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EDITORIAL

SCIENTIFIC ARTICLES / VĚDECKÉ STATĚ

SCIENTIFIC REPORTS / VĚDECKÁ SDĚLENÍ

Editorial
Editorial

MOJMÍR HELÍSEK

Dear Readers,

The second edition of the ACTA VSFS scientific magazine from 2015 presents four papers with a diverse thematic orientation.

The first two papers are the winning works from the competition for the Professor Vencovský Prize (information about the competition is stated below). We will publish another wining work in the next edition.

Volha Audzei's paper on *Information Acquisition and Excessive Risk: the Impact of Policy and Market Volatility* concerns with the decision-making of financial market agents from the point of view of risk taking. A theoretical model has been created to evaluate this decision-making. Under the conditions of low interest rates and the reduction of market risks (which is the policy of central banks), agents have little motivation to acquire information about risky assets. As such, risky assets accumulate in their portfolios.

Hana Lipovská's paper *The Fiscal Placebo* analyses the delay in the implementation of discretionary fiscal policy in the Czech Republic. It authenticates the arguments, according to which time delays are pro-cyclic and therefore preclude the implementation of discretionary fiscal policy. This is followed by the reasons which show that an implementation delay can be neutral from the point of view of the economic cycle. In the end, it introduces the concept of the fiscal placebo, according to which an implementation delay may have a negative, neutral or even positive effect on the real economy.

Dana Kubíčková in the third paper *Ohlson's Model and its Prediction Ability in Comparison with Selected Bankruptcy Models in Conditions of Czech SMEs* compares the results of the evaluation of the financial situation in small and medium-sized enterprises. The information has been acquired using Ohlson's model and it was compared with assessments provided by other models (Altman's Z-score model, IN05 and Taffler's model). Ohlson's and Taffler's models identified a very good financial situation in 90% of companies, while Altman's model and the IN05 model only identified such a situation in 40% of companies.

Soňa Harasimová in the fourth paper *A Perception of the Town: Inhabitants´ Values and Preferences of the Moravian-Silesian Region, the Czech Republic* aims to evaluate 15 selected areas from the point of view of urban life and especially to define the perception and evaluation of the environment. The data for this study was acquired from her own research in six district towns in the Moravian-Silesian Region. The results gained from the research were so varied that it was not possible to acquire an average for the entire region.

The author of this editorial has provided information about two events in the Scientific Reports section. The first of these is the competition for the Professor František Vencovský Prize for young economists and the second is the associated conference on the European Economy – a Return to Growth or Long-term Stagnation?

I am sure that these research results will be of interest to you and that you will continue to be our loyal readers.

Mojmír Helísek
Executive Editor
University of Finance and Administration

Vážení čtenáři,

druhé číslo vědeckého časopisu ACTA VŠFS z roku 2015 přináší čtyři články s rozličným tematickým zaměřením.

První dva články patří mezi vítězné práce v soutěži o Cenu prof. Vencovského (informace o soutěži je uvedena níže). Další vítěznou práci uveřejníme v příštím čísle.

Volha Audzei se ve svém článku *Získávání informací a nadměrné riziko: role úrokových sazeb a volatility na trzích* zabývá rozhodováním agentů finančních trhů z hlediska podstupování rizika. K vyhodnocení tohoto rozhodování je vytvořen teoretický model. V podmínkách nízkých úrokových sazeb a snižování tržního rizika (což je politika centrálních bank) mají agenti malou motivaci získávat informace o rizikových aktivech. Ve svých portfoliích proto hromadí riziková aktiva.

Hana Lipovská v článku *Fiskální placebo* analyzuje implementační zpoždění diskreční fiskální politiky v České republice během ekonomických krizí. Ověřuje argumenty, podle kterých jsou časová zpoždění procyklická, a tedy znemožňují provádění diskreční fiskální politiky. Následně vysvětluje důvody, podle kterých může být implementační zpoždění neutrální vzhledem k ekonomickému cyklu. Nakonec zavádí vlastní koncept fiskálního placeba, podle kterého implementační zpoždění může mít záporný, neutrální či dokonce kladný dopad na reálnou ekonomiku.

Dana Kubíčková ve třetím článku *Ohlsonův model a jeho predikční schopnost ve srovnání s vybranými bankrotními modely v podmínkách malých a středních firem v České republice* porovnává výsledky hodnocení finanční situace malých a středních podniků. Údaje byly zjištěny pomocí Ohlsonova modelu a byly srovnány s hodnocením, které poskytují jiné modely (Altmanův model Z-score, IN05 a Tafflerův model). Ohlsonův a Tafflerův model identifikoval velmi dobrou finanční situaci u 90 % firem, Altmanův model a IN05 model u 40 % firem.

Soňa Harasimová si ve čtvrtém článku *Vnímání města: hodnoty a preference obyvatel v Moravskoslezském kraji, Česká republika* klade za cíl zhodnotit 15 vybraných oblastí pro život ve městě, a zejména definovat vnímání a hodnocení životního prostředí. Data pro tuto studii byla získána z vlastního výzkumu v šesti okresních městech Moravskoslezského kraje. Získané výsledky průzkumu však byly natolik odlišné, že není možno zjistit průměr za celý region.

V sekci Vědecká sdělení Vás autor tohoto editorialu informuje o dvou událostech. První je soutěž pro mladé ekonomy o Cenu prof. Františka Vencovského, druhou je navazující konference Evropská ekonomika – návrat k růstu nebo dlouhodobá stagnace?

Věřím, že Vás tyto výsledky výzkumu zaujmou a zůstanete nadále našimi věrnými čtenáři.

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

Information Acquisition and Excessive Risk: Impact of Policy Rate and Market Volatility

Získávání informací a nadměrné riziko: role úrokových sazeb a volatility na trzích

VOLHA AUDZEI

Abstract

Excessive risk-taking of financial agents drew a lot of attention in the aftermath of the financial crisis. Low interest rates and subdued market volatility during the Great Moderation are sometimes blamed for stimulating risk-taking and leading to the recent financial crisis. In recent years, with many central banks around the world conducting the policy of low interest rates and mitigating market risks, it has been debatable whether this policy contributes to the building up of another credit boom. This paper addresses this issue by focusing on information acquisition by the financial agents. We build a theoretical model which captures excessive risk taking in response to changes in policy rate and market volatility. This excessive risk takes the form of an increased risk appetite of the agents, but also of decreased incentives to acquire information about risky assets. As a result, with market risk being reduced, agents tend to acquire more risk in their portfolios then they would with the higher market risk. The same forces increase portfolio risk when the safe interest rate is falling. The robustness of the results is considered with different learning rules.

Keywords

Rational Inattention, Interest Rates, Financial Crisis, Risk-taking

Abstrakt

Nadměrné podstupování rizika zástupci finančního trhu získalo po nedávné finanční krizi mnoho pozornosti. Nízké úrokové sazby a tlumená volatilita na trhu během období Velkého zklidnění (Great Moderation) jsou někdy obviňovány ze stimulace podstupování rizika, které vedlo k nedávné finanční krizi. V posledních letech, kdy centrální banky po celém světě provádí politiku nízkých úrokových sazeb, a zmírňují tržní rizika, je akutní otázka, zda tato politika nepřispívá k vytvoření další úvěrové konjunktury. Náš článek se zabývá tímto tématem z pohledu získávání informací zástupců finančního trhu. Sestavíme teoretický model, který zachycuje nadměrné podstupování rizika v reakci na změny úrokové sazby a/nebo tržní volatility. Toto nadměrné riziko získává formu zvýšené chuti zástupců finančního trhu riskovat, ale také snížené motivace získávat informace o rizikových aktivech. V důsledku sníženého tržního rizika, mají zástupci finančního trhu tendenci hromadit více rizika ve svých portfoliích než v případě s vysokým tržním rizikem. Stejné mechanismy zvyšují riziko portfolia, když je úroková sazba snížena. Robustnost získaných výsledků je posuzována z hlediska různých pravidel učení.

Klíčová slova

Rational Inattention, úrokové sazby, finanční krize, podstupování rizika

JEL Codes
E44, E52, G14, D84

Introduction

The paper is motivated by the debate about whether a low policy rate has contributed to the recent financial crisis and if the ongoing policy of low interest rates is contributing to the building up of a new financial bubble. There are voices among policy-makers and academics suggesting that one could observe worrying tendencies of risky asset accumulation[1]. There is evidence of an increased risk appetite, which is believed to be attributed to accommodative monetary policy conditions and subdued market volatility (for the evidence see, e.g., Bank for International Settlements 2014). At the same time both proponents and opponents of a low policy rate do not have clear answers as to what tools a central bank should use in order to maintain price stability and stimulate output growth on the one side, and financial stability on the other (for a recent debate on this see Stein 2013 and Bernanke 2013).

The question asked in this paper is if endogenous information acquisition can drive over-accumulation of risk when safe interest rates or market volatility is reduced. It is common that in portfolio choice models with rational expectations, investment into a risky asset is linear in excess return. In our model, when the policy rate or market volatility falls, risk accumulation in the economy increases in a nontrivial way.

We capture the excessive risk accumulation by modeling information decisions. Financial agents invest in information to reduce the variance of their forecasts. We show that when market volatility declines, agents invest into information less and acquire more of a risky asset. This results in an even larger portfolio risk than in the economy with higher market volatility. With interest rates being lowered, our model not only captures the standard "search-for-yield" effect, where financial intermediaries invest more into risky assets. We also show an increase in agents' ignorance about the asset quality. With low information investment and large risky asset holdings it implies a larger portfolio risk accumulation.

The main contribution of our model to the current debate is that it mimics excessive risk-taking of financial agents. We show that average risk monitoring declines with lower interest rates despite the growth in excess return on a risky asset. Another result is over-accumulation of risky assets in a low risk environment. That is to say with low variance of risky asset return, agents take more risk in their portfolio than they would have with a high risky asset variance. This effect is explained in our model with just one deviation from rational expectations: agents do not know the future return, but only its distribution, i.e. there is no assumption of agents' irrationality. In our model, this result is driven by a decline in risk monitoring in low risk environment. Combined with an increase in risky asset acquisition, it results in higher portfolio variance compared to high variance environment.

1 *For the evidence see Stein (2013); the recent examples of uncertainty among policy makers could be found in articles by Chris Giles "Central Bankers Say They Are Flying Blind " and "IMF warns on risks of excessive easing" in The Financial Times, April 17, 2013.*

To check the robustness of the results, in the spirit of Nieuwerburgh and Veldkamp (2010) we consider two alternative learning functions, a linear and an entropy based. The rise in portfolio risk when the safe interest rate falls is robust to a learning rule specification. The increase in risk with falling market volatility is more pronounced in a linear learning rule.

1 Related Literature

Our study relates to the several stands of literature. First, there is the literature on the role of interest rates in mitigating or stimulating asset booms, in particular papers providing empirical evidence that easier monetary policy is associated with higher risk-taking. Maddaloni (2011) concludes that, for the euro area and US, low short-term interest rates cause softening of the banks' lending standards. Additional support for a risk-taking channel of monetary policy can be found in Gambacorta (2009) and Ongena and Peydro (2011). Adrian et al. (2010) find empirical support for the notion that monetary policy effects the supply of credit, operating through the term spreads; and that monetary policy can influence risk appetite. Ahrend (2010) focuses on a different aspect of the financial imbalances - on excessive asset prices growth, and finds that low interest rates cause growth in some asset prices in OECD countries, particularly on the housing market. Detken and Smets (2004) come to the similar conclusion that low policy rates coincide with asset price booms. The evidence on the dynamic interaction between stock prices and Federal Reserve policy rate is provided by Laopodis (2010). White (2012) discusses the "unintended consequences" of easy monetary policy, among which are misallocation of credit and structural changes in the financial sector, e.g. movements from traditional banking model to shadow banking. Statistical evidence that a long period of low interest rate and low market volatility have contributed to excessive risk-taking is summarized in the Annual Report of the Bank for International Settlements (2014).

There are theoretical studies focusing on the channels through which monetary policy affects risk-taking or asset prices. Taylor (2007 and 2010) suggests that the Fed´s low rates stimulated a house price boom through credit growth. The several mechanisms through which the risk-taking channel of monetary policy could work are mentioned in Borio and Zhu (2008). In particular, search-for-yield implies that low interest rates result in a low return on the safe assets, which pushes investors to accumulate more of the risky ones in the search for an acceptable portfolio return. Also low interest rates imply a lower discount factor for evaluation of assets or income flows, causing higher risk tolerance. Our model incorporates both of these channels within the bank's portfolio choice problem.

The banks risk monitoring incentives in connection with monetary policy are studied in the model of Dell Ariccia et al. (2010). Their findings depend on the banks capital structure and the possibility of adjusting it. They conclude that with a flexible capital structure monetary policy easing leads to higher leverage and risk-taking. Their approach, however, is different from that pursued in this paper in several respects. They concentrate on a partial equilibrium model, where banks choose the probability of loan repayment subject to costs. Therefore, in their model banks do not learn about the asset quality, but invest to increase return probability. We build a general equilibrium model where banks are uncertain about the risky asset return, but might invest in reducing their uncertainty. That

is, learning does not influence the return probability, but makes banks more informed. Therefore, we capture two aspects of risky behavior - investment in an asset known to be risky and investment into learning about the asset quality.

Another strand of literature our study is related to is dedicated to the learning and expectation formation and relaxation of the assumption of rational expectations. Among the papers to support the importance of imperfect expectations and learning are Boz and Mendoza (2010), Bullard et al. (2010), Kurz and Motolese (2010), Lorenzoni (2009), Adam and Marcet (2010). Empirical support for the role of imperfect expectations can be found in Fuhrer (2011) and Beaudry et al. (2011). In this paper we incorporate the idea that agents do not have perfect foresight and have to form subjective expectations about risky asset return. We use the approach of Nieuwerburgh and Veldkamp (2010) to model the banks decisions to invest in learning about the risky asset. In Nieuwerburgh and Veldkamp (2010), the investor draws an additional signal about asset return, and pays for an increase in the signal precision before observing it. We modify their formulation for information acquisition, so that in our model agents select the information budget depending on risk premia and market volatility.

To conclude, our study is motivated by rich empirical evidence. Our model explores causalities between monetary policy and agents' risk-taking. We also show that prolonged periods of low interest rates or low risk lead to excessive accumulation of risk.

The remainder of the paper begins with analysis of a partial equilibrium model to describe the intuition for the main results. In section 3 the financial sector is described, and the intuition for excessive risk-taking is presented in section 4 within a partial equilibrium. In section 5 we complete the model for general equilibrium and then proceed with the calibration, simulations and discussion in section 6. The last section concludes.

2 The Model of Financial Sector

Consider a model with a financial intermediary, bank, a manufacturing firm and a household. The assets in the economy are manufacturer claims (a risky asset) and reserves (a safe asset). The risk in manufacturer claims comes from the uncertainty about future productivity. All the agents in the economy know the productivity distribution. The household puts savings in the bank (in the form of investment), and the bank transfers all its profit back to the household. The safe and risky interest rates are set by the market.

The bank is risk-averse, which is motivated by the fact that banks are often subject to regulations and have reputational concerns for the safety of their deposits. We then expand the model and grant financial intermediary access to a noisy signal about future productivity. This signal helps the agents to reduce the variance of their forecast. Yet they have to pay for it. Banks are Bayesian, they form forecasts of risky returns as a weighted average of their prior and the signal.

We abstract from any nominal variables in the model. All the prices and returns are real. In what follows, we present the model set-up. We start with a partial equilibrium model

to illustrate the mechanism of the excessive risk-taking and information acquisition. Then we simulate general equilibrium model to study the model dynamic and potential role of interest rates feedback[2].

We start with a description of the financial sector.

Banks. The bank is risk-averse and has mean-variance utility in its next period net return:

$$\max_{k_t^b} E_t \Pi_{t+1} - \frac{1}{\rho} Var\left(\Pi_{t+1}\right) \tag{1}$$

where ρ is the risk aversion parameter, k_t^b is the bank's risky asset holdings and Π_{t+1} stands for the next period return. That is, portfolio variance is costly and the bank, therefore, has incentives to reduce it. The next period return consists of the return on the bank's portfolio minus the information budget:

$$\Pi_{t+1}^b = d_t R_t^s + k_t^b \left(R_{t+1}^r - R_t^s\right) - b_t \tag{2}$$

where d_t is household investment, R^r and R^s are respectively gross returns from risky and safe assets, b_t is the information budget selected by the bank. The bank's future return depends on the amount of funds it has for investment - d_t, and from a composition of its portfolio - quantity of risky asset, k_t^b: Note that the return is reduced by the information investment, b_t:

The bank's objective is to maximize (1), and the choice variables are information budget, b_t, and risky asset quantity k_t^b. Compared to the strand of literature on rational inattention with exogenous capacity constraint, here we endogenize capacity and formulate it in budget terms.

Maximizing the bank's utility, we get its holdings of the risky asset:

$$k_t^b = \frac{E_t R_{t+1}^r - R_t^s}{\rho \widehat{\sigma}_t^2} \tag{3}$$

where $\widehat{\sigma}_t^2$ is risky asset return variance. Sign '^' stands for posterior variance, updated after information decisions. As is typical in the literature, the amount of risky assets bought is increasing with excess return, $E_t R_{t+1}^r - R_t^s$, and is decreasing with risk aversion, ρ, and risky asset return variance $\widehat{\sigma}_t^2$.

For simplicity, we make the bank transfer all its profit to the household in return to their savings, d_t.

Information Acquisition. The information acquisition is modeled similar to Nieuwerburgh and Veldkamp (2010). In their paper an investor is allocating his/her exogenously limited capacity to learn between different assets depending on his/her portfolio decisions. In our

2 *In our model a risky interest rate could be viewed as a reverse of the asset price. With larger demand for a risky asset, it drops, potentially offsetting higher risk appetite.*

model, we endogenize learning capacity by replacing it with the budget, b_t. The bank then chooses the budget to determine how much to learn subject to fixed learning costs, *a*.

Financial intermediaries can reduce the variance of their return forecast by investing into additional signal and pay costs proportional to the variance reduced. The decision to monitor is taken ex-ante signal realization. For this purpose, the period is decomposed into sub-periods. The timing is as in table 1.

Table 1: The Timeline of Information Decisions

subperiod 1	subperiod 2
$\mu_t \sim N(R^r_{t+1}, \sigma^2_t)$	information signals are realized
expected posterior return is $E\hat{\mu} \sim N(\mu, \hat{\sigma}^2_t)$	$\hat{\mu}$ is formed using Bayes rule,
budget, b_t and $\hat{\sigma}^2_t$ are chosen	and portfolio is chosen: k^b_t

In table 1 μ_t is the bank's prior about future return, R^r_{t+1}, $E\hat{\mu}$ is the posterior the bank expects to get after observing the signal. $\hat{\sigma}^2_t$ is the posterior variance after observing the signal[3].

In the first subperiod the agent has prior variance, $\hat{\sigma}^2_t$; and expected return, μ_t, both coinciding with true moments of return distribution. The agent decides what budget to allocate to information decision. The choice of the budget determines by how much the variance will be reduced. In the spirit of Nieuwerburgh and Veldkamp (2010) we interpret it as an investment into purchasing additional market data, when an agent does not have prior knowledge of what is in the data, but knows that this data will sharpen his/her forecast. We model this decision as a choice of budget that determines posterior variance, $\hat{\sigma}^2_t$. When choosing the budget and posterior variance, agent takes into account what the return expectations will be after the signal is observed. In other words, the agent has to form expectations about return expectations: expected posterior $E\hat{\mu}$. Yet before paying for the signal and observing it, the expected posterior equals the prior $E\hat{\mu} = \mu$.

When taking decisions in subperiod 1, the agent rationally anticipates the demand for the risky asset in the subperiod 2 as in (3) where $\hat{\sigma}^2_t$ is posterior variance of the return. Thus, with the information investment - budget bt and (3), the banks utility is rewritten:

$$\max_{b_t, k^b_t} E_t \Pi_{t+1} - \frac{1}{\rho} Var\left(\Pi_{t+1}\right) \tag{4}$$

subject to the learning rule:

$$f\left(\sigma^2_t, \hat{\sigma}^2_t\right) \cdot a \leq b_t, \tag{5}$$

3 *All posterior variables are formed using Bayes rule.*

and non-forgeting constraint: $\sigma_t^2 - \hat{\sigma}_t^2 > 0$. a is cost of reducing the variance, and $f(\sigma_t^2, \hat{\sigma}_t^2)$ is the learning function. The function is continuous and monotone in both of its arguments, it is increasing in initial variance, σ_t^2, and is decreasing in posterior, $\hat{\sigma}_t^2$. Intuitively, the more we reduce the posterior variance relative to the prior, the more we should pay. We assume that the information budget is exhausted so that (5) becomes equality. Then with the properties of our learning function, the choice of the information budget, b_t, uniquely determines the posterior variance and captures the information decision of the bank.

In the following section we consider risk-taking decisions of the bank in a partial equilibrium to identify risk driving forces.

Aggregating Financial Markets. The total investment into the safe asset, res, is given by the bank's financial resources not invested into the risky asset:

$$res_t = d_t - k_t^b$$

The investment into the safe asset is determined as deposits, dt, that was not invested in the risky asset, k_t^b.

Recall, that the risky asset in the model is the investment in the manufacturing firm, which uses it to build new capital. The manufacturing firm does not have funds for investment on its own. To invest it has to sell its claims to the bank. Thus, the total investment into the capital is then given by the bank's risky asset holdings:

$$I_t = k_t^b$$

3 Excessive Risk-Taking and Information Acquisition

In this section we analyze the two channels through which a bank accumulates risk in the portfolio when the safe interest rate is reduced or market volatility declines. One of them is clear from (3): whenever the safe interest rate drops, it increases the risk premium and makes the risky asset more attractive. Similarly, when asset variance is reduced, the bank rationally increases holdings of the risky asset. The other channel highlighted in this paper is a change in information acquisition: reduction in the information budget. Through this channel, the bank increases the riskiness of the asset per se by choosing to learn less about it. The portfolio risk then, as a product of risky asset holdings and return variance, increases with the lower interest rate and, in some cases, lower market volatility.

At first glance, the reduction in information acquisition with increase in risky asset holdings might seem counter-intuitive. It could be suggested that with larger asset holdings, agents would like to learn more about them. For example Nieuwerburgh and Veldkamp (2010) found that when allocating fixed learning capacity between the assets, agents allocate more to those assets they invest more into. Here, we should remind the reader, that in our paper we are studying not the allocation of the fixed capacity, but the determination of this capacity: by how much agents are willing to reduce their expected income in order to reduce the income variance. Also this capacity, in the form of the information budget, is itself a function of expected return and initial variance. It describes a trade-off between

the return the agent expects to get and variance he/she would like to reduce. Below, we study the properties of the information budget for specified learning functions.

As learning function choice could influence the results (and we show later that this is the case), we consider alternative functions. Nieuwerburgh and Veldkamp (2010) show that the choice of utility function and learning technologies in uences results quantitatively and, sometimes, qualitatively. They consider mean-variance and exponential utility functions, and three learning rules: one linear and two entropy based measures. Below, we study mean-variance utility under linear and entropy learning functions.

Information Budget and Comparative Statics. As in Nieuwerburgh and Veldkamp (2010) we consider alternative learning functions, $f(\sigma_t^2, \hat{\sigma}_t^2)$ in (5): a linear rule and an entropy based. The linear function implies that the bank pays fixed costs, a, for each unit of the linear decline in the variance:

$$b_t = a(\sigma_t^2 - \hat{\sigma}_t^2) \tag{6}$$

Linear constraint is an intuitive rule and simple to work with. The one caveat is that it is marginally as costly for the agents to reduce the variance by 1% as by 100%. Agents potentially could choose to learn the whole truth and choose the posterior to be zero. This, of course, is very costly for them in absolute terms of linear costs, a, and this never happened in our simulations. But in the general case, one should consider this possibility.

The entropy based constraint implies that the agent pays for each unit of log variance decrease. One can find some variation in the definition of the entropy based learning rule. For example, in Nieuwerburgh and Veldkamp (2010) it is the simple ratio of prior to posterior variance. Mackowiak and Wiederholt (2009) use the logarithm of base 2, while there are many papers on rational inattention using a natural logarithm (e.g. Matejka and McKay (2015) and Cabrales et al. (2013)). In our definition of entropy we follow Mackowiak and Wiederholt (2009)[4]:

$$b_t = a \cdot log_2 \left(\frac{\sigma_t^2}{\hat{\sigma}_t^2} \right) \tag{7}$$

The advantage of the entropy rule is that when the agent gets closer to learning the true state of the world (posterior variance goes to zero), the required budget goes to infinity. The entropy constraint is also well-motivated for analysis of processing the information subject to limited capacity. In our case, however, the agent's decision resembles more a choice of a quality of market report to buy or market expert to pay, than processing market data him/herself. That is, in our view, both types of constraints are well reasoned here.

To select the information budget the agent maximizes the utility as in (4), but the decision is now divided in two subperiods. The information budget is chosen in the first subperiod:

$$\max_{b_t} E_{t,1} \left(E_{t,2} \Pi_{t+1} - \frac{1}{\rho} Var_{t,2}(\Pi_{t+1}) \right) \tag{8}$$

subject to (3) and posterior variance, $\hat{\sigma}_t^2$, given by one of the learning rules: (6) or (7).

4 The results with a natural algorithm do not differ qualitatively, and there is a minor quantitative difference.

Note, that in (8) the agent chooses b_t in the first subperiod before knowing his expected return in the second subperiod (before the signal - market report - is realized). Adopting the formula from Nieuwerburgh and Veldkamp (2010), formula 14, we have:

$$\max_{b_t} -0.5 + \frac{\sigma_t^2}{\hat{\sigma}_t^2} \cdot \left(1 + \frac{(\mu_t - R_t^s)^2}{\sigma_t^2}\right) - b_t$$

It is instructive to analyze comparative statics of the resulting solutions. In the partial equilibrium model we take as given both assets returns, $E_t R_{t+1}^r$ and its mean, and R_t^s. It will be convenient then to consider model's response to change in expected risk premia, $E_t R_{t+1}^r - R_t^s$. In a general equilibrium, both returns will be determined by the market clearing condition, with a stochastic component influencing risk asset return. In table 2, the changes in the information budget with respect to variables of interest are described (for full description of the derivatives, the reader is referred to the appendix).

Table 2: Comparative Statics: Information Budget

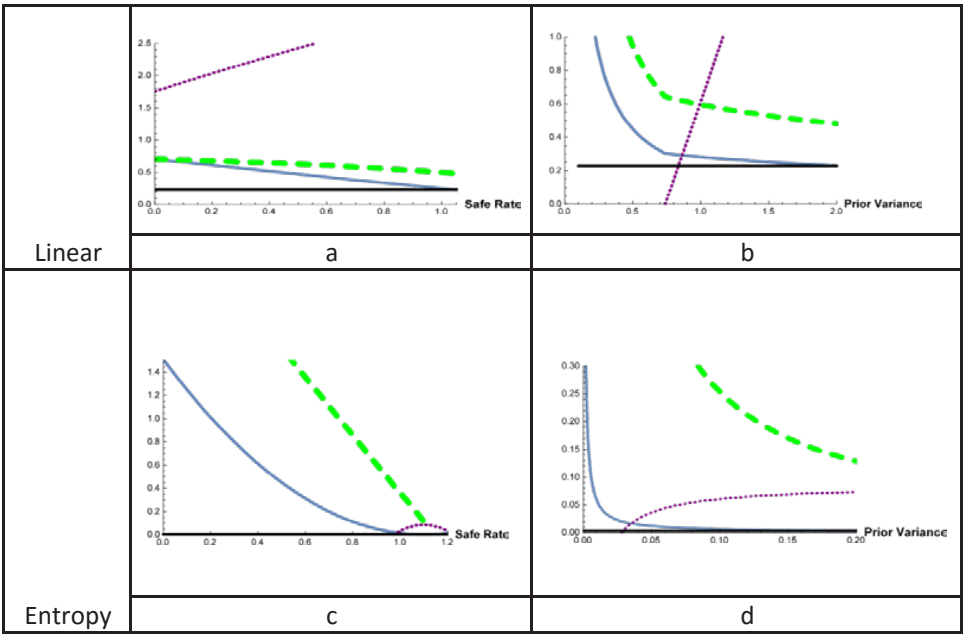
Information budget derivatives	Linear rule	Entropy rule
$\frac{\partial b_t}{\partial(\mu_t - R_t^s)}$	negative	negative for $\mu_t > R_t^s$, otherwise 0
$\frac{\partial b_t}{\partial \sigma_t^2}$	positive	positive for $\mu_t > R_t^s$, otherwise 0
$\frac{\partial b_t}{\partial a}$	positive	positive, but negative for relatively small

Comparing derivatives under both learning rules in table 2, we see the similar signs of the responses. The information budget rises when initial variance rises, so that with larger volatility in the market, agents are willing to sacrifice a larger budget to reduce uncertainty. Also, with a larger expected risk premium agents are willing to invest less in reducing the uncertainty, as the larger expected return compensates agents for taking a risk.

Table 2 explains the information channel of increase in risk-taking. When the safe interest rate falls, it decreases the expected risk premium (which is $(\mu_t - R_t^s)$), and decreases the information budget. With a lower information budget, the agent has a larger posterior variance. Similarly, with a lower initial volatility (prior variance), the agent decides to have a smaller information budget. The initial effect of a reduction in interest rate or initial variance on the risky asset position is positive. It could be suggested, that a small information budget and larger posterior variance may offset this effect. We show below that this is not the case in our model. The bank's risky position rises, and, together with small information acquisition, drives up portfolio variance.

Risk Accumulation in Partial Equilibrium. Calculating derivatives with respect to risk premium and prior variance, we find that risky asset holdings decrease in initial variance and increase in risk premium[5]. Figure 1 illustrates this point. The graphs were drawn with fixed interest rates. Later in the paper we analyze a general equilibrium model where interest rates are set by the market.

Figure 1: Risk Accumulation in a Partial Equilibrium



Note: dotted line corresponds to information budget b, dashed line - to risky asset holdings kb, solid line - to portfolio variance, bold solid line - steady state portfolio variance

In figure 1 panels *a* and *b* correspond to a model with a linear learning rule; and *c* and *d* to an entropy learning rule. The solid black line on all the graphs shows the initial (before reduction in safe interest rate and variance) portfolio variance. The solid blue line represents portfolio variance, its rise over the initial level shows the increase in portfolio variance. The channels of portfolio variance increase are clear from the figure: there is a decline in information acquisition, b_t[6], and an increase in risky asset holdings, k_t^b.

Panels *a* and *c* in figure 1 show, that when the safe interest rate falls, there is a larger risk accumulated in the portfolio. The risky asset position increases and the information budget falls. This resembles the debate that a low interest rate environment stimulated excessive risk-

5 *With the entropy learning, the risky asset position increases in risk premium for large enough* σ_t^2. *All derivatives are in the appendix.*

6 *At some point (panels b-d) the information budget hits zero. At this point, the model behaves the same as the one without information acquisition. Below this point, a sharper increase in risky asset holdings,* k_t^b, *is observed.*

taking during the Great Moderation. In our model, we capture also lower incentives to get information about the risky asset the agent becomes more ignorant about the asset quality.

A similar result is found for reduction in market volatility in panels b and d. Surprisingly, when the prior variance falls, the agent ends up with a larger portfolio risk than in a higher variance environment. This result is, again, driven by the information channel: an agent is willing to pay less for variance reduction when it is already small; and by larger risky asset accumulation when the risk gets smaller. This finding could be also be applied to the Great Moderation period, when market volatility was perceived to be low and financial agents demonstrated a higher risk appetite.

Of course, when trying to explain overaccumulation of risk during the Great Moderation, other forces besides the low volatility, mentioned, and a low safe interest rate environment could be considered. We show in this paper, however, that market volatility and low policy rates could be contributing factors to increase in risk preferences. These are also important factors to consider when addressing current central banks' policy of low interest rates and suppressing market volatility.

Next, we complete the model and consider risk accumulation in a general equilibrium.

4 General Equilibrium Model

Here we briefly describe the rest of the model and general equilibrium. Then we consider the equilibrium impact of the interest rate change on risk preferences and information acquisition, when there is feedback between the agents' asset holdings and market interest rates.

Household. There is a representative household which maximizes the following utility function:

$$\max_{\{c_{t+i},d_{t+i}\}_{i=0}^{\infty}} E_t \sum_{i=0}^{\infty} \beta^i u\left(c_{t+i}\right) \tag{9}$$

subject to a budget constraint:

$$d_t + c_t = \pi_t^{fin} + \pi_t^p - t_t \tag{10}$$

where d_t is household savings, ${}^f\pi_t^{fin}$ is realized profit from the financial sector, π_t^p is realized profit from manufactures and *t* is tax. The household decides how much to consume and to invest in the bank. Its income is generated by the bank s and manufacturer's profits net of lump-sum taxes. $u(c)$ is twice differentiable and concave. Note, that we abstract from any labor decisions.

The consumption Euler equation looks standard and relates gross interest on savings to the stochastic discount factor:

$$u'(c_t) = R_{t+1}^d \beta E_t u'(c_{t+1}) \tag{11}$$

$$R_{t+1}^{d} = R_t^s + \frac{k_t^b}{d_t}(R_{t+1}^r - R_t^s) \tag{12}$$

Manufacturer. On the production side there is a representative producer with a production function:

$$y_{t+1} = z_{t+1}k_t$$

where z is stochastic productivity.

The producer needs to borrow money to finance investment (make new capital), and the law of motion for capital is then:

$$k_{t+1} = I_t + (1\text{-}\delta)k_t \tag{13}$$

The producer maximizes one period profit, which consists of revenues minus payment on the loan for investment purposes:

$$\max_{k_{t+1}} E_t \pi_{t+1}^p = E_t \left(y_{t+1} - R_{t+1}^r * I_t\right) \tag{14}$$

where R^r is the gross interest rate paid to investors in the capital. We define R^r as

$$R_{t+1}^r = z_{t+1}\alpha \left(k_{t+1}\right)^{\alpha-1} \tag{15}$$

That is, R^r depends on future productivity, is decreasing in capital, and is uncertain from the investors point of view because of the uncertain *z*. Productivity z is such that the expected return is as modeled in table 1.

Note, that all variables are expressed in real terms - in the units of final output.

4.1 Central Bank and Government

It is assumed that the government pays gross interest on the safe asset, and finances expenditures by taxing the household. The government budget is balanced:

$$g_t = taxes_t = R_{t-1}^s res_{t-1} - res_t \tag{16}$$

The role of the central bank in this economy is limited. Here we allow for a shock to the safe interest rate through the household s Euler equation (11) which is supposed to resemble monetary policy shock.

4.2 Equilibrium

Equilibrium in this model is a set of allocations: $\{c_t, d_t, y_t, k_t, k_t^b, res_t, b_t, \hat{\sigma}_t^2, g_t\}_0^\infty$ such that given prices and beliefs all agents solve their problems and markets clear.

5 Simulations

5.1 Calibration and Parameter Values

In the model, most of the parameters are standard. The only nonstandard parameters are learning costs, *a*, moment of productivity distribution - $E(z)$ and initial variance of agents' beliefs, σ_t^2.This group of parameters was selected to ensure the existence of solutions, and non-negative values of information cost, b_t[7]. Also, for alternative learning specifications, to ensure the existence of equilibrium, these three parameters have to be different.

Table 3: Parameter Values

		Linear	**Entropy**
ρ	risk-aversion	2	
α	capital share	0.33	
δ	depreciation	0.02	
β	discount factor	0.95	
$E(z)$	mean productivity	10	
a	information costs	1	1.5
σ_t^2	prior variance	1.1	

Table 3 shows the selected parameter values used for the simulation below. In this paper we are focusing mainly on intuition, how low policy rates and / or subdued market volatility can influence risk-taking and what the contribution of the information channel could be. Above, in the section on partial equilibrium, we show that both risk-taking channels work regardless of parameter values. That is why we consider our procedure for selecting information costs and prior variance satisfactory for our purpose. If, however, one is targeting quantitative effects, more rigorous calibration of information costs and market volatility is necessary. For the mean productivity values, we are targeting that the condition $z_{t+1}\alpha\left(k_{t+1}\right)^{\alpha-1} > R_t^s$ is satisfied in the steady state. Even though the selected number seems to be large, it results in steady state risky asset return 1.2369 and 1.0920 for linear and entropy rules respectively.

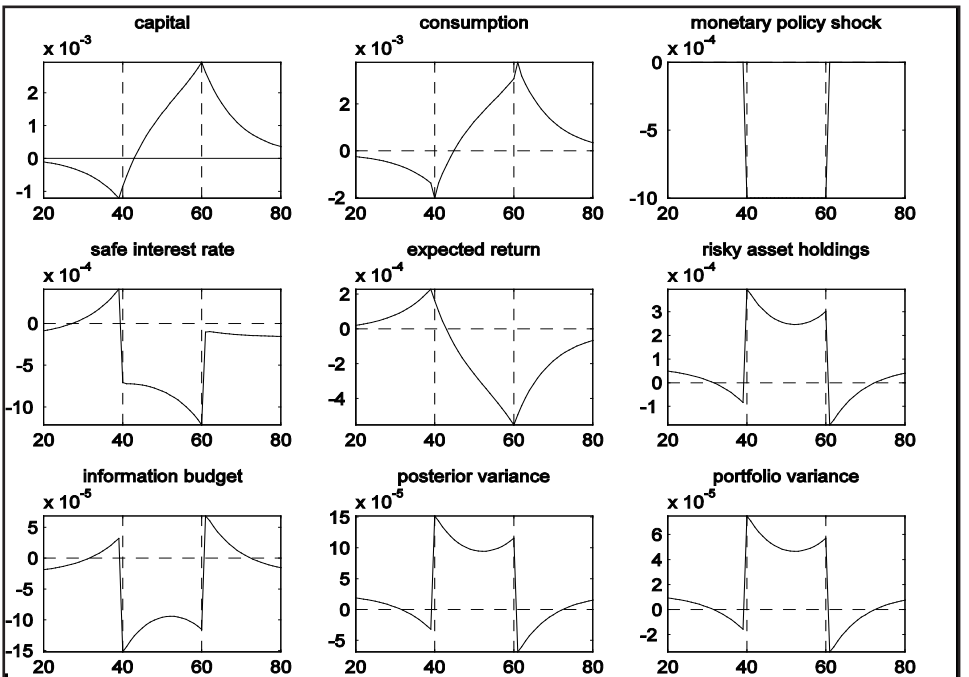
In the next subsection we show general equilibrium results for our model of information acquisition.

7 *Condition for the existence of non-negative bt are in appendix.*

5.2 Simulations

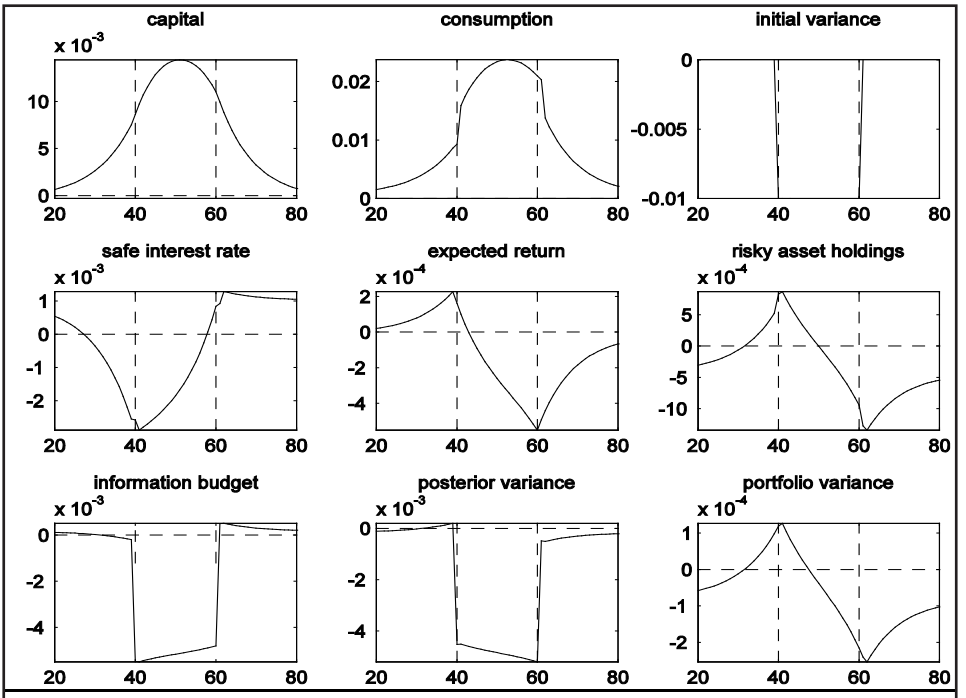
We start with a linear learning rule model. For the simulations[8], we lowered the initial variance or safe interest rate for 1% and 0.1% respectively for 20 periods. The safe interest rate was reduced using a deterministic shock to the household's Euler equation (11). After 20 periods, both of the variables return to their steady state values, together with other model variables. Figure 2 reports responses for a linear learning rule model. The vertical dashed lines mark the start and end of the decline in selected variables. Panel a shows the reaction to a shock to the Euler equation, which we here call "monetary policy". Recall that there is no money in the model, and this name is figurative to suggest that the shock to the safe interest rate resembles monetary authority action in a full-blown New Keynesian model. One also can note from the panel a that agents are rational and the safe interest change is expected: the slight adjustment to the change starts ahead of the actual shock realization. Following the decline in the safe interest rate, the bank's risky asset holdings increase. The risky asset is investment into capital in our economy, which is why additional capital is accumulated. Larger capital accumulation reduces the expected return on capital. This is the force that returns the model to the steady state after the policy is removed. Before this, there is a drop in the information budget as a larger risk premium (expected return on risky asset falls less than safe interest rate) makes an agent tolerate larger risk. Lower information acquisition determines larger posterior variance. Both larger posterior variance and the risky asset position increase the bank's portfolio risk.

Figure 2: Linear Learning Rule



a. Accommodative "Monetary Policy" Shock, 0.1%

8 *The simulations are done using Dynare version 4.2.*

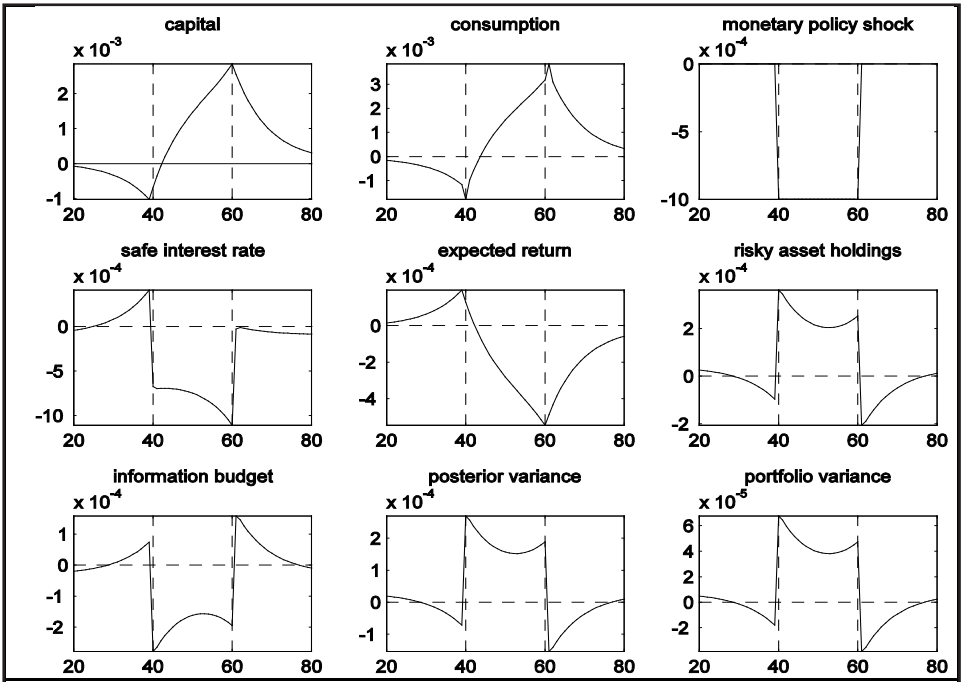


b. Prior Variance Reduction by 1%

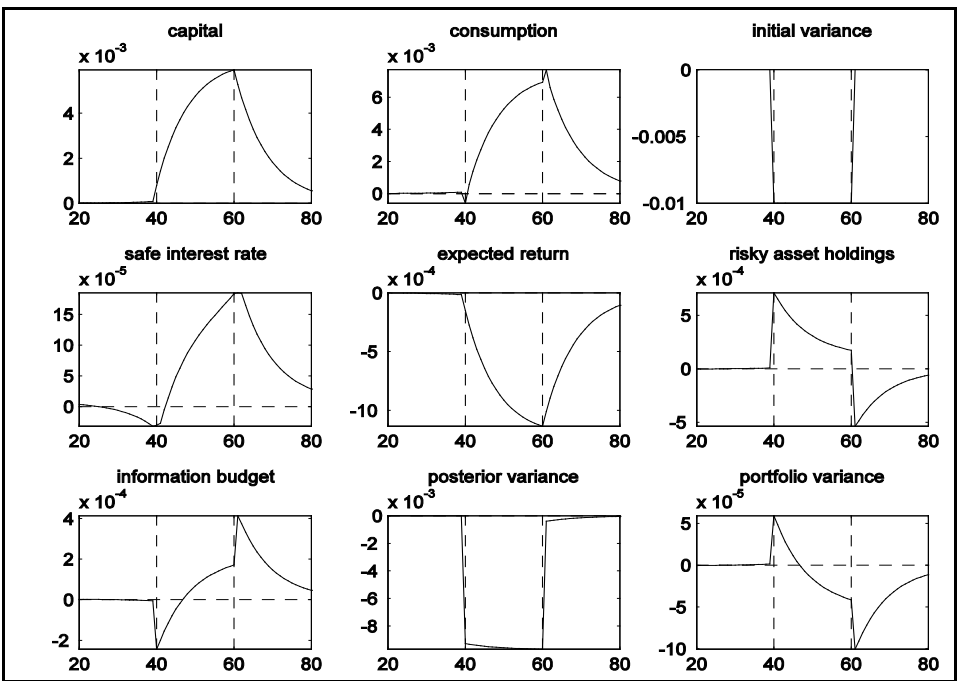
For the change in initial variance, panel b, we also observe some adjustments beforehand. Anticipating decline in the variance, risky-asset holdings, capital and consumption start to increase before the actual variance reduction. Accumulation of capital declines the return on capital, which is the risky asset in our model. At period t =40 when the initial variance falls, the information budget falls too. Posterior variance, being the difference of prior variance and the information budget, declines, but two times less than the prior. Information costs are unity in this model, which is why, without the information channel the posterior variance from (6) should fall by the same amount as the prior variance. A decline in the information budget here reduces the effect of initial volatility on the risk that agents are facing. This and a rise in risky asset portfolio holdings increase portfolio variance above the steady state level. At period t =50, when the expected return reaches its minimum value, risky asset holdings and portfolio variance start declining. After the policy is removed and the level of capital reduced, the increasing expected return returns the economy back to the steady state.

For the model with the entropy learning rule, figure 3, panel a; a very similar response to interest rate decline is found. A reduction in safe interest rates simultaneously reduces information acquisition and increases risky asset holdings. A combination of the two increases the bank's portfolio risk.

Figure 3: Entropy Learning Rule



a. Accommodative "Monetary Policy" Shock, 0.1%



b. Prior Variance Reduction by 1%

When considering a reduction in prior variance, figure 3, panel b, a different response of the information budget and safe interest rate is observed. Risky asset holdings are increased, raising capital and consumption and decreasing the expected return. At the same time there is a reduction in the information budget, but unlike in the linear model, this effect is short-lived, and is reversed in a couple of periods. This leads to short-lived increase in portfolio variance, which declines afterwards. If in the linear model the information budget is always below the steady state level for lower prior variance, it is not the case in entropy. With the entropy constraint, there is a larger effect of falling expected return on the information budget. With the expected return falling, the information budget starts to increase, decreasing posterior variance and portfolio risk. Also, the initial fall in the information budget is less pronounced than in the linear model. The difference is partially attributed to larger information costs and partially to a different functional form of learning function.

Conclusions

This paper addresses the debate as to whether periods of low policy rates and low market volatility could lead to overaccumulation of risky assets. It is motivated by the number of empirical studies showing that increase in risk appetite is associated with low policy rates.

We contribute to the literature by building a model with rationally inattentive financial agents, who decide how much to invest in information acquisition subject to information costs. Information acquisition is modelled as paying for a decline in risky asset variance. We consider two basic learning functions: entropy and linear learning rule.

It is then shown that with a low safe interest rate there are two channels of increase in risk-taking: a standard in the literature search-for-yield, and a decline in the information budget. These two channels result in a high risky asset position and high risk of the asset per se, as an agent face higher uncertainty about asset returns. As a result, agent accumulates more risk in his or her portfolio when the safe asset rate falls. These findings are robust to the learning rule specification.

Another result is larger risk-taking with the decline in risky asset volatility. When the variance of risky return falls, agents rationally increase their risky asset holdings. At the same time, they are willing to pay less for further reduction in return variance. Lower incentives for information acquisition partially offset the drop in initial variance, with posterior variance falling much less than the prior. In combination with larger risky asset holdings, it increases agent's portfolio variance.

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References

ADAM, K. and A. MARCET (2010) *Booms and busts in asset prices*. IMES Discussion Paper Series 10-E-02, Institute for Monetary and Economic Studies, Bank of Japan.

ADRIAN, T., A. ESTRELLA and H. S. SHIN (2010) Monetary cycles, financial cycles, and the business cycle. Technical report.

AHREND, R. (2010) Monetary ease: A factor behind financial crises? Some evidence from OECD countries. *Economics - The Open-Access, Open-Assessment E-Journal* 4(12), 1 30.

BANK FOR INTERNATIONAL SETTLEMENTS (2014) 84th annual report: 1 april 2013 31 march 2014.

BEAUDRY, P., D. NAM, and J. WANG (2011) *Do mood swings drive business cycles and is it rationa*l. Working Paper Series 17651, NBER.

BERNANKE, B. S. (2013, March 1) Long-term interest rates. San Francisco, California. Annual Monetary/Macroeconomics Conference: *The Past and Future of Monetary Policy.*

BORIO, C. and H. ZHU (2008) *Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?* BIS Working Papers 268, Bank for International Settlements.

BOZ, E. and E. G. MENDOZA (2010) *Financial innovation, the discovery of risk, and the U.S. credit crisis.* NBER Working Papers 16020, National Bureau of Economic Research, Inc.

BULLARD, J., G. EVANS, and S. H. SEPPO (2010) A model of near-rational exuberance. *Macroeconomic Dynamics* 14(2), 166 188.

CABRALES, A., O. GOSSNER and R. SERRANO (2013) Entropy and the value of information for investors. *American Economic Review* 103(1), 360 377.

DELL ARICCIA, G., L. LAEVEN, and R. MARQUEZ (2010) *Monetary policy, leverage, and bank risk-taking.* IMF Working Papers 10/276, International Monetary Fund.

DETKEN, C. and F. SMETS (2004) *Asset price booms and monetary policy*. Working Paper Series 364, European Central Bank.

FUHRER, J. (2011) *The role of expectations in U.S. in ation dynamics.* Working Paper Series 11-11, Federal Reserve Bank of Boston.

GAMBACORTA, L. (2009) Monetary policy and the risk-taking channel. *BIS quarterly review* (December), 43 53.

KURZ, M. and M. MOTOLESE (2010) Diverse beliefs and time variability of risk premia. *Economic Theory* 47(2), 293 335.

LAOPODIS, N. (2010) Dynamic linkages between monetary policy and the stock market. *Review of Quantitative Finance and Accounting* 35(3), 271 293.

LORENZONI, G. (2009) A theory of demand shocks. *American Economic Review* 99(5), 2050 2084.

MACKOWIAK, B. and M. WIEDERHOLT (2009) Optimal Sticky Prices under Rational Inattention. *American Economic Review* 99(3), 769 803.

MADDALONI, A. (2011) Bank risk-taking, securitization, supervision, and low interest rates: Evidence from the euro-area and the U.S. lending standards. *Review of Financial Studies* 24(6), 2121 2165.

MATEJKA, F. and A. MCKAY (2015) Rational inattention to discrete choices: A new foundation for the multinomial logit model. *American Economic Review* 105(1), 272 298.

NIEUWERBURGH, S. V. and L. VELDKAMP (2010) Information acquisition and underdiversification. *Review of Economic Studies* 77(2), 779 805.

ONGENA, S. and J. PEYDRO (2011) Loose monetary policy and excessive credit and liquidity risk-taking by banks. Technical report.
STEIN, J. C. (2013, February 7) Overheating in credit markets: Origins, measurement, and policy responses. St. Louis, Missouri. A Research Symposium sponsored by the Federal Reserve Bank of St. Louis.
TAYLOR, J. B. (2007) Housing and monetary policy. *Proceedings*, 463 476.
TAYLOR, J. B. (2010) Getting back on track: macroeconomic policy lessons from the financial crisis. *Review* (May), 165 176.
WHITE, W. R. (2012) Ultra easy monetary policy and the law of unintended consequences. Technical report.

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Appendix Comparative static

Linear Learning Rule

From table 2 the solution for information budget is positive when information costs are:

$$a > \frac{\left(\mu_t - R_t^s\right)^2}{\sigma_t^2} + 1$$

That is, larger than one plus the expected return to variance ratio. In this interval, the derivative with respect to initial variance is positive:

$$a\left(1 - \frac{1}{2\sqrt{a\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)}}\right) > 0$$

And the derivative with respect to risk premium is non-positive:

$$-\frac{a\left(\mu_t - R_t^s\right)}{\sqrt{a\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)}} < 0$$

The impact of information costs increase is always positive on the interval with positive b_t:

$$\sigma_t^2 - \frac{\sqrt{a\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)}}{2a} > 0$$

The effect on risky asset portfolio holdings is characterized by the following derivatives:

$$\begin{aligned}
\frac{\partial k_t^b}{\partial \sigma_t^2} &= -\frac{a^2\left(\mu_t - R_t^s\right)}{2\rho\left(a\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)\right)^{\frac{3}{2}}} < 0 \\
\frac{\partial k_t^b}{\partial\left(\mu_t - R_t^s\right)} &= \frac{a^2\sigma_t^2}{2\rho\left(a\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)\right)^{\frac{3}{2}}} > 0
\end{aligned}$$

Entropy Learning Rule

$b_{t'}$ is positive when

$$\log\left[\frac{a\sigma_t^2}{\left(\mu_t - R_t^s\right)^2 + \sigma_t^2}\right] > \log\left[\log\left[2\right]\right] - \log\left[2\right] = \log\left[\frac{\log\left[2\right]}{2}\right] = -1.0597$$

The derivative of budget with respect to initial variance, σ_t^2 is always nonnegative:

$$\frac{a\left(\mu_t - R_t^s\right)^2}{\sigma_t^2\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)\log\left(4\right)} \geq 0$$

The derivative with respect to risk premia $\left(\mu_t - R_t^s\right)$ is always non-positive:

$$\frac{a\left(\mu_t - R_t^s\right)}{\left(\left(\mu_t - R_t^s\right)^2 + sigma\right)\log[2]} \leq 0$$

The derivative of budget, b_t, with respect to information costs, a, is:

$$\frac{1 + \log[\frac{a\sigma_t^2}{\left(\mu_t - R_t^s\right)^2 + \sigma_t^2}] - \log[\log[4]]}{\log\left(4\right)}$$

The sign of the derivative is determined by the nominator. The derivative is positive when:

$$\log[\frac{a\sigma_t^2}{\left(\mu_t - R_t^s\right)^2 + \sigma_t^2}] > \log[\log[4]] - 1 = \log\left[\frac{2\log 2}{e}\right] = -0.6703$$

Since 0.6703 >1.0597, there is a region where the derivative could be negative. The information budget is decreasing with information cost, when information costs are:

$$\frac{\log\left[2\right]}{2}\left(\frac{\left(\mu_t - R_t^s\right)^2}{\sigma_t^2} + 1\right) < a < \frac{2\log 2}{e}\left(\frac{\left(\mu_t - R_t^s\right)^2}{\sigma_t^2} + 1\right)$$

Thus for relatively small information costs, an increase in information cost will reduce the information budget. For other, feasible values of a, an increase in information costs also increases the information budget.

The effect on risky asset portfolio holdings is characterized by the following derivatives:

$$\frac{\partial k_t^b}{\partial \sigma_t^2} = -\frac{a\left(\mu_t - R_t^s\right)}{\rho\left(\left(\mu_t - R_t^s\right)^2 + \sigma_t^2\right)^2\log\left(4\right)} < 0$$

$$\frac{\partial k_t^b}{\partial\left(\mu_t - R_t^s\right)} = \frac{a(-(\mu_t - R_t^s)^2 + \sigma_t^2)}{\rho((\mu_t - R_t^s)^2 + \sigma_t^2)^2\log(4)} > 0$$

if $\sigma_t^2 > \left(\mu_t - R_t^s\right)^2$

The Fiscal Placebo
Fiskální placebo

HANA LIPOVSKÁ

Abstract
Discretionary fiscal policy is associated with long time lags that, according to many authors, prevent its efficient implementation during economic crises. Implementation lags, i.e. the lag between the day on which economic policymakers decide on a specific form of response to the actual economic situation and the day on which a relevant law takes effect, have the signalling function. In this article we analyse the implementation lag in the discretionary fiscal policy in the Czech Republic during economic crises. First, we present arguments according to which time lags are pro-cyclic and thus they prevent implementation of the discretionary fiscal policy. We will verify the grounds behind the arguments concerning the Czech economy. Furthermore, we focus on the reasons due to which the implementation lag may be neutral as concerns the economic cycle. In the third part, we present our own concept of fiscal placebo pursuant to which the implementation lag may have negative, neutral, or even positive impacts on the actual economy. We have demonstrated, that anti-crisis laws have taken effect, with a single exception, always only after the end of the recession to which they were supposed to react and the volume of the funds used by the government to achieve stabilization is relatively low.

Keywords
Czech economic policy, fiscal discretion, fiscal placebo, Great Recession, implementation lag, signalizing function

Abstrakt
Diskreční fiskální politika je spjata s dlouhými časovými zpožděními, která podle řady autorů znemožňují její efektivní používání během ekonomických krizí. Implementační zpoždění, tedy zpoždění mezi dnem, kdy se tvůrci hospodářských politik rozhodli o konkrétní podobě reakce na reálnou ekonomickou situaci, a dnem, kdy příslušný zákon nabyl účinnosti, však mají také funkci signalizační. V předkládaném příspěvku analyzujeme implementační zpoždění diskreční fiskální politiky v České republice během ekonomických krizí. Nejprve uvádíme argumenty, podle kterých jsou časová zpoždění procyklická, a tedy znemožňují provádění diskreční fiskální politiky. Opodstatněnost těchto argumentů ověříme pro českou ekonomiku. Dále se zabýváme důvody, podle kterých může být implementační zpoždění neutrální vzhledem k ekonomickému cyklu. Ve třetí části zavádíme vlastní koncept fiskálního placeba, podle kterého implementační zpoždění může mít záporný, neutrální či dokonce kladný dopad na reálnou ekonomiku. Ukázali jsme, že protikrizové zákony nabyly (s jedinou výjimkou) účinnosti vždy až po skončení recese, na kterou měly reagovat, přičemž jejich finanční objem byl vždy relativně nízký.

Klíčová slova
česká hospodářská politika, fiskální diskrece, fiskální placebo, implementační zpoždění, signalizační funkce, Velká recese

JEL Codes
E62, H30, H70, K40

Introduction

The 2008 economic crisis brought back the debate older than six decades about the use of discretionary fiscal policy tools to stabilize the economic cycle. *The Great Recession*[1] has brought up also a new discretionary fiscal policy form reacting to the problems involving a public finance deficit and quickly growing public debt. Economic policymakers started (already before the start of the Great Recession) to return slowly to Keynesian concepts that they abandoned in the seventies of the 20th century. The creation of the European currency union with common currency - euro - was the reason behind the renaissance of the fiscal discretion. The euro area member states had to give up the autonomy of the monetary policy and in the environment of the decentralized fiscal policy the fiscal discretion has inevitably gained on importance. While the monetary policy is hard to understand for citizens, the discussion about a reduction or an increase in tax rates, support for new jobs, implementation of investment stimuli or reduction in the public debt is understandable for voters and may affect electoral results especially during an economic crisis.

Auerbach (2005, p. 4) notes: *"Politicians perhaps never experienced the same loss of enthusiasm for activist fiscal policy that economists did. (...) Perhaps politicians have not learned anything about the practice of fiscal policy since the 1970s; or perhaps economists have."* One of the things that economists have learnt is probably to not underestimate the risks of long time lags within the economic policy. While external lags are relatively short as concerns the fiscal policy and are not deemed to be a fundamental problem, internal lags - especially implementation lags, which are the only lags that may be affected to a significant extent by fiscal policymakers - represent one of the fundamental arguments against the use of deliberate anti-crisis fiscal discretion. Therefore it is astonishing that no analysis of the length and structure of the implementation lag has been presented in the Czech expert literature so far. The length of the implementation lag in discretionary fiscal policy calculated by us may represent an input for future analyses dealing with the canonical question: "Rules or discretion?"[2] Contemporary economic policymakers and theoretical economists face this old issue again but this time under totally new economic circumstances occurring after the end of the Great Recession.

The existence of time lags ranks among fundamental arguments against the use of discretionary fiscal policy within both fine tuning of the economy and mitigation of impacts of an economic recession. Already in 1942, Keynes presented a sceptic attitude towards the ability of governments to implement anti-crisis measures quickly: "Organized public works, at home and abroad, may be the right cure for a chronic tendency to a deficiency of effective demand. But they are not capable of sufficiently rapid organization (and above

1 *Taking the cue from the term Great Depression that is reserved within the economic history for the crisis taking place in the thirties of the twentieth century, the term Great Recession is used to identify the longest recession after the World War II, which started in the last quarter of 2007 (comp. Jílek 2013, p. 310 and Grusky et al. 2011).*

2 *Comp. canonical article Rules Rather than Discretion (Kydland and Prescott 1977).*

all they cannot be reversed or undone at a later date), to be the most serviceable instrument for the prevention of the trade cycle" (Keynes 1942, cit. according to Bartlett 1992).

Therefore, in this study we deal with the consequences of the implementation lag in respect of the economic policy while defining, for the purposes of this work, discretionary fiscal policy measures *as a legal norm through which the volume of state budget income or expenditures is changed outside the budgeting process.* We focus only on laws, not on government decrees or similar legislative norms that should be used to implement fiscal discretion only exceptionally due to their nature.

The aim of this paper is to describe the effects of long implementation lags. First, we will briefly define the implementation lag in a discretionary fiscal policy and present a unique database created for the purposes of this analysis. Then we will present arguments according to which time lags are pro-cyclic and thus they prevent implementation of a discretionary fiscal policy. We will verify the reasoning behind the arguments concerning the Czech economy. The second sub-chapter deals with the grounds according to which the implementation lag may be neutral as concerns the economic cycle. In the third part we will present our own concept of fiscal placebo pursuant to which the implementation lag may have negative, neutral, or even positive impacts on the actual economy.

1 Implementation Lag

Interventions of economic policymakers within the economy take place in the real time (Slaný, 2003). If at the time t_0 a change in the economy takes place (an increase in prices or slowdown of the economic growth pace, for instance), a response takes place at the time $t_1=t_0+\lambda$ where λ represents a certain time lag. As concerns automatic stabilizers, $\lambda=0$, because automatic fiscal stabilizers react to the actual condition of the economy in the real time (Kalckreuth and Wolff 2007) and because they are not associated with inevitable discretionary and implementation lags (Šaroch et al. 2003). Unlike automatic fiscal stabilizers, the discretionary fiscal policy features a positive time lag. The longer the λ time lag is, the higher the probability that the economic reality at the time t_1 will differ from the economic reality at the time t_0 is. In such a case, fiscal discretion may have pro-cyclic effects instead of intended anti-cyclic effects (Slaný, 2003). Based on the comparison of various approaches towards classification of individual types of time lags (see Lipovská at al., 2016) we distinguish:

1. Recognition lag - the time lag between a change in the actual economy and its recognition. It depends on the activities of statistical agencies.

2. Decision-making lag - the time lag between the recognition of a change in the economy and a bill responding to that change.

3. Implementation lag - the time lag between the submission of a bill and its implementation within the legislation.

4. Effectiveness lag - the time lag between implementation of a law and initiation of a response within the actual economy.

The implementation lag is the only time lag within discretionary fiscal policy that may be minimized by economic policymakers through their own activities. For the purposes of the present study we define the implementation lag as the *period of time between a decision of economic policymakers on a specific form of the reaction to a fundamental change in the economy and implementation of that reaction within the legislation.* We divide further the implementation lag into the approval lag, i.e. the period of time between submission of a bill to the Chamber of Deputies until its publication in the Collection of Laws (i.e. until the effective date of the law) and the legislative lag which is the period of time between the publication of the law in the Collection of Laws and the date on which the law takes effect. Thus the length of the implementation lag is significantly affected by parameters of the legislative process.

Pursuant to the provision of § 99 of the Rules of Procedure of the Chamber of Deputies, the Chairman of the Chamber may declare **the state of emergency legislation** in case of extraordinary circumstances. A bill adopted during the state of emergency legislation is not subject to the first reading and the Chairman assigns it directly to committees along with the deadline that cannot be exceeded. During the second reading, the general debate may be abandoned and the speaking time may be limited to 5 minutes. The third reading of the bill may take place immediately after the end of the second reading. The Chairman of the Senate shall summon a meeting within ten days from the submission of the bill to the Senate but the Senate may return to the regular constitutional period of time (Boháč 2011, p. 97–98). The procedure within the state of emergency legislature is important especially in view of adoption of anti-crisis laws during the periods of economic recession.

A majority of authors agree that discretionary fiscal policy features long internal lags[3] and relatively short external lags while as concerns the monetary policy, the situation is different (compare with Marthinsens 2008, p. 417; Thomas 2005, p. 556 or McEachern 2014a, p. 686). Estimates of the average lags in both the monetary policy and the fiscal policy are showed in Table 1. The relatively shorter external lags in fiscal discretionary policy are explained by Jovanovski and Muric through the faster identification of effects of the fiscal policy, because while the fiscal policy affects the aggregate demand and income directly, the monetary policy affects them indirectly through modifications of interest rates. The recognition lags in both policies are similar. The fiscal policy features a longer implementation lag which is the result of the lengthy process of adoption of laws (Jovanovski and Muric 2011, comp. Taylor 2000).

3 *An internal lag is political; it is determined by the ability of economic policymakers to recognize a change in the economic situation and their ability to act within enforcement of a response to that change. On the contrary, an external lag is based on the willingness of economic entities to react to discretionary measures (Lipovská et al., 2016)*

Table 1: Estimates of average lags in the monetary policy and the fiscal policy (in months)

	Internal lag		External lags	Total lag
	recognition	action		
Monetary policy	3	0	1 –20	4–23
Fiscal policy	3	1–15	1–3	5–21

Source: Willes – "Lags in Monetary and Fiscal Policy" (1968), cited according to Jovanovski and Muric (2011).

Marthinsen (2008) defines intervals of all types of time lags. According to Marthinsen, the recognition lag length varies from three up to six months, the implementation lag (that includes also the decision-making lag) lasts from three months up to two years, and the effectiveness lag lasts from three months up to one year. Thus three or even fourteen calendar quarters may pass between a fundamental change in the economy and manifestation of the full effect of discretionary fiscal policy; the political (internal) lag lasts from two up to ten calendar quarters and the external (operational) lag may take from one to four quarters. Hoover draws attention to the fact that the total length of the internal lag exceeds the average recession (Hoover 2011); according to Gordon and Jorgenson, the internal (political) lag lasts ten calendar quarters (cit. according to Auerbach 2005). In 2001, Zeman, the social democratic prime minister, estimated that the time lag in the economic area lasts approximately two years[4], i.e. eight calendar quarters (Zeman, 2001).

A certain delay occurs already due to the recognition lag. In the monitored period, the Czech Statistical Office published the statistical estimate of the quarterly gross domestic product on the 70th calendar day after the end of the reference period[5] (Fischer, 2004). If we apply a narrower definition of a recession, the recession may be understood as at least two subsequent calendar quarters during which a drop in the actual gross domestic product occurs (Claessens, Kose 2009). This so called technical recession[6] is recognizable, based on the first GDP estimate, only after two quarters and 70 days, i.e. after 8-9 months.

The data concerning the implementation lag length are very variable and they range from 1 up to 30 months (see Table 2) while a majority of authors state estimates concerning only the economy of the U.S.A. But in the new millennium, the American fiscal policy features a shorter implementation lag (Taylor 2009). Moreover, Taylor states that the 2001 crisis started in the United States in March and ended in November, nevertheless discretionary fiscal policy measures were implemented already in June 2001, i.e. during the crisis. Similarly, the fiscal discretion featured a shorter implementation lag also during the crisis in 2008.

4 *Based on the context it is obvious that the then Prime Minister meant a fiscal policy lag.*

5 *In compliance with the standard ESA 2010 (see ČSÚ 2015 and Sixta 2014), currently the preliminary estimate of the GDP development for a calendar quarter that already ended published at the time T+45 days; the statistical estimate is published at the time T+60 days, and a more accurate estimate is published at the time T+90 days (ČSÚ 2015).*

6 *The term technical recession is used by the Czech Statistical Office, for instance (ČSÚ 2012).*

Table 2: Average length of the implementation lag

Author	Implementation lag length (in months)
Willes (Willes 1968, in Jovanovski 2011)	1–15
Scott, Barnett[7] (2008)	7,5
Blinder (2004)	30
Marthinsen[8] (2008)	3–24

Source: Processed by us.

Thomas (2005) points out, using the United States of America as an example, that a longer implementation lag in discretionary fiscal policy, when compared to the implementation lag in the monetary policy, is a logical consequence of the approval process involving both chambers of the US Congress and the President of the U.S.A. The length of the implementation lag is then affected predominantly by political obstacles.

Another political factor that affects the implementation lag length in the U.S.A. (when compared to Great Britain) is the weak party political discipline within the presidential system (Blinder 2004). According to Blinder, political disputes taking place in the Congress may delay the decision-making by many months - especially when one political party controls the White House and the other party controls the Congress.

2 Data and Methodology

Our analysis is based on a unique database that we have created based on a set of income and expenditure laws of the fiscal policy contained in a study prepared by the Czech National Bank *Fiscal Discretion in the Czech Republic in 2001–2011: Has It Been Stabilizing?* (Ambriško et al. 2012). It means the discretionary fiscal measures the volumes of which exceed 0.1% of GDP. Based on explanatory reports concerning bills, we have complemented this set by, for instance, the laws modifying the setting of investment stimuli or the laws promoting creation of jobs.

The basic database provided by the Czech National Bank distinguishes between the income and expenditure discretionary measures affecting the Czech economy during the

7 *Authors state that the monetary policy features a lag lasting only one calendar quarter on average and capital expenditures are implemented with a one year lasting lag.*

8 *According to Marthinsen, the term implementation lag covers both the decision-making lag and the implementation lag. Since within the Czech economy the decision-making lag lasts approximately 2 months (see Fischer 2004), pursuant to the definition used by us the implementation lag corresponds to the interval of 1–22 months.*

years 1995 - 2011[9]. Authors included into the database only the measures the impacts of which exceed 0.1% of GDP. Expenditure measures are a bit harder to process for the purposes of our analysis; a number of measures are implemented through implementing regulations especially by decrees of ministries or government regulations. Implementing regulations are not subject to the legislative process and their implementation is governed by the *Legislative Rules of the Government*, as amended.

The CNB database has not been created to analyse the implementation lag but it has served to assess the influence of fiscal discretion on macroeconomic activity (see Ambriško et al. 2012, p. 3). The scope of observation (*n*=28), which is absolutely insufficient for he needs of our analysis, has not been limiting in any manner in respect of the declared purposes of this study. If we want to analyse the implementation lag in the discretionary fiscal policy in the Czech Republic, we need to identify all relevant laws. Therefore it was necessary to include into our unique extended database both the laws implemented during the years 2011 - 2013 and the laws in respect of which the volumes of adopted discretionary measures do not exceed 0.1% of GDP. The third extension, in compliance with our definition of discretionary fiscal policy and discretionary measures, involves incorporation of the laws affecting the employment rate and investment stimuli. At the same time, it was necessary to exclude from the original database of the CNB the six discretionary measures implemented before the end of the year 1996 when the Senate, which did not exist at that time, did not participate in the legislative process at all. The limited database containing 22 laws was complemented by four tents of laws. Unless otherwise stated further in the text, the data file containing n = 62 observations is subject to an analysis. Laws were included into the extended database based on an analysis of explanatory reports concerning the laws adopted during the years 1997-2013[10] and stenographic minutes of the meetings of the Chamber of Deputies of the Parliament of the Czech Republic.[11]

2.1 Anti-crisis Laws

The role of time lags in the economic policy is important especially when adopting anti-crisis laws. Table no. 3 shows nine laws the explanatory reports on which explicitly prove that they had been drafted in response to an economic crisis.

9 We refer to that database as to the CNB database and use the term extended database to identify our own database created for the purposes of implementation lag measuring. Authors would like to thank Ing. Dana Hájková, M.A., Ph.D. and Ing. Pavel Soukup for providing the database and consultations.

10 Within the Automated Legal Information system (ASPI) 1652 explanatory reports are available for the period from 1 January 1997–31 December 2013, concerning the laws that took effect during that period

11 For more details see Lipovská et al. (2016).

Table 3: Anti-crisis laws

	Measure type	Description
Act no. 287/1997 coll.	restriction	A reduction in salaries of state officials
Act no. 289/1997 coll.	restriction	A reduction in the state budget expenditures in the area of transfers
Act no. 216/2009 coll.	expansion	A reduction in the period of tangible assets depreciation
Act no. 217/2009 coll.	expansion	Protection of debtors against bankruptcy during the crisis
Act no. 221/2009 coll.	expansion	Discounts for employers to reduce work costs
Act no. 287/2009 coll.	expansion	Potential co-participation of the government within stabilization of financial markets
Act no. 326/2009 coll.	expansion	Support for economic growth, mitigation of crisis impacts
Act no. 418/2009 coll.	restriction	A reduction in salaries of state officials
Act no. 192/2012 coll.	expansion	Stipulation of drawing on investments

Source: Explanatory reports concerning the above acts. Processed by us.

Table 4: Comparison of the implementation lags of anti-crisis and other laws, including the p-value of the t-test

	CHDIL	SIL	PRIL	AIL	LVIL	TIL
anti-crisis laws	73	25	16	151	0	149
other laws	102	30	10	180	46	226
p-value	0.16	0.37	0.19	0.25	0.14	0.09

Source: Own calculations. Note: CHDIL = implementation lag in the Chamber of Deputies of the Parliament of the Czech Republic, SIL = implementation lag in the Senate of the Parliament of the CR, PRIL = implementation lag associated with the President of the Republic, AIL = approval implementation lag, LVIL = legis-vacancy implementation lag,
TIL = total implementation lag. The p-values of the t-test are highlighted in respect of which we reject, at the 1% level of significance, the zero hypothesis on the equal length of a relevant implementation lag type concerning the bills discussed within both the standard and non-standard procedure.

Despite the fact that during the crisis individual lag elements where shorter when we compare anti-crisis laws with other laws (see Table 4), this difference is statistically insignificant. We have succeeded in proving, at the 10% level of significance, that the total implementation lag of anti-crisis laws is shorter than the total implementation lag of other

laws and this difference amounts to 77 days on average. Because the research is primarily intended to compare the set of urban population, the specific subset of socio-demographic characteristics of the each of the six towns was designed. The available data from the census of 2011 year were support for the creation of quotas.

3 Impacts of the Implementation Lag

In this chapter three potential impacts of the long-term implementation lag are analysed. Relevant literature (e.g. Friedman 1948) traditionally emphasizes the negative role of time lags in view of the pro-cyclic tendencies of fiscal policies. The first sub-chapter is devoted to negative impacts. In the second sub-chapter, we reflect the modern understanding of time lags: the Great Recession in 2007 diverted the traditional view in favour of the thesis of neutral character of time lags. In the third sub-chapter, we presents the third and totally different view - the concept of fiscal placebo. Pursuant to this concept, the implementation lag does not affect the actual economic cycle but it fulfils only the signalling function.

3.1 Negative Impacts of the Implementation Lag

According to critics of discretionary fiscal policy, the time lag increases the instability of the economy and leads to wobbling of the economic cycle, which is contrary to the stabilization objective. Friedman states that the lags *make impossible any definitive statement about the actual degree of stability likely to result from the operation of the monetary and fiscal framework described above* (Friedman 1948, p. 254), Economic growth estimates are published by the Czech Statistical Office on a quarterly basis. If discretionary fiscal policy is to level cyclic fluctuations (an idealized scheme of the anti-cyclic fiscal discretion is showed in Figure 1), the total lag in the discretionary fiscal policy would have to be shorter than three months so that a discretionary measure is adopted within the discussed quarter. If the total lag is longer, the cycle may wobble as the scheme in Figure 2 shows.[12] In this model example the economy has not been stabilized. On the contrary, after implementing the discretionary fiscal policy, the variability of the economic cycle is significantly greater than the variability of the original (subject to levelling) economic cycle.[13]

If the total implementation lag itself in the Czech Republic lasts over two quarters, the sum of the recognition, decision-making, and effectiveness quarters must be negative. Otherwise the total time lag will exceed one quarter.

The decision-making lag may be very short or even equal zero where there is a portfolio, prepared in advance, of directly applicable discretionary fiscal measures (expenditure programs, for instance) that may be submitted to the Senate almost immediately.

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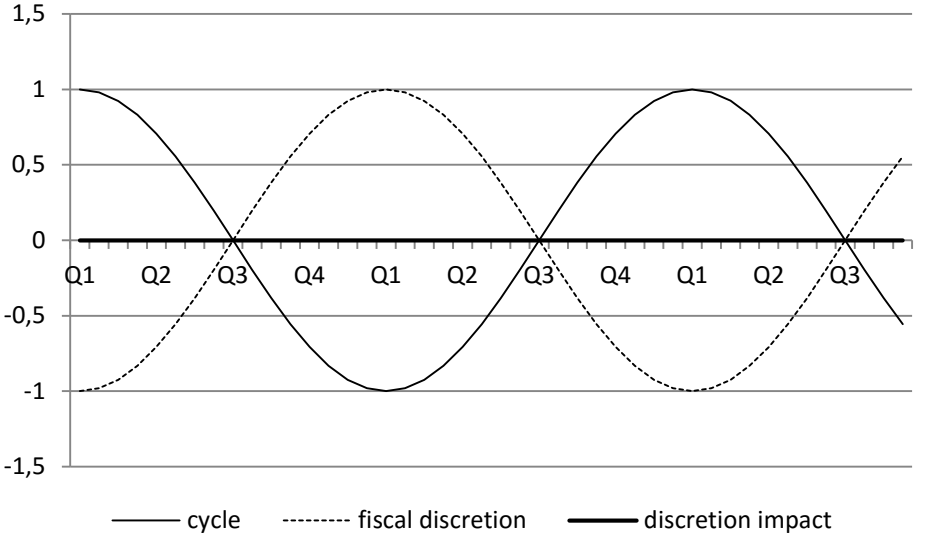
12 The model lag $\lambda=8$ months has been chosen arbitrarily similarly like the value of the potential $\bar{y}=0$. The schemes in figures 1 and 2 are based on an idealized assumption that the discretionary fiscal policy reacts to every variation from the potential and this through a discretionary measure the impact volume of which at the time $t_0+\lambda$ precisely balances the variation from the potential at the time t_0.

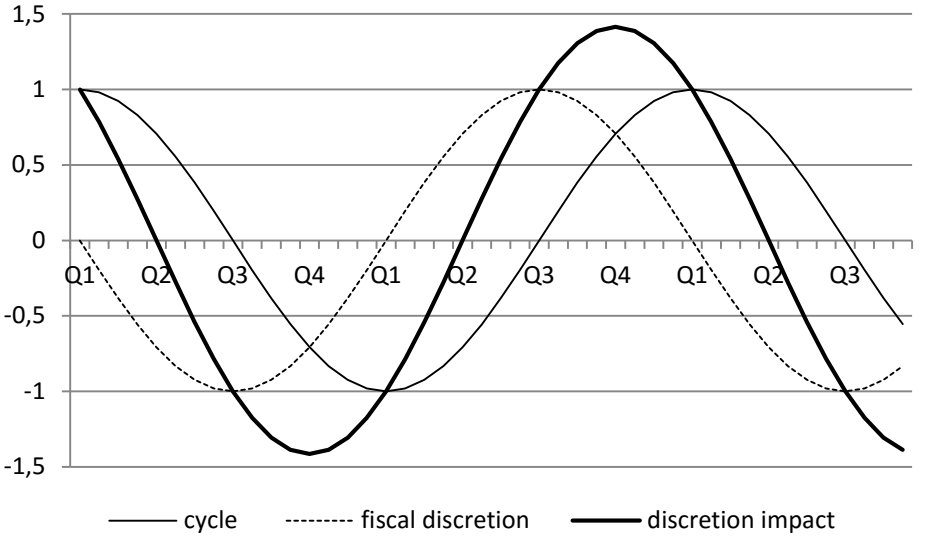
13 In this model example, the decisive variation increased from $\sigma=0.69$ to $\sigma=0.97$.

Figure 1: Ideal impact of fiscal discretion upon a zero lag



Source: Processed by us.

Figure 2: Impact of fiscal discretion on the economic cycle upon the lag λ=8 months



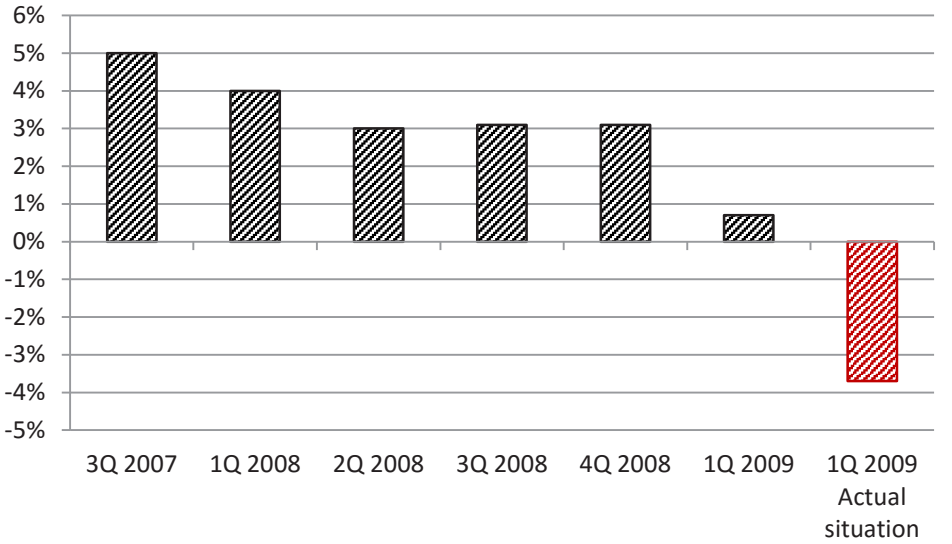
Source: Processed by us.

The recognition lag could be negative if we can predict precisely the economic changes that occur if economic policymakers do not interfere into the economic cycle (Friedman 1948). In fact, economic growth predicting is not very successful. There is a significant

difference between the preliminary estimate of the year-over-year GDP growth and the revised value (compare Čapek 2007 or Fischer 2004); prognoses of the actual economic growth are notoriously inaccurate. For instance, the macroeconomic prognoses of the Ministry of Finance of the CR are valid at the 5% level of significance only for twelve months (Vacková 2014). Figure 3 shows the modifications of the prognosis of the actual year-over-year GDP growth for the first quarter of 2009 when the Czech economy faced a recession. Despite the fact that the Czech National Bank refined its prognosis in time from the optimistic 5% predicted in the third quarter of 2007 to 0.7 % predicted already in the first quarter of 2007, the actual economic growth in the monitored period was negative (-3.7%). Due to the fact that the development of the economy is very hard to predict (especially during a recession period, compare with Vacková 2014), a negative recognition lag cannot be assumed.

The implementation lag that occurs during the legislative process has a significant informative function. During the process of approval of a bill, the general public may become familiar, in general, with the legislator´s intention. Thus economic entities may react to expected changes (e.g. as concerns taxes) even before such changes are implemented (Lepper et al. 2011) and the effectiveness lag may coincide with the implementation lag. The empirical results of the OECD countries (except for the U.S.A. and Great Britain) show that economic agents do not react to the government´s information about fiscal policy changes (Perotti 2004).

Figure 3: Development of the CNB prognosis - the actual year-over-year GDP growth



Source: CNB, prognoses of the actual year-over-year GDP growth (October 2007 - November 2013). Processed by us.

Based on empirical observations, the average time lag is not only longer than one quarter but it is also longer than or equals the total implementation lag. If the discretionary fiscal policy is to mitigate the impacts of an economic recession, the average total lag must be

shorter than the average recession duration. Since the average recession in the United States lasts eleven months from the peak to the bottom, according to Feldstein good luck is vital to deliver fiscal stimuli at the right time (Feldstein 2002). Similarly, Hoover (2011, p. 692-693) draws attention to the fact that due to the lengthy process of adoption of a discretionary fiscal policy, the recognition and implementation components together exceed the period of the average recession.

According to the International Monetary Fund, the average recession period for 21 developed countries during the years 1973 - 2000 represented 1.5 year (Kadeřábková and Žďárek 2006, p. 22). Periods of individual non-transformation recessions in the Czech Republic according to the Czech Statistical Office are showed in Table 4 while a recession is understood as a continuous drop in the actual quarterly GDP adjusted for seasonal variations in the quarter-over-quarter comparison[14] (Dubská and Kučera 2014, p. 7). The average economic recession period in the Czech Republic (factoring in the low information value of the average value calculation based on three observations only) amounts to three quarters according to that data. The implementation lag itself thus lasts one half of the recession period (or 43% of the recession length if we follow only the length of the implementation lag in respect of anti-crisis laws):

	Number of quarters
1997	3
2008–2009	3
2012–2013	6
Average recession length	4

Source: Dubská a Kučera 2014, p 35. Processed by us.

3.2 Neutral Impacts of the Implementation Lag

The economic development at the beginning of the new millennium, and especially the economic crisis after the year 2007, cushioned the critical perception of long implementation lags. In his studies published before the beginning of the American mortgage crisis, Feldstein stated that the discretionary fiscal policy during a recession is not possible due to the lags that are too long when compared to the recession length but the duration of the American financial crisis (2007 - 2009) allowed implementation of a stabilization policy (Feldstein 2008).

14 *A different understanding of a recession will yield different results; for instance, according to Howard (2011) the 2008-2009 recession in the Czech Republic lasted three quarters. We have selected the CNB results due to the consistent methodology (other authors state, for instance, only the data concerning the 1997 recession or only the data concerning recessions taking place in the new millennium).*

The problem of time lags is irrelevant where the discretionary fiscal policy reacts more to the long-term drop in demand than to the traditional economic cycle within which the slowdown of the economy takes less than one year as, for instance, in the case of Japan (Feldstein 2002, p. 6). According to Krugman (2009), the implementation lag does not represent an obstacle for the discretionary fiscal policy because recently after the end of a recession, the unemployment rate increases in a long run.[15] According to Krugman, stimuli for the economy are meaningful until interest rates are close to the zero threshold, i.e. until the central bank increases interest rates.

During the recession, the Czech National Bank reduced its two-week repo rate from 2.25 % in December 2008 to 0.05 % in November 2012. At the time of preparation of this study, the two-week repo rate remained unchanged for a period of 38 months. According to Krugman´s criterion, the total implementation lag lasting 7.2 months does not represent any problem for the Czech discretionary fiscal policy.

The above arguments focused on the consequences of the implementation lag in the discretionary fiscal policy as concerns the traditional, i.e. stabilizing concept. But if we use a wider definition of the discretionary fiscal policy as *a legal norm which changes the volume of the state budget income or expenditures outside the budgeting process,* the threat of pro-cyclic effects of the fiscal discretion due to the implementation lag will be reduced significantly. A majority (85%) of discretionary fiscal measures subject to our analysis represented the measures in respect of which the effort to stabilize the economic cycle has not been declared explicitly. The impact of fiscal discretion is absolutely separated from the economic cycle phase within the implementation of European legislation, for instance. A majority of discretionary fiscal measures thus worked as accidental shocks that could stimulate or restrain the economic growth unintentionally. In such cases, the length of implementation lags enables agents only to adjust their expectations concerning the future economic development and therefore it is neutral as concerns the cycle.[16]

3.3 Fiscal Placebo

Despite the fact that the implementation lag associated with the anti-crisis fiscal laws in the Czech Republic is significantly shorter than the implementation lag within other discretionary fiscal laws, only one anti-crisis law was implemented during the recession in response to it (Act no. 192/2012 Coll., an amendment to the act regulating investment stimuli). Seven other proposed measures were submitted already during the recession but they took effect only during the calendar quarters following the end of the recession.

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15 According to a report of the National Bureau of Economic Research (NBER).

16 The implementation lag may affect the growth of the economy also when it comes to those discretionary fiscal measures. An increase in the excise duty may serve as an example. In this case, the long implementation lag results in the forward buying effect that will be manifested through the GDP growth during the period immediately before the effective date of a relevant restrictive fiscal measure and through lower consumption (and thus potentially lower GDP growth) during the period immediately after the effective date of the relevant fiscal restriction. Thus the implementation lag would be neutral in view of the economic growth only if it is very short.

A draft amendment to the act regulating salaries of government officials was submitted after the end of the 2008-2009 recession.

This consequence of the implementation lag is not typical only for the Czech Republic. Bartlett (1992) presents a list of anti-crisis measures adopted in the United States during the years 1945 - 1992, which took effect only after the end of a relevant recession. According to him, this worsened the inflation, increased interest rates, and as a consequence, it worsened the course of next recessions. Therefore in this chapter we will present the concept of fiscal placebo. This concept allows us to explain why governments implement anti-crisis fiscal measures despite the fact that the recognition lag and especially the implementation lag cause the pro-cyclic impact of laws.

We define fiscal placebo as an anti-crisis discretionary fiscal measure the volume and actual impact of which on the economy are small and the main purpose of which is to demonstrate for the electorate the active efforts of fiscal policymakers aimed at cycle balancing during an economic recession. Let´s assume that economic policymakers know that they cannot affect the economic cycle due to the long time lag. But according to Drápal "a socially inacceptable situation may make politicians act in the situations within which they themselves would not act otherwise" (Drápal 2011, p. 108). Furthermore, Drápal calls this effect the syndrome of "it is necessary to do something" and presents, as an example, the reactions to unexpected situations such as the terrorist attacks taking place on 11 September 2001 or some laws that were adopted in Great Britain only to calm down the public.

While an economic crisis represents a risk for the politicians from ruling parties as to the probability of their being re-elected in the next elections, it represents an opportunity for the opposition. Empiric results show that during the 2008 - 2013 economic crisis voters "punished" ruling parties through national elections to the extent corresponding to the seriousness of the crisis experienced by the given country (Hernández and Kriesi 2014). In the countries that were affected by the crisis the most, traditional political parties collapsed (ibidem).

Therefore it is strategic for the politicians from opposition (or non-parliamentary) parties to emphasize the threat posed by a crisis and to point out the inactivity of the government. Opposition politicians are motivated to predict an economic crisis even before it is manifested in the data of statistical agencies in order to maximize the number of votes in the next parliamentary elections. The government´s demonstration of the ability to act is a reaction to the opposition criticism of the government´s policy, i.e. submission of a stabilization package that most likely will not mitigate the recession but, on the contrary, it will destabilize the economy due to the long implementation lag. Moreover, in the environment of budgetary deficits and government debts, a stabilization package deepens the imbalance of public finance and thus negatively affects expectations of investors who monitor the long-term consequences of the fiscal policy. If the implementation of a stabilization package deepens the deficit significantly, a drop in investments accompanied with a drop in the number of newly hired workers may occur (Tanzi 2012, p. 7). Unlike the opposition, ruling politicians (due to the costs associated with the implementation of a stabilization package) are motivated to deny any indications of an imminent crisis and to

calm down the public until publication of the statistical data.[17] Subsequently, a rational strategy involves demonstration of the ability to act through approval of discretionary fiscal measures the volume of which is minimal. Adoption of a package of anti-crisis laws may mitigate the negative expectations within the economy and, at the same time, reduce the potential electoral profit of the opposition. Thanks to the low volume of the measures, the pro-cyclic effect of the long implementation lag is neutralized and no destabilization of the public finance is imminent. Thus the fiscal measures show primarily the placebo effect - they do not influence directly the actual economy but only mitigate negative expectations (or support positive expectations).

The hypothesis of the fiscal placebo effect is empirically supported by the volume of anti-crisis measures in the countries affected by a crisis. The low volume of the stabilization package in the United States was criticised by Feldstein (2008); the impacts of the anti-crisis laws on the Czech state budget are summarized in Table 5.[18]

If the fiscal placebo concept is valid, the implementation lag length does not represent any serious problem. A relatively faster legislative process signalizes to voters the ability of economic policymakers to act, but the effectiveness following the end of a recession is associated with the full risk of the pro-cyclic effect. According to this concept, the date of the first reading in the Chamber of Deputies, when the media start to inform about a bill, is more important than the effective date. Thus as concerns adoption of anti-crisis laws, the implementation lag has the signalling function.

17 *In October 2008 (when the Czech economy already faced a recession according to the CSO data published later), the then minister of finance, Miroslav Kalousek, stated in an interview for daily newspaper Právo: "The right of the opposition to submit alternative proposals is absolutely legitimate. But it is absolutely irresponsible that the make efforts to abuse the current situation. Some statements of chairman Jiří Paroubek and the alleged need to create some rescue plans for the Czech Republic could be called scaremongering. I say it again: we are not to face any crisis. The fact is that the economic growth will be slower. Despite all possible problems, the Czech Republic will continue to become richer and to grow." (Kalousek 2008).*

18 *The estimated impacts of Act no. 326/2009 Coll. on the support for the economic growth and social stability, were supposed to, according to an explanatory report, amount to 51.3 billion CZK in 2009, 44 billion CZK in the year 2010, and to 44 billion CZK in the year 2011. But Act no. 362/2009 Coll. (Janota´s Package) cancelled, for instance, the proposed vehicle scrappage scheme and reduced the impacts of the original law in general.*

Table 5: Impacts of anti-crisis laws on the state budget

	Impact of anti-crisis laws on the state budget [billion CZK]				
	1997	**1998**	**2009**	**2010**	**2011**
Act no. 287/1997 Coll.	+0.1				
Act no. 289/1997 Coll.	+0.2	+16			
Act no. 216/2009 Coll.				-9.4	-3.6
Act no. 217/2009 Coll.			-0.1		
Act no. 221/2009 Coll.			-17		
Act no. 326/2009 Coll.			-31.8	-3.6	
Act no. 418/2009 Coll.				+7.126	
total	+0.3	+16	-48.9	-5.874	-3.6

Source: Explanatory reports to anti-crisis laws, the CNB database. Processed by us.
Note: expansive fiscal measures are marked with the minus sign. Other anti-crisis laws had no declared impact on the state budget in the explanatory report.

Conclusions

Within this study we followed the impacts of the implementation lag on the economic policy. Economists have always drawn attention to the risk of economic cycle destabilization due to long time lags. Increasing lengths of economic recessions and a change in the perception of objectives of discretionary fiscal policy during the last decade mitigate those arguments.

We have demonstrated, using the 1997 - 2013 empirical data concerning the Czech Republic, that despite the fact that stabilizing discretionary fiscal measures feature the total implementation lag that is significantly shorter than in case of other discretionary fiscal laws, anti-crisis laws have taken effect, with a single exception, always only after the end of the recession to which they were supposed to react. Moreover, the volume of the funds used by the government to achieve stabilization is relatively low, which is determined by a narrow space determined for fiscal discretion due to the high share of mandatory expenditures and primarily due to the long-term instability of public finance.

Therefore and based on the results, we have proposed the fiscal placebo concept pursuant to which the implementation lag fulfils only the signalling function. Implementation of stabilization packages represents only a strategic decision of the government the position of which is destabilized during a recession. In such a case, a long implementation lag does not have to have a negative effect but, on the contrary, it may mitigate negative senti-

ments within the economy thanks to its informative function. Professor Peltzman[19] points out potential worsening of the economic situation due to a reduction in the private consumption caused by the expected increase in taxes in future. Fiscal *placebo* that may have, in compliance with the medical interpretation of the term *placebo* both a positive and neutral effect, could therefore become the fiscal *nocebo*. Provided that the fiscal placebo assumption is valid, a long implementation lag does not have to represent a problem.

If the fiscal placebo concept is not valid (under the conditions of the Czech economy), an answer to the alternative question should be sought: How to reduce the implementation lag length? At this point we deem it necessary to emphasize that *in no case* the conclusions of our study are aimed to provide any arguments in favour of shortening of the legislative process. We are aware of the potentially inverse relation between the speed at which laws are adopted on one hand and their quality on the other hand. Based on a detailed analysis of the implementation lag length and its structure, we believe that no modification of the legislative process can contribute significantly to a faster implementation of discretionary fiscal policies. As concerns deliberate fiscal discretion, the objective of which is to stabilize the economy, the pro-cyclic impact of fiscal measures cannot be excluded. Under such circumstances the implementation lag can be prevented only through elimination of adoption of deliberate discretionary fiscal measures in favour of automatic stabilizing factors and other non-intervention tools of the economic policy.

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References

AMBRIŠKO, R., V. AUGUSTA, D. HÁJKOVÁ et al. (2012) *Fiscal Discretion in the Czech Republic in 2001–2011: Has It Been Stabilizing?* CNB Research and Policy Notes, č. 1.
AUERBACH, A. (2005) The Effectiveness of Fiscal Policy as Stabilization Policy. *Bank of Korea International Conference on the Effectiveness of Stabilization Policies*. 27. 5. Seoul.
BARTLETT, B. R. (1992) If It Ain't Broke, Don´t Fix It. *The Wall Street Journal.* 2. 12.
BLINDER, A. S. (2004) *The Case Against the Case Against Discretionary Fiscal Policy.* Working Paper 100, Princeton University's Center for Economic Policy Studies (CEPS). Dostupné z http://www.princeton.edu/ceps/workingpapers/100blinder (citováno 6. 10. 2014).
BOHÁČ, R. (2011) *Legislativní proces: (teorie a praxe).* Praha: Tiskárna Ministerstva vnitra, 547 s.

19 E-mail correspondence with professor Peltzman during the period from 28 November 2014 until 5 December 2014.

CLAESSENS, S. and A. KOSE (2009) What Is a Recession? *Finance & Development*, roč. 46, č. 1, s. 52–53. Dostupné z: http://www.imf.org/external/pubs/ft/fandd/2009/03/basics.htm
ČAPEK, J. (2007) Nejistota vybraných makroekonomických dat zemí Visegrádu. In Slaný, A. a kol. *Faktory konkurenceschopnosti* (Komparace zemí V-4). Brno: Masarykova univerzita, s. 179–189, 10 s. CVKS.
ČSÚ (2012) *Recese, deprese – Metodika*. Dostupné z: http://www.czso.cz/csu/redakce.nsf/i/recese_deprese
ČSÚ (2015) Politika revizí ČSÚ.
DRÁPAL, J. (2011) Stav legislativní nouze. In: WINTR, Jan a Marek ANTOŠ. *Parlamenty: funkce, kultura, procedury*. Vyd. 1. Praha: Leges, s. 105–117.
DUBSKÁ, D. and L. KUČERA (2014) *Tendence a faktory makroekonomického vývoje a kvality života v České republice v roce 2013*. Praha: Český statistický úřad, 70 s. Dostupné z: http://www.czso.cz/csu/2014edicniplan.nsf/publ/320192-14-r_2014
FELDSTEIN, M. (2002) *The Role for Discretionary Fiscal Policy in a Low Interest Rate Environment*. Working Paper 9203, National Bureau of Economic Research (NBER).
FELDSTEIN, M. (2008) The Stimulus Plan We Need Now. *The Washington Post*. 30. 10.
FISCHER, J. (2004) Stabilita čtvrtletních odhadů užití HDP. *Politická ekonomie*, roč. 52, č. 3, s. 344–354.
FRIEDMAN, M. (1948) A Monetary and Fiscal Framework for Economic Stability. *The American Economic Review*, roč. 38, č. 3, s. 245–264.
GRUSKY, D., B. WESTERN and Ch. WIMER (2011) *The great recession*. New York: Russell Sage Foundation, xi, 329 s.
HERNÁNDEZ, E. and H. KRIESI (2014) The electoral consequences of the financial and economic crisis in Europe. Florence: European University Institute.
HOOVER, K. D. (2011) *Applied intermediate macroeconomics*. New York: Cambridge University Press, xl, 899 s.
HOWARD, G., R. MARTIN and B. A. WILSON (2011) Are Recoveries from Banking and Financial Crises Really So Different? *International Finance Discussion Papers*, Working Paper Nubmber 1037 (Washington: U. S. Federal Reserve System).
JÍLEK, J. (2013) *Finance v globální ekonomice II: Měnová a kurzová politika*. 1. vyd. Praha: Grada, 557 s.
JOVANOVSKI, T. and M. MURIC (2011) The Phenomenon of Lag in Application of The Measures of Monetary Policy. *Ekonomska istraživanja*, roč. 24, č. 2, s. 154–163.
KADEŘÁBKOVÁ, A. and ŽĎÁREK, V. (2006) *Makroekonomická analýza*. Vyd. 1. Praha: Vysoká škola ekonomie a managementu, 2006, 293 s.
KALCKREUTH, v. U. and G. WOLFF (2007) T*esting for contemporary fiscal policy discretion with real time data*. Frankfurt am Main: Dt. Bundesbank, 25 s.
KALOUSEK, M. (2008) Interview. In: *Právo*. 7. 10.
KEYNES, J. M. (2006) *General Theory Of Employment, Interest And Money*. Atlantic Publishers & Dist, 400 s.
KRUGMAN, P. (2009) How Late is too Late? *The New York Times*. 27. 1.
KYDLAND, F. and E. C. PRESCOTT (1977) Rules Rather than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy*, roč. 85, č. 3, s. 473–492.
LEEPER, E., T. WALKER and S-CH. S. YANG (2008) *Fiscal Foresight: Analytics and Econometrics*. Working Paper 14028, National Bureau of Economic Research (NBER).
LIPOVSKÁ, H., NĚMEC, D. and J. FISCHER (2016) Implementační zpoždění diskreční fiskální politiky. *Politická ekonomie*. V tisku.

MARTHINSEN, J. E. (2008) *Managing in a global economy: demystifying international macroeconomics*. Mason, OH: Thomson South-Western, xx, 746 s.
MCEACHERN, W. A. (2014) University of Connecticut. *Economics: a contemporary introduction.* 10e. 800 s.
PEROTTI, R. (2005) *Estimating the effects of fiscal policy in OECD countries.* Discussion paper 4842. CEPR. Londýn.
SIXTA, J. (2014) Po 20 letech dochází k revizi národních účtů. *Statistika & M*y, roč. 4, č. 7–8, s. 6–7.
SLANÝ, A. (2003) *Makroekonomická analýza a hospodářská politika*. Vyd. 1. Praha: C. H. Beck, XIII, 375 s.
ŠAROCH, S., P. PAVELEK and M. ANDRLE (2003) *Rehabilitujeme fiskální makroekonomickou stabilizaci?* Working Paper 1, Institut pro ekonomickou a ekologickou politiku a Katedra hospodářské politiky.
TANZI, V. (2012) *Realistic Recovery: Why Keynesian Solutions Will Not Work.* Londýn: POLITEIA.
TAYLOR, J. B. (2000) Reassessing Discretionary Fiscal Policy. *Journal of Economic Perspective*, roč. 14, č. 3, s. 21–36.
TAYLOR, J. B. (2009) The Lack of an Empirical Rationale for a Revival of Discretionary Fiscal Policy. *American Economic Review*, roč. 99, č. 2, s. 550–555.
THOMAS, L. B. (2005) *Money, banking, and financial markets*. Mason, Ohio: Thomson/South-Western, XXII, 618 s.
VACKOVÁ, P. (2014) Evaluation of the Ministry of Finance's Forecast History. *Statistika*. 2014, roč. 94, č. 2, s. 18–35. Dostupné z: http://www.czso.cz/csu/2014edicniplan.nsf/engpubl/320197-14-eng_q2_2014
ZEMAN, M. (2001) *Zpráva o stavu realizace Programového prohlášení a o činnosti vlády ČR od března 2000 do současnosti.* Stenoprotokol, 37. schůze, 3. volební období. Dostupné z: http://www.psp.cz/eknih/1998ps/stenprot/037schuz/s037223.htm

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Ohlson´s Model and its Prediction Ability in Comparison with Selected Bankruptcy Models in Conditions of Czech SMEs

Ohlsonův model a jeho predikční schopnost ve srovnání s vybranými bankrotními modely v podmínkách malých a středních firem v České republice

DANA KUBÍČKOVÁ

Abstract

In this paper are presented the results of a study examining the ability of Ohlson's Logit model assessing and predicting the financial condition development of SMEs in comparison with the other models outcomes. Ohlson´s model was created using logit regression, which allows in the evaluation of the financial situation involve qualitative and discrete variables. The aim of the study is to determine whether the method used to derive the model influences the final assessment of the financial condition and indication of bankruptcy. The solution is based on the comparison of the resulting assessment of these four models, value of which were calculated on the same sample of Czech firms. As compared models were selected Z-score model, derived in the terms of US enterprises, IN05 model, which was derived in the conditions of Czech companies and Taffer´s model, derived in the conditions of UK firms. The sample consisted of 1996 small and medium firms in the manufacturing industry in Czech Republic. Data were obtained from the database of Albertina for the period of the years 2012 and 2013. It was found that the assessment of the firm´s financial situation matches in case of the results of Ohlson´s model and Taffler´s model, greater differences were found between the resulting values of Ohlson´s and Taffler´s model on one side and IN05 and Altman's model on the other side. Ohlson´s model and the Taffler´s model confirmed a good financial situation of companies in about 90 per cent of firms, Altman´s model and IN05 model in about 40 per cent of firms. The influence of the method used to derive the model on the assessment of the financial condition of companies was not proven.

Keywords

bankruptcy models, Ohlson´s model, Z-score, IN05, Taffler´s model, logit regression analysis, financial condition, prediction ability

Abstrakt

V tomto článku jsou porovnávány výsledky hodnocení finanční situace malých a středních podniků, které byly zjištěny při aplikaci Ohlsonova modelu, s hodnoceními, které byly zjištěny na základě jiných modelů. Ohlsonův model je odvozen s využitím logitové regresní metody, která dovoluje zapojit do posuzování finanční situace kvalitativní parametry a nespojité veličiny. Cílem studie je zjistit, zda metoda použitá pro odvození

modelu ovlivňuje výsledné hodnocení finanční situace a indikaci bankrotu. Metodou řešení je komparace hodnocení zjištěných jednotlivými modely v jediném souboru malých a středních firem v ČR a porovnání jejich výsledných hodnot. Jako porovnávaný model byl zvolen Altmanův model Z-score pro nekótované firmy, odvozené z podmínek amerických firem, IN05, který byl odvozen z podmínek českých podniků, a Tafflerův model odvozený z podmínek firem ve Velké Británii. Analyzovaný soubor zahrnoval 1996 firem, působících v odvětví zpracovatelského průmyslu v České republice. Data za období 2012 a 2013 byla získána z databáze Albertina. Bylo zjištěno, že hodnocení finanční situace firem na základě Ohlsonova modelu se shoduje s výsledky zjištěnými na základě Tafflerova modelu. Větší rozdíly byly zjištěny mezi hodnocením podle Ohlsonova modelu a Tafflerova modelu na jedné straně a modelů Z-score a IN05 na druhé straně. Ohlsonův a Tafflerův model identifikoval velmi dobrou finanční situaci u 90 % firem, Altmanův model a IN05 model u 40% firem. Vliv metody, která byla použita pro odvození modelu hodnocení finanční kondice firem, nebyl prokázán.

Klíčová slova
bankrotní modely, Ohlsonův model, Z-score, IN05, Tafflerův model, logitová regresní analýza, predikční schopnost, finanční situace

JEL Codes
G33, M21

Introduction

The recent developments of the global economy have affected the thinking and decision-making of many economic entities. Company managers, owners, investors and other stakeholders as well as academics have shifted their attention to various methods and tools that allow reliably identify companies' financial situation. More than ever before, there has been a strong demand after such methods and tools that could indicate potential problems in advance and thus making it possible to adopt corrective measures before any critical events actually occur. This has increased focus on the prediction models. Using appropriately selected indicators, these models should predict whether a company would be successful within its further business activity or whether it would face serious problems. Originally, these models had been developed with a view to identify potential financial problems in the future. Consequently, they have been referred to as bankruptcy prediction models. However, the general practice later required more detailed characteristics of an overall financial situation – not only information about potential financial problems, but also the specification of the degree of financial health or in which area there are the threats. This triggered the creation of models that measure the financial health of a company using rating scale and allowed more detailed assessment.

One stream of the researchers focuses on the older models and their prediction reliability in the current or national conditions. Other direction of research interest is focused on creating new models reflecting the new conditions of companies operations as well as the advancement in economic modeling and mathematical processes applicable for this purpose. The financial situation of companies is affected by new factors, original factors change in their intensity; in addition to financial and quantified characteristics, various qualitative characteristics are gaining ground. The financial situation is significantly

affected by such factors as market position, long-term contracts, past developments in the form of court disputes, profit generation, etc. Consequently, the construction of new models is associated with various efforts. The aim of these research efforts is to increase the number of parameters, included in the financial situation assessment as well as efforts aimed at involving parameters outside of financial statements. Limitation of the former method used for models derivation consists in the limited range of indicators that could be included in the evaluation as well as the necessity of the subsequent limits definition to separate healthy companies, "grey area" companies, and companies headed to bankruptcy. All these facts shift the attention to other methods. The econometric method of logit regression is the method that offers opportunities for these new demands.

One of the models, construction of which is based on the logistic method, is the model of J. A. Ohlson, professor of Accounting at the New York University Stern School of Business. The model was created in 1980, relying on accounting data – similarly as other models – which were complemented by the non-accounting indicators. It was the indicator describing the development of the price level and inflation and to indicators describing the profit development. The basic model of J. A. Ohlson of 1980 has gradually been updated. Significant sensitivity of the model to signals dating back to the period, in which the model was derived, resulted in the construction of updated variants (1993, 2003, and 2010). Close relation to national conditions, in which companies operate, was reflected in the construction of models for individual national economies (United States, Turkey, China, Iran).

The Czech economic literature does not mention the Ohlson´s model as often as the Altman Z-score. Consequently there is no sufficient information about the model´s accuracy and reliability. The aim of this paper is to compare the firms´financial situation assessment of the Ohlson´s model with the assessments of selected models, Altman Z-score and IN05.

1 Literature Review

Assessment of the financial situation of companies under bankruptcy models and comparing their predictive ability in the national economy is studied by many authors in various national condition. In the Czech economic literature P. Šlégr (2013) compared the results of the model Z-score and IN05 on a sample of fifty largest Czech companies in the period 2006 to 2010 and found that the evaluations of both two models are not identical. Evaluation based on the model IN05 seems to be significantly worse than that one based on the Z-score model. However, this prediction - according to available information – was not confirmed by the real development.

Klecka and Sholleová (2010) compared the evaluation of glass making firms based on three models: the Altman Z-score, Credibility index and IN05 model. In relation to the tested models stated that „these models could not predicate an actual crisis of these enterprises sufficiently in advance, … however could show in advance the bad financial condition and weakened immunity a longer time before the beginning of crisis… Concerning the influence of external factors, these models reflect right their consequences in economy and corporate finance, thereby such indication is practically effectual for

needs of management of enterprise only incase of gradual incidence of these influences" (Klecka, Sholleová, 2010, p. 8-9). Consensus or inconsistencies in the evaluation based on the individual models they did not comment on. Čámská and Hájek (2012) assessed the financial health of the firms in the whole glassmaking industry using the Altman model and IN05 model. They concluded that the results of the both models differ.

Kupilík in his study (2013) found that earlier versions of Ohlson´s model are inaccurate in assessment of Czech companies, while newer versions assessed the situation of Czech companies generally more sensitive. Evaluation by Ohlson's model mostly coincided with the evaluation compared models Z-score, IN05, Taffler model, solvency index, and also with the values of selected indicators of financial analysis. Moreover in case of firms, which had to close down their operations due to the financial distress, all variants of this model identified the real danger of bankruptcy in advance.

Adamec (2010) compared the resulting values of the model IN05, ZETA, Ohlson´s model and Shumway model. He concludes that one year before the bankruptcy the characteristics are already profiled in such an extent that the models are able to predict the bankruptcy with a relatively high accuracy. In the case of IN05 however the ability to predict the bankruptcy worsens two years before the decay.

In foreign literature are published much more research papers focused on this issue. The bankruptcy or financial failure prediction is investigated from different aspects. One group of researches assessed the predictive ability of existing models (Zeta, Ohlson, Shumway, Zmijewski, Shirata etc.) and verify their reliability in national conditions (Grice, Dugan, 2003, Moghadam et al. 2003, Kumar et al., 2012, Jouzbardand et al., 2012). The second group of researchers is focused on testing the predictive ability of existing models in the current conditions, including the search for new indicators of bankruptcy (Wang, Campbell, 2010, WU et al., 2010, Pongsatat et al. 2004, Shumway, 2001 etc.). The third group is trying to create new models using the same methodology, suitable for contemporary national economic environment (Liao, 1994, Gurčík, 2002, Chen et al., 2009). The other significant group of researchers focusing on the issue of input data, whose source is accounting, and verifies the influence of different accounting practices (including IFRS) on the explanatory power of indicators and default models (Kubíčková, Jindřichovská 2012, Lantto, A., Sahlström, P., 2009 etc.).

2 Methodology and Data Description

2.1 Logit Regression

Ohlson´s model has been built up on the base of logit regression (sometimes also referred to as "logistic regression"). In contrast to linear regression, which assumes continuous dependent variable ($Y = b_0+\Sigma b_i x_i$), logit regression operates with discontinuous independent variable. In case we assume that there are *n* realizations of the dependent variable y_n (financial problems yes=1, no=0 for *n* companies), then the following applies:

$y_i = 1$ with the probability of p_i and $y_i = 0$ with the probability of $1-p_i$,

In order to create a logit model, it is assumed that the variable η_i (y_i) has linear dependence on the independent variables x_1, x_2, … x_k. The resulting relationship can be described in the form of a linear dependence equation:

$$\eta_i (y_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots. + \beta_k x_{ki}, \qquad \text{where } i = 1,2, \ldots n \tag{1}$$

The resulting value η_i (y_i) may be both positive and negative. Consequently, it is necessary to apply logarithmic transformation $\eta_i = \ln (p_i / (1 - p_i)$ to the calculation. The matrix notation of the equation is as follows:

$$\eta = \beta X \tag{2}$$

where η (η_1, η_2, … η_n) are the dependent variable values, X is the matrix with n x (k+1) of independent variables; β (β_1, β_2, …β_k) are the inquired model parameters (variable weights). Adjustments lead to the relationship for the probability pi as follows:

$$\ln (p_i / (1- p_i) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots. + \beta_k x_{ki}, \tag{3}$$

$$p_i / (1- p_i) = \exp \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots. + \beta_k x_{ki}$$

$$p_i = \exp \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots. + \beta_k x_{ki} \; / \; (1- p_i) \tag{4}$$

The resulting matrix notation for the probability calculation is as follows (Šedivá, 2012):

$$P = \left(\frac{1}{1+ e^{-Q}} \right) \tag{5}$$

The result (dependent variable Y) gives the probability for the given event (i.e. potential bankruptcy) to occur (Liao, 1994).

2.2 Characteristics of the Ohlson´s model Construction

Basic form of Ohlson´s model

The basic form of J. A. Ohlson´s model was constructed in 1980. He is believed to be the first to develop a model using Multiple Logistic Regression (Logit) to construct a probabilistic bankruptcy model for the predicting bankruptcy and the first who explicitly consider the timing issue. The basic variant was derived from the corporate data in the United States that reflected the situation of the 1970s and 1980s (Ohlson, 1980). To derive the model he used data from the period of 1970-1976 for his study and worked with a relatively large sample of companies – 2,163 companies in total. In this sample, it was included 105 failing companies and 2,058 financially sound companies. His objective was not to find new, special indicators of financial distress, but to rely on simplicity and application of experiences gained so far: first six indicators were used, because they appear in most publications dealing with financial situation assessment/ bankruptcy prediction.

The model comprised nine financial ratios based on accounting data identified from the group of analyzed companies as most sensitively reacting to future financial problems. Weights are attributed to individual indicators, with their values being integrated within the resulting variable Q based on the following relationship:

$$Q = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3 + \beta_4 * x_4 + \beta_5 * x_5 + \beta_6 * x_6 + \beta_7 * x_7 + \beta_8 * x_8 + \beta_9 * x_9 \quad (6)$$

where $\beta_1,\ldots\beta_9$ are weight coefficients for individual characteristics (financial and other ratios $x_1,.,.x_9$), β_0 is a constant by which the sum of weighted values of indicators is increased.

The characteristics ($x_1,\ldots.. x_9$) included in the model are constructed as follows:

$$X_1 = \log \frac{total\ assets}{GNP\ price-level\ index}$$

$$X_2 = \frac{total\ liabilities}{total\ assets}$$

$$X_3 = \frac{working\ capital}{total\ assets}$$

$$X_4 = \frac{current\ liabilities}{current\ assets}$$

X_5: X_5 = 1, if total liabilities > total assets, X_5 = 0, if total liabilities < total assets

$$X_6 = \frac{net\ income}{total\ assets}$$

$$X_7 = \frac{funds\ provided\ by\ operation}{total\ liabilities}$$

(where: funds provided by operations = net income + depreciations/amortizations)

X_8: X_8 = 1, if the sum of net income for the two previous periods is less than 0
X_8 = 0, if the sum of net income for the two previous periods is more than 0

$$X_9 = \frac{NI_t - NI_{t-1}}{|NI_t| - |NI_{t-1}|}$$

where: NI_t is the net income for the current period and NI_{t-1} is the net income for the previous period and $|NI_t|$ and $|Ni_{t-1}|$ are the absolute values of the net income for current / previous period.

Resulting variable Q is only an interim result that must be applied in the probability calculation relationship (see Formula (5)):

$$P = \left(\frac{1}{1+ e^{-Q}}\right)$$

The resulting value of the model (P) describes the probability that bankruptcy occurs for the company being analyzed with a predetermined period of time (i.e. one year, two years, or five years). It may have different values in the interval of ⟨0;1⟩. The probability calculation also suggests that the higher the value Q as the sum of values of individual indicators, the higher the propensity to bankruptcy; on the other hand, low Q values characterize stable situation:

- If $Q < 0$, then $P \rightarrow 0$ (P converges to 0);
- If $Q > 0$, then $P \rightarrow 1$ (P converges to 1);
- If $Q = 0$, then $P = 0.5$.

The indicators significance is characterized by positive or negative value – negative impact of an indicator with positive value, as it reduces the total Q. On the other hand, negative indicator value has a positive effect, as it increases the total Q. The indicator weight relates to the significance of the characteristic measured by the given indicator.

The fact that the results give immediate information about the company bankruptcy probability rate was considered the main benefit of models derived by means of logit regression by Ohlson (and probably the only benefit, according to the author himself). It does not require any artificial scales for the result interpretation, it allows more precise characterization and layering of the measured characteristics, and eliminates the problem of extreme values. The probability of 50 per cent is the limit for determining whether a company is headed for bankruptcy or whether it is financially sound. The interval of 45 per cent to 55 per cent is indicated as the "grey area" that eliminates the assessment insensitiveness around the 50 per cent limit.

2.3 Ohlson´s model and its Variants

In the original study in 1980 Ohlson derived three model variants. All the variants comprise nine financial ratios $x_1 – x_9$ (see equation (6)) and differ in the weights of these indicators. In all three variants the highest weight and negative impact is attributed to indicator x_2, which describes the company indebtedness level. Significant impact is also attributed to indicator x_5, which describes the company´s debt from different perspective (if the total debt exceeds total assets, ie. overindebtedness) and corrects the impact of the indebtedness indicator through its negative value. Significant positive impact on the overall financial situation (high weight) is attributed to the net income in the past two years (indicator x_8) and return on assets after taxation (indicator x_6).

The first model should predict bankruptcy within the period of one year. It means that in case the resulting model value is more than 50 per cent, the company is at risk of bankruptcy or serious financial problems (as appropriate) in the current or in the following year.

The second model of the original study was supposed to predict bankruptcy in the period of next two years: in case the results suggest bankruptcy for a company, it should not take place during the current year, but rather during the next year and the year after that. The third model was supposed to predict company bankruptcy/serious financial problems one or two years in advance, i.e. not in the next year, but during the year after next year or in the year after that.

In the followings years, Ohlson's prediction function was verified in various economic environments – in the United States, Turkey, Iran, and other countries - and also with longer period from the model creation. The results of these verifications brought important findings that later have encouraged the creation of other model variants. Subsequent verifications confirmed that, the first model of 1980 with one yeart prediction horizon predicts the company´s development most accurately.

The first three variants of the models, more precisely their weights of indicators, as well as the weights of indicators in the following model versions are presented in the Table 1.

In 1993, the models of Altman and Ohlson were tested in order to determine whether the respective model parameters changed over time compared to the original variants (Jin, 1993). A new version was constructed using data of 99 failing companies and 1 980 prosperous companies from the period of 1981-1990. Intentionally were omitted companies from the sector of transportation and finance. Two variants were constructed (1993/1, 1993/2); the first one should have predicted bankruptcy one year in advance, the second one two years in advance. Original indicators and their calculation were used in the new model; changes occur in terms of weights attributed to individual indicators and in the constant included in the calculation.

In the following years the test results of this model under different conditions revealed that indicators and coefficients are sensitive to the conditions and period, from which they originated. The model accuracy decreased depending on the period passing the time when it was created: being the highest in the time closest to the period the model was created (1988-1991), next years (1992-1999) gradually declining. Therefore, Ohlson decided to recalculate the model. The work was associated with deliberations on whether it is necessary to link prediction to bankruptcy or whether it would be more useful to focus to the prediction of a "moderate variant", i.e. the financial distress prediction. Relied on a relatively large sample of companies the new model was derived in 2003 (for USA conditions). The new model was created in the three variants (2003/A, 2003/B, 2003/P), i. e. three new sets of coefficients (weights) of the initial nine indicators were derived: the first variant, general (A), was derived from the entire sample, the second one (B) from the subset with unstable companies only (i.e. with financial problems), and the third one (P) from the subset with industrial companies only. Compared to the previous model of 1993, the constant was omitted. The testing confirmed the prediction accuracy of the three new model variants is higher than the previous ones. Once again was also confirmed, that prediction accuracy is higher for models, the derivation of which is closer to the period, from which the tested data originate. Furthermore, the final assessment unambiguously focused on the prediction of serious financial problems, and not bankruptcy/end of com-

pany operations. This model can be considered as the last "international variant" (Wang, Campbell, 2010).

In 2009 insufficient reliability of the existing Ohlson's model variants under the conditions of Turkish economy led to a new variant of this model (2009 T), which was created based on the data of relatively small set of Turkish companies (70 companies) (Muzir, & Çağlar, 2009). The structure of indicators was the originally one including the constant, the only differences were in the indicator´s coefficients (weights of the indicators).

In 2010, the Ohlson's model was recalculated by economists from the University of Queensland in Australia that tried to find new weights of indicators (Wu, Gaunt, & Gray, 2010). Following the results of verification and recalculation, a new model was created (2010), in which indicators used in all of the aforementioned models have been included, only the coefficients have changed. Compared to the previous variants the calculation was based on much larger sample of companies: 50,611 companies, of which 887 were failing companies, and 49,724 financially healthy companies, used data from the period of 1980 to 2006.

In 2010 Chinese economist Ying Wang and American Professor Michael Campbell created the Ohlson's model variants for the Chinese economy (Wang, Campbell 2010). Using data from Chinese companies from the period of 1998 to 2008, they constructed (similarly as Ohlson in 1980) three model variants (2010 C1, 2010 C2, 2010 C3), with different period of prediction of bankruptcy, more preciously of serious financial problems: model C1 is to predict financial problems one year in advance, model C2 within two years, C3 one or two years in advance.

In the same year 2010, as a result of doubts whether the number of variables included in the model is justified and whether all indicators in fact contribute to the model sensitivity, were constructed new versions of model for the Chinese economy (2010 CU1, CU2, CU3). With the aim to increase the explanatory power and simply the model application, three new alternative models were constructed (Wang, Campbell 2010). They included only five variables/indicators selected from the original model: x_2 (indebtedness), x_3 (working capital to assets), x_4 (current liabilities to current assets), x_5 (excessive debt), and x_8 (income development in the past two years). The constant is also used. By assigning weights to individual indicators (based on the set of firms), three model variants were constructed– varying in the time horizon for prediction of problems (as in the previous case).

In 2011 was created the latest variant of Ohlson's model (2011 I). It resulted from the testing of the four most famous bankruptcy prediction models (Ohlson, Zmijewski, Shumway, and Altman) for the economy of Iran. The application of these models promoted the construction of a new Ohlson's model variant (Kordlar & Nikbakht, 2011). It was derived from data of more than 1 500 Iranian companies, of which 142 ended their activities due to financial problems (no financial and transportation companies were included). The new model applied again the set of nine indicators and a constant, only attributing new weights to indicators based on the conditions of the Iranian economy.

Table 1: Overview of coefficients used in the Ohlson´s bankruptcy model variants

	x_1 = log (assets / price index)	x_2 = liabilities / assets	x_3 = net working capital / assets	x_4 = current liabilities / current assets	x_5 = liabilities>assets a) yes =1; b) no = 0	x_6 = net income / assets	x_7 = funds provided by operations / liabilities	x_8 = income for past two years<0:a) yes=1;b) no =0	x_9 = income increase / absolute income increase	Constant
Q	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	β_0
1980/1	-0.407	6.03	-1.43	0.0757	-2.47	-1.83	0.285	-1.72	-0.521	-1.32
1980/2	-0.519	4.76	-1.71	-0.297	-2.74	-2.18	-0.780	-1.98	0.4281	1.84
1980/2	-0.478	5.29	-0.990	0.062	-4.62	-2.25	-0.521	-1.91	0.212	1.13
1993/1	-0.1659	1.7518	-0.8496	0.035	-0.2911	-2.5018	-2.362	0.9512	- 0.5192	- 2.2473
1993/2	-0.1639	0.8749	-2.0623	-0.2224	-0.0916	-6.1045	-1.6608	-0.1286	-0.3576	-0.7325
2003A	-0.777	3.224	-0.323	0.589	0.041	-2.86	-2.854	0.372	0.206	0
2003B	-0.881	3.931	0.054	0.166	0.645	-0.548	-2.886	0.656	-0.3	0
2003P	-0.706	2.204	-1.25	0.455	0.553	-3.79	-4.591	0.157	0.309	0
2009 T	-0.228	7.186	-0.073	0.613	-1.714	3.264	-4.187	0.438	-0.154	-4.582
2010	-0.17	3.69	-1.87	0	-0.54	0.03	-0.06	1.16	-1.02	-7.2
2010 C1	-0.8983	0.9546	-0.9234	0.00248	2.9508	-0.0109	-0.033	3.2088	0.5871	-1.3128
2010 C2	-0.2786	-0.2152	-0.2132	-0.0207	1.4666	-0.00755	-0.0541	-4.157	-0.9292	-5.5238
2010 C3	-0.5974	-0.4991	-0.4699	-0.00164	2.0091	-0.01	-0.042	3.7182	-0.1823	-2.48
2010 CU1	0	-0.9925	-0.9865	0.00237	3.3802	0	0	3.11	0	-7.5113
2010 CU2	0	-0.1404	-0.1591	-0.0231	1.5255	0	0	4.2852	0	-7.4331
2010 CU3	0	- 0.417	-0.4086	0.00177	2.1839	0	0	3.8624	0	-6.7685
2011 I	-0.14	14.58	2.92	-0.6	-0.17	-1.4	-2.6	3.79	-0.25	-12.87

Source: own elaboration based on literature

2.4 Models Used for Comparison

In this research was compared the prediction ability of four models: Ohlson´s model, model IN05, Altman´s Z-score model and Taffler´s model.

Ohlson´s model, used in our research, was that one from the 2003 for the industry. This selection was made with regards to the set of analysed firms. The other reason of this selection was that the newer version of this model reflect the specific conditions of countries with economies, different from Czech Republic. The structure of this model is as folows:

$$Q\ (2003)\ P = -0{,}706\ x_1 + 2{,}204\ x_2 - 1{,}25\ x_3 + 0{,}455\ x_4 + 0{,}553\ x_5 - 3{,}79\ x_6 - 4{,}591\ x_7 + 0{,}157\ x_8 + 0{,}309\ x_9 \quad (7)$$

where: $x_1 - x_9$ are the indicators included in the original model mentioned above.

Probability calculation will be according formula mentioned above (5).

IN05 model is a model, that was created based on the conditions and accounting data of Czech firms. Its structure is as follows (Neumaier, Neumaierová, 2005):

$$IN05 = 0{,}13 * x_1 + 0{,}04 * x_2 + 3{,}97 * x_3 + 0{,}21 * x_4 + 0{,}09 * x_5 \quad (8)$$

where: x_1= total assets/liabilities, x_2=EBIT/interests, x_3=EBIT/total assets,
*x_4 = revenues/total assets, x_5 = current assets/shortterm liabilities**
) shortterm liabilities = shortterm debts + shortterm bank loans)

Interpretation of the value IN05:

IN > 1.6	- the firm is in a good financial situation and creates value for the owners,
IN < 0.9	- the firm is financially unstable and value do not constitute
0.9 < IN < 1.6	- about the financial situation of the firm cannot be said anything definite (grey zone).

Companies which reach the value below 0.9 will reach a bankruptcy with probability of 0.97 and with probability of 0.76 will not create value for owners. Companies which have reach the value ranging from 0.9 to 1.6 reach the bankruptcy within two years with probability of 0.50 and with probability of 0.70 will form the value for owners. Firms above the upper limit 1.6 then do not run the bankruptcy with probability of 0.92 and with probability of 0.95 will create value for owners.

The Altman´s model Z-score is aimed to identify the possible serious financial problems of the firms in the future of two years. It was created in some variation. For the purpose of our research we used the formula designed for the assessment of companies that are not listed on the regulated capital markets in USA, derived in 1983 (Altman, 2010):

$$Z_o = 0{,}717*x_1 + 0{,}847*x_2 + 3{,}107*x_3 + 0{,}420*x_4 + 0{,}998*x_5 \quad (9)$$

where x_1 = *Net Working Capital / Total Assets*
x_2= *Retained Earnings / Total Assets*
x_3 = *EBIT / Total Assets*
x_4 = *Equity / Total Liabilities*
x_5 = *Sales / Total Assets*

Interpretation of the value of Z-score is divided into three levels according to value Z_o:
a) Values higher than 2.7- the firm is in good condition, there is not a threat of bankruptcy in the next two years
b) Values between 2.7 – 1.2 - further development cannot be specified more precisely (grey zone),
c) Values lower than 1.2 - the firm is threatened by the serious financial problems in the next two-three years

Taffler´s model is also a model aimed to predict possible bancruptcy of the firms. The model was published in 1977 designed for assessment of UK SMEs (Taffler, 1982). We used the modificated version of the model that includes four indicators:
R_1 = EBT / short term liabilities
R_2 = current assets / liabilities
R_3 = short term liabilities / total assets
R_4 = revenues / total assets

The formula for the calculation of this model is:

$$TZ = 0{,}53 * R_1 + 0{,}13 * R_2 + 0{,}18 * R_3 + 0{,}16 * R_4 \quad (10)$$

Interpretation of the value TZ is as follows:

TZ > 0,3 =	very low posibility of the firms´ bankruptcy
0,2 < TZ < 0,3 =	grey zone, there cannot be said nothing precisely of the firm financial condition
TZ < 0,2 =	high posibility of the firm´s bankruptcy

2.5 Data Source and Sample of Firms Definition

The data of firms were obtained from the database Albertina. The criterion for sample of firms selection was the legal form (a limited liability company, joint-stock company) and the criteria to define small and medium-sized enterprises, which is number of employees smaller than 250 and turnover lower than 50 mil. EUR or a balance sheet total of less than 43 mil. EUR. The fourth criterion in definition of SMEs is the independence of the firm, that means that in the firm has not a share in the extent 25 per cent or more any other firm who is not SME. To respect this criterion we have no enough information. We try to fill it so that in the sample we included only the Czech firms and companies the owner of which was originally from the Czech Republic. The other criteria for the selection of companies was the main field of activity (manufacturing industry), the availability of the financial statements in the full extent of from the years 2012 and 2013, the seat in the municipalities of over 1000 of the population and at the same time the seat outside the town of over 500 thousand inhabitants. This criteria should unify the conditions in which the companies operate. Thus the selected file included 2086 companies. Verification of the completeness and reliability of the data this file reduced to a finite number of 1996 companies.

3 Achievements of the Research

Based on algorithms of the four models have been calculated resulting values of each firm identifying their financial condition, i. e. four resulting values of 1996 firms, which were included in the sample. The basic characteristics of resulting values´ descriptive statistics are presented in Table 2.

Table 2: Resulting values of the models – statistical description

	Ohlson´s model	**Z-score model**	**Model IN05**	**Tafler´s model**
Number of firms	*1996*	*1996*	*1996*	*1996*
Average	**0.087 (0.13)**	**2.36**	**1.545**	**0.956**
Category on average	**Stable financial situation**	**Grey zone (uper level)**	**Grey zone (uper level)**	**Stable financial situation**
Median	**0.001**	**2.47**	**1.391**	**0.693**
Minimum	**0.000**	**-128.84**	**-27.987**	**-5.812**
Maximum	**1.000**	**44.34**	**35.468**	**18.890**
Variance	**0.056**	**15.985**	**6.055**	**1.523**
Standard deviation	**0.238**	**3.998**	**2.461**	**1.234**

Source: own calculations

Values of the Ohlson´s model is expected in the interval ⟨0;1⟩. They represent the probability of the bacruptcy, more preciously of serious financial difficulties. In the analysed set of firms the values of this model were dispread in the whole interval, although great deal of the firms reach the value near the value of zero. Values lower than 0.001 (i. e. 0.1 per cent) were reached in the half of the firms (1042 firms, 52 per cent), values higher than 0.999 (i. e. 99.9 per cent) were in 63 firms (3 per cent). Based on this results can be concluded that the financial condition of firms according to Ohlson´s model is assessed as very stabil and without any threats of bancruptcy. That corresponds to the average value reached in the set of firms on the level of 9 per cent, which means the posibility of bancruptcy on average 9 per cent.

The resulting values of Ohlson´s model were then adjusted for the extremely low and extremely high values (less than 0.001, more than 0.999). The average value of the indicator has due to this correction increased to 0.13. It also indicates a very low average level of risk. On the other hand, in the 63 companies the value is higher than 0.999, that indicate the future plight almost certain. The resulting values distribution were compared with the results of other models (between Ohlson´s model and Z-score model, including Ohlson model and IN05, and the Z-score and IN05). Test conformity of the resulting models values distribution was not confirmed, the values of the models differ significantly.

Altman Z-score gave a somewhat different track results. Good financial health indicates fewer companies. The average value was 2.35, which ranks companies in the sample in the gray zone, but closer to the upper limit, that indicates a good financial condition of companies. The resulting value of this model were adjusted of excluding extreme values (lower than -5.1 and greater than 5.1). The corrected average value reached of 2.57, which is slightly higher ratings then before correction and confirmes the overall pozitive evaluation. Median lower than the average of the corrected file but indicates the dominance of companies with lower than average levels. The test for normal distribution confirmed that the results of this model exhibit a normal distribution.

Rating by IN05 model was more sparsely compared with the first two models, but indicate good financial condition as well. The average value was reached at 1.545, that lies in the gray zone, but near the upper limit of it. Excluding outliers was achieved adjustment average value which was a bit higher. The relation of median and average value when median is lower than average reveals the greater proportion of lower values and a little worse situation in the whole sample. It can be explain by the extremly high values reached in some firms due to the some of indicators. One of the causes of extreme values was the indicator x2 (EBIT/interest). Low values of interests in some firms caused extremely high levels of this indicator. Despite the fact that in calculation the reccommended correction (Neumaier, Neumaierová, 2005) was applied (maximum value of |9.0|), the resulting values reached very high level in some firms. A similar effect had an indicator x1 (A/total liabilities). In case of low value of firms´ debt this indicator reach extremely high value.

Resulting ratings of firms of Taffler´s model was similar to the Ohlson´s model results. The average value of 0.956 reached in the sample indicates very good financial stability of the firms. Values greater than 0.3 indicating good financial situation were achieved in 88.9 per cent of the companies, values lower than 0.2, indicating the threat of bankruptcy were found in 6 per cent of companies. Also in case of this model the median is lower than average value and it means the larger share of values lower than average and somewhat reduces the very good assessment of the whole sample.

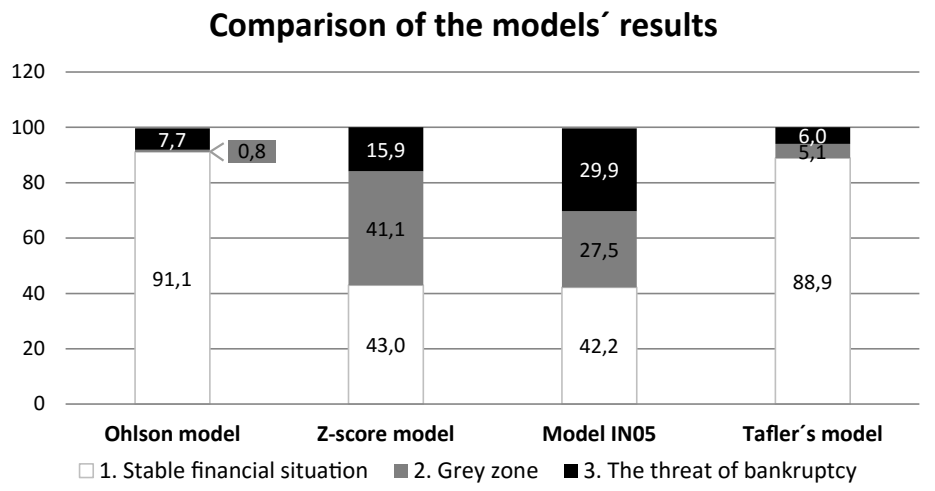
Frequency of individual categories of rating scale based on the compared models is shown in Table 3 and Figure 1.

Table 3: Assessment of the firm´s financial condition

Category	**Ohlson´s model**		**Z-score model**		**Model IN05**		**Tafler´s model**	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%
1. Stable financial situation	1826	91.5	858	43.0	853	42.6	1774	88.9
2. Grey zone	16	0.8	822	41.2	550	27.6	102	5.1
3. The threat of bankruptcy	154	7.7	316	15.8	597	29.8	120	6.0
Total	*1996*	*100.0*	*1996*	*100.0*	*1996*	*100.0*	*1996*	*100.0*

Source: own calculations

Figure 1: Resulting classification of compared models



Source: own calculations

Classification of companies into categories according to the compared models slightly differ. In the case of Ohlson´s and Taffler´s model there is significantly greater proportion of companies which are positively assessed, while the results of Z-score and model IN05 show relatively worse situation: the same share of firms with stable financial situation and of firms in the grey zone. Model IN05 in comparison with the Z-score indicates greater share of firms with the threat of bankruptcy. As compared all the models the greatest share of firms in the grey zone identifies model Z-score. The largest share of endangered firms identifies model IN05. However, both in Z-score and in IN05 model prevails the share of firms with positive evaluation of financial situation. There is an interesting coincidence in the results layout of two pairs of models: Model Ohlson´s and Taffler´s rank much less companies into the category of endangered firms with the risk of bankruptcy (7.7 per cent and 6.0 per cent respectively). Models Z-score and IN05 identify the greater share of companies threatened of bankruptcy, despite there is a greater disparity between the shares (15.9 per cent and 29.9 per cent respectively).

The congruity in the classification of companies by Ohlson´s model and other models describe the data in Table 4.

This comparison shows that in the category companies with stable financial situation has been achieved similarity to the Ohlson´s model assessment in the extent of 84 per cent in classification of model IN05 and at the same time Taffler´s model (84 per cent), while the classification of Z-score model were quite different (47 per cent). In the classification of endangered firms were in relation to Ohlson´s model all the three models almost identical: 58, 52 and 59 per cent of firms respectively. The smallest conformity was reached in the classification of the three models in the grey zone, but the number of firms in this category is minuscule.

Table 4: Classification of Ohlson´s and other compared models

Category	**Ohlson´s model**	***Of which:***	***According to:***					
			Z score model		**Model IN05**		**Tafler´s model**	
	Number of firms		*Abs*	*%*	*Abs.*	*%*	*Abs.*	*%*
1. stable financial situation	*1826*	**stable financial situation**	**872**	**47**	**1535**	**84**	**1531**	**84**
		grey zone	763	42	149	8	149	8
		The threat of bankruptcy	199	11	149	8	146	8
2. grey zone	*16*	*stable financial situation*	4	25	3	19	2	13
		grey zone	**4**	**25**	**2**	**12**	**0**	**0**
		The threat of bankruptcy	8	50	11	69	14	87
3. the threat of bankruptcy	*154*	*stable financial situation*	31	20	56	36	26	17
		grey zone	33	22	18	12	22	14
		The threat of bankruptcy	**90**	**58**	**80**	**52**	**106**	**59**

Source: own calculations

4 Summary and Discussion

Performed calculations and comparisons showed that the models in the evaluation of financial situation of firms differ. Relatively greater consensus in the assessment of financial condition was found between the Ohlson´s model and Taffler´s model. On the contrary larger differences were observed in the results of Ohlson and Taffler´s model on one side and Z-score and IN05 on the other side. Ohlson´s model and Taffler´s model presented the financial situation of the companies significantly better. Model IN05 assessed the firms´ financial situation the most strictly. Final verifying which of the compared models predicted the future fate more precisely could bring subsequent analysis of the real data.

When calculating the value according to different models (IN05, Z-score and Taffler´s), has proven their high dependence on the ratio indicators, which include. The problem was not in the selection of indicators and their sensitivity for predicting bankruptcy, but in the possibility of some ratios to reach extreme values. The resulting model value then - in individual cases - loses its explanatory power and predictive capability within a validated rating scale and also limits the comparability of the value in space and time. In the analysed sample of companies proved as problematic the indicator debt ratio (A/Liabilities) and interest coverage (EBIT/Interests) and also the return on assets or return on equity

(EBIT/A, EAT/E). These indicators use items "interest" (IN05), "foreign capital" (IN05, Z-score) or profits at different levels. It is obvious that these indicators are significant of possible future distress. But values of these indicators may acquire in the particular circumstances of extreme values that do not correspond to lower / higher risk. The applicability of such model is thus limited.

In the case of Ohlson´s model, these obstacles did not occur. It can therefore be assumed that the problem is partially removed the another way of deriving the model (logit regression), which at the same time create space for other criteria for evaluation of financial situation. The resulting values of this model, however, show too soft evaluation. The reason may be that the model was derived in a different economic environment and at a different time. Sensitivity to the conditions and time the model was derived were the stimulus for construction different national models. To verify the reliability of the models based on logit regression in comparison with the models based on linear regresion or to construct the model variant based on the Czech environment should be the themes of further research.

Performed comparisons also drew attention to the financial data, which are the main source for the both derivation and subsequently calculation of the models. The role of accounting data and accounting methods (continental, anglosaxon, national) in the predictive ability of the models and the reliability of the final verdict still remains in the background of attention. The accounting principles and methods affect the data across accounting statements. They are not only different in different national environments, but also within a single the national environment itself (as a result of options in financial reporting).

5 Conclusions and Possible Future Research

Performed comparison of Ohlson´s model and selected three prediction models, model Z-score, model IN05 and Taffler´s model, revealed that the evaluation of companies financial situation using the model based on the logit regression differs significantly from the assessment based on models derived by linear regression, although this conclusion is not absolutely true: some similarities can be found with the assessment of Taffler´s model. Ohlson´s model identifies much better financial situation of companies than models Z-score and IN05. In the evaluation of financial situation coincide models of Z-score and IN05. The very favorable assessment of the firms could be explained by structure of indicators and the model application in different economic conditions and in the distance from the time of its construction, specifics of economic surroundings, etc.

The study raises a number of questions which can become a stimulus for further research. Problems to discussion and the theme for further research can be seen in the folowing areas:

a) What indicators – financial, non-financial - are the most sensitively to the future financial distress and what is discriminatory power of these indicators.
b) The methods used to derive the model and their impact on the model prediction accuracy of the real bankrupcy.

c) The degree to what is the model accuracy affect by the data entering the model derivation (distribution, outliers).

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References

ADAMEC, J. (2010) *Faktory predikce finanční tísně. In:* sborník příspěvků mezinárodní vědecké doktorské konference INPROFORUM Junior, České Budějovice: Jihočeská univerzita 2010.
ALTMAN, E. I. (2010) *Bankruptcy, Credit Risk, and High Yield Junk Bonds.* Massachusetts: Blackwell Publisher Inc.
ČÁMSKÁ, D. and J. HÁJEK (2012) Companies related to the glass making industry and their financial health. In: Kislingerová E., Špička J. (ed.). *Transakční náklady českých ekonomických subjektů v insolvenčním řízení, možnosti jejich snižování a zlepšení statistiky insolvenčních řízení*. Praha: Oeconomica, s. 11-12.
GRICE, J. S. and M. T. DUGAN (2001) The Limitations of Bankruptcy Prediction Models: Some Cautions for the Researcher. *Review of Quantitative Finance and Accounting*, Vol. 17, pp. 151-166.
GRICE, J. S. and M. T. DUGAN (2003) Re-estimations of the Zmijevski and Ohlson Bancruptcy Prediction models. *Advances in Accounting*, Vol. 20, pp. 77-97.
GRICE, J. and M. T. DUGAN (2010) The Limitations of Bankruptcy Prediction Models: Some Cautions for the Researcher. *Review of Quantitative Finance and Accounting*, Vol. 17, pp. 151-166.
GURČÍK, Ľ. (2002) G-index – metóda predikcie finančného stavu poľnohospodárskych podnikov. *Agricultural economics* s. 373-378.
CHEN, H. J., S. Y. HUANG and C. S. LIN (2009) Alternative diagnosis of corporate bankruptcy: A neuro fuzzy approach. *Expert Systems with Applications*, 36, pp. 7710–7720.
JIN, M. (1993) *A Re-examination of Two Major Bankruptcy Prediction Models*. Vancouver: The University of British Columbia. Department of Commerce. Guidance of the study: Joy Begley.
JOUZBARKAND M., V. AGHAJANI, M. KHODADADI and F. SAMENI (2012) Creation Bankruptcy Prediction Model with Using Ohlson and Shirata Models. DOI: 10.7763/ IPEDR. V54. 1.
KLEČKA, J. and H. SCHOLLEOVÁ (2010) Bankruptcy models enuntiation for Czech glass making firms. *Economics and Management*. pp. 954-959. ISSN 1822-6515
KORDLAR, A. E. and N. NIKBAKHT (2011) Comparing Bankruptcy Prediction Models in Iran. *School of Doctoral Studies (European Union) Journa*l. pp. 24-31.
KUBÍČKOVÁ, D. and I. JINDŘICHOVSKÁ (2013) Impact of IFRS reporting on prediction of development of financial conditions of Czech firms. In: proceedings of the 6th International Scientific Conference *„Finance and the Performance of Firms in Science, Education and Practice*", April 25-26. Zlín: UTB.
KUMAR, R. G. and K. KUMAR (2012) A comparison of bankruptcy models. International *Journal of marketing, financial service and management research*. Vol. 1, No 4, pp. 76-86.

KUPILÍK, O. (2013) *Analýza vlastností bankrotního modelu Ohlson.* Bakalářská práce, Plzeň Západočeská univerzita, Fakulta aplikovaných věd, 75 s.
LANTTO, A. and P. SAHLSTRÖM (2009) Impact of International Financial Reporting Standard adoption on key financial ratios. *Accounting and Finance*. Vol. 49, p. 341–361.
LIAO, T. F. (1994) *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models.* Sage University Paper series on Quantitative Applications in the Social Sciences. pp 07-101. Thousand Oaks, CA Sage.
MOGHADAM A. G., F. N. ZADEH and M.M.G. FARD (2003) Review of the prediction power of Altman and Ohlson´s models in predicting bankruptcy of Listed Companies in Tehran Stock Exchange – Iran. *Houston Business Journal*. 19 November, pp. 1-14.
MUZIR, E. and N. ÇAĞLAR (2009) The Accuracy of Financial Distress Prediction Models in Turkey. *Anadolu University Journal of Social Sciences*, Vol. 9, No. 2, pp. 15-48.
NEUMAIER, I. and I. NEUMAIEROVÁ (2005) Index IN 05. In: proceedings of the international scientific conference *Evropské finanční systémy*. June 21. - 23. ESF MU v Brně. Brno: Masarykova universita, s. 143–148. Available at: http://is.muni.cz/ do/1456/sborniky/2005/evropske-financni-systemy-2005.pdf [Access: August 12, 2015].
OHLSON, J. A. (1980) Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*. Vol. 18, No. 1, p. 109-131.
PONGSATAT, S., J. RAMAGE and H. LAWRENCE (2004) Bankruptcy Prediction for Large and Small Firms in Asia: A Comparison of Ohlson and Altman. *Journal of Accounting and Corporate Governance*. Vol. 1, No 2.
SHUMWAY, T. (2001) Forcasting bankruptcy more accurately: a simple hazard model. *Journal of Business*. Vol. 74, No. 1, pp. 101-124.
ŠEDIVÁ, B. (2012) Binární a zobecněné lineární regresní modely. Mathematical Models in Econometrics (MME) course. Faculty of Applied Sciences of the University of West Bohemia in Pilsen. Available at: http://home.zcu.cz/sediva/mme/archiv/MME06.pdf. Online 2015-10-02
ŠLÉGR, P. (2013) The Evaluation of Financial Stability of Czech Companies through the Z-Score and the IN05 Index and their Comparison. In: proceedings of the 7th WSEAS International Conference *Recent Advances in Management, Marketing and Finances*. Cambridge, MA USA, January 30 - February 1. pp. 29-33. ISSN: 2227-460X.
TAFFLER, R. J. (1982) Forecasting company failure in the UK using discriminant analysis and financial ratio data. *Journal of the Royal Statistical Society* 145(3): 342-358.
WANG, Y. and M. CAMPBELL (2010) Financial Ratios and the Prediction of Bankruptcy: The Ohlson´s model Applied to Chinese Publicly Traded Companies. *Journal of Organizational Leadership and Business*. No. 2.
WU, Y., C. GAUNT and S. GRAY (2010) A comparison of alternative bankruptcy prediction models. *Journal of Contemporary Accounting & Economics*. Vol. 6, pp. 34-45.

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A Perception of a Town: Inhabitants´ Values and Preferences of the Moravian-Silesian Region, the Czech Republic

Vnímání města: hodnoty a preference obyvatel v Moravskoslezském kraji, Česká republika

SOŇA HARASIMOVÁ

Abstract

The overall objective of the towns is their sustainable development, but it is not possible to exactly define it. It is a subjective idea and it is closely related to a value system and preferences of inhabitants. The aim of this study is to evaluate 15 selected areas for living in a town and mainly define a perception and evaluation of Environment as well as the Appearance of public spaces and relations between these areas and image of the town. There is the evaluation of the current situation and proposals for changes in these areas. There is also a position of Environment in the overall ranking of 15 areas that are important for residents. Data for this study were obtained from a survey in six district towns of the Moravian-Silesian Region, 452 people were questioned in February 2014. Respondents evaluated the current situation in 15 selected areas and they also suggested proposals for changes in these areas. Results of the study show that the Environment was ranked with regarding to the typology of the chosen town. But the results of the evaluation of the current environmental situation in the towns were so different that they cannot be averaged for the whole region.

Keywords

perception of a town, evaluation of environment, evaluation of public areas, typology of towns

Abstrakt

Celkovým cílem měst je jejich udržitelný rozvoj, ale tento pojem není možné přesně definovat. Je to subjektivní myšlenka, a ta je také úzce spjata s hodnotovým systémem a preferencemi obyvatel. Cílem této studie je zhodnotit 15 vybraných oblastí pro život ve městě, a zejména definovat vnímání a hodnocení životního prostředí, jakož i vzhledu veřejných prostor a vztahy mezi těmito oblastmi a image města. Je zde zhodnocení současné situace a návrhy na změny v těchto oblastech. K dispozici je také pozice životního prostředí v celkovém pořadí 15 oblastí, které jsou důležité pro obyvatele. Data pro tuto studii byla získána z vlastního výzkumu v šesti okresních městech Moravskoslezského kraje, v únoru 2014 bylo dotázáno 452 obyvatel. Respondenti zhodnotili současnou situaci v 15 vybraných oblastech a také navrhli změny v těchto oblastech. Výsledky studie ukazují, že životní prostředí se umístilo v hodnocení s ohledem na typologii zvoleného města. Výsledky vyhodnocení současné situace v oblasti životního prostředí ve městech byly tak odlišné, že nemohou být počítány jako průměr pro celý region.

Klíčová slova
vnímání města, hodnocení životního prostředí, hodnocení veřejných prostor, typologie měst

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Introduction

The town is ethnically, economically and socially multi-layered community and members of different groups identify themselves with the town on the basis of experience, memories and emotions (Šrajerová, 2006). People of the town identify themselves through: a family and friends, architectural monuments, buildings, streets and squares, a language or dialect, geographical and landscape phenomena and others (Bitušíková, 2003).

People have always felt two contradictory longings: a desire for freedom and a wish to make place one´s home (Neill, 2004). Every town is recreated by its residents who work and live in it, so it is often developed spontaneously and not exactly according to plans of its founder or public administrators (Petrová, 2013).

In the past, the most important task for the city council was to provide adequate sanitary conditions for its residents (Hojer, M., Bullberg A. and Pettersson, R., 2011). Today, the city council deals with other questions: How different is our city from the other towns? How to attract new investors, tourists, and eventually future residents? (Baker, 2007) All of these groups contribute to economic and social development of the city. And even the smallest village is ultimately more complex than the largest industrial corporation because there are various reasons why people live in it (Anholt, 2010).

Urban areas are facing not only an increasing population and a growing demand of touristic activity. However, whilst increasing touristic activity is an important for certain cities, tourism facilities are responsible for a substantial increase in environment degradation due to tourists' rising expectation for services and facilities (Girivati, N., Homma, R., Iki, K., 2013).

As Blackman states (1996) urban policy is essentially about welfare of local residents in an urban society. But many of the city's development strategies are focused only on the target groups of tourists and businessmen, which causes discontent of local residents (Matlovičová, 2010).

Olsson and Berglund (2009) wonder why to take into account the interests and attitudes of local residents. How to involve groups of differently oriented residents in the process of planning and development of the town and why they consider this target group to be more important than the target group of visitors and investors. The feedback on dealing with satisfaction with life in a given space is a key element in the creation of the town development strategy. The most important of all inhabitant groups are middle-class residents who best responds to various incentives and initiatives of a local government (Bucchiara, 2013).

Golledge, Richardson and Gale (1987) describe behavior of a newcomer to the city. At the beginning he/she will be interested in three main things: housing, food and employment. There are another incentives and interests for living that residents consider to be important: an attractive, safe and healthy environment, a city without homelessness, adequate housing, opportunities for business and development, a place for cultural excellence and others (Smyth and Hedley, 2005).

Hard and soft factors have significant influence on decision-making of residents. Matlovičová (2010) researched these soft factors: inhabitants' satisfaction with life, quality of housing, willingness to remain living in the town and others. Prioritizing of needs of tourists at the expense of residents (e.g. Russian-language inscriptions in spa towns in a western part of Bohemia) completely suppresses the natural cooperation of target groups in the town, which results in greater separation of residents and owners of the shops and hotels.

Other soft factors for the development and growth such as activities and behavior of the public sector are becoming more important. There are already mentioned quality of housing, possibilities for small business and midsize companies, image of the town, the local culture, environmental quality, access to health care and others (Rumpel 2002). Hard factors of development such as the availability and cost of land, capital or labor are less important for the residents (Ježek, Rumpel a Slach 2007).

Environmental damage negatively influences architectonic heritage and further development of the city. Even towns which are not big industrial centers have pollution problems, as T. Luque-Martínes at al. (2007) shows on an example of Granada.

More and more inhabitants want to participate in the development of their city. Avraham and Ketter (2012) give the example of Tel Aviv, where 800 residents were involved in the process of creating a new vision for the city's development. And according to the Dutch model, development strategy of each town is then incorporated into the overall development strategy of a region (Heeley, 2011).

This study is focused on mapping of opinions and preferences of the population in selected towns of the Moravian-Silesian Region which is situated in the north-eastern part of the Czech Republic. Research questions are following: What is the residents´ attitude to the urban environment and appearance of public space in the town? Which areas do the residents consider to be the most important for a satisfied and quality life in the town? How do they evaluate these areas and which changes would they like to make in selected areas?

1 Green Towns – Clean Towns?

Certain amount of green open spaces in the urban environment is a result of long process. The provision of substantial green open areas reached the highest level in 1960 (Freestone, 2000). Since then, parks, public gardens and open areas had to recede because of urban

development. However, not every green city is also a clean city. Almost thirty years ago, C. S. Yadev (1987) stated that the current urban problems are mainly ecological problems.

Air pollution caused by various gases is almost invisible. Carbon monoxide is one of the major pollutants due to the toxicity. It is formed by incomplete combustion of carbon and organic substances. It is emitted by cars, local heating, energy and metallurgical industries. Sulfur dioxide is a colorless, poisonous gas that is produced by burning of sulfur. Oxides of nitrogen are also toxic and mostly colorless gas.

As it is shown in table 1, air quality varies considerably in different towns.

Table 1: Emissions of main pollutants in air by the Moravian-Silesian Region in 2013

Pollutants	Sulphur dioxide	Nitrogen oxides	Carbon monoxide
Towns	REZZO 1-3	REZZO 1-3	REZZO 1-3
Bruntál	0.5	0.2	0.7
Opava	0.4	0.3	1.2
Nový Jičín	0.6	0.4	2.7
Frýdek-Místek	4.6	3.1	51.5
Karviná	11.7	13.9	10.3
Ostrava-město	32.4	28.6	166.5

Note: Sulphur dioxide – specific emissions (t/km²)
Source: The Czech Hydrometeorological Institute

There is also a chemical industry in Ostrava (32.4 t/km² of sulphur dioxide). High levels of carbon monoxide in air in Frýdek-Místek are caused by the fact that many towns and villages near the mountains are not connected with natural gas and the residents are accustomed to use coal to heat their homes.

Marzuff et al (2008) describes four types of ecological studies that can be implemented in the urban environments. N. Heyen, M. Kaika and E. Swyngedouw (2006) developed a ten-point Manifesto for urban political ecology. According to authors, this manual can be used for basic debate about environment in a city or as a platform for future research.

But how do residents evaluate the environment in the city? Should air quality be improved and heating with solid fuels be reduced? Or would they rather encourage people to plant new trees and to sort household waste? And how much attention do the inhabitants pay to the appearance of public space in their town and do they appreciate it? Would they like to have more green areas and parks? Or would they rather repair sidewalks and build more public playgrounds for their children?

Contemporary towns have got multi-layered identity of open public spaces. These spaces are characterized for diversity of users, where people go for different reasons and where they perceive these places in different ways (H. Caskin and F. Bernardo, 2009).

2 Methods

2.1 Study Sitess

This research was carried out in six towns of the Moravian-Silesian Region (shortened for the MSR) in February 2014. Forman (2008) describes concept of a region as two main characteristics: macroclimate and a cultural-social pattern. Looking at natural and industrial diversity of towns that are located in the territory of the region, the towns were divided into three groups according to their typology.

Bruntál is located in the western part of the region. This town is characterized by an underdeveloped industry and there are areas with predominating agricultural production. The Jeseníky Mountains have an important place in promotion of tourism. According to the statistics, there is the highest rate of unemployment (17.97%), the least job vacancies and the smallest number of inhabitants per square kilometer.

The city of Ostrava (the district city) and Karvina are characterized by heavy, metallurgical and machine tools industry. Until the end of the 20th century mining dominated in both areas, the OKD Company is the only black coal producer in the Czech Republic. Active coal mining is processed only in Frýdek-Místek and Karvina now. For this reason, the quality of the environment is often on low level. Service area and machine-building industry have been rapidly developing.

Opava, Nový Jičín and Frýdek-Místek are towns which have approximately the same size and population, as well as developed production in light industry, machine-building and services. Tourism is developing in the Beskydy Mountains (Frýdek-Místek) and at the Odra river-landscape (Novy Jičín). There is also the lowest rate of unemployment: Frýdek-Místek 9.34%, Nový Jičín 9.67% and Opava 11.23%.

As it was stated by K. J. Gaston (2010) the Moravian-Silesian Region belongs to the typical European urban settlement, where majority of the population lives in city with fless than half a million inhabitants (City of Ostrava) and the others live in towns around. New development models call for better understanding of local circumstances and priorities and links between rural and urban areas (Rydin, 2005).

2.2 Data Sample

The aim of empirical research is to analyse the perception and evaluation of inhabitants´ satisfaction in 15 selected areas, which the residents consider to be important areas for life in the town.

For the purpose of this research the construction of a sample that represents people of six towns using the quota sampling was suggested. The basic quotas are place of residence, age, education and gender of the respondents.

Because the research is primarily intended to compare the set of urban population, the specific subset of socio-demographic characteristics of the each of the six towns was designed. The available data from the census of 2011 year were support for the creation of quotas.

Respondents were divided according to age into following groups: under 15 years, 20-24 years, 25-39 years, 40-59 years, +60 years. And according to education: primary, apprenticed, secondary schools, university bachelor, university master's degree. Respondents were chosen as the basis of quota sampling.

The total size of a proposed research sample is 600 respondents, 100 people from each town. This size allows to do the expected statistical evaluation of data (sorting of the second and third grade). The size of each urban sub-population does not reflect the relative size of each urban population. It is primarily used to make a comparison between towns. The sample should adequately contain sufficiently numerous subcategories also in smaller towns to allow adequate statistical evaluation of collected data.

The questionnaire contains 15 closed questions. Basic indicators (areas of evaluation) are in order: interpersonal relationships, culture and behavior of inhabitants, environment in a town, health care, public safety, quality of public administration, appearance of public space, social services, access to education, housing, provision of information to citizens, image of a town, image of a region, the number of job vacancies, transport and infrastructure.

The first part of the question is focused on evaluation of current situation in particular area. Questioners rated the areas from 1 (the best) to 5 (the worst). The total list of all evaluated areas is in Table 3.

The second part of the question includes suggestions for a change in a particular area. Five of the most frequent responses were chosen from a similar questionnaire survey, which was carried out electronically in 2009. The management of the MSR was the author of the survey (Strategie rozvoje MSK). These options - suggestions were summarized in the second part of the question: "What would you change?".

The last question No. 16 refers to the overall evaluation of 15 above mentioned areas. Respondents choose 5 areas out of 15 areas that are most important for them. The area on the first position was given five points, the area on the fifth position was given one point. Total list of all evaluated areas is in Table 4.

We can obtain data from following research issues:
- Assessment of the current situation of each area.
- Suggestions for change (respondents choose 1 out of 5 options).
- Evaluating the most important areas of life in the town.

2.3 Data Analysis

The questionnaire survey was addressed to 600 respondents, 471 questionnaires were answered, 19 pieces were excluded because of incomplete information. 452 questionnaires were collected from towns: 71 pcs from Bruntál, 84 pcs from Opava, 72 pcs from Nový Jičín, 81 pcs from Frýdek-Místek, 69 pcs from Karvina and 75 pcs from Ostrava-city. To sum up, 74% of respondents answered the questionnaire.

Respondents answered all of the 15 surveyed areas in the questionnaire. The aim of this study is to analyze primarily the Question No. 3 Environment in the town and Question No 7 Appearance of public space.

Carr (1992) points that popular awareness concerning the urban environment is about air quality, waste disposal, water supply and general health of the biosphere. Public spaces differ depending on their social, cultural, economic and symbolic functions, depending on the meaning, contested and negotiated they are, that different publics bring to them (Fyfe, 1998). Evaluation of public space is also related with the existence of the town center. Madanipour, A., Knierbein, and Degros S., (2014) consider the center to be the heart of each town, including natural "meeting zones" and therefore it is extremely important to keep the center of the town inhabited by residents, not just companies, offices and commercial space.

Table 2: Evaluation of the current situation – two chosen areas

Town Quest. No.	Bruntál	Opava	Nový Jičín	Frýdek-Místek	Karviná	Ostrava město
3	2.15	2.47	2.81	3.03	3.69	3.65
7	2.50	2.13	2.61	2.41	2.55	2.73

Note: Values are expressed in mathematical average, 1 is the best - 5 is the worst. Quest No. 3 Environment in your town. No. 7 Appearance of public space (area) in your town.
Source: Own research

Residents of Bruntál evaluate Environment in a town as the best of all areas. On the other hand, residents of Karvina and Ostrava-město consider the environment in town as very unsatisfactory. Their assessment is consistent with the data of The Czech Hydrometeorological Institute. Most of the inhabitants receive data indirectly through local media or announcements of the Town Hall. People usually know which factories and companies are the biggest polluters in the area. Unfortunately, many citizens contribute to this situation by burning coal in their home central heating (high levels of carbon monoxide).

Looking at the figures of question No. 7 (Appearance of public space in your town) residents (except the Bruntál ones) evaluated the public spaces in their town better than environment in town.

In the Table 3 there are 15 areas (numbers inside table) and their position on the evaluation of the current situation in each town.

Table 3: Evaluation of the current situation in each town

Town Order	Karviná	Ostrava město	Nový Jičín	Frýdek-Místek	Opava	Bruntál
1st	9	4	10	9	9	3
2nd	7	9	11	10	10	6
3rd	15	10	9	12	7	8
4th	10	15	4	15	12	7
5th	11	1	12	4	3	9
6th	8	8	7	7	1	10
7th	6	6	6	8	8	11
8th	1	11	8	11	11	1
9th	12	7	15	2	2	2
10th	4	12	3	5	5	5
11th	2	13	1	1	15	12
12th	13	2	2	6	4	15
13th	5	5	5	13	13	13
14th	3	3	13	3	6	4
15th	14	14	14	14	14	14

Note: 1st is the best - 15th is the worst. Areas: 1 Interpersonal relationships and cooperation in your town. 2 Culture and behaviour of people in your town. 3 Environment in your town. 4 Health care in your town. 5 The safety of people in your town. 6 The quality of town government. 7 Appearance of public space (area) in your town. 8 Social services in your town. 9 Availability and quality of education in your town. 10 Housing in your town. 11 Providing information to citizens and visitors of town. 12 Image of your town. 13 Image of the Moravian-Silesian region. 14 Number of jobs in your town. 15 Transport and infrastructure in your town.
Source: Own research

When evaluating the current situation, the Appearance of public space (Area No. 7) moves from the 2nd (in Karviná) to the 9th position (in Ostrava-město). There is the difference of 7 positions. Environment in the town (Area No. 3) is evaluated from the 1st (in Bruntál) to the 14th position (industrial towns). The difference is 13 positions.

In every town, there are the Technical Services that are paid and run by the Town Hall. These companies are responsible for cleaning of areas belonging to the town (litter bins, repair and installation of benches, lawn cutting, care of plants, bushes and trees, functioning of fountains in summer, removal of snow in winter and others). Upkeep of public spaces and other services paid by towns operate reliably, for the general satisfaction of

citizens. Finally, it has to be said, that residents usually do not throw litter in the streets or destroy equipment for relax in parks of the town in which they live.

Appearance of public spaces in Karvina is on the second place. It is unique, because a part of town was newly built after the World War II as residential suburbs for miners and metallurgists (many of them daily commuted to Ostrava). Nevertheless the town has its historic centre, including a square, a town hall, a church and a chateau. Appearance of public spaces of Opava is on the third place and in Bruntál on the fourth place. These towns are very old towns founded in the 13th century which have a square, a town hall and streets with old houses. In Opava, there is a continuous belt of parks, which replaced the medieval fortifications 200 years ago. The urban environment in these towns is also for this reason evaluated positively.

The residents of Frýdek-Místek and Nový Jičín evaluate Appearance of public space on the 6th place. Frýdek-Místek is a conurbation on the Ostravice river, each town (Frýdek and Místek) has its own history, square with Renaissance houses, a town hall and churches (until their union in 1943). Residents, however, still strictly define whether they live in Frýdek or in Místek. Nový Jičín is also an old town with the historic centre, there is a square, a town hall, a castle and a church. In addition, the town centre has been declared as the Urban Conservation Area.

The Ostrava city suffers from the fact that it is "composed" of the former independent villages and boroughs. In fact an important centre of a town (with a square, a church and a town hall) is in every suburb, so the residents living there do not have a close relationship with the main Town Hall and with the main Square in the city centre. Because of the fact that Ostrava was also the former center of metallurgical and mining industries, there are still many empty technical places and buildings (mining towers, old ironworks and factories). Some areas were successfully transformed into the technological museums or places of entertainment (e.g. the Area of Dolní Vítkovice), the others slowly decay.

In the Table 4 there is list of all areas (positions from 1st to 15th) that respondents consider important for their living in each town.

Table 4: Evaluation of all areas in order of priority for living in each town

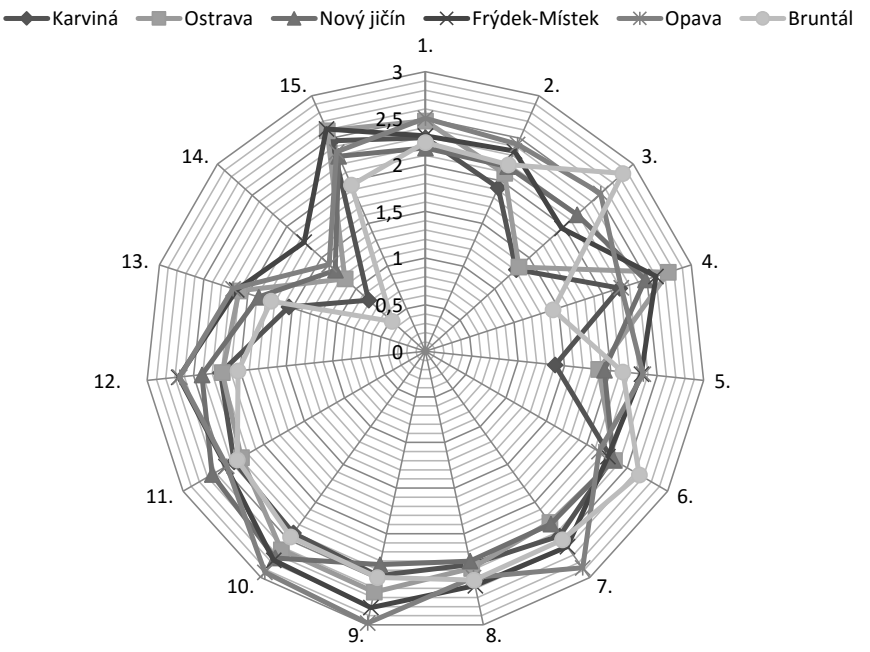
Town Order	Karviná	Ostrava město	Nový Jičín	Frýdek-Místek	Opava	Bruntál
1st	5	3	5	4	5	4
2nd	4	5	1	5	3	14
3rd	14	14	14	3	10	10
4th	3	4	4	14	14	5
5th	10	9	3	1	15	3
6th	2	1	10	10	1	15
7th	9	10	8	2	4	9
8th	1	2	15	9	2	1
9th	15	15	12	8	8	8
10th	7	8	2	6	7	7
11th	8	12	9	7	6	2
12th	12	7	7	15	9	12
13th	11	11	6	11	12	13
14tth	13	6	11	13	13	6
15th	6	13	13	12	11	11

Note: 1st is the most important - 15th is the least important
Areas: 1 Interpersonal relationships and cooperation in your town. 2 Culture and behaviour of people in your town. 3 Environment in your town. 4 Health care in your town. 5 The safety of people in your town. 6 The quality of town government. 7 Appearance of public space (area) in your town. 8 Social services in your town. 9 Availability and quality of education in your town. 10 Housing in your town. 11 Providing information to citizens and visitors of town. 12 Image of your town. 13 Image of the Moravian-Silesian region. 14 Number of jobs in your town. 15 Transport and infrastructure in your town
Source: Own research

After calculating of the total average of six towns, the overall ranking of all 15 areas is following: the most important area is safety of people (Area No. 5), then there is health care (Area No. 4) and number of jobs (Area No. 14). If we look at the priorities stated by Golledge, Richardson and Gale in 1987 (housing, food and employment), we can see a significant change here. Employment or number of jobs is still important, but food and housing were replaced by safe living and available health care.

Scale of evaluation (of the current situation in each town) was reversed in polarity in order to better quantify various areas of the town.

Fig. 1 Dimension of evaluated towns



Areas: 1 Interpersonal relationships and cooperation in your town. 2 Culture and behaviour of people in your town. 3 Environment in your town. 4 Health care in your town. 5 The safety of people in your town. 6 The quality of town government. 7 Appearance of public space (area) in your town. 8 Social services in your town. 9 Availability and quality of education in your town. 10 Housing in your town. 11 Providing information to citizens and visitors of town. 12 Image of your town. 13 Image of the Moravian-Silesian region. 14 Number of jobs in your town. 15 Transport and infrastructure in your town.
Source: Own research

The smallest difference in dimension of the towns is at the Area No. 8 Social Services (0.23 of point), the Area No. 1. Interpersonal relationships (0.31 of point) and on the third place there is the Area No. 11. Providing information to citizens and visitors of town (0.36 of point). At the opposite side of the list on the thirteenth place there is the Area No. 14. The number of jobs (1.00 of point), then Area No. 4. Health care (1.30 of point) and the biggest differences in evaluation are at the Area No. 3 Environment in your town (1.54 of point).

Table 5: Correlation coefficients (Pearson Correlation)

Areas No.	Karviná	Ostrava město	Nový Jičín	Frýdek-Místek	Opava	Bruntál
3 Environment	0.284	0.313	0.219	0.307	0.284	-0.071
4 Health care	-0.234	-0.127	0.012	0.303	0.381	0.017
14 Number of jobs	0255	0.478	0.224	0.226	0.087	0.118
7 Appearance of public space	0.548	0.332	0.391	0.539	0.237	0.16

Source: Own research, data from Fig. 1. Average evaluation of current situation in relation to evaluation of area No 12 Image of the town.

There is no relation between evaluation of Environment (Area No. 3) and Image of the town (Area No. 12) in Bruntál (-0.07), the value of variable is close to zero. According to the classification of Brymann and Duncan, the relation between these two figures of other five towns is assessed to be small. The image of the Bruntal town is relatively very low and not very efficient. The significant relation between evaluation of Number of jobs (Area No. 14) and Image of the town (Area No. 12) is in Ostrava (0.48). Another relation with higher variable is at evaluation of Appearance of public space (Area No. 7) and Image of the town (Area No. 12) in Karviná (0.55) and in Frýdek-Místek (0.54). According to the above mentioned classification, the relation is considered to be average.

2.4 What Would You Change?

Suggestions what to change in these areas are based on the most mentioned ideas from the survey in 2009. This survey was held by the Municipality Office of the Moravian-Silesian Region (Strategie rozvoje Moravskoslezského kraje, 2009).

Table 6: What would you change? (Area No 3. Environment in the town)

Town Areas	Bruntál	Opava	Nový Jičín	Frýdek-Místek	Karviná	Ostrava město
1	8	34	32	38	61	55
2	21	17	28	13	18	17
3	25	7	10	9	1	7
4	25	17	16	13	13	8
5	21	25	14	27	7	13

Note: The figures in the table were converted to percent due to the different number of respondents who answered questionnaire in each town.
Areas: 1 to improve air quality. 2 To reduce heating with solid fuels. 3 To plant new trees. 4 To improve home waste sorting. 5 To reduce density of town traffic.
Source: Own research

The residents of towns (except Bruntál) require improving of air quality. With reference to Table No. 1 Karvina (61%) and Ostrava city (55%) are the cities where there is the highest presence of pollutants in the air. Closely related to it there is the wish to reduce heating with solid fuels (in Frýdek-Místek and also in Nový Jičín), which is dependent on the technical possibilities and willingness of firms to expand the supply of natural gas in places where it is still not available.

The Bruntál town is out of average evaluation, though it is placed almost next to the mountains, the residents require to plant more greenness. The respondents' answers to the suggestions for changes in the environment are balanced (around 23%) they also require to sort more household waste, as well as to reduce traffic congestion in the town

Table 6: What would you change? (Area No 7. Appearance of public space)

Town Areas	Bruntál	Opava	Nový Jičín	Frýdek-Místek	Karviná	Ostrava město
1	35	15	9	22	16	11
2	7	19	17	17	26	27
3	7	7	3	16	7	9
4	9	15	23	6	12	17
5	42	44	48	39	39	36

Note: The figures in the table were converted to percent due to the different number of respondents who answered questionnaire in each town.
Areas: 1 To repair sidewalks. 2 To create more green areas and parks. 3 To build playgrounds for children. 4 To cancel illegal dumping of waste. 5 To engage the unemployed in cleaning of town.
Source: Own research

The most suggestions for change concerning to the appearance of public spaces were gathered in No. 5 - To engage the unemployed in cleaning the town. The residents are aware of the high unemployment rate in their town and region. Looking at the structure of the unemployed, the most of them has only basic education, so it is difficult to find a job. Community work (and cleaning of public areas in particular) has a double benefit both to provide a relevant work for people without permanent jobs and help to remove visible defects in public places of the town.

However, to do this, there is need of cooperation of the City Hall, the local Labour Office and organisations providing social services. To repair sidewalks (Option No. 1) needs cooperation with the Town Hall and local building companies and it can be a good example of Public and Private Partnership. The existing legislative framework of the Czech Republic enables to perform this kind of community work and it is successfully used mainly in small towns and villages.

Different answers occurred in suggestion No. 4. - To cancel illegal dumping of waste. Frequency of these answers seems to depend on the personal experience of residents with illegal dumping of household waste around the town.

Area 3, Option No. 3 (to plant new trees) of the Table 5 and similarly Area 7, Option No. 2 (to create more green space and parks) of the Table 6 show that residents consider their town to be sufficiently green. Option No. 3. Build playgrounds for children – does not seem to be so important for residents. On average, only 7% of inhabitants would like to do changes in this area.

Result

Looking at Table 1 Emissions of main pollutants into air by region in 2013, we can see that the carbon monoxide is the worst pollutant in the air. It is typical for the area of Ostrava and industrial parts of the Moravian-Silesian Region. The study of W. Endlicher (2011) shows that the greatest reduction in air pollution (transport, household heating, small factories and more) in the city of Berlin took place until 2000. Since then, the trend of reducing pollutants is slightly decreasing. Ostrava has been reducing its emissions in the atmosphere, but it is more than 15 years backwards in this process.

Comparing the data in Tables No. 3 and No. 4, we can see that although the Environment in Bruntál is evaluated as the best area, the residents do not considered this area as the most important for their life. Residents do not require improving air quality so much proposals for changes in the other four areas are balanced. First, this is due to economic conditions (absence of large industrial companies) and then natural and climatic conditions subtly influence the evaluation of the urban environment. Residents naturally accept that live near the mountains and that their town is truly "green."

Residents of Ostrava, where the environment and especially air is damaged the most, considered quality and clean environment the most important for their life. In the overall assessment there are Opava (engineering), followed by Frýdek-Místek (machinery and mining industry) and Karvina (metallurgy and mining industry).

Looking at the Table 3 Evaluation of the current situation – all areas in towns, we can find out that Appearance of public space in general is evaluated on higher position than Environment in the town. General public space is represented by complex of units such as the main square and by many particular items like street lamps, lawns, benches and others. All these parts of public space are more visible and inhabitants can control them every day. But the environment of the town (and mainly quality of air) is quite invisible issue, so if it got worse, it would be difficult to recognize the changing situation.

Residents of towns (except City of Ostrava) positively evaluated current Appearance of public spaces. All these towns have their historic center, including a main square, a town hall, a church and nearly most of them have a chateau or a castle. According to K. Lynch (1960) all these elements are important parts of the urban image of the city.

People living in the towns of the Moravian-Silesian region value other areas of life differently than it was for example in 1987 (Golledge, Richardson and Gale). Summing up the results of Table 4 three are the most important areas: safe living in the town, accessible health care and work and jobs. It can be a result of general aging of population in these towns. Looking at the other areas we can see that Environment in the town is more important than Appearance of public space.

Results of Table 6 and Table 7 show that the residents suggest to take better care of environment. The prime concern is to improve air quality, which can be achieved by the Regional Office and its organizations (City of Ostrava) in a legislative way - ex ante (official announcements and regulations) and ex post (fines and negative taxes). It will be a long-time process, because most of the main polluters are big industrial corporations (mainly in Ostrava) and family houses (other towns and villages).

The respondents could express only one suggestion for change (Table 6 and Table 7). If they answered that they want to improve the air quality in towns Karvina and Ostrava, there can not be determined whether their next wish was to sort more household waste or to plant more trees in the town. Other suggestions (source of survey in 2009) which were not so common and which were not listed in the questionnaire are: Area No. 3 Environment in the town - building of ring roads outside of the town center, respect for environmental limits of pollution, limits of building on arable land, regular information about the state of the environment and its changes during the time. Area No. 7 Appearance of public space - more frequent cleaning of public areas, revitalization of existing parks, more parking spaces and others. However, it is certain that inhabitants expressed what is now the most important for them and what the Town Council should deal with.

The aims set for this article were fulfilled.

Conclusions

The end of an era of classic industrial cities in the USA by Ward (2000) came in the 80-ies of the last century. Ostrava was the most affected by end of an industrial era twenty years ago. Karviná and Frýdek-Místek, former metallurgical and mining towns, also have to find new ways for their development. Post-industrial times call for new forms and ways of growth of formerly so called "industrial city". Certainly the city would not give up on its "technical heritage", but it should be actively used for further development. It may not cover only technical monuments. Marshall (2011) cites the example of Edinburgh and its Georgian urbanism, which has its historical place, even if it does not serve to its original social purpose.

The Manifest already mentioned and written by N. Heyen, M. Kaiko and E. Swyngedouw (2006) can be the theoretical basis for creation of development strategies with regard to urban political ecology. The practical content of development strategy can be the figures which were obtained in this questionnaire survey. They show that the residents carefully pay attention to in what urban environment they live and they have an accurate idea of how their town should look like and how it should be developed.

In the long term, the environment is more important than the appearance of public spaces. But when the residents evaluate the current situation, the appearance of public space is valued better than existing environment in the town. The Bruntál town is the only exception – it is located next to the mountains and according to the typology of cities and municipalities it belongs among the municipalities with limited industrial production and therefore it has well-preserved environment.

The highest correlation coefficients were measured when evaluating the town's image and appearance of public spaces. This area seems to be important in managing and forming of the image of the town. This is of particular importance in the division of towns according to the typology of cities. The Bruntál town is considered as the town with limited industrial activity and it has given the coefficient as very low with no dependency. The lowest correlation coefficients were measured when evaluating the town's image and health care.

The detected data can be used for comparison with the data from the survey found in 2009 on the territory of the Moravian-Silesian Region. And also the data can be used for active formation of positive image of the Moravian-Silesian Region. Specific data for individual towns can be a guideline for building a city development strategy. It is up to the Town Council of towns how they will work with these specified data and how they will use these figures for the town's development.

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References

ANHOLT, S. (2010) *Places: Identity, Image and Reputation.* London: Palgrave Macmillan.
AVRAHAM, E. and E. KETTER (2012) *Media Strategies for Marketing Places in Crisis.* USA: Routledge.
BAKER, B. (2007) *Destination branding for small cities.* USA, Portland: Creative Leap Books.
BITUŠÍKOVÁ, A. (2003) Čo je město? Město v představách jeho obyvateľov. *Český lid. Etnografický časopis* / 90, No. 3, pp. 217-224.
BLACKMAN, T. (1996) *Urban Policy in Practice.* USA: Routledge.
BUCCHAIRA, B. M. (2013) *Marketing schools, marketing cities.* London: The University of Chacago Press.
CARR, S. (1992) *Public Space.* Cambridge: Cambridge University Press.
CASKIN, H. and F. BERNARDO (2009) *The Role of Place Identity in the Perception, Understanding, and Design of Built Environments.* Bentham e Books.
ENDLICHER, W. (2011) *Perspectives in Urban Ecology: Ecosystems and Interactions between Humans and nature in Berlin.* Berlin: Heidelberg, Springer.
FORMAN, R. T. T. (2008) *Urban Regions: Ecology and Planning Beyond the City.* Cambridge: Cambridge University Press.

FREESTONE, R. (2000) *Urban Planning in a Changing World: The Twentieth Century Experience.* Oxford: Routledge.
FYFE, N. (1998) *Images of the Street: Planning, Identity and Control in Public Space.* USA: Routledge.
GASTON, K. J. (2010) *Urban Ecology.* Cambridge: Cambridge University Press.
GIRIVATI, N., R. HOMMA and K. IKI (2013) *Urban tourism: Designing a tourism space in a city context for social sustainability*. In: WIT Transactions on Ecology and the Environment, Volume 179, 2014, pp. 165-176.
GOOLEDGE, G., D. ICHARDSON and N. GALE (1987) *Cognitive images of the city.* In: C. S. Yadev (Ed.), Perceptual and cognitive images of the city. New Delhi: Concept Publishing Company, pp. 213-253.
HEELEY, J. (2011) I*nside City Tourism*. England: MPG Books Group.
HEYEN, N., M. KAIKA and E. SWYNGEDOUW (2006) *In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism*. USA: Routledge.
HOJER, M., A. BULLGERG and L. PETTERSSON (2011) *Images of the Future City: Time and Space For Sustainable Development*. Sweden: Springer Business Media.
JEŽEK, J., P. RUMPEL and O. Slach (2007) *Marketingový management obcí, měst a regionů*. Ostrava: Repronis.
LUQUE-MARTÍNEZ T. et al. (2007) Modeling a city´s image: The case of Granada. *Cities*. 24, No. 5, pp. 335-352.
LYNCH, K. (1960) *The image of the city*. Harvard: Massachusetts Institute of Technology.
MADANIPOUR, A., S. KNIERBEIN and A. DEGROS (Eds.) (2014) *Public Space and the Challenges of Urban Transformation in Europe*. Oxford: Routledge.
MATLOVIČOVÁ, K. (2010) *Analýza percepcie urbánneho prostredia jako základ marketingovej stratégie oreintovanéj na rezidentov.* Prípadová štúdia města Prešov. In J. Ježek & L. Kaňka, (Eds.), *Konkurenceschopnost a udržitelný rozvoj malých měst a venkovských regionů v České republice.* Plzeň: Západočeská univerzita v Plzni, pp. 169-196.
MARSHALL, S. (2011) *Urban Coding and Planning.* New York.
MARZUFF, J. M. et al. (2008) *Urban Ecology, An International Perspective on the Interaction Between Human and Nature.* New York: Springer.
NEIL, W. J. V. (2004) *Urban Planning and Cultural Identity*. England: Routledge.
OLSSON, K. and K. BERGLUND (2009) City Marketing: The Role of the Citizens. In: T. Nyseht & A. Viken (Eds.), *Place Reinvention, Nohthern Perspectives.* England: Ashgate Publising Ltd., pp. 127-145.
PETROVÁ, H. (2013) Města jako myšlenky. In Moderní řízení, 2013 (8), pp. 20-21.
RUMPEL, P. (2002) *Teritoriální marketing jako koncept územní ho rozvoje.* Ostrava: Ostravská univerzita.
RYDIN, Y. (2005) *Governing for Sustainable Urban Development,* United Kingdom: Earthscan.
SMYTH, H. and M. HEDLEY (2005) *Marketing the city, the role of flagship developments in urban regeneration.* London: E and FN SPON.
STRATEGIE ROZVOJE MORAVSKOSLEZSKÉHO KRAJE na léta 2009–2020. Příloha č. 3 *Mapování názorů na současný stav a rozvojové potřeby Moravsko-slezského kraje, 2009.* Retrieved from: http://verejna-sprava.kr-moravskoslezsky.cz/assets/rozvoj_kraje/srk_2009_2020.pdf
ŠRAJEROVÁ, O. (2006) Image sledovaných postsocialistických miest v představách ich obyvateľov. *Vývojové proměny postsocialistických měst ostravského a hornoslezského regionu v podmínkách transformace.* Tilia: Slezský ústav Slezského zemského muzea, pp. 66-88.

WARD, S. V. (2001) *Selling Palces: The Marketing and Promotion of Towns and Cities 1850-2000*. USA: Routledge.
YADEV, C. S. (1987) *Contemporary City Ecology,* India: Concept Publishing Company.

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The Professor František Vencovský Prize
Soutěž o Cenu profesora Vencovského

MOJMÍR HELÍSEK

At the beginning of May 2015, the Rector of the University of Finance and Administration announced the fifth part of the competition for young economists aged up to 35 associated with the awarding of the Professor František Vencovský Prize.

The goal of the competition for this prize is to support the research activities of young economists aged up to 35 and at the same time to honour the memory of the significant Czech national economist František Vencovský (1923-2006). The prize was created with the agreement of the family of this significant expert in the area of monetary theory and practice. The rules of the competition require the submission of a research essay based on original research. The competition for this prize is announced at two-year intervals. It was first announced in 2007. The first place winner receives 200,000 CZK, while the other winners are awarded a material prize.

This year's competition had the theme "The European Economy – a Return to Growth or Long-term Stagnation?" Competition papers were accepted from the areas of:

- monetary and financial theory
- financial markets and their regulation
- economic and social policy
- the current problems in European monetary integration
- with a possible overlap into associated areas.

The papers could be focussed on theory or economic-policy applications.

The rules of the competition were designated by the nominated scientific committee, which monitored the course of the competition, evaluated the competition papers and designated the competition winners. The committee received seven competition papers, all of which met the formal and content prerequisites. This involved high quality research work and the committee therefore had a difficult decision to make. In the end, after long discussions, the committee decided to divide the first prize into two equal amounts and to give a material prize for third place. It is necessary to add that the members of the committee assessed the work anonymously and only the committee secretary knew the names of the competitors.

As in the previous years of the competition, this year's winning papers will now be published in our magazine. The first two works can be read in this edition, while the next will be published in the following edition.

As in the previous years of the competition, the announcement of the winners this year took place at a conference with the same thematic focus as the competition, i.e. "The European Economy – a Return to Growth or Long-term Stagnation?"

Like the previous years of the competition, this year's competition for the Professor Vencovský Prize has contributed to the support of economic research. I am sure that in two years it will also take place as successfully as this year.

Information on the competition is available at: www.vsfs.cz/cena

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The Conference on the European Economy - a Return to Growth or Long-term Stagnation?

Konference Evropská ekonomika - návrat k růstu nebo dlouhodobá stagnace?

MOJMÍR HELÍSEK

The one-day conference on the *European Economy – a return to growth or long-term stagnation?* was held by the University of Finance and Administration in the Congress Hall at the Czech National Bank on 27th November 2015. The conference's morning program involved papers presented by invited experts, while the afternoon program was dedicated to the winners of the Professor František Vencovský Prize.

The main paper on the topic of *Growth in the European economy in the light of the steps of the ECB* was given by Governor of the Czech National Bank, Miroslav Singer. František Bostl, the chief economist at Colosseum, spoke on the topic of *The TTIP Agreement – an advantage or the source of problems*. Martin Diviš, the Chairman of the Board of Directors and the Managing Director of the Kooperativa insurance company, captivated the audience with the topic *The Czech Republic – top of the class in Europe in 2015?*

The speakers agreed in their topics that Europe has been facing several threats in recent months which could be negatively reflected in the development of the economy and further slow down its growth. The challenge of recent years has been the migration crisis which has divided experts. There are varying opinions as to whether migration will provide a necessary injection in the form of an increased influx of the lacking workforce or whether, on the contrary, the wave of migrants will mean high costs associated with, for example, the payment of social benefits. The entire process may not only lead to the gradual closure of European borders, but also to the limitation of trade. In this context, the planned TTIP (Transatlantic Trade and Investment Partnership) on free trade between the European Union and the United States may be positive.

Another significant risk, which was commented on by the attending economists, is the risk of deflation. Interest rates worldwide are at very low levels approaching zero, so it is possible to acquire a comparative advantage through a weaker currency.

The Czech Republic fared very well in 2015 from the point of view of the economy, whereby we expect GDP growth of around 4.5%, i.e. a higher rate of growth than in all other European Union states. This fact was also the subject of an interesting discussion, in which M. Singer stated that: "the Czech economy has the potential to be among the faster growing economies in Europe, because the economy is balanced from a macroeconomic point of view, it has relatively little debt and the micro –fundamentals are solid."

A further significant topic was the competitiveness of the European Union and the divergence of the economic performance of the individual European states; on the one

hand represented by Germany and on the other hand by Greece and Portugal or Italy and Spain. As Governor Singer stated: "the belief that membership of the euro area will lead to greater discipline in economic policies (and politicians) has proved to be an illusion and wishful thinking."

The question which strongly resounded from today's forum is whether projects involving the unification of Europe with the aid of fiscal or banking union can even be successful and whether on the contrary this situation will not lead to the overall weakening of Europe as a whole in relation to the remainder of the world.

The afternoon section of the conference evaluated this year's competition for the Professor F. Vencovský Prize and the names of the winners were announced. They then presented their papers. This was the fifth part of the competition for young economists aged up to 35 let which the Rector of the University of Finance and Administration announces at two-year intervals.

First place went to Volha Audzei with a competition paper entitled *"Information Acquisition and Excessive Risk: the Impact of Interest Rates and Market Volatility"*. The competition paper concerns itself with the problem of risk taking by financial agents and reaches the conclusion that low interest rates and/or market volatility lead to excessive risk taking and reduce the motivation to acquire information about risky assets. The author works at the Czech National Bank and at CERGE-EI as a researcher and at the same time is studying for her doctorate at CERGE-EI.

Hana Lipovská also came first equal with her competition paper *"Fiscal Placebo"*. The competition paper concerns itself with the problem of government intervention (using the example of Czech governments) during economic crises. The author introduces the concept of the "fiscal placebo" according to which government intervention in the form of fiscal measures only serves a signalling function. Proposals of anti-crisis laws are therefore only a strategic decision of the government, the position of which is under substantial threat during a crisis. The author works at the Economic-Administration Faculty at Masaryk University in Brno, where she is also studying in the doctorate program. At present, she is also an external employee of the Václav Klaus Institute.

Third place went to Jakub Matějů with the competition work *"How Does Expansive Monetary Policy Induce a Build-up of Asset Price Bubbles and Amplify the Credit Cycle"*. The competition work concerns itself with the establishment of price bubbles in models of general balance where they may result from the moral hazard of investors who demand a higher than optimal amount of risky assets. The work reaches the conclusion that an expansive monetary policy may lead to a financial cycle in the form of price increases for risky assets. The author works at the Czech National Bank and is studying in the doctorate program at CERGE-EI.

In the past, the conferences associated with the announcement of the winners of the Professor František Vencovský Prize for young economists have been attended by a number of significant economic personalities on both a Czech and an international scale, such as, for example, Professor Sam Peltzman from the University of Chicago, Professor Nicolas

Barr from the London School of Economics, Professor Michael Landesmann from the Wiener Institut für internationale Wirtschaftsvergleichung or Professor Václav Klaus. I am sure that further years of the competition and the conference will also take place with similar success.

Information on the conference is available at: http://www.vsfs.cz/bienale/

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