are significantly damaged, because the surrender value is a fraction of the premiums paid

(for insurance coverage with significant investment component); insurance companies actually charge all acquisition costs to clients, even with a surcharge for contract violation. A similar campaign, in a less drastic form, was organized directly by a leading Czech life insurance company; the objective was to replace insurance product relatively beneficial for clients with considerably worse product (i.e. more beneficial for the insurance company).

The key significance of a distribution network for life insurance sales is in practice also reflected in the fact that the ownership or contractual arrangement of such networks represents a major barrier to entry into the life insurance market. Similarly important is clients' inertia – e.g. decision-making processes on annuitization of savings in the United Kingdom. This leads to high concentration of the life insurance market in many not only relatively small countries. All this is reflected in high margins of life insurance companies.

Consumer protection organizations are, at least partially, successful in the life insurance sector of the Western world. This has actually led to a recent ban on the provision of commissions by insurance companies in UK; naturally, independent advisers may give advice to clients for a fee – (directly) paid by clients. Moreover, there have been long-term efforts aimed at standardizing basic life insurance products in UK so that clients can effectively compare them. It is the comparability of products that represents the major problem, not only for average clients. It is actually a fact that insurance companies intentionally design their products to ensure they are not basically comparable; on a general level, this is the case in most sectors of the economy; however, life insurance products are very difficult to compare due to their very nature.

In 2014, the Czech Ministry of Finance suddenly reacted to the misuse of unit-linked life insurance for tax optimization of earnings through employers' contributions to private life insurance – the amendment to the Income Tax Act newly excluded unit-linked life insurance from the definition of "private life insurance" (authorized to with income tax base deduction as well as similar deductions from the social/health insurance assessment base in case of employers' contributions). The Czech Insurance Association successfully prevented the amendment; a parliamentary proposal for an amendment correction replaced this exclusion with a ban to withdraw one's savings in the course of the insurance term and claim government support. Moreover, insurance companies reacted by introducing "self-regulation" measures aimed at promoting transparency of unit-linked life insurance plans sold. This "self-regulation" also included the following two indicators:

- Standardized cost indicator in the form of a pie-chart informs clients about the percentage of premiums paid to risk premium, insurer's costs, and investments in funds.

- Synthetic TER (total expense ratio or ongoing charges, as appropriate) represents annual rate of costs of an investment fund in relation to the current assets.

Insurance companies now show such indicators within extensive pre-contractual information for clients. For example, Česká pojišťovna specifies 12 investment funds for the "My life" insurance, with TER ranging from 0.08 to 3.19%, whereas two of the featured funds of ČP Invest (fund of funds) also show "synthetic TER" in the amount of 2.14% and 2.21%, all data are for 2013. The relevant table also contains information that the maximum manage-

ment fees for the said funds amount to 3%, as well as information on the current fee for individual funds, ranging from 0 to 3% (ČP, 2014).

The self-regulation measures of insurance companies are certainly welcome; however, the important thing here is whether costs and fees go down. The synthetic TER, as approached by Czech insurance companies, covers only funds' costs, but does not contain insurers' costs or margins included in gross premiums, let alone standard surcharges in actuarial background data of annuities. The said TERs do not include annuity phase costs, which are estimated at extra 0.25 to 0.5% of assets per year during the savings phase (D'Addio et al., 2009). On the other hand, there are not very many pensions paid out under unit-linked life insurance; therefore, the annuity phase costs only have minor importance under this insurance.

TER is the most frequently used indicator of investment funds' costs (cost-to-revenue ratio). It does not include all funds' costs or margins. Blake (2014) actually states that about 80% to 85% costs are hidden costs. According to him, hidden cash costs include: bid-ask spread, transactions costs in underlying funds, undisclosed revenue; hidden non-cash costs then include: market impact, information leakage, market exposure, missed trade opportunity or market timing costs, delay costs. The whole area of assessing costs is very extensive, exceeding the scope of this paper. We should also add that TER of 1.5% to 2.5%, with all costs included, is considered to be an average value within the life insurance sector. The impact of such TER on the resulting amount of savings after 40 years is the reduction of the entire pension pot by 30% to 50%. This is a lot, but it also documents the dominance of choice from many life insurance products, with expensive distribution, within the competitive environment prevailing in Western Europe.

The private life insurance provision model is not suited to support arrangement of mass private pension insurance; this model corresponds to life insurance sales, customized to individuals and families – with reservations, as there are trends aimed at reducing overhead within this life insurance segment as well. Elsewhere competition between private providers is assumed to reduce charges. As charges are opaque, competition generally proves an ineffective instrument to control costs. Pensions, particularly personal pensions, are not bought off the shelf, but are actively sold. How a product is marketed shapes what consumer hears and the choice she makes. UK now relies more on caps than competition to keep charges in check (Casey, Whiteside, 2014). These facts should also be reflected in the Czech government policy with regard to "private life insurance".

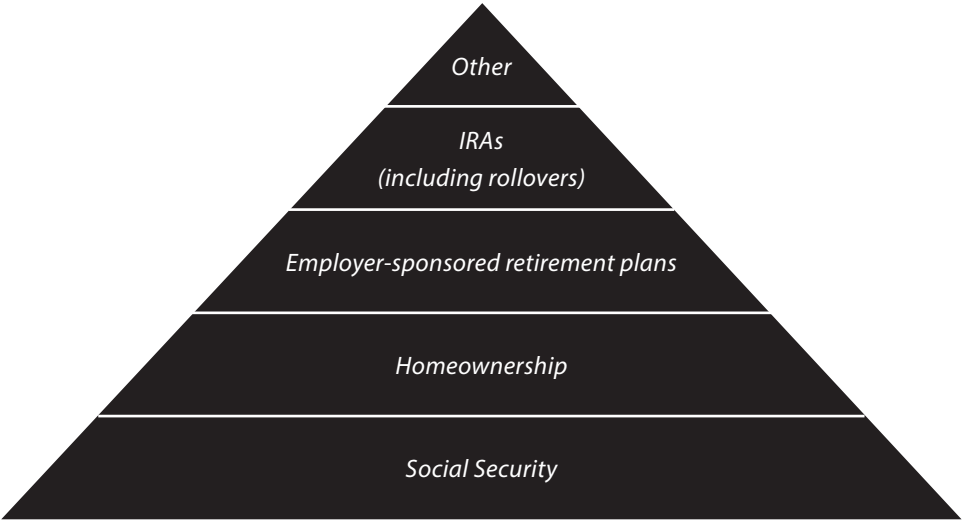
2.3 Occupational Pension Provision Model

Occupational pensions have evolved in many advanced countries after the Second World War. (Or thanks to the Second World War, if you like, in the United States – as a byproduct of wartime wage regulation – as company benefits were not subject to such regulation … and labor force was scarce during the war conjuncture.) Liberals refused occupational pensions as ineffective paternalism. On the other hand, conservatives agreed with them, due to their emphasis on "performance" rather than social stratification. Communists annulled occupational pensions, because they contradicted central planning as well as the

Leninist ideology of social benefits at the level of full wage, only to introduce occupation categories as a preference of manual and risky labor within otherwise uniform pension security – as it was already clear that the Leninist social insurance program could not be supported by the economy. Our liberal Klaus enforced the annulment of occupation categories and, as a form of compensation, permitted employers' contributions to supplementary pension insurance, operated by private companies. The social-democratic social model combines two universal pension pillars: uniform social insurance and universal pensions or income-tested pensions, with another means-tested benefit in both cases. By default (or at least historically), the social-democratic policy is also supported by unions and vice versa, which leads to the support of occupational pensions, particularly through collective bargaining agreements of higher and nationwide type.

The application of different social models has resulted in differently significant occupational pensions in different countries. For example, in the United States, employer-sponsored retirement plans are considered a third layer in a five-layer pyramid – after "Social Security" (public pillar for the private sector) and homeownership, followed by individual retirement accounts (including rollovers) and other assets – see Figure 2. While the importance of each layer differs by household, together they have enabled recent generations of retirees, on average, to maintain their standard of living in retirement (ICI, 2014).

Figure 2: US Retirement Resource Pyramid



Source: ICI (2014).

Occupational pensions, in their initial and basic form, are managed by foundations or trust funds in the interest of clients – i.e. fund members or employees, as appropriate.

Employers act as sponsors, responsible for the scheme funding. This does not rule out employees' contributions, which may actually be a precondition to employers' contributions (e.g. in the form of matching contributions); these schemes also use auto-enrolment etc. Even the product – specific terms and conditions for claiming pensions – is subject to an agreement. Defined benefit pensions were typical, fully-funded (on a model basis), similarly as original social pension insurance schemes. Therefore, it was not possible to select products or providers within a single occupational scheme. This was in fact a collective pension insurance managed by a nonprofit organization.

Occupational schemes exist in different sizes and – also for this reason – they tend to use outsourcing: for asset investments and standard fund administration. A nonprofit institution is thus limited to custody (board members are custodians), resulting not only in scale economies, but also in potential conflict of interest with administrators and investors. Nonprofit institutions operate within a more or less perfect competition environment and their overhead costs, also reflected in the amount of pensions and other benefits, are very differentiated, mainly due to the volume of assets under management.

The standard occupational pension provision model does not need sales force, since participants recruit solely from the given company's employees or branch / sector, as appropriate. In some developed countries, this model overcame competition of other employee security schemes (e.g. in Germany), in other countries it became significantly consolidated in the form of nationwide schemes resembling social insurance (e.g. in Finland), while in Switzerland and Australia, occupational pensions simply became mandatory. In the course of the process, there were significant product changes in most countries that affect the contents of occupational pensions and consequently their administration: this concerns the replacement of defined benefit (DB) schemes by defined contribution (DC) schemes. In theory, the transformation of DB systems to DC systems would not have to be associated with an provision model change: after all, original social old-age insurance systems have been DB schemes, whereas DC system is used for modern social old-age insurance, specifically NDC (notional DC) – "solely" the (actuary) technique changes. However, if we "reverse" the basic "technical" component of the scheme, it actually changes the participants' approach or utilization, as appropriate.

In DB occupational schemes, the key portion of the financial risk is borne by employers, whereas employers "only" make contributions in DC occupational schemes – and investments risks are borne by clients. In case the critical risk is borne by clients, it is systemically logical that they should be able to choose a pension fund, in which "their" pension savings are invested: collective pension schemes have thus been transforming into individual retirement accounts (IRA) – either arranged by employers or not – which represent personal pension savings / insurance, i.e. an entirely different provision model.

The transition from a DB to a DC system in occupational schemes is associated with the advantage in the form of simple transferability of savings from one employer to another; the need of such transferability is given by the modern labor market itself. Significant pension funds cannot be built on the hypothesis of lifelong employment with a single employer; furthermore, it is at least impractical to claim pension benefits from several employers, drawing on "partial" old-age pensions from all or most employers during retirement. All

this regardless of the fact that each occupational pension scheme has its own "technical minimums" for pension claims to arise.

In the Netherlands, DB occupational pensions continue to be absolutely dominant – comprising about 90% of participants of this pension pillar. These products automatically involve lifelong pensions – not only in the Netherlands. On the other hand, DC systems rigorously separate the savings phase (investments) and (potential) annuity payment phase: pension savings are cumulated within a client's personal account; once a retirement age is reached, clients apply for their account balance annuitization. Occupational pensions have historically been "associated" with annuity payments; this situation continues in the Netherlands – DC system participants must receive lifelong pensions.

In other countries, the rule of pension claims/savings annuitization has been "breached". Not all savings have to be annuitized in Switzerland that has had mandatory occupational pensions since 1985. In the United Kingdom, the following situation remains as of early 2015: annuitization is mandatory within existing voluntary occupational pensions (however, soft compulsion is being introduced), whereas clients are entitled to lump sum benefit in the amount of 25% of their savings – tax-free, as an incentive for these pensions. In Australia, voluntary occupational pensions were transformed into mandatory pensions as of 1992, without the annuitization obligation – and the annuitization rate is very low (about 10%). As of 2005, a major change occurred in Australia: "Superannuation" participants may change their provider (occupational pension "Super fund") and deposit their pension savings to retirement savings account with a number of financial institutions (banks, life insurance companies, etc.); this has resulted in the establishment of hundreds of thousands of small "pension funds" managed by financial institutions.

The major involvement of private financial institutions within existing occupational pensions considerably modifies these schemes and consequently the given country's entire pension system. In the United Kingdom, many fundamental reformatory changes were adopted, with a view to increase transparency, lower administrative and other costs, etc.; occupational pensions have been transforming into "workplace pensions" – with soft compulsion (auto-enrolment), low-cost national pension company NEST (competing with private companies as well as occupational funds), and annulment of the annuitization obligation. The reason for this consists in high costs of private providers of pension savings and annuities, as well as mis-selling on the part of dealers. Basic services should newly be provided by employers, including the use of a default fund and the possibility to use NEST. Products should be simple – the system is only reduced to "pension" savings, annuities are "given up" (regulation is not introduced, NEST will not provide pensions). Workplace pensions represent a "solution" in the area of provision of occupational pensions on the basis of soft compulsion – however, it is already a different model.

2.4 Mandatory Private Savings Provision Model

The model of mandatory private pension savings, in its general form, has been promoted by the World Bank (James et al., 1994). The area of annuity markets has only gained ground after the commencement of public pension privatization in selected countries. Privatization supporters stated after ten years: "the annuity industry is minuscule in most countries.

But in countries that have instituted mandatory retirement savings plan, it is growing rapidly. …Preliminary findings suggest that the cost of annuities is lower than might be expected" (James, Vittas, 2000, pp. 1, 3).

SPC EC / OECD studies indicate the pay-out phase overhead in advanced countries from 0.25% to 0.5% of assets per year during the savings phase – additionally (SPC, 2008), (D'Addio et al., 2009). "The current situation, in terms of consumer detriment, is stark:

- Each annual cohort of pensioners loses in total around £500 million – £1 billion in lifetime income. This will treble as schemes mature and auto-enrolment is phased in.
- The figure represents 5-10 per cent of the annual amount consumers spend on annuities.
- An estimated 20 per cent of this loss is transferred to the government and the taxpayer through reduced tax revenues and the increased demand for means-tested retirement benefits" (Harrison, 2012, p. 9).

Annuity markets greatly depend on government regulation and support. "An understated feature of the annuity market at present is that there is a clear 'default' option, for contract-based DC members in particular, which exploits member inertia in a similar way to auto-enrolment, but with potentially detrimental results. About six providers dominate both the scheme and annuity markets. Their retention of DC customers at retirement, who take the internal annuity offered, varies considerably. One major provider, which the report could not name, has a retention rate of 86 per cent, which, coincidentally, is the about the same percentage of members that use the default accumulation fund" (Harrison, 2012). The same problem is mentioned and quantified in a book issued by the UK Parliament as follows: „The industry is failing pension scheme members when they convert their pension funds into annuities. Purchasing an annuity from a provider other than the one which holds an individual's fund could increase their retirement income by as much as 20% to 40%. However many people are unaware that they have the option to shop around for an annuity" (Parliament, 2013).

The UK Government decided to eliminate all annuity-related problems through a point-blank liberal measure: by introducing "freedom and choice in pensions" – while annulling the annuitization obligation for DC pension pots. As of April 2015, each participant of a DC workplace pension scheme may withdraw all funds in the form of a lump-sum payment – once turning 55 (this age will gradually increase as of 2028 to 57). In official words, these "individuals will have the freedom to make the decisions that suit their own circumstances". This "simplification" will also be associated with the taxation system simplification. The response to the government's proposals has been overwhelmingly positive. Nevertheless, experts of the London-based Pensions Institute were horrified: „It took two years of detailed work by the Pensions Commission to create a political consensus for auto-enrolment, and this was followed by seven years of preparation before auto-enrolment was introduced. The ending of private-sector pensions in the UK was introduced overnight without any consultation or any apparent examination of the evidence or the potential consequences. It could turn out to be a completely reckless policy change. How can this be avoided? It is essential that the decumulation stage of a DC scheme is institutionalised

in the same way that auto-enrolment has institutionalised the accumulation stage and taken it out of the high-charge world of retail accumulation products, such as personal pensions. In a similar way, economies of scale and more efficient risk sharing need to be exploited in the decumulation phase to enable good value drawdown products to be designed. We urgently need to move away from retail decumulation products like individual drawdown and retail annuities. An appropriate decumulation product that can be integrated into auto-enrolment might be described as one that:

- Benefits from institutional design, governance, and pricing.
- Delivers a reasonably reliable income stream (i.e. with minimal fluctuations).
- Maintains the purchasing power of the fund.
- Offers the flexibility to purchase a life annuity at any time (or at regular predetermined intervals to hedge interest rate and longevity risk).
- Is simple to understand, transparent and low-cost.
- Requires minimal consumer engagement.
- Benefits from a low-cost delivery system (Blake, 2014, pp. 12-13).

However, there is no experience in the world with a system as proposed by Harrison and Blake. In case such solution is relatively simple, certainly these experts would just "write it" The United Kingdom has the largest annuity market in Europe; the market responded to the announcement concerning the annulment of the mandatory annuitization in new workplace pensions through reduction of annuity rates. A globally known solution to the problem is an establishment of a national pension insurance institution – as is the case in Sweden – but this would probably be too much "hot" for the United Kingdom. However, the experts could have tried proposing a solution that involves the national pension company NEST, they could have also used the former SERPS scheme in their arguments: The principle was that everyone would receive a SERPS pension of 25% of their earnings above a "lower earning limit" (approximating to the amount of the Basic State Pension, a flat-rate pension). However, the UK Government used a moment of surprise, introducing a "liberal" proposal that includes the annulment of the annuitization obligation and simplification of pension taxation. We can assume that the annuity market in Great Britain will gradually decline significantly – even to a tenth of the current situation, in line with the Australian scenario.

The mandatory pension savings model, without mandatory annuitization, has a significantly lower quality in terms of the pension theory and policy – it does not cover the longevity risk; Harrison and Blake are absolutely right in this regard. It is actually not about pensions, as it "only" concerns savings or investments, as appropriate. Once clients reach retirement age, they gain access to a substantial amount of money – to their pension pot. This solution is beneficial for many clients – some of them repay their debts, others will "count" on shorter length of their life (lump-sum payment is more beneficial for them), some will use the pot as a general reserve, with some amount potentially left for children as bequest. It is always important to consider other pension pillars existing in the given country – and their robustness. The final decision is a matter of public choice.

The mandatory pension savings provision model is strongly affected by government regulation. It may be – currently only theoretically – minimum, as was originally the case in

Chile (as of 1981). It had resulted in a wild market, with full-fledged private pension companies operating therein. Today, only six providers remain of the former tens. The government regulates their margins by assigning new clients to a company that commits to the lowest and constant fee (percentage of wage) for the period of 2 years. World Bank experts believe the model of open competition for allocating new contributors to be suboptimal (Schwarz et al., 2014). A national pension company has recently been formed in Chile.

World Bank experts state that, in post-communist countries, the relatively high costs of the mandatory funded systems are explained by the emphasis on individual selection, by provision of costly and misplaced guarantees and by an industrial organization of the pension fund industry that facilitates oligopoly behavior. Pension fund management companies in the region are typically hybrids between account management (record keeping) and portfolio management (asset management). Account management is a business with scale economies and therefore there is not much room for competition. Full separation between the asset management and account management businesses, with centralized account management and competition in portfolio management, is a way of introducing efficiency to both functions. Swedish blind accounts are efficient in lowering the barriers to potential entry of new competitors, which in turn helps reduce fees (Schwarz et al., 2014). Government regulation of mandatory pension savings everywhere has been converging to the use of default funds and life-cycle strategies, with the caps on fees being commonly set.

The mandatory private pension savings model was originally designed for market conditions without substantial government regulations. Mainly the annuity market failed to prove successful in practice, leading some countries to exclude it from the model – e.g. under heading of freedom and choice in pensions – with other countries not implementing the mandatory annuitization of "pension" savings at all; public annuity provision is also a model solution. The substantial need for government regulation is also felt in the first, accumulation phase of these schemes. It is often recommended – with a view to reduce overhead or margins – to apply a public account management or so-called blind accounts, as appropriate. The mandatory private pension savings model has thus been substantially limited by government regulation, also leading to market deformations.

2.5 Voluntary Private Savings Provision Model

An alternative to the mandatory private pension savings is the voluntary savings with government support. Without such government support, we cannot assume a massive participation within the system. The management of such system is also crucial – depending on products (with government support) and institutional arrangements (which institutions feature government-supported products).

From the product perspective, life insurance would be optimal; however, it would have to be significantly regulated by the government – to ensure the system is beneficial for clients. Products should be profitable for clients even without the government support. The government support should ensure client inflow and promote the product benefits for clients. But the private life insurance provision model is not a solution, as already demonstrated above. The provision of annuities would have to be taken over by the state – and

this measure is difficult to combine with voluntary insurance. An unqualified attempt was the original regulation of the Czech "supplementary pension insurance with state contribution"; in this case, pension funds should have used statistical mortality tables – the theory does not permit this. The 1994 product was designed as pension insurance; to this day, lifelong pensions are being accentuated in the wording of the relevant act as the principal solution, "lump-sum settlement" may be provided "instead of pensions". However, the practical situation is very different – hardly anyone opts for pensions instead of lump sum benefits. After the mandatory annuitization of savings under Riester pensions was annulled in Germany as of 2014, it is undeniable that voluntary pension insurance cannot form part of a mass voluntary pension product.

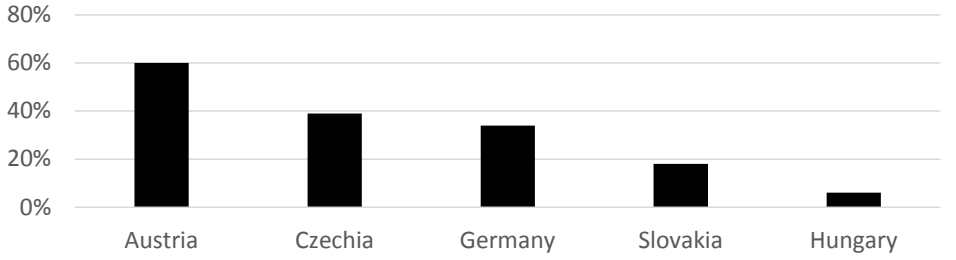
Individual pension savings may be provided by several institutions: banks, mutual funds, and insurance companies or, alternatively, by a single specialized institution (pension company). Competition of several types of institutions exists in Germany and Austria, for example, with insurance companies dominating the market. There is also a trend towards combined products, such as the combination of pension and contractual (Bauspar) savings (Germany: Wohn-Riester) or possibility to (partially) settle a mortgage loan or invoice for home purchase from pension savings. The purpose is similar in case of possible overhead in case disability occurs or simply pay-outs after 10, 12 or 15 years (so-called merit pension / benefit under the Czech supplementary pension insurance).

Under the current situation in the Czech Republic, it would be possible to merge supplementary pension insurance and Bauspar savings – both products are general saving products: under Bauspar savings, clients receive a 10% government contribution from their own contributions simply for making such contributions for the period of 6 years ("vesting period"); under supplementary pension insurance (and new "supplementary pension savings"), the vesting period is 5 years – regular contributions must be made until the statutory retirement age minus 5 years. With regard to supplementary pension insurance, clients may withdraw one half of their savings after 15 years (merit pension or lump sum settlement instead of such pension, as appropriate), provided they selected this option when taking out the policy (this option being free of charge). It was possible to contract supplementary pension insurance until 2012; as of 2013, it has been closed within a "transformation fund", with possibility to make contributions for valid policies. At the end of 2014, there were 4.6 million participants to the supplementary pension insurance. Together with the new supplementary pension savings, pension companies had 4.8 million clients and the government paid out state contributions of CZK 6.9 bn. in 2013.

The Bauspar savings product originated in Germany, as a form of mutual assistance (association) of individuals interested in financing residential housing in a specific location, in the period after the First World War when housing was scarce. Savers are assigned an assessment number, thereby creating a loan waiting list. Today, the significance of such product is only marginal, unless (however) it is subsidized by the government. This is still the case in Germany and Austria; after 1990, this product – with government contributions – was exported to several post-communist countries, with parent private Bauspar savings banks generating high dividends through significantly higher fees (or a fee, as appropriate, for the contract conclusion – usually in the amount of 1% of the "target amount", i.e. even more than double the amount of potential savings) than in Austria, for example. The

relatively highest Bauspar savings coverage is in Austria, with about 60% of the entire population benefiting from the product (5.3 million contracts at the end of 2014) – also see Figure 3.

Figure 3: Bauspar Savings Prevalence in 2013 (per cent of population with contracts)



Source: Wruuck (2014).

In Austria, the government contribution amounts to 1.5% of participants' contributions, with interest returns being exempt from taxes. In the Czech Republic, the government contribution amounts to 10% of participants' contributions, with taxation of interest. Possible elimination of the Bauspar savings contribution is solely a political issue: at the end of 2014, there were 3.8 million contracts in the Czech Republic, with the government subsidies amounting to CZK 4.8 bn. In Slovakia, the government contribution rate has declined third year in a row – it amounts to 5.5% of participants' contributions in 2015; however, the maximum absolute amount of annual support per contract remains the same (66.39 EUR), i.e. less than the Czech maximum of CZK 2,000.

Since the beginning, the Czech supplementary pension insurance has basically been a banking product, if we look apart from the right (in fact insignificant) to claim lifelong annuities. The only difference from standard savings products is the fact that the interest rate is determined at the year end, based on the performance of (today's transformation) fund. From a technical perspective, the supplementary pension insurance in the Czech Republic may be considered a universal life insurance, with fees being charged from an (CZK) account and annual valuation (interest rate) being credited. Under universal life insurance plans, additional "fees" (risk premiums) are usually charged for arranged risk insurance; Czech pension funds did not take advantage of this in the past – they could have sold DB disability pensions; however, the government discriminated this pension / benefit by the fact that no state contribution was made in respect to individual pension contributions. Not even after the 2013 reform can pension companies charge their clients' personal accounts with "fees for operating supplementary pension insurance through a transformed fund"; pension companies charge this fee in respect of the transformed fund's assets. The maximum fee shall be determined as:

a) 0.6% of average annual balance of the transformed fund; and
b) 15% of profit reported in the transformed fund's financial report.

At the beginning of 2015, Bezděk proposed an overall increase of the aforementioned fees – due to declining yields of 10Y government bonds and guarantee of non-negative annual nominal returns for supplementary pension insurance clients. This guarantee is generally considered as problem (Schwarz et al., 2014); however, it does not mean we should settle for a simple solution detrimental to clients. Each simple savings product must be beneficial for clients, even without a government subsidy. In case the private sector cannot achieve this through its provision model, it is primarily the private sector's problem. It is obvious the aforementioned fees would be sufficient for a national pension institution. Generally speaking, we could discuss a potential supplementary pension insurance reform to a supplementary pension savings scheme, e.g. through a transfer of funds to mandatory conservative fund with maximum fee of 0.4% of assets plus 10% of any valuation. We should remind the fact that the British national pension company NEST is "fine" with 0.3% of assets plus 1.8% of client contributions (contribution charge is expected to end once the set up costs have been met), i.e. roughly 0.5% of assets in total. The "second" pension pillar in the Czech Republic is associated with maximum fees of 0.3% to 0.6% of assets, based on the pension fund risk rate plus (with the exception of government bond pension fund) 10% of any valuation.

The pension theory and policy findings do not suggest that governments should – in any way whatsoever – subsidize private pension saving schemes. After all, the private pension savings are indirectly subsidized by the fact that financial services are currently exempt from value-added tax payments in the EU. Many countries tax these services by an alternative tax, collected in Denmark, for example, in the amount of 10.9% of financial sector payroll. The VAT exemption for the financial sector could be abolished. The existing Danish payroll tax could be extended according to one of four financial activities tax (FAT) models. (Nielsen and Hjerrild, 2013). FAT as a compensation for VAT in the financial sector should be introduced in the Czech Republic, irrespectively of other private pension savings reforms.

Government support of voluntary private pension savings complies with the conservative social model, in the form of "deferred income tax", with insurance premiums/savings contributions deducted from an income tax base and resulting pensions or lump-sum benefits fully subject to income tax. This tax treatment of voluntary private pension savings is an analogy to the social insurance premium treatment, equally paid by employees (being deducted from an income tax base) and employers (not being taxed as employees' earnings). It is a tax treatment regime referred to as EET: the first letter (E = exempt) describes the insurance premium tax regime; the second letter (E) indicates the tax regime applicable to capital returns, whereas the third letter (T = taxed) specifies the tax regime for any benefits paid out.

The liberal and the social-democratic social models are not interested in subsidizing or promoting, as appropriate, voluntary private pension savings; this is ideally associated with TTE or ETT tax regimes, as appropriate. Furthermore, the parallel with social insurance does not exist here: social insurance does not exist within the liberal model and the social-democratic model features universal social insurance financed through employers' contributions (with ETT tax regime in case of a fully funded scheme).

The results are significant in the neoliberal social model: existence of private insurance or savings as the key pension pillar. The World Bank declared mandatory private pension savings (James et. al., 1994) as the factual system base ("second" pillar), whereas voluntary pension savings should act as the third pension pillar. The reality (of neoliberal type) was mostly different: the second pillar was not associated with hard compulsion, but "only" soft compulsion – so that no one (e.g. poor individuals) could make excuses that they "have" to take part in savings even though they do not have the money or simply do not want to do so, e.g. for ideological reasons. Several soft compulsion methods are used: opt-out, auto-enrolment and matching contributions, including government contributions. In case a soft compulsion method is applied, voluntary pension savings product (in its pure form) no longer makes systemic sense, because it may be reduced to savings in excess of the soft compulsion system – this is absolutely clear in practice in case of government contributions – participants receive government contributions even for their contributions over the specified rate (e.g. 3% of wage). This is also the case in the Czech Republic: government contributions are paid in respect of supplementary pension insurance with participants' monthly contributions of CZK 300 to 1,000.

The Czech system of the supplementary pension insurance, supplementary pension savings, and private life insurance meets the basic specific "parameters" of the neoliberal soft compulsion system: the number of participants exceeds the number of payers within the basic public "pension insurance", with government support being intensively used. Therefore, it is actually a "second" pension pillar, whereas the key problem is the fragmentation and, consequently, considerable lack of concept of this second pillar. Instead of a single government support system or single pension savings tax treatment regime, as appropriate, we have several systems: one for supplementary pension insurance and subsidiary pension savings with participants' contributions, another one for private life insurance paid by insureds, and a third one for employers' contributions under supplementary pension insurance, supplementary pension savings and private life insurance. This is an absurd system that must be united, disregarding the fact that we should follow a uniform concept of the entire pension system – select one of the social models and reform the government support system accordingly. Since our "pension insurance" is de facto a conglomerate of flat-rate pension and universal social pension insurance, the basic model alternative should be the elimination of any state support of the supplementary pension insurance, supplementary pension savings, private life insurance, as well as Bauspar savings. This list could also include government support of mortgage loans and loans under the Bauspar savings scheme.

In case our voters or political parties, as appropriate, still wish to operate government subsidies of the mentioned financial products, it would be advisable to not only newly and uniformly formulate such state support, but to reduce it to a new simple, and basically uniform, pension savings product, in combination with existing Bauspar savings and existing government support of mortgage loans and loans under the building savings scheme that would be beneficial for clients even without the state support, even with prevailing low interest rates. For this purpose, we could also use the infrastructure and products of today's second pension pillar in the Czech Republic that is to be annulled.

Voluntary private pension savings products cease to make separate sense under hard or soft compulsion pension schemes, as it is reduced to mere increase of contributions of participants (or third parties – employers, for example) over the mandatory or basic extent. In other systems, the form and tax treatment of the voluntary private pension savings should correspond to the relevant social model. Private pension savings provision models should correspond to the social model selected in the given country. Significant deviations from these models result in high administration and other costs that are financed by clients and government contributions.

Conclusions

Each social model uses at least two pension pillars and their form tends to be determined by the general characteristic of the given model as well as the specifics of pension market functioning within the given system or country, including the government regulation system and the rent-seeking rate on the part of the pension sector. The liberal pension model is very simple in terms of its administration – the solidary pillar is part of the public administration, whereas this provision model is associated with very low costs, representing major benchmark for other provision models. The liberal model, in its standard form, assumes smooth functioning of financial institutions, particularly of life insurance companies that provide private pension insurance.

In principle, the public pension provision model is fully functional. Efforts aimed at privatizing social insurance pensions were motivated by aspirations to change the social model, to convert to the neoliberal model. In many countries, practical experience with neoliberal reforms has not only resulted in stronger solidary pension pillars, but also in the use of public insurance companies within the "second" pillar. This is not just about low administration costs of large public pension institutions, but also about respecting the behavior of the given system's participants.

The standard life insurance provision model offers fulfillment of all insurance needs of individuals and families, based on their individual needs. However, practical applications are associated with major problems in the form of market failures. This is most apparent in annuity markets that are marginal in a number of countries. Distribution networks represent a major barrier to entry into the life insurance market of a country. The government support of life insurance products under these conditions is mainly a rent-seeking instrument. Government regulation could prove beneficial in this regard, e.g. in the form of ban on commissions provided by life insurance companies, government support reduced to simple and low-cost saving products, etc.; however, this leads to an entirely different provision model.

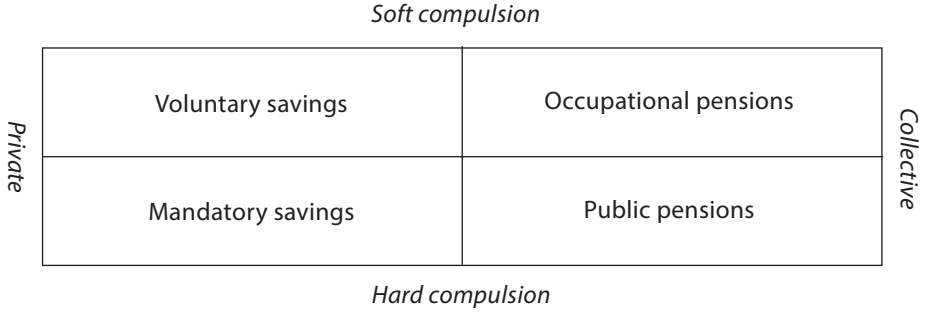
Occupational pensions have gained ground in most Western countries, particularly with the conservative social model. Under a standard occupational pension provision model, employers act as sponsors and guarantors of defined benefit pensions, managed by a board in the interest of employees. This provision model has been substantially modified in more countries by outsourcing investments and management to the private financial sector, converting to a defined contribution pension savings, and transformation to workplace pensions, with employers paying contributions and providing basic information to

employees, who can opt for external pension savings providers. These transformations may ultimately lead to soft compulsion personal pensions, foreseen by the neoliberal social model. Intensive government regulation may also comprise a low-cost national pension company. In several countries with higher level collective bargaining, the most occupational schemes are quasi-mandatory; this concept is close to the social-democratic social model, with low-cost provision system.

The mandatory private pension savings provision model was constructed for the main pillar of the neoliberal pension model. Various soft compulsion methods prevailed in the practice of the relevant countries: opt-out, auto-enrolment, matching contributions by employers, and government support. This provision model also envisages further intensive government regulation, aimed at reducing otherwise high costs and margins of private pension companies.

Voluntary private pension savings and insurance products without any government support comply with the liberal and the social-democratic social models. With regard to the existence of the life insurance provision model, only low-cost personal pension savings with government support has its own separate design significance for most wage earners, i.e. consequently a soft compulsion system. The Czech system of parallel existence of supplementary pension insurance, supplementary pension savings, private life insurance, and Bauspar savings is a chaotic and nontransparent soft compulsion system that enables substantial rent-seeking by the financial sector.

Figure 4: Typology of provision models



Source: Own elaboration

We have distinguished four main provision models of pension insurance and savings: two of them are collective pension schemes, providing annuities (if large enough): public and occupational pensions. The other two are basically private pension savings only, due to failure of private annuity markets. Public pensions and mandatory private pension savings rely on the hard compulsion, of course. Occupational pensions and voluntary private pension savings typically use soft compulsion methods, to get an important coverage. See our simplified typology of provision models in Figure 4.

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Conference on Financial Markets - already the Seventh

Konference Finanční trhy již po sedmé

VLADISLAV PAVLÁT, OTAKAR SCHLOSSBERGER[1]

On May 28 and 29, 2015 the University of Finance and Administration held the 7th International Conference titled **„FINANCIAL MARKETS WITHIN THE GLOBALIZATION OF WORLD ECONOMY".**

The main goal of the conference was to assess key problems of the situation on financial markets in the Czech Republic and in the world and to analyse the presumable further short-term and medium-term development of financial markets.

The conference was organized under the auspices of Miroslav Singer, Governor of the Czech National Bank.

Even though the agenda of the conference was split in two days, based on our experience from the previous years the organizational committee decided not to divide the agenda into sections but to offer individual speakers an opportunity to present the selected top-quality speeches during the plenary session of the conference. The organizational committee succeeded with this plan and all participants in the conference could listen to and discuss presented issues and speakers´ questions harmoniously. The second day of the conference was reserved for the students of Doctoral Study Programs and for selected students of the follow-up Master´s Study Program. The student section of the conference was supported from funds earmarked for a specific academic research.

The conference agenda focused on these thematic blocks:

1. **General Issues of Financial Markets**

This thematic block mainly focused on the current state and development tendencies of the financial markets globalization; financial markets growth after the Global Economic Crisis; dynamics of the development of the main segments of financial markets in the world.

2. **Issues Related to Individual Segments of the Financial Market**

The second block of the discussed issues dealt with new phenomena in the area of the main segments of financial markets, development of the segments of the financial markets infrastructure and with the reform of social insurance.

3. **Regulation of Financial Markets**

The third block of the conference was represented by the topic Financial Markets Regula-

1 *Otakar Schlossberger was the expert guarantor of the conference, Vladislav Pavlát was the expert gestor of the student section of the conference.*

tion. It included topics such as qualitative change in the area of national and international regulation of financial markets and changes in the area of payment system.

The two-day conference saw a number of foreign and Czech experts from practice, universities and research areas. On the first day of the conference, after the opening and introductory speeches, the participants of the conference presented their opinions on the related issue. The second day then continued with presentations of the students of the Doctoral and Master´s Study Programs who presented the results of their work related to the issue of financial markets to be discussed.

The first day of the conference was opened by *Petr Budinský,* Vice-rector of the University of Finance and Administration. His speech was followed by *Pavel Řežábek*, member of the Bank Council of the Czech National Bank. His introductory presentation titled „Financial markets in global economy," aroused great interest of the participants of the conference. In the last decades, the development of financial markets has accelerated, which generally led to higher risks. The role of central banks markedly increased and in the foreground of their activities we can find measures allowing the control of financial stability. However, the higher significance of the regulation brings about higher risks connected with low interest rates and risks induced by quantitative release. *Petr Budinský*, Vice-rector of the University of Finance and Administration, assessed the current situation of financial markets in his paper based on the analysis of selected segments. He mainly focused on the diverse development of bond markets, stock market, oil market and observed changes in the sovereign rating of individual countries. During the assessment of the impacts of the so-called quantitative release he stressed some opposing effects of this process. *Tadeusz Sporek*, Head of Global Economy Department at the University of Economics in Katowice dealt with contemporary approaches towards the evaluation of the development of the globalization concept in this interesting paper on globalization and analysed the strong points of the recent papers of Polish authors related to these issues. *Malgorzata Dziembala*, (University of Economics in Katowice) focused on the impact of the economy crisis on the economy of EU countries and presented an analysis of the cohesion funds of the European Union concluding that without their application the impacts of the crisis on individual states would have been far more radical.

Block 1 (General Issues of Financial Markets) *Mojmír Helísek´s* paper attracted considerable attention by indicating that the introduction of the euro is not possible without the consent of the relevant state. He also presented a comprehensive analysis of the development of the question related to the introduction of the euro in the Czech Republic since joining the EU and stressed that the negative approach towards the euro is mainly caused by political reasons anchored in the past. A presentation of *Radim Valenčík,* and the team of authors (Jan Červenka, Ondřej Černík and Jiří Mihola) received a positive response. Based on the application of the theory of cooperative games it presented an original interpretation of the evaluation of financial markets based on the model of supply and demand of investment opportunities and investment means on the financial market.

Block 2 (Individual Segments of Financial Market) included a paper of *Jaroslav Vostatek* who critically approached the topic of current discussion issues of social models of pension savings and insurance and concluded that the pillars of pension funds urgently need

reforms; some of the existing proposals are chaotic and non-transparent. *Vladislav Pavlát* focused on theoretical possibilities of the analysis of financial markets infrastructure which needs to be viewed as a complex system. His presentation also analysed the relationship between selected international organizations operating in the area of financial markets infrastructure.

Block 3 (Regulation of Financial Markets) *Otakar Schlossberger* presented a comprehensive paper on the regulation of payment services in Europe where he analysed the current regulation of payment services in the Czech Republic in comparison with anticipated changes implemented as a result of the new EU Directive which shall allow higher quality and availability of payment services for general public.

The student section, which was opened by *Mojmír Helísek*, Vice-rector of the University of Finance and Administration, was represented by 9 participants – mainly students of Doctoral Study Program who presented their findings from their upcoming theses or papers elaborated as part of projects implemented at the University of Finance and Administration. As for the Banking topic, a paper presented by *Jaroslav Tichý* attracted attention of the audience. It contained an analysis of selected indicators of the biggest banks in the Czech Republic documenting their dominant position. *Miroslav Zetek* in his paper on Hedge funds compared the historical development of this type of funds in the United States of America and in Europe and analysed the differences in their regulation in the USA, EU and a specific regulation in the Czech Republic. *Roman Mentlík* analysed various impacts of the introduction of the euro on the prices in the Czech Republic in case of one-time introduction and introduction in a long run. Papers related to bitcoin virtual currency were interesting as well. *Michal Bezvoda* especially stressed negative effects of utilizing these currencies. *Nikita Nikiforov´s* paper focused on the possibility of bitcoin financial analysis.

The evaluation of the results of the student section showed that the presented work demonstrated a very good contents level.

We can conclude that the Proceedings of the conference will be published with assigned ISBN which will depict the conference. The proceedings will also include reports accepted after a two-round review process. It is our wish to have these Proceedings included in the Web of Science.

We are looking forward to the next year of the conference that is planned for 2017.

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The length of manuscripts, using the usual structure of research papers, is 15 – 20 PC pages (single spacing). Please submit the manuscripts in good English in electronic format together with a printed copy. Attached, submit the executive summary – abstract (150 words max.) and keywords (6 – 8), both also in Czech.

Please number your notes as you go along. Add a bibliography in alphabetical order, including page numbers when citing magazines or a journal. Inside the text, please use e.g. Afonso (2001), and when citing include the page number. Use the compatible forms for tables and figures. Highlight where pictures, graphs and tables will be placed in the text. Write your contact address: full name and titles, name and address of your work, telephone number and email, including the same for all co-authors.

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