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Economic Studies and Analyses
Ekonomické studie a analýzy

SCIENTIFIC ARTICLES
VĚDECKÉ STATĚ

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EDITORIAL STAFF / REDAKCE:
internet: http://www.vsfs.cz/acta
VŠFS, Estonská 500, 101 00 Praha 10

Radim Valenčík – Executive Editor / výkonný redaktor (radim.valencik@vsfs.cz)
Lenka Pokorná – Secretary / tajemnice (lenka.pokorna@vsfs.cz)
Petr Mach – Publishing Editor / vydavatelský redaktor (petr.mach@vsfs.cz)

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EDITORIAL

SCIENTIFIC ARTICLES / VĚDECKÉ STATĚ

FROM SCIENTIFIC LIFE / Z VĚDECKÉHO ŽIVOTA

FEEDBACK / OHLASY

FROM NEW ECONOMIC LITERATURE / Z NOVÉ EKONOMICKÉ LITERATURY

Editorial
Editorial

RADIM VALENČÍK

Dear readers,

This year's first issue of journal ACTA VŠFS contains articles from both hemispheres, both western and eastern, as well as north and south. Specifically, from the following countries: Indonesia, Russia, and the Czech Republic.

It continues to use quality research methods so that the results of the analysis of standard topics be beneficial for the development of theoretical knowledge even if they are carried out in very different territorial, social and culturally historical conditions. Our efforts are also to mediate discussions on general theoretical starting points of economic theory, considering the very profound transformations of the current global economic system.

We begin with *Analysis factors affecting Indonesia stock market (case studies on consumer goods index)*, Indonesian author Vietha Devia, which focuses on the impact of the exchange rate (Indonesian rupiah vs. the US dollar) and inflation (according to the consumer price index) on the stock market. The use of adequate statistical methods shows that the exchange rate has a significant negative effect, while inflation does not have a significant impact on the consumer goods index on stock markets. The paper is interesting both by using statistical methods and some more general conclusions concerning factors affecting the international exchange.

We consider the second article *Theory of consumer behaviour in economic science*, written by Svetlana Sazanova from Russia, to be very important. It, amongst other things, responds to an article devoted to the economics of productive consumption published in the previous issue of our journal. The article is devoted to an overview of the development stages of consumer behaviour theory in economic science, comparing the ratio of rational and irrational motives of economic activity in the works of ancient philosophers, scholastics, mercantilists, representatives of classical political economy, neoclassical economic theory, points to the great heuristic potential of the theory of productive consumption in clarifying the modern consumers' behaviour. The author sees further development of the theory of productive consumption within usage of theory of organic irrationality and theory of economic communication.

The third article *The efficiency of GARCH models in realizing Value at Risk estimates*, written by domestic author Tomáš Jeřábek, deals with an important type of financial risk associated with price fluctuations on financial markets. One measure of market risk is Value at Risk (VaR), which is defined as the maximum loss that can be achieved over a specific time horizon and at a given level of reliability. The aim of the article is to determine the importance of choosing a conditional volatility model within a parametric

and semiparametric approach for VaR estimates. The author shows the advantages of the models used over other methods.

The fourth contribution *Quantification of the impact of a ban on the use of gender in life insurance*, also written by domestic author Ondřej Poul, quantifies the impact of gender regulation in life insurance on the final price for the customer. It responds to the ruling of the EU Court of Justice of 1 March 2011 that price formation could no longer use gender-based pricing, as it would conflict with Council Directive 2004/113/EC implementing the principle of equal treatment between men and women in access to and provision of goods and services. This decision forced life insurers across Europe to create new premium rates and created information asymmetry in favour of clients. According to theory, the behaviour of market subjects in information asymmetry leads to a new market equilibrium. In practice, to modify product designs, which is documented and illustrated on specific examples.

The first ACTA's issue of the year 2020 is supplemented by two information from the scientific life. Both relate to events that possess a long tradition at the University of Finance and Administration. This is the seventh year of the Competition for the prof. František Vencovský's Prize, which takes place as a biennial and which, like in the previous events, is a form of support for young scientists, as well as the 22nd annual scientific conference Human Capital and Investment in Education.

In the section Feedback we publish an analysis of the treatise of authors Radim Valenčík and Petr Wawrosz *Economics of productive consumption as an offshoot of main currents of economic theory* prepared by Vladislav Pavlát, doyen of science at the University of Finance and Administration.

The journal issue that gets your hands on is concluded by a review prepared by Josef Budík on the scientific monograph of Vladislav Pavlát. This monograph is devoted to the history of the Prague Stock Exchange.

Finally, we as an inspiration for future research formulate a problem that gradually crystallized in discussions about certain articles and at the research event that we have informed about. It is related to the view of economic reality through the economics of productive consumption. The problem is this:
Under what conditions, the investment opportunities of each person associated with the acquisition, preservation and usage of his human capital would be used regardless of who owns the investment means necessary to use them (or, which is the same question viewed from the other side, what is currently preventing this)?

To better understand the question, we shall move it to a more realistic position. For example, education, health care, etc. has effects in the form of the acquisition or preservation of human capital, and these effects are also reflected as an increase in the income of different entities. Extending lender-borrower relations to this area promising to make investment opportunities increasingly less influenced by how much anyone owns financial resources. This would create a higher level of equality in society in terms of the development and application of human abilities. However, we do not see more significant shifts in this direction. What are the causes of this situation?

The answer to that question is not nearly as simple as it might seem at first glance and cannot even be pushed back by pointing out that this is a problem that is caused by many different factors. The social relevance of the answer to it is considerable because it would suggest a path to a higher level of both equality and effectiveness of the social system at the same time.

Given that the focus of our journal (financial markets and financial relations, the private and public sector context, private and public insurance systems) directly concerns this issue, we shall be happy to be able to answer this question by helping to dissect the logic of the factors involved and conveying a view of this question by a prism based on the specific context it has got in different parts of the world.

Doc. Radim Valenčík, CSc.
Executive Editor

Vážení čtenáři,

první letošní číslo časopisu ACTA VŠFS obsahuje články z obou polokoulí, a to jak západní a východní, tak i severní a jižní. Konkrétně pak z následujících zemí: Indonésie, Ruska, České republiky.

Pokračuje v dlouhodobém záměru využívat kvalitní výzkumné metody tak, aby výsledky analýzy standardních témat byly přínosné pro rozvoj obecné teorie i v případě, že jsou provedené ve velmi odlišných teritoriálních, společenských a kulturně historických podmínkách. Naší snahou je rovněž zprostředkovat diskuse o obecných teoretických východiscích ekonomické teorie v návaznosti zohlednění faktu velmi hlubokých proměn současného globálního ekonomického systému.

Začínáme článkem *Analýza faktorů ovlivňujících trh indonéských akcií (případová studie závislosti na indexu spotřebitelských cen)* indonéského autora Vietha Devia, který se zaměřuje na vliv kurzu (indonéské rupie vůči dolaru) a inflace (dle indexu spotřebitelských cen) na akciový trh. Použitím adekvátních statistických metod ukazuje, že směnný kurz má významný negativní účinek, zatímco inflace nemá významný vliv na index spotřebního zboží na akciových trzích. Příspěvek je zajímavý jak použitím statistických metod, tak i některými obecnějšími závěry, které se týkají faktorů ovlivňujících mezinárodní směnu.

Za velmi důležitý považujeme druhý článek *Teorie spotřebního chování v ekonomické vědě*, jehož autorkou je Světlana Sazanová z Ruska, která mimo jiné reaguje na článek věnovaný ekonomii produktivní spotřeby uveřejněný v předcházejícím čísle našeho časopisu. Článek je věnován přehledu fází vývoje teorie spotřebitelského chování v ekonomické vědě, porovnává poměr racionálních a iracionálních motivů ekonomické činnosti v dílech starověkých filozofů, scholastiků, merkantilistů, představitelů klasické politické ekonomiky, neoklasické ekonomické teorie, poukazuje na velký heuristický potenciál teorie produktivní spotřeby při objasnění chování moderních spotřebitelů. Autorka vidí další vývoj teorie produktivní spotřeby ve využití teorie organické iracionality a teorie ekonomické komunikace.

Třetí příspěvek *Účinnost Garch modelů při realizaci odhadů Value at Risk* domácího autora Tomáše Jeřábka se zabývá důležitým typem finančního rizika, které je spojeno s cenovými pohyby na finančních trzích. Jednou z měr tržního rizika je Value at Risk (VaR), jež je definována jako maximální ztráta, které lze dosáhnout v určitém časovém horizontu a při dané úrovni spolehlivosti. Cílem článku je určit důležitost volby modelu podmíněné volatility v rámci parametrického a semiparametrického přístupu pro odhad VaR. Ukazuje přednost použitých modelů oproti jiným metodám.

Čtvrtý příspěvek *Kvantifikace dopadu regulace pohlaví v životním pojištění* rovněž domácího autora Ondřeje Poula kvantifikuje dopad regulace pohlaví v životním pojištění na finální cenu pro zákazníka. Reaguje na rozhodnutí soudního dvora EU z 1. března 2011, podle kterého již nelze při cenotvorbě využívat podklady založené na rozlišování pohlaví, neboť by došlo k rozporu se směrnicí Rady 2004/113/ES, kterou se zavádí zásada rovného zacházení s muži a ženami v přístupu ke zboží a službám a jejich poskytování. Toto rozhodnutí donutilo životní pojistitele v celé Evropě k vytvoření nových sazebníků

pojistného a informační asymetrie ve prospěch klientů. Chování tržních subjektů při informační asymetrii dle teorie vede k vytvoření nové rovnováhy na trhu. V praxi pak k úpravám produktových designů, což je doloženo a ilustrováno na konkrétních příkladech.

První číslo ročníku 2020 je doplněno dvěma informacemi ze života vědy. Obě se týkají akcí, které mají na Vysoké škole finanční a správní dlouholetou tradici. Jedná se o sedmý ročník soutěže o Cenu prof. Františka Vencovského, který se koná jako bienále a který podobně jako předcházející ročníky je formou podpory mladých vědeckých pracovníků, a dále pak o 22. ročník vědecké konference Lidský kapitál a investice do vzdělání.

V rubrice Ohlasy uveřejňujeme rozbor pojednání autorů Radima Valenčíka a Petra Wawrosze *Ekonomie produktivní spotřeby jako přesah hlavního proudu ekonomické teorie* zpracovaný Vladislavem Pavlátem, doyenem vědy na Vysoké škole finanční a správní.

Číslo časopisu, které se vám dostává do rukou, uzavírá recenze zpracovaná Josefem Budíkem na vědeckou monografii Vladislava Pavláta. Ta je věnována historii Burzy cenných papírů Praha.

Na závěr zformulujeme problém, který postupně vykrystalizoval při diskusích k některým článkům a na odborné akci, o které informujeme. Souvisí s pohledem na ekonomickou realitu prostřednictvím ekonomie produktivní spotřeby. Problém zní takto: **Za jakých podmínek by byly investiční příležitosti spojené s nabýváním, uchováním a uplatněním lidského kapitálu využívány bez ohledu na to, kdo je jejich vlastníkem a kdo je vlastníkem investičních prostředků nezbytných k jejich využití (resp., což je tatáž otázka nahlížená z druhé strany, co tomu v současné době brání)?**

Otázka není zdaleka tak jednoduchá, jak by se mohlo zdát na první pohled a nelze ji ani odsunout poukazem na to, že se jedná o problém, na který působí velké množství nejrůznějších faktorů. Společenská relevance odpovědi na ni je přitom značná, protože by naznačila cestu k tomu, aby se sladila cesta k vyšší míře rovnosti a efektivnosti společenského systému současně. Budeme rádi, když budeme moci na stránkách našeho časopisu k odpovědi na tuto otázku přispět, když napomůžeme rozklíčovat logiku působících faktorů a když zprostředkujeme pohled na tuto otázku prizmatem vycházejícím ze specifického kontextu.

Doc. Radim Valenčík, CSc.
Výkonný redaktor

Analysis Factors Affecting Indonesia Stock Market (Case Studies on Consumer Goods Index)

Analýza faktorů ovlivňujících trh indonéských akcií (případová studie závislosti na indexu spotřebitelských cen)

VIETHA DEVIA SAGITA SUMANTRI

Abstract

This study aims to examine the effect of exchange rate and inflation on the stock market. The exchange rate used is the Rupiah against the US Dollar and the Consumer Price Index as a measure of inflation. While the sector used as a stock market case study is the Consumer Goods Index Sector. The study period during 2010–2017. The method used multiple linear regression with R software. The classic assumption test results show the existence of autocorrelation problems, but can be correcting by the Cochrane-Orcutt method on Eviews after 8 model iterations. The results of multiple linear regression tests showed that the exchange rate has a significant negative effect, while inflation has no significant effect on the Consumer Goods Index.

Keywords

exchange rate, inflation, stock market, consumer goods index

JEL Codes

E22, E31, E44

DOI

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Abstrakt

Cílem této studie je zkoumat vliv kurzu a inflace na akciový trh. Použitý směnný kurz je rupiáš vůči americkému dolaru a index spotřebitelských cen jako míra inflace. V případové studii je využit sektor spotřebního zboží v letech 2010–2017. Jako metoda je využita vícelineární regrese R softwarem. Klasické výsledky testů prokazují existenci autokorelačních problémů, které ale lze korigovat metodou Cochrane-Orcutt na Eviews po 8 modelových iteracích. Výsledky více lineárních regresních testů ukázaly, že směnný kurz má významný negativní účinek, zatímco inflace nemá významný vliv na index spotřebitelských cen.

Klíčová slova

směnný kurz, inflace, akciový trh, index spotřebního zboží

1 Introduction

Investment is a speculative activity to get profits in the future. Mortenson (2010) said that investment is every plausible economic activity or asset and efforts to equalize the present value with the expected income in the future (Eklund, 2013). We can apply the investments in the real sector and the monetary sector.

In the monetary sector, investment can be done on stock market. The stock market is the center of the capital market which reflects the economic trend (ICSI, 2013). It valuation plays a key role in Q-type models of investment determination (Tease, 1993). Some variables that are thought to affect the stock market include inflation and exchange rates.

There are several factors that are thought to affect the stock market, two of them are inflation and exchange rates. Ammer, (1994) said that rising inflation causes real dividends and required equity returns to be lower. One of the goals of investing is to increase long term purchasing power, but high inflation can failing it and making the economy overheated (PIMCO, 2011). In classical theory, exchange rate movements can affect competitiveness in international markets and the position of a country's trade balance and ultimately affect the flow of investment funds and the stock market (Phylaktis and Ravazzolo, 2005).

In Indonesia, stocks are traded on the Jakarta Stock Exchange (JSX) with Jakarta Composite Index (JCI) as the benchmark index of JSX. JSX has nine joint sectoral index, consist of Agriculture, Mining, Basic Industry, Various Industries, Consumer Goods, Property, Infrastructure, Finance, Trade and Services. In recent years, Consumer Goods Index always shows a rapid growth.

OJK (2010) Reported during 2009 Consumer Goods Index showed a sharp increase. At the end of April 2016, the JCI movement continued to strengthen in the green zone with the Consumer Goods Index as the backbone of the JCI (Suhendra, 2016). Consumer Goods Index has the highest index among the other sectors. It supporting more than 50% of the JCI.

Many research has been conducted before but shows heterogeneous results. Delgado, Delgado and Saucedo (2018) shows that the exchange rate and inflation has a negative and statistically significant effect on the stock market index. The appreciation of the currency leads to the increasing on the stock market index. Blau (2018) showed the similar evidence that between currency market and stock market there is an important link. In China, the RMB index and stock market liquidity are cross-correlated and demonstrate strong and positive persistence (Li et al, 2018). Related to inflation, Tiwari et al., (2015) added that inflation does not necessarily mean that the stock is in stock in the long run. Gavriilidis and Kgari (2016) have similar result, and they found no evidence of a statistically significant relationship between stock market returns and inflation. However Brown, Huang and Wang (2016) showed different result that inflation is significant in pricing portfolios formed on investment.

Based on background, the author wants to examine the influence of exchange rates and inflation on the stock market. The author focuses on the Consumer Goods Index with the exchange rate of the Rupiah against the US Dollar and the Consumer Price Index as a measure of inflation. The focus of the research was in 2010–2017. In that period there was shocks to the Indonesian economy that is shock of increasing on world oil prices in 2013–mid 2014 as Indonesia is an oil importing country.

2 Theoretical Concepts

2.1 Relationship Between Exchange Rate and The Stock Market

The effect of exchange rate to stock market show different result, depends on the few factors. Whether the country export oriented or import oriented; the size of the industry or company in the country; the exchange rate regime which adopt by the country; and degree of openness of a country's economy.

For exporting countries, the depreciation of the currency has positive impact on stock market. Based on Mankiw (2016), exchange rate depreciation can increase competitiveness in the international market so that the export value increases. Thus the profits of a company will increase as well as the stock price (Phylaktis and Ravazzolo, 2005). Otherwise, for importing countries, the depreciation leads to increase on production cost and reduce the profit. Thus the investor attractive less to invest in this countries.

The changes in exchange rates in the bigger industries have a greater impact on the stock market than small industries. Mollick and Sakaki, (2018) shows that commodity currencies strongly depreciate with positive global equity shocks. However, changes in exchange rates will not price in the US stock market if the company portfolio is not classified as an industry with a strong asset structure (Du and Hu, 2012).

Related to exchange rate regime, Chkili and Nguyen (2014) in their research in Brazil, Russia, India, China and South Africa (BRICS) show that the stock market response to changes in exchange rates evolve in two different regimes, namely a low volatility regime and a high volatility regime. Zolfaghari and Sahabi (2017) reinforced that exchange rate significantly affect Stock Return of Operating Companies in the Oil Industry (SROCOI) in Iran's stock market during different regimes. In financial crisis 1997, countries with an exchange rate peg experienced significantly greater currency depreciation and significantly lower stock returns (Grier and Grier, 2001).

In small open economic country, the exchange rate volatility has the greater impact on stock market than the big one. For small open economies such as Asia Pacific, exchange rate shocks instantaneously affect prices on the stock market. However, in countries with higher economic freedom, shows that market efficiency is very large, that is why the exchange rate shocks cause less short-run volatility in Singapore's and Hong Kong's Stock Markets (Yang, 2017). Wong (2017) added that exchange rate movements is an important factors that affect the stock market.

2.2 The Relationship Between Inflation and Stock Market

Inflation is a general increase in overall price level and simultaneously. One method of measuring inflation is the Consumer Price Index (CPI). The CPI is the average level of "consumption basket of goods" (Garín, Robert and Sims, 2018). The basket of consumer goods and services which measures in CPI will tells us about the value of the money in our pocket (Parkin, 2012).

In developed countries, the average inflation rate is low. Based on IMF data, China recorded CPI inflation averaging 2.6% over the past ten years. In the United States average inflation annually at 3.28% from 1914 to 2017 (KDA Forex, 2018). However for developing countries almost lived through high-inflation and hyperinflation period (Calderón and Schmidt-Hebbel, 2009). According to World Bank (2013), for developing countries as a whole, have inflation rate at 5.1 percent annualized rate in the three months through December 2012 from an average 7.2 percent in 2011 and have expected inflation at 6.3% in 2013. In recent years, Indonesia has average inflation at 5%.

Gokal and Hanif (2004) Said that the inflation making uncertainty about the future profitability of investment. Furthermore Brown, Huang and Wang, (2016) found that inflation is a significant factor in the formation of portfolio prices which related to asset growth, investment desire and book to market ratio in thus portfolio. However, for high inflation countries, stock price is irrelevance for investment decisions, because stock price is significantly less sensitive than countries with lower inflation (Farooq and neveen, 2018).

In Egypt, inflation rate generally had an impact on the stock market in the short run and long run (Omran and Pointon, 2001). In the United States, correlations between the inflation and Stock Market are varies overtime (Antonakakis, Gupta and Tiwari, 2016). In UK the inflation rate has the varying impact too on stock market depends on inflationary regimes (Li, Narayan and Zheng, 2010). (Oxman, 2012) added that the relationship between inflation and stock market depends on the measure of inflation and the model used.

3 Research Method

This study uses multiple linear regression with time series data from 2010 to 2017. In multiple linear regression on time series data, a few assumptions must be fulfilled as follows:

a. No multicollinearity: there be no exact linear relationship among independent variables (Gujarati, 2003).
b. No heteroschedasticity: Data sets have heteroscedastic problem when they have disturbances in different variances (Greene, 2003). While in the OLS regression, the disturbances must be assumed to be uncorrelated across observations or called homoscedastic.
c. No Autocorrelation: the covariance value between observations to Ui and Uj has a correlation value equal to 0 for i ‡ j (Greene, 2003).

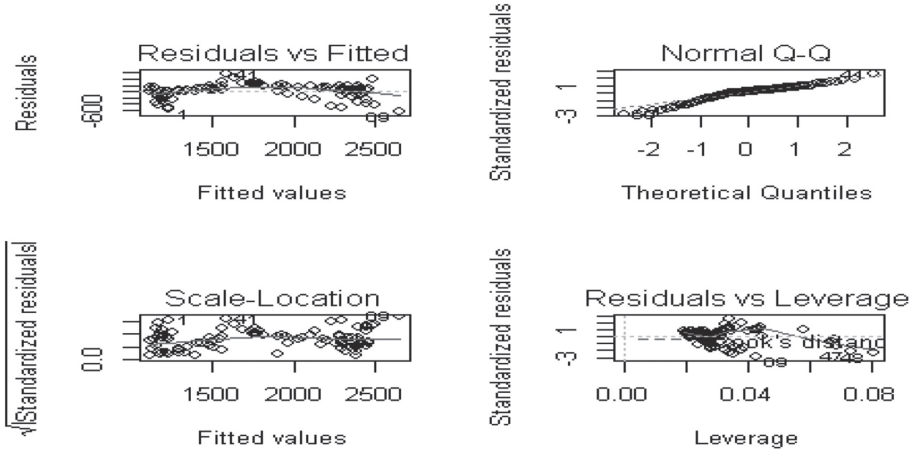
d. Normality: in OLS regression all samples must meet the normal distribution assumptions. If not, the result test will be inaccurate, and consequently, the t and F tests are not generally valid in finite samples (Das and Rahmatullah Imon, 2016).

4 Result and Discussion

4.1 Statistical Result

Based on the results of the classic assumption test conducted with R studio software, the results show that the three assumption tests have been fulfilled. They are no multicollinearity, no heteroschedasticity and have normal distribution (see figure 1). However, there is an autocorrelation problem (see Figure 2a), marked by a scatter plot forming two linear line. In time series data, especially in financial data, the problem of autocorrelation is a common problem that often happens. Sewell (2011) found that in the stock market data there is often an autocorrelation relationship, especially in stock returns.

Figure 1: Result of Classic Assumption



Source: Output of R Software

Figure 2: The Autocorrelation Problem

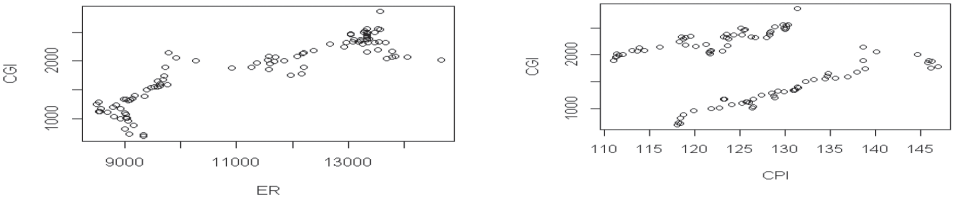


Figure 2.a **Figure 2.b**

Source: Output of R Software

According to Mcguirk and Spanos (2002), to solve the problem of autocorrelation in a linear regression model is use of AR (1) process, and then use GLS to estimate the model. The AR (1) model provides a good approximation to the spectral density over a thin frequency band (Muller, 2014). However, on the estimation model that has been done by the author using autoregressive, the problem of autocorrelation is indeed solved, but a new problem arises, namely heteroscedasticity. In Table 1 and 2 we can see the addition of CGI lags (1) to overcome autocorrelation, showing significant results and free from autocorrelation. However, in Table 3, the VIF value in ER and (CGI, 1) lag is greater than 5, which indicates the presence of heteroscedasticity symptoms.

Table 1: Result of Removal Autocorrelation by added AR (1)

lm(formula = CGI ~ ER + CPI + lag(CGI, 1), data = data1)				
Residuals:				
Min	1Q	Median	3Q	Max
-2.681e-13	-2.818e-14	-5.980e-15	1.074e-14	1.705e-12
Coefficients:				
	Estimate	Std. Error	t value	Prob
(Intercept)	-2.513e-12	3.925e-13	-6.402e+00	6.35e-09 ***
ER	2.462e-16	2.409e-17	1.022e+01	<2e-16 ***
CPI	9.756e-15	2.470e-15	3.950e+00	0.000153 ***
lag (CGI, 1)	1.000e+00	8.518e-17	1.174e+16	<2e-16 ***
Signif. codes	0 '***'	0.001 '***'	0.01 '*'	0.05 '.'

Source: Output of R Software

Table 2: Durbin-Watson Test

data: M_CGI1
DW = 2.2239, p – value = 0.791
alternative hypothesis: true autocorrelation is greater than 0

Source: Output of R Software

Table 3: Result of Heteroscedasticity Test

Breusch-Pagan test	>vif(M_CGI1)		
data: M_CGI1	ER	CPI	lag (CGI,1)
BP = 237.33, df = 3, p – value < 2.2e-16	6.172089	1.229494	5.906916

Source: Output of R Software

The author tries another way to eliminate autocorrelation with the Cochrane-Orcutt. Jaggia and Kelly-Hawke, (2008) said that to correct for autocorrelation one often uses GLS procedures such as the Cochrane-Orcutt. This method is a popular method for correcting autocorrelation in time series regression model (Dielman, 2009). First, the author used Cochrane-Orcutt in R, but the results show that the variables did not converge (Table 4). Author continued the Cochrane-Orcutt method in stata, but the results showed that

convergence was not achieved (Table 5). Finally, the Cochrane-Orcutt on Eviews, the autocorrelation problem can be resolved, and the AR model (1) have been reached after eight iterations (Table 6). The results of show that the exchange rate has a significant negative effect on the Consumer Goods Index (CGI). However, inflation have negative correlation to CGI but insignificant on the CGI.

Table 4: Cochrane-Orcutt in R

Cochrane-orcutt estimation for the first order autocorrelation			
call: lm(formula = CGI ~ ER + CPI, data = data1)			
number of interaction: 100 rho 0.993657			
Durbin-watson statistic			
(original):	0.31918	p-value:	5.535e-29
(transformed):	NA	p-value:	NA
Coefficients:	NA		

Source: Output of R Software

Table 5: Cochrane-Orcutt in Stata

Source	SS	df	MS	Number of obs = 95 F (2, 92) = 6.51 Prob > F = 0.0023		
Model Residual	69038.9076 407076.968	2 92	34519.4538 5924.63697			
Total	556915.875	94	5924.63697			
CGI	Coef	Std.Err	t	p>(t)	(95% Conf. Interval)	
ER	-.1019274	.0305649	-3.33	0.001	-.1626319	-.041223
CPI	-2.590222	1.984262	-1.31	0.195	-6.531137	1.350693
_cons	7635.011	1332.841	5.73	0.000	4987.874	10282.15
rho	.9936566					
Durbin-Watson statistic (original) 0.319176 Durbin-Watson statistic (transformed) 2.032953						
convergence not achieved						

Source: Output of Stata

Table 6: Cochrane-Orcutt in Eviews

Dependent Variable: CGI Method: Least Square Included observations: 95 after adjustment Convergence achieved after 8 iterations				
Variable	Coefficients	Std. Err	t-stat	prob
C	7793.672	7999.376	0.974285	0.3325
ER	-0.102009	0.030990	-3.291648	0.0014
CPI	-2.589229	1.995840	-1.297313	0.1978
AR (1)	0.993878	0.010596	93.79564	0.0000
R-squared	0.981811			
Inverted AR roots 0.99				

Source: Output of Eviews

4.2 Economical Discussion

4.2.1 The Effect of Exchange Rate to Stock Market

The result of this study is that the exchange rate has a significant negative effect on the stock market. The result is consistent with the theory put forward by Dornbusch, who said that the exchange rates cause movements in stock prices (Dilrukshan, Simpson and Evans, 2009). Aydemir & Demirhan (2009) and Delgado, Delgado & Saucedo (2018) has similar result, which stated that exchange rate negatively affect stock market. However, the impact of the exchange rate fluctuations on the stock market depends on whether the country is export-based or import-based.

According to Tang and Yao (2018) in export-based countries, the exchange rate is positively related to the stock market because they undervalue their currency exchange rates to encourage the economic activity and raises the stock prices. While in import-based countries, the exchange rate negatively related to the stock market because they overvalued their exchange rates, so stock prices rise with economic growth.

In an export-based country, appreciation of domestic currency negatively affect the export sales (Ma and Kao, 2008) decline the firm's profit and so does its stock price (Dilrukshan, Simpson and Evans, 2009; Imna, Amin and Janor, 2016). Otherwise, the exchange rate depreciation has a positive impact on the export sales. (Muhammad and Rasheed, 2002) said domestic currency depreciation makes local firms more competitive in international market, leading to an increase in the exports which in turn raises the stock prices.

For a country which has many importing firm, the depreciation of the exchange rate increases the price of imported goods and inflation in the domestic market (Ma and Kao, 2008). Indonesia itself still utilizes around 75% of imported raw materials on its production

and industrial processes (Appa, 2014). The data from the Central Statistics Bureau and the Trade Ministry reinforced it, overall during 2013–2017 the import value of raw materials reached 75%–77% of import value.

Another factor which make negative relation between exchange rate and Indonesia stock market is the exchange rate regime which adopt by Indonesia. During the study period, Indonesia adopt free floating exchange rate regime. According to (Chortareas, Cipollini and Eissa, 2012), the changes in the exchange rate regime from pegged to floating exchange rate regime has a significant impact. When a floating exchange rate regime is applied, the stock market is very sensitive to exchange rate devaluations.

In a floating exchange rate regime, the exchange rate depends entirely on market demand and supply which making high uncertainty and risk. Moreover, the impact of real assets changes in assets are also uncertain (Glen and Jack, 2002). Also, Indonesia is small open economic country and has interdependent among another countries related to trading and economic activity. (Labonte, 2004) said if a country's economy is highly reliant on its neighbors for trade and investment when there is economic shocks on its neighbors, it will has similar effect to the country. It indicates that Indonesia still has a large risk of exchange rate volatility, further affect the level of uncertainty in the profits obtained on investment.

4.2.2 The Effect of Inflation to Stock Market

In this study, the results show that inflation negatively related to the stock market but not significant. It is in line with Lukisto and Anastasia (2014), the results show that SBI interest rate and the Rupiah Exchange Rate against the US dollar significantly influence the stock price index, but inflation and GDP growth have no significant effect. Furthermore, they explained that the average of inflation rate during the study period is 0.6% per month. It signifies the stock market still accept if the monthly inflation rate which is around 0.6%. Kewal (2012) reinforced stated that if inflation below 10%, it will not be disturbed the stock market. Gokal and Hanif (2004) added that but the decline in growth associated with an increase from 10% to 20% inflation. In the author's research period, the average annual inflation rate during 2010–2017 was 5.22% percent or 0.43% per month.

Another explanation why inflation did not significant affect the stock market especially Consumer Goods Index is the presence of large industries which are categorized as the largest issuers in the Consumer Goods Index. Besides, they have many subsidiary and have a big number of export in many countries. According to report from OJK (2017), in the Consumer Goods Industry sector, there are five largest issuers with the largest assets and the largest income (see table 7).

Table 7: 5 Largest Issuer in Indonesia Consumer Goods Industry

Issuer	Income (in million)	Assets (in million)
PT HM Sampoerna Tbk	Rp. 95.466.657	42.508.277
PT. Gudang Garam Tbk	Rp. 76.274.147	62.951.634
PT. Indofood Sukses Makmur Tdk	Rp. 56.750.317	82.174.515
PT. Unilever Indonesia Tbk	Rp. 40.053.732	16.745.695
PT. Indofood CBP Sukses Makmur Tbk	Rp. 34.466.069	28.901.948

Source: cited from OJK, 2017

PT Indofood Sukses Makmur Tbk (Indofood) is a company in the Consumer Goods Industry with the largest assets. Up to 2014, PT Indofood Sukses Makmur Tbk has expanded and invested in 40 countries (Sukmana, 2014). One of PT Indofood's products, Indomie, recorded a large export value in 100 countries (Anonymous, 2015). For PT Unilever Tbk, it's engaged in many fields such as food, beverages, household appliances, and personal care. Unilever has headquarter in Amsterdam and has many subsidiaries regarding investment and ownership of production located in Europe, America, South Asia, Asia & Pacific including Indonesia, Africa and Middle East (Paul Elshof, 2005).

For Tobacco Industry, Indonesia have PT. Gudang Garam Tbk and PT. Sampoerna Tbk. PT. Gudang Garam has many subsidiaries spread throughout Indonesia. It has the main export destination countries such as Malaysia, the Middle East and Japan (Anonymous, 2014). PT. Sampoerna has headquartered in Surabaya and has around 59 subsidiaries in Indonesia. In 2005 40% of the shares were affiliated by Philip Morris, the original cigarette producer from United States (Wibowo, n.d.).

Conclusion

The main results of this study found that the exchange rate of Rupiah against U$S has significant negative effect on the stock market. The depreciation of the Rupiah currency leads to decline on stock market (Consumer Goods Index). The main cause is the large proportion of Indonesia's imported raw materials. 75% of industries still rely on imported raw materials for the production process. Morover, Indonesia adopt free floating exchange rate and categorized as small open economic country. So, when there is economic shocks on its neighbours, it will has similar effect to Indonesia and making high volatility of Indonesia currency. However, the inflation volatility does not have a significant effect on the stock market. Indonesia has the annual inflation rate in Indonesia below 10%. During the study period, from 2010–2017, Indonesia had an average annual inflation rate of 5.22%.

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Contact address

Vietha Devia SS. SE., ME (Ph.D. Candidate)
School of Economics
Huazhong University of Science and Technology, Wuhan, P.R. China, 430074
(vietha.devia@hotmail.com)

Lecturer, Faculty of Business and Economics
University of Brawijaya, Malang, Indonesia, 65144
(vietha.devia@ub.ac.id)

Theory of Consumer Behavior in Economic Science

Teorie spotřebního chování v ekonomické vědě

SVETLANA SAZANOVA

Abstract

The aims of this article is to study the evolution of the theory of consumer behavior in economic science in the context of the ratio of rational and irrational motives of behavior and the answer to the question: can the theory of economic communications become an instrument for the further development of the theory of consumer behavior. The research methodology includes the method of rational reconstruction of scientific knowledge, the method of comparative analysis, the historical method, the method of scientific abstraction and others. The theoretical basis of the study is the work of representatives of various areas of economic thought in a historical context, including ancient philosophers, scholastics, mercantilists, representatives of classical political economy, neoclassical economic theory, behavioral economics, institutional economics, systemic economic theory.

The author concludes that the further development of the theory of consumer behavior is possible based on a synthesis of the theory of productive consumption and the theory of economic communications.

Keywords

productive consumption, theory of consumer behavior, neoclassical economic theory, economic communications, economic rationality, organic irrationality

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Abstrakt

Článek je věnován přehledu fází vývoje teorie spotřebitelského chování v ekonomické vědě. Autor porovnává poměr racionálních a iracionálních motivů ekonomické činnosti v dílech starověkých filozofů, scholastiků, merkantilistů, představitelů klasické politické ekonomiky, neoklasické ekonomické teorie, poukazuje na velký heuristický potenciál teorie produktivní spotřeby při objasnění chování moderních spotřebitelů. Autor vidí další vývoj teorie produktivní spotřeby ve využití teorie organické iracionality a teorie ekonomické komunikace.

Klíčová slova

produktivní spotřeba, teorie spotřebitelského chování, neoklasická ekonomická teorie, ekonomická komunikace, ekonomická racionalita, organická iracionalita

Statement of the problem and research methods

The research problem is that the standard neoclassical theory of consumer behavior, based on economic rationalism and marginal utility theory, does not adequately explain the behavior of a modern consumer. A comparative analysis of the ratio of rational and irrational motives of economic activity in the works of ancient philosophers, scholastics, mercantilists, representatives of classical political economy, neoclassical economic theory allowed the author to draw a conclusion about the great heuristic potential of the theory of productive consumption to explain the behavior of modern consumers. Further development of the theory of productive consumption is possible, according to the author of the article, on the basis of a synthesis of the theory of productive consumption and the theory of economic communications. The study of the main stages of the development of the theory of consumer behavior is based on the application of the method of rational reconstruction of science, the method of scientific abstraction, the method of comparative analysis, as well as an interdisciplinary approach.

Consumer behavior research: from antiquity to neoclassicism

The behavioral concept in economic science has come a long way in the formation and development: from antiquity to the present day. At various periods in the development of economic science and practice, philosophers and scientists have differently explained the motives of human behavior. For Plato, innate ideas were the main motive, and innate abilities were the main factor. Aristotle considered the main motive – the satisfaction of needs and desires. In his opinion, the desire to satisfy needs motivates a person to engage in activities that comply with the laws of nature, that is, the management of the household (economy), and the desire to satisfy desires motivates people to engage in activities that are contrary to the laws of nature (chrematistics), that is, trade, usury etc. Thus, already ancient philosophers distinguished two motives – rational and irrational – inducing a person to economic activity.

The medieval scholastic philosophers (Thomas Aquinas and others) considered religious feeling to be the main motive of human activity, but also allowed a rational motive necessary for farming. Thomas Aquinas "justified" the types of occupations that Aristotle attributed to chrematistics: interest collection, as well as commercial and entrepreneurial profit. He proved that these types of economic activities are permissible if part of the income from them goes to public purposes. So Thomas Aquinas coordinated an irrational motive (religious feeling) with a rational one. The economic doctrines of antiquity and the Middle Ages were characterized by a fuzzy separation of consumer and producer motivation, which is due to the dominance of subsistence farming.

The great geographical discoveries, the development of international trade, the growth of income and social status of the merchant bourgeoisie, the Reformation and the bourgeois revolution in the Netherlands led to a rethinking of the relationship between religious and rational motives of human activity. Mercantilists considered the source of wealth to be the

sphere of money and then trade, and therefore justified profit as "profit from alienation," regardless of the source of origin. Mercantilists did not analyze in detail the motives of consumer behavior, believing, by default, that desires and needs are equally worthy of satisfaction.

Philosophers of the Enlightenment believed that the rational motives of human behavior are the main, but called for moderation in consumption in accordance with the laws of nature. This Aristotelian logic and his naturalistic approach led to a "paradox of water and diamonds," which even the great Adam Smith could not solve. A. Smith considered the pursuit of wealth to be the main motive for the behavior of both the producer and the consumer, and the satisfaction of needs receded into the background. Smith proved that the pursuit of wealth is a rational motive without analyzing the irrational motives of economic behavior.

G. Gossen and W. Jevons suggested paying attention to the philosophy of hedonism, which allowed a different look at the motives of economic behavior and solve the "Smith paradox". Hedonism and subjectivity, combined with the marginal approach, led to the formation of the theory of marginal utility and the neoclassical theory of consumer behavior.

A feature of the neoclassical theory of consumer behavior is the principle of maximizing utility, which the consumer seeks to implement in every transaction. But, as noted by R. Valenčík and P. Wawrosz (2019), this short-term motive does not allow explaining the behavior of a modern consumer. In the 21st century, consumers are striving to a greater extent to satisfy the needs for health and education services and, to a lesser extent, to material benefits. This feature of modern consumer behavior can be explained by the theory of productive consumption, the basic ideas of which were formulated by Friedman (1957). He proved that consumption is productive in the sense that people (households) behave in accordance with a long-term strategy, which can be described in general terms as maximizing the present value of their future income from the acquisition and exploitation of assets consisting of both human and from non-human capital.

Consumer Behavior Research: Productive Consumption and Economic Communications

Productive consumption is consumption that increases utility and income at the same time. There are three forms of productive consumption: nutrition, health, education. All three forms serve current needs and therefore can be labeled as consumption expenditures; although sometimes it can be evaluated differently in the case of education. At the same time, labor efficiency increases or, depending on the interpretation, the supply of human capital. From this point of view, the main consumption expenditures can be classified as productive. Productive consumption ensures the satisfaction of current needs and at the same time increases the production potential of labor.

The main provisions of the theory of productive consumption are as follows:

1) the economic agent makes decisions, guided by a long-term strategy for using current income to acquire assets in order to increase the present value of future income;

2) the behavior of an economic agent is influenced not only by a rational motive, but also by experience, features of its psyche, which can both strengthen and weaken long-term motivation;
3) the economic agent identifies his well-being with the achievement of a certain level of income in the future, that is, he is interested in the growth of human capital;
4) to achieve their long-term goals, economic agents are interested in communication with each other (Jurásek, 2019; Valenčík, 2019).

The theory of productive consumption offers a new look at how consumers maximizes their utility. To meet current needs, the consumer "relies on reality" (Valenčík and Wawrosz, 2016), using certain means, performing certain actions and getting into certain situations. Seeking to maximize utility in the present, the consumer achieves a certain pleasure or experience (this satisfaction is associated with a certain emotion). Thanks to experience, the consumer appreciates the receipt or acquisition of funds that he uses to perform actions, perform the activity itself, situations in which he finds himself or who he avoids. Initial experience, directly related to the satisfaction of initial needs, leads to new needs and new experience (Valenčík, 2019). New experience arises from the synthesis of transferred experience that arises as a result of satisfying existing requirements, when the same means of activity, the same activity, and the same situation simultaneously determine the satisfaction of many requirements. Thanks to the experience of satisfying certain needs, various types of experience are synthesized, and new needs appear.

The mechanism for the transfer, generalization and consolidation of experience over the means, actions and situations that determine the achievement of future experience (including the possession of certain goods or the performance of certain types of activities) plays a dual role:

- on the one hand, it significantly increases the motivation to acquire economic resources and intermediate goods or to perform certain actions. Since these intermediary goods or activities often provide more productive achievement of the initial goals than the situation when the original goal was achieved without their existence, and therefore it also increases the effectiveness of decision-making in terms of achieving the original goals;
- on the other hand, it removes the current human activities from their original goals (the intermediary goods themselves become the goals of human activities).

Thus, the growth of human capital is an important aspect of the consequence of productive consumption; Another important aspect is a new understanding of the activity of an economic agent in the continuum "present – future". Consumption becomes productive if, in deciding on consumption, the economic agent seeks to maximize the future beneficial effect and, as a result, increase the discounted cost of human capital. Understanding that the behavioral model inherent in productive consumption can be extended to other products also changes the behavior of the manufacturer.

Orientation of the consumer to the future to a greater extent than to the present, his desire to increase human capital, stimulates the manufacturer to look for opportunities to meet the future needs of the consumer. The image of the future becomes the main condition for

coordinating the interests and actions of the producer and consumer, which both strive to maximize their well-being and their human capital in the future. The vulnerability of the hypothesis formulated is the degree of rationality of economic agents. If economic agents are completely rational, then 1) they have all the information about the present, 2) their cognitive abilities are perfect and then equilibrium is reached automatically. But since economic agents are not completely rational (or even irrational), that is, they do not have all the information, and their cognitive abilities are limited, they need experience and emotions in order to form their idea of the future and make decisions in the present.

The assumption of the organic irrationality of economic agents further changes the researcher's view of consumer behavior (Kleiner, 2005). The main question, in our opinion, is the following: is it possible, within the framework of the theory of productive consumption, to solve the problem of subjective psychological prerequisites for violation of rationality of behavior? (Ariely, 2012).

In general, rationality of behavior assumes that an economic agent can, using all the information available to him, perform the following actions: see and accurately describe the goal he is facing in a given situation; identify all possible alternatives for choice and describe them; generate many valid alternatives; rank acceptable alternatives based on preference relationships; identify the best alternatives and make the final choice. Therefore, a violation of the rationality of choice is associated with objective or subjective limitations. Objective limitations include lack of information resources; incorrect technology of comparative analysis of alternatives, evaluation and interpretation of information. Subjective restrictions include conscious unwillingness to carry out all the actions necessary for the formation and solution of the problem of choice; antipathy to the mental, analytical or volitional activity necessary for making a decision. Thus, organic irrationality is associated not only with a lack of information and limited cognitive abilities, but also with a lack of will to implement mental operations and / or actions.

Is it possible to solve the problem of organic irrationality through economic communications? The hypothesis that economic communications can solve the problem of subjective psychological prerequisites for violation of rationality of behavior is based on the assumptions: 1) the essence of economic communications is not reducible to the exchange of information about the subject of a transaction; 2) economic communications are part of socio-economic systems of various levels.

The essence of economic communications is not reduced to the exchange of information about the object of the transaction, because the essence of man is not reducible only to its rational component. The human person is formed in the process of socialization, that is, interaction with other people, institutions, values of society (Sen, 1987; Kleiner at al., 2018). Economic communications themselves take place in a specific institutional environment formed by institutions of law, culture, religion, etc. Therefore, in short-term economic (one-time, spot) communications, information is exchanged on the personal characteristics of counterparties, their cultural memes (Jurásek at al., 2016), values, as well as rules of behavior, which they follow. In long-term (repeated) communications, not only broadcasting, but also the exchange of cultural norms, expectations, ideas about the future, and informal institutions is already taking place. Consequently, economic

communications expand many alternatives, reduce cognitive limitations, and therefore, compensate for the effect of subjective psychological prerequisites for violation of rationality of behavior (Sazanova at al., 2019).

Economic communications are part of the socio-economic system and its subsystems: production, exchange, distribution and consumption. In each subsystem, economic communications have their own characteristics. In the production subsystem in the interactions of economic agents, the main role is played by technologies and rational economic calculation, therefore economic communications to a greater extent solve the problem of information asymmetry, since the choice of alternatives is limited by the requirements of technology and economic calculation. In the subsystems of exchange, distribution and consumption, humanistic factors are becoming more important, therefore, communications solve the problem of structural uncertainty, pushing economic agents to certain mental operations or specific actions. Thus, from the point of view of the concept of irrational behavior of economic agents, economic communication becomes the link between the rational and irrational aspects of the behavior of economic agents.

Some authors (Soumyananda, 2014; Steger, 2002) believe that focusing on the productive aspects of consumption contributes to eliminating property-based inclusiveness and creating equal opportunities for social advancement. In this sense, they also interpret the positive role of social capital, paying attention to the role of education and health in its development. From the point of view of productive consumption distinguish between human and social capital. Human capital is a combination of knowledge, skills that are used to meet the needs of man and society as a whole. The valuation of human capital includes household and state spending on food, clothing, housing, and culture. Social capital is a set of social ties that allow for economic activity. Social capital is an economic resource, since it reduces the cost of coordinating the activities of economic agents by crowding out formal contracts with trust relationships based on informal norms, professional ethics, etc.

Social capital is considered as a prerequisite for the use of human abilities, but it is not identical to the phenomenon that we call investment in social status, when the possibility of obtaining or using human capital by one entity is carried out at the expense of another entity. Differentiation of investments in human capital, social capital, social status is a complex theoretical task. The solution to this problem is possible, in our opinion, using the theory of cooperative games, which analyze the negotiation processes, which are a form of communication. For example, as a communication analysis tool, you can use the Nash negotiation model (S, d), where S is the set of available solutions, and d is the starting point of disagreement. If we consider other situations in which, as an alternative to the initial problem, the Nash negotiation models will be considered as the points of the alternative cost of investing in social status and the reaction points of the player who invests in status, we will get a very strong theoretical apparatus that can be used to analyze situations that are often encountered in negotiations to achieve a generally acceptable goal (project or reform) (Valenčík, 2019).

Neoclassical economic theory claims that "supply creates its own demand", and the theory of productive consumption claims that "consumption creates production". This means

that the perception of economic agents about desired future consumption engenders their current production plans. Consequently, economic communications, on the one hand, provide interactions of people in the present tense, and on the other hand, are an instrument for building the future.

Conclusion

A study of the theory of consumer behavior in a historical context made it possible to establish that the focus of scientists has consistently shifted from irrational motives of behavior to rational motives. This led to the dominance in economics of the concept of a rational economic agent – the basic behavioral concept of modern microeconomic analysis. Deviations from a rational motive (for example, following traditions) were explained by neoclassical economists as exceptions, confirming the rule or particular cases of rational behavior (Maialeh, 2019). However, studies of the second half of the XX century. showed that deviations from rational behavior can be explained in terms of the concepts of limited rationality, organic (procedural) rationality, and organic irrationality. The emergence of new behavioral concepts is associated, according to the author, with a change in consumer behavior. The theory of productive consumption and the concept of organic irrationality make it possible to more reliably, according to the author of the article, explain the behavior of a modern consumer, the distinguishing characteristics of which are: orientation toward a greater degree in the future in making consumer decisions; the desire to increase human capital, not only in the present, but also in the future; organic irrationality; the need for economic communications to overcome cognitive, informational, and time constraints. The author proved that economic communications are a tool for the modern consumer, with the help of which he forms his preferences in the present and in the future.

The synthesis of the theory of productive consumption and the theory of economic communications is, in the opinion of the author of the article, fruitful for the further development of the theory of consumer behavior.

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Contact address

Svetlana L. Sazanova
Cand. (Econ.), Associate Professor
Associate Professor, Department of Institutional Economics
State University of Management, Moscow, Russia, 109542
(slsazanova@fa.ru, sazanova@mail.ru)

Associate Professor, Department of Economic Theory
Financial University under the Government of the Russian Federation, Moscow, Russia
(sl_sazanova@guu.ru)

The Efficiency of GARCH Models in Realizing Value at Risk Estimates

Účinnost GARCH modelů při realizaci odhadů Value at Risk

TOMÁŠ JEŘÁBEK

Abstract

Market risk is an important type of financial risk that is usually caused by price fluctuations in financial markets. One determinant of market risk comprises Value at Risk (VaR), which is defined as the maximum loss that can be achieved within a certain time horizon and at a given reliability level. The aim of the article is to determine the importance of selecting conditional volatility model within the parametric and semi-parametric approach for VaR estimation. The results ascertained show that the application of these models tends to provide more accurate predictions of actual losses as compared to traditional approaches to VaR estimates. Overall, the application of conditional volatility models ensures that VaR estimates are more flexible to adapt to changing market conditions – especially in the periods associated with higher return volatility. Furthermore, the results show that the differences between individual models of contingent volatility are primarily determined by selecting the specific distribution of the standardized residue series.

Keywords

Value at Risk, GARCH models, distribution of standardized residues, extreme values theory

JEL Codes

C22, C52, C53, G15

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Abstrakt

Tržní riziko je důležitým typem finančního rizika, které je zpravidla způsobeno cenovými pohyby na finančních trzích. Jednou z měr tržního rizika je Value at Risk (VaR), jež je definována jako maximální ztráta, které lze dosáhnout v určitém časovém horizontu a při dané úrovni spolehlivosti. Cílem článku je určit důležitost volby modelu podmíněné volatility v rámci parametrického a semiparametrického přístupu pro odhad VaR. Zjištěné výsledky ukazují, že aplikace těchto modelů má tendenci poskytovat přesnější předpovědi skutečných ztrát, a to ve srovnání s tradičními přístupy pro odhad VaR. Celkově aplikace modelů podmíněné volatility zajišťuje, že získané odhady VaR se daleko flexibilněji přizpůsobují měnícím se tržním podmínkám – především v obdobích spojených s vyšší volatilitou výnosů. Výsledky dále ukazují, že rozdíly mezi jednotlivými modely podmíněné volatility jsou primárně dány výběrem konkrétních rozdělení standardizovaných reziduí výnosových řad.

Klíčová slova
Value at Risk, GARCH modely, rozdělení standardizovaných reziduí, teorie extrémních hodnot

Introduction

The growth in the importance of the market risk management process is strongly motivated by increased volatility in the financial markets, especially over the past few decades, which was reflected in a stronger effort to search for appropriate risk measurement approaches. The most well-known risk measure comprises Value at Risk (VaR), which is defined as the maximum loss that can be achieved within a certain time horizon and at a given reliability level. VaR was introduced in 1994 as a risk management method under the RiskMetrics system of the J.P. Morgan bank. Theoretical knowledge about VaR is provided by, for example, by Jorion (2007) or Alexander (2008). Later VaR began to be criticized for the lack of sub-additivity and convexity, see, for example, Artzner et al. (1999), resulting in the measure called Expected Shortfall (ES). *t*-day ES with the reliability level α represents an average loss exceeding VaR with the same time horizon and the same reliability level – hence the next ES denomination as a conditional or average VaR. Therefore, it is clear from the specification mentioned that the ES estimate primarily depends on the VaR's quality of estimation. In other words, although we focus on the ES estimate, it is still necessary to carefully choose the VaR methodological apparatus.

As a part of the parametric approaches to VaR estimation, the choice of a suitable distribution of the returns of individual risk factors that affect the price of individual assets or the entire portfolio is pivotal. The initial assumption introduced in RiskMetrics was that these returns had a normal or Gaussian distribution. However, this assumption has proved to be unrealistic, see, for example, Christoffersen and Diebold (2000), Pafka and Kondor (2001) or Bauwens and Laurent (2005). A certain group of researchers is of the opinion that it is not necessary to know the complete distribution of the analysed financial returns, but only their tails, i.e., only returns (or losses), which are very unlikely to happen. It, thus, concerns extreme losses or extreme incomes. For this purpose, the so-called Extreme Values Theory (EVT), which is the basic representative of a group of semi-parametric approaches for VaR estimation, has become very popular. One of the pioneers of the EVT application in measuring market risks was McNeil (1997) who compared EVR-based VaR estimates with other popular approaches and found out that EVT delivers the best results in measuring the market risk of the German stock index DAX 30. Embrechts et al. (1999); Longin and Solnik (2001); Gilli and Kellezi (2006); Diamandis et al. (2011), Radivojevic et al. (2016), Sowdagur and Narsoo (2017) belong to the other works.

In the following years, the application of conditional volatility models in market risks measurement appeared significant. Therefore, there is a view that the instability of the distribution parameters over time also affects the distortion of normalcy, namely that volatility of returns changes over time. For example, Christoffersen et al. (2001) compared VaR performance in using the EWMA and GARCH (1,1) volatility models with the S&P 500 stock index. The results showed that the VaR accuracy estimates at 95% and 99%

reliability levels based on GARCH (1,1) overshadows the second rated model. Engle and Manganelli (2004) reach a similar conclusion, showing a significant inaccuracy of EWMA-based estimates, i.e., the original RiskMetrics. The authors mentioned see the presence of extreme returns in the analysed data series as the reason for the failure of these models.

In order to capture the influence of heavy tails of financial returns, Bams et al. (2005) and Hartz et al. (2006) applied VaR models based on GARCH and using different probability distributions. Their works suggest that the performance of GARCH with Student distribution is more efficient than GED based errors distribution. So and Yu (2006) examined the performance of seven different types of GARCH models within VaR estimates of stock indexes and exchange rates. Overall, they conclude that Student-based distribution models give a more accurate estimate of 1% VaR than normal distribution. From the most recent works, for example, Mutu et al (2011) examined the performance of VaR models using the historical simulation, the extreme values theory (EVT) and the GARCH volatility model and exponentially weighted moving average (EWMA) model for five CEE and East European indexes BET, PX50, BUX, SOFIX and WIG20. The authors focused particularly on the crisis period around 2009 and show that VaR application with EVT and GARCH overcomes other approaches. Abad et al. (2016) examine the performance of VaR models with EVT access. In the volatility modelling, various modifications of the GARCH model are used together with both the normal and the Student distribution. Comparison of models' performance is made both during a volatile season and in case of periods with more volatile financial returns. The results show that the best performance (for both periods studied) is achieved by applying an asymmetric GARCH model with Student distribution.

The aim of the article is to determine the importance of choosing conditional volatility model within the parametric and semi-parametric approach to VaR estimation. Motivation for the stated goal is also based on the current popularity of non-parametric historical simulation for VaR, both in financial and non-financial institutions. The application of historical simulation is simple, but its disadvantage comprises too much attachment to the historical development of the analysed returns. The rest of the text is arranged in four chapters. The first chapter presents the methodology used, namely the principle of estimation of Value at Risk, the modelling of the conditional average value and the volatility and subsequently the way of testing the quality of the obtained estimates. The second chapter includes the data used, including their basic characteristics. The results are presented in the third chapter with the discussion in the fourth chapter.

Methodology

Value at Risk

VaR represents the worst possible loss that occurs over a certain period of time at a given reliability level. VaR therefore gives risk managers information what maximum funds the institution might lose at some future moment and with a certain likelihood. Since

its introduction in the 1990s VaR has become a standard measure of risk. We consider a random variable r whose values represent financial returns. Then the VaR variable with the realiability α, VaR_α is determined by (1-α)-variable division of random variable r_t, i.e.,

$$VaR_\alpha = q_{1-\alpha}(r_t). \tag{1}$$

Several approaches are used to estimate VaRs, with output being the structure of the revenue distribution of a given instrument or the entire portfolio. In the case of parametric approaches, these are some of the standard divisions, most often normal. In this case, it applies for the VaR estimate that

$$VaR_\alpha = \mu + \sigma\Phi_{1-\alpha}^{-1}, \tag{2}$$

where μ, or more precisely σ is the median value, or more precisely the standard deviation of the return series and $\Phi_{1-\alpha}^{-1}$ represents the (1-α) variable of the normalized normal distribution, i.e., the normal distribution with zero median value and unit scatter. In addition to the parametric approach, a nonparametric historical simulation can also be used, which employs the so-called empirical distribution of returns, i.e., it uses a historical sample of the last few observed analyses of returns. The specific VaR value is then determined as the respective magnitude of this empirical distribution.

One of the critical factors in the VaR estimation is the density of the distribution of financial revenues, especially in the tail area. In order to increase the accuracy of the VaR, the so-called extreme value theory is used (EVT), which directly selects some extreme values from the available sample to best match the empirical tail distribution, instead of estimating the entire distribution with the entire spectrum of samples. An approach based on the theory of extreme values focuses on a certain limited distribution of extreme returns that is essentially independent of the distribution of revenues itself. For the realization of the EVT approach, the so-called limit crossing method is used in the area of finance (POT), which is based on the use of the generalized Pareto division (GPD).

For the purpose of the POT performance, let us consider the random variables $r_1, r_2, \ldots, r_n$, representing the financial returns. Among these variables we choose threshold value *v* and examine all variables exceeding u. Let us title the values of these variables $g1, \ldots, g_N$, where $g_i = r_i - u > 0$ and *N* is the number of returns greater than *u*. Now let us define the distribution function $F_u(x)$ of the distribution values exceeding u as

$$F_u(x) = P(r - u < g | r > u) = \frac{F(g+u) - F(u)}{1 - F(u)}. \tag{3}$$

However, given that for a large u N is generally very small, i.e., a very small number of values exceed a given threshold the estimate of F_u (x) could represent a rather complicated problem. Therefore, for a large u instead of F_u (x) its easier estimated approximation can be used. On the basis of the Balkema and De Haan theses, see Balkema and De Haan (1974) apply to $u \to \infty$

$$F_u(x) \approx G_{\xi,\sigma}(g), \tag{4}$$

for $y \in [0, r_F - u]$, if $\xi \geq 0$, where r_F is the right final point of returns distribution, and $y \in \left[0, -\frac{\xi}{\sigma}\right]$, if $\xi < 0$. $G_{\xi,\sigma}$ is the so-called generalized Pareto division (GPD). Parameter ξ indicates the power of GPD tails – in particular the larger the ξ value, the heavier the GPD tails. Thus, for modelling financial returns GPD is more suitable where ξ≥0. Now the distribution function can be expressed as follows

$$F(r) = F(g + u) = [1 - F(u)]G_{\xi,\sigma}(g) + F(u). \tag{5}$$

The only thing that is left to estimate is *F*(*u*). For this purpose we will place $F(u) = \frac{n-N}{n}$ and subsequently we get

$$F(r) = \frac{N}{n}\left(1 - \left(1 + \frac{\xi}{\sigma}(r-u)\right)^{-\frac{1}{\xi}}\right) + \left(1 - \frac{N}{n}\right), \tag{6}$$

and by subsequent adjustment we add

$$F(r) = 1 - \frac{N}{n}\left(1 + \frac{\xi}{\sigma}(r-u)\right)^{-\frac{1}{\xi}}. \tag{7}$$

The parameters of the distribution function (7) can be estimated by several approaches, of which the most popular is the maximum assurance method to be used in this text. For the VaR estimate it then applies that

$$VaR_\alpha = u + \frac{\sigma}{\xi}\left(\left(\frac{n}{N}\alpha\right)^{-\xi} - 1\right). \tag{8}$$

Modelling of the conditioned median value and volatility

A simplistic assumption within the analysis of financial time series is that financial returns are independent, equally distributed random variables with zero median value and constant volatility. However, this assumption is unrealistic in the vast majority of cases. In case of its deletion, returns can be modelled through the following equation

$$r_t = \mu_t + \sigma_t z_t, \tag{9}$$

where μ_t is the median value dependent on time *t* (we refer to the so-called conditional median value) and σ_t is the time changing volatility (the so-called conditional volatility). Further, z_t represents a random variable with identically and independently divided values, assuming zero median value and unit scatter.

In order to model the conditional median value of financial returns, the autoregressive (AR) model is most commonly used. It is a simple model of a stationary time series designed by Box and Jenkins (1970). The aim of this model is to remove linear dependencies from the time series to obtain residues that are not mutually correlated. The conditional median value μ_t can be expressed as AR (m) of the model as follows

$$\mu_t = \mu + \sum_{i=1}^{m} \phi_i r_{t-i}, \tag{10}$$

where μ is the unconditional median value of the time series $\Phi_1,\ldots,\Phi_m$ are estimated autoregressive coefficients.

Different approaches can be used for the purpose of modelling σ_t. In particular, we refer to the frequently used EWMA model in the literature, as well as several representatives of the GARCH model class. EWMA represents the easiest option for conditional volatility modelling and is based on the use of the smoothing parameter λ, which determines the rate of smoothing the effect of earlier return observations. Specifically, for a sufficiently large *n*, the EWMA can be expressed as follows

$$\sigma_t^2 = (1-\lambda)\sum_{i=0}^{n-1} \lambda^i (\varepsilon_{t-i})^2. \tag{11}$$

The EWMA model was used in the known RiskMetrics approach for Value at Risk estimate, designed by J. P. Morgan bank. For the smoothing parameter, RiskMetrics considers the value of λ=0,94.

The basis for GARCH models comprises the conditional heteroskedasticity model (ARCH), where the conditional volatility in process (1) can be expressed as follows

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i (\varepsilon_{t-i})^2, \tag{12}$$

where $\alpha 0>0$ and $\alpha_i \geq 0$ for $i=1,\ldots,q$. Volatility is, therefore, presented as a linear combination of *q* residual squares within the ARCH (q) model. The problem of the ARCH model is its inability to identify the autocorrelation structure of conditional volatility, see Brooks (2008). The solution is the generalized model of conditional heteroskedasticity (GARCH). In general, the GARCH (*p,q*) model can be defined as follows

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i (\varepsilon_{t-i})^2 + \sum_{i=1}^{p} \beta_i (\sigma_{t-i})^2, \tag{13}$$

where $\alpha_0>0$, $\alpha_i, \beta_i \geq 0$ for $i=1,\ldots,q$, or more precisely $i=1,\ldots,p$. Thus, the conditional volatility is defined in the GARCH model by means of a linear combination of residual squares (as well as by ARCH) and by using historical values of conditional volatility itself.

The models so far mentioned do not fully reflect the nature of the volatility of the revenue time series. Although they are well characterized by volatility clustering, the problem arises from their inability to model the asymmetric effects in the model, namely the leverage effect. The leverage effect is discussed in the case when the "wanted development" of the time series is negatively correlated with changes in volatility, in the sense that volatility decreases, for example, in the growth of returns, or more precisely the decrease of losses – i.e., in case of the "good" development of the series, and on the other hand, the increase in volatility occurs when the returns decline, or more precisely the losses increase – i.e. in the "bad" development of the series. In other words, the previous models depend on the squares of residues, and therefore the effect caused by the positive shock is the same as in the case of negative shock. In order to capture the leverage effect, several innovations of the existing GARCH models have been proposed, whereas the most commonly used

comprise the GJR-GARCH models proposed by Glosten et al. (1993). For conditional scattering estimated by GJR-GARCH (p, q) model the following applies

$$\sigma_t^{\delta} = \alpha_0 + \sum_{i=1}^{p}\left(\alpha_i|e_{t-1}|^{\delta} + \gamma_i|e_{t-1}|^{\delta} I_{t-i}^{-}\right) + \sum_{j=1}^{q}\beta_j\sigma_{t-j}^{\delta},\ I_{t-i}^{-} = \quad (14)$$

$$= \begin{cases} 1, \text{for} e_{t-i} < 0 \\ 0, \text{other way} \end{cases}$$

where $\delta \geq 1$, $\alpha_0 > 0$, $\alpha_i \geq 0$, $-1 \leq \gamma_i \leq 1$, $\beta_j \geq 0$, pro $i=1,\ldots,p$, or more precisely $j=1,\ldots,q$ and further for stationarity of the model the following condition $\frac{\gamma+\alpha}{2} + \beta < 1$ needs to be met. The coefficient γ is just an indicator of the leverage effect. Of the model group (14), the model using δ = 2 is most often used. It is often referred to as GJR-GARCH for its frequent use. Another widely used class representative of the above models is the TGARCH model, referred to as the threshold model, which results from equation (14) by laying δ = 1. Parameters of all three GARCH models used are estimated by the maximal assurance method, which provides asymptotically effective estimates of the search parameters.

For the VaR estimation with the reliability of α realized by applying the above models the following applies

$$VaR_{\alpha} = \mu_t + \sigma_t q_{1-\alpha}, \quad (15)$$

where $q_{1-\alpha}$ (1-α) is the (1-*α*) quantum of the used random variable z_t, whereas for the EWMA model we consider z_t as a random variable with a normalized normal *N* (0,1) distribution. For the class of GARCH models, in addition to the mentioned distribution the Student's and tilted Student's distribution is also used.

Testing the quality of the obtained estimates

VaR values are obtained at a reliability level of 95% and 99%. As a standard, the ratio of the relative performance of VaR, $\hat{a}$ and the α-variable considered is used as a benchmark for comparing and evaluating the approaches used, where $\hat{a}$ represents the ratio of the number of estimates underestimating the actual realized loss and the number of all estimates obtained. The $\hat{a}$ value then corresponds to the theoretical relative error rate of the given model, namely for 95% reliability it is $\alpha = 0.05$ and for 99% reliability then $\alpha = 0.01$. Preference is given to models, for which this ratio is close to 1.

In addition to this informal back testing method, we use two formal approaches to determine the quality of the VaR estimates, namely the unconditional Kupiec (UC) test, which tests whether the model's failure rate corresponds to VaR's significance, see Kupiec (1995). In other words, it is about whether the deviation of $\frac{\hat{\alpha}}{\alpha}$ from value 1 is statistically significant. Higher number of failures, i.e., $\frac{\hat{\alpha}}{\alpha} > 1$, are identified by the test as

underestimating the risk, while a lower failure rate, i.e., $\frac{\hat{\alpha}}{\alpha}\alpha<1$, is considered unnecessary

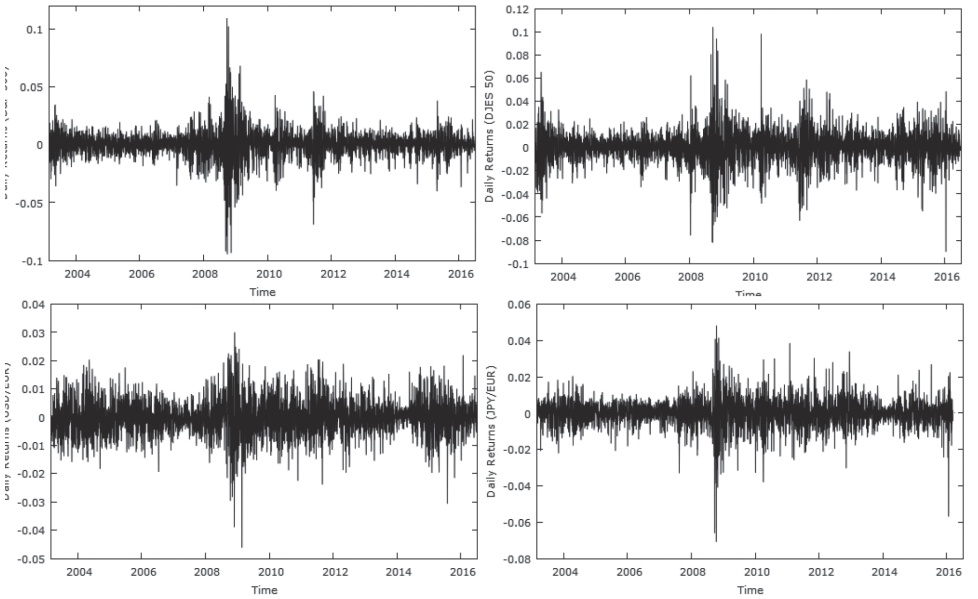
risk overestimation. The disadvantage of this test is its inability to determine whether failures are random, i.e., uncorrelated over time. This problem can be solved by applying Christoffersen's conditional test, see Alexander (2008). By combining both tests, we get the so-called Mixed Kupiec (CC) test, which can be considered as the overall model quality indicator.

Data and its empirical analysis

Four financial data samples are used in this work, namely two stock indexes, the Dow Jones Euro Stoxx 50, which measures the performance of 50 stock titles of leading companies in the Eurozone and the S&P 500 stock index, consisting of 500 stock titles of US companies. And further two exchange rates, especially USD/EUR and JPY/EUR. The data sample covers the period from 1 January 2003 to 31 August 2016 and dates are expressed in the form of daily logarithmic returns.

Figure 1 shows the evolution of daily returns of all monitored variables. Within all four ranges, an average zero return is apparent, as is shown in Table 1.

Figure 1: Daily logarithmic returns of stock indexes and exchange rates



Source: Author's construction

As noted above, most financial series are subject to a conditional median value that changes over time and volatility. From the charts in Figure 1 it can be concluded that these phenomena occur within the analysed series. Statistical tests are used for verification,

namely the Ljung-Box Q test and the ARCH test; see, for example, Brooks (2008). In case of three of four monitored series, we reject the Q test application at 1% of the significance of the hypothesis on the separation independence – see Table 1, where value 1 indicates the assumption of an alternative hypothesis about the breach of the independence of the returns over time, and the value 0 then confirms the tested independence. In case of the European stock index, the 1% level of autocorrelation was not confirmed. Furthermore, using the ARCH test in all rows, we reject the zero hypothesis about the absence of ARCH effects, so the used return series are burdened with time-varying conditional volatility.

For the purposes of further analysis of the observed returns, table 1 presents basic descriptive statistics. The minimum and maximum values are relatively far from the averages, which confirms the occurrence of extreme events during the time period under review. The value of the standard deviation of returns, or their volatility, is slightly higher than the exchange rates for stock indexes. Additionally, the skewness of all returns is negative. This fact indicates that the presence of extreme values in the left-hand tails of the analysed distributions is more frequent in the presence of extreme values in the right tails. The standardized kurtosis value is greater than 0, indicating that the revenue distribution is sparser than the normal distribution, most notably the Japanese Yen exchange rate. This means that most of the returns are concentrated around the mean, but there are more distant observations.

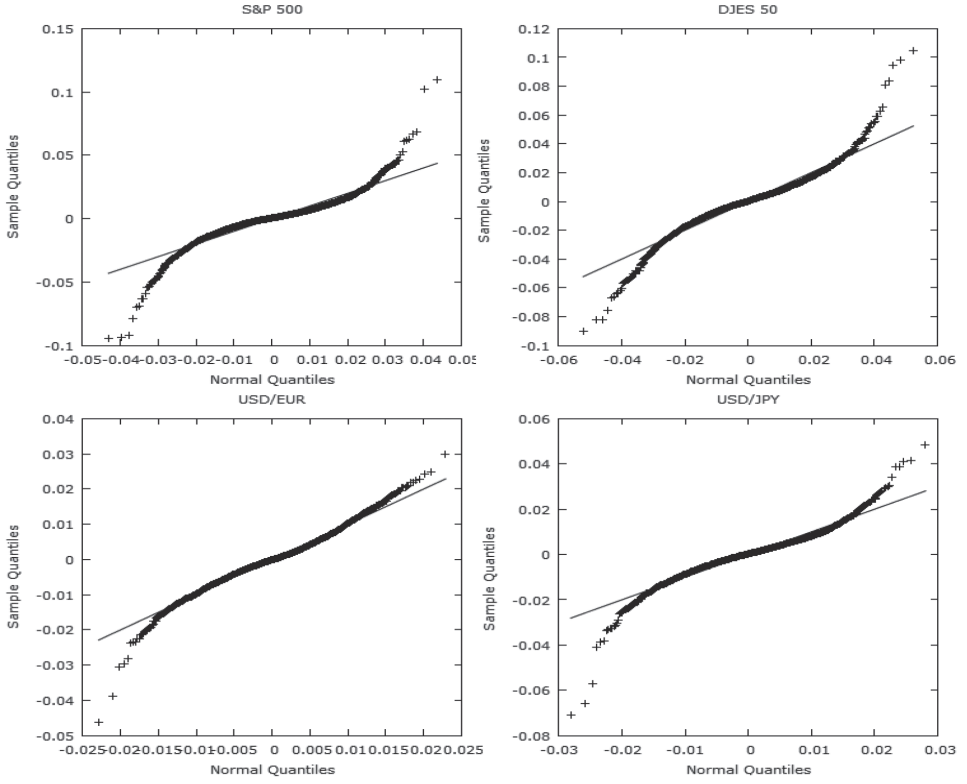
These stated characteristics, such as negative obliquity and higher sharpness, are typical features of financial returns and carry the problem of the so-called heavy tails. The point is that there are extreme losses (negative returns) in these ranges, which result in the distribution of returns not being Gaussian or normal. In order to verify that the normality of returns is actually violated, we use the Q-Q quantity graphs shown in Figure 2. These are charts, in which we enter against each other the theoretical distribution – in our case, the normal distribution and the quantitative empirical distribution.

Table 1: Basic characteristics of daily returns

	SP 500	DJES	USD/EUR	JPY/EUR
Mean	0,0001	0,0001	0,0001	-0,0001
Median	0,0007	0,0003	0,0000	0,0002
Min	-0,0569	-0,0764	-0,0410	-0,0662
Max	0,0609	0,0729	0,0273	0,0435
Standard Deviation	0,0110	0,0140	0,0064	0,0082
Skewness	-0,1980	-0,1262	-0,1657	-0,4210
Kurtosis	3,3806	3,9978	2,4356	6,2345
Jarque-Bera	1	1	1	1
Q test	1	0	1	1
ARCH test	1	1	1	1

Source: Author's own processing

Figure 2: Quantitative (Q-Q) graphs of daily returns



Source: Author's construction

It is clear from the graphs that the drawn points are S-shaped, which is a typical manifestation of the existence of heavy tails. Therefore, we cannot talk about the normality of the monitored returns. This fact is also confirmed by the application of the Jarque-Bera test, which rejects the hypothesis on the normal distribution of the analysed data at 1% materiality level.

Results

In this section, we focus in detail on comparing the predictive performance of the the above-described approaches to VaR estimates, with particular attention being paid to the application of three GARCH models in the selection of different types of distribution. As specific approaches to the VaR estimation, or more precisely ES both traditional approaches represented by parametric variation-covariance method, parametric approach used in RiskMetrics, i.e. with EWMA application and nonparametric historical simulation are used. As a part of the historical simulation, we consider a historical sample covering the last 250 observations (HS250), as well as a historical sample involving observations corresponding to the last two business years, i.e., the range of 500 recent earnings (HS500). The choice

of these ranges corresponds to the methodology of historical simulation applied by most banks operating in the Czech Republic.

GARCH models are applied within the parametric approach to the VaR estimation where AR (1)-GARCH (1,1), AR(1)-GJR-GARCH (1,1) and AR(1)-TGARCH(1,1) models are used to model the conditional median and conditional volatility (1)-TGARCH (1,1) models, where for independent and equally divided residues z_t,, from equation (9), we consider the normal, Student's and tilted Student's distribution. In addition, GARCH models are used within the semi-parametric approach to VaR estimation, namely AR (1)-GARCH (1,1)-EVT, AR(1)-GJR-GARCH (1,1)-EVT and AR(1)-TGARCH (1,1)-EVT.

The values in table 2 represent $\hat{a}/a$ ratios, where $\hat{a}$ represents the percentage of one-day estimates underestimating the actual state and α then represents the model of the assumed percentage of underestimation given by the VaR's reliability; we consider specifically that α = 0,05 and 0,01. For ratios marked bold, it applies that according to the UC test at 5% level of significance, their $\hat{a}$ is statistically significantly different from $\hat{a}$. Ratios not highlighted, on the other hand, meet the UC test. Bold framing for a given series of returns is the best model with a ratio approaching 1. For example, the α /0,01≈2,5 value for VC method of estimating VaR returns of the European index means that the output of this method is 2,5 times more erroneous estimates than expected. Specifically, the given method implements 44 erroneous predictions, underestimating the risk, whereas given the scope of the forecast sample only $1750 \cdot 0.01 = 17.5 \approx 18$ erroneous estimates are expected.

The results show that, in case of stock indexes, traditional approaches to VaR estimates mostly substantially underestimate the actual risk. In particular, the variable-co-variable (VC) method works relatively well only at the 95% VaR level, with 99% of the level failing – more specifically, the VC of all methods used most significantly underestimates the real risk of providing the US stock index 3.1 times than expected. The paramount model used in RiskMetrics with EWMA (RM) application fails, and so does the VC method, in being applied within 99% reliability; on the other hand, it provides better output than VC – which is probably due to the assumed conditional volatility. From traditional approaches historical simulation provides the best results. As for the difference between the 250-sample and the 500-sample versions, the first one seems to be more accurate than the larger 500-sample version, although the differences between the outputs provided are not significant. Figure 3 included in the appendix represents the development of one-day 99% of VaR estimates for each serie. Graphs on the left side represent traditional approaches. Comparing both versions of the historical simulation, it is clear from the figures that the 250-sample version tends to overstate the risk, but adapts more quickly to the changing market volatility.

Table 2: Ratios *â/α* for 1-day VaR estimates – traditional approaches

	0,05		0,01		0,05		0,01	
	SP	DJES	SP	DJES	USD	JPY	USD	JPY
VC	1.1314	1.1200	**3.0857**	**2.5143**	0.9143	1.0871	**1.9429**	**2.0000**
EWMA	1.2571	1.2571	**2.5714**	**1.8857**	1.0057	1.1657	1.3143	**1.8286**
HS250	1.0171	1.0982	**1.4286**	**1.5429**	1.0171	1.0857	**1.5429**	1.1429
HS500	1.0514	**1.6914**	**1.4857**	**1.7714**	0.9600	1.0171	0.0571	1.0286

Source: Author's own processing

Table 3 represents the mentioned ratios in case of application of GARCH class models within a parametric approach. The results show that in all cases the deviations between *â* and *α* are statistically insignificant, i.e., their values can be considered identical. Furthermore, it is clear that estimates made using GARCH models are more accurate than outputs from traditional methods. The most accurate results are framed in bold for each model, and it is clear that the highest precision is not given directly by the particular model but by the distribution of standardized residues.

Table 3: Ratios *â/α* for 1-day VaR estimates – GARCH models

	0,05		0,01		0,05		0,01	
	SP	DJES	SP	DJES	USD	JPY	USD	JPY
GARCH-n	0,9486	1,0623	0,8571	1,1804	0,8254	0,8147	0,9648	0,8576
GJR-G-n	0,9486	1,1314	0,8571	1,2571	0,8800	0,8686	1,0286	0,9143
TGARCH-n	0,9338	1,1314	0,8438	1,2571	0,8595	0,8484	1,0047	0,8930
GARCH-t	0,8199	0,9854	0,7551	1,0667	0,8770	0,8136	1,0038	0,7925
GJR-G-t	0,8686	1,1086	0,8000	1,2000	0,9486	0,8800	1,0857	0,8571
TGARCH-t	0,8523	1,0896	0,7850	1,1795	0,9217	0,8551	1,0550	0,8329
GARCH-st	1,0406	1,1938	0,9584	1,2923	1,1422	1,0596	1,3073	1,0321
GJR-G-st	1,0406	1,2258	0,9584	1,3269	1,1712	1,0865	1,3405	1,0583
TGARCH-st	1,0394	1,2685	1,0218	1,3731	1,1712	1,0865	1,3405	1,0583

Source: Author's own processing

Indeed, it can be seen from table 3 that the differences between GARCH models are primarily determined by selecting the z_t division. Models with the same distribution, but with different approaches to volatility, have similar *â/α* ratios than models with the same access to volatility and different distributions. In case of the US stock index, the best results are achieved by using the titled Student's distribution, both at lower and higher levels of reliability. In case of the European Index, the Student's distribution appears to be the best choice. For the estimate of VaR returns of exchange rate, the use of tilted Student's distribution seems best for JPY/EUR, in case of USD/EUR then for 95% of the Student distribution VaR application. The highest accuracy of the 99% VaR of the USD/EUR exchange rate appears to be achieved by using a normal distribution, but the application of the Student's distribution also generates good outputs. Overall, therefore,

the application of the conditional volatility models used generates very similar, if not in some cases identical results. Differences are created by choosing specific types of division. When choosing a specific approach for VaR estimation, it is necessary to focus primarily on the probability distribution of the analysed returns, or more precisely their residuals, with the most accurate estimates being provided by Student's distribution, or more precisely tilted Student's distribution.

Graphs on the right-hand side of figure 3 represent the development of VaR estimates made by applying GJR-GARCH models with normal Student's distribution. Tilted Student's distribution is not included in the charts for clarity. Furthermore, these graphs present the estimates made using RM access and the GJR-GARCH-EVT model with Student distribution. The graphs show that the RM application has the highest tendency to underestimate the risk – it provides the lowest VaR values. Similarly low values are obtained by application of a tilted Student's distribution. On the contrary, GJR-GARCH-EVT application, which has a strong tendency to overestimate the real risk, provides the highest estimates. This feature is also characteristic for GARCH-EVT and TGARCH-EVT, as shown in table 4. Again, similar performance of models is confirmed using the same distribution – in this case the Student's distribution within conditional volatility models and the generalized Pareto division within the EVT.

Table 4: Ratios $\hat{a}/a$ for 1-day VaR estimates – GARCH-EVT models

	0,05		0,01		0,05		0,01	
	SP	DJES	SP	DJES	USD	JPY	USD	JPY
GARCH-evt	0,8486	0,8758	0,6223	1,1640	0,7952	0,7280	0,7840	0,7280
GJR-G-evt	0,8571	0,9029	0,6286	1,2000	0,8114	0,7429	0,8000	0,7429
TGARCH-evt	0,8829	0,9390	0,6474	1,2480	0,8277	0,7577	0,8160	0,7577

Source: Author's own processing

Table 5 for each of the tested VaR models includes for each VaR estimate average values and standard deviations of the observed ratios. The standard deviation in this case determines the rate of deviation of a given ratio from the value 1, i.e., for the standard deviation SD_i, belonging to the i-model, it applies that

$$SD_i = \frac{1}{N}\sqrt{\sum_{j=1}^{N}\left[(\hat{\alpha}/\alpha)_j - 1\right]^2}, \tag{16}$$

where N denotes the number of the valuated ranks (within a certain degree of reliability). In our case, $N = 4$. The models with the smallest standard deviation tend to be consistent across the series of returns. For each row and reliability level, an average closest to one and the deviation closest to zero is selected. In terms of the average ratios valuation for traditional approaches to VaR estimation, the best performance is provided by nonparametric historical simulation, namely its 250-sample version, which shows the lowest deviation of the observed estimates.

Table 5: Averages and deviations of ratios *â/a* – traditional approaches

	0,05		0,01	
	Average	SD	Average	SD
VC	1,0632	0,1080	2,3857	1,4605
RM	1,1714	0,1998	1,9000	1,0049
HS250	1,0514	0,0618	1,4143	0,4454
HS500	1,1800	0,3474	1,0857	0,6559

Source: Author's own processing

In terms of GARCH models, the application of the Student's and standard distribution provide similar deviations between estimates made by them. The same is true about average estimates. On the contrary, the application of the tilted Student's distribution shows higher deviations in the estimates and thus the higher uncertainty of the estimates obtained. If we compare the results for GARCH models with historical simulation (best rated traditional approach), then it is obvious that HS shows a significantly higher uncertainty of realized estimates than is the case for GARCH models. The uncertainty of the HS is even higher than that of the GARCH-EVT models – see table 7.

Table 6: Averages and deviations of averages *â/a* – GARCH models

	0,05		0,01	
	Average	SD	Average	SD
GARCH-n	0,9128	0,1335	0,9650	0,1364
GJR-G-n	0,9571	0,1136	1,0143	0,1539
TGARCH-n	0,9433	0,1269	0,9996	0,1597
GARCH-t	0,8740	0,1437	0,9045	0,1639
GJR-G-t	0,9514	0,1074	0,9857	0,1641
TGARCH-t	0,9297	0,1193	0,9631	0,1654
GARCH-st	1,1090	0,1255	1,1475	0,2137
GJR-G-st	1,1310	0,1495	1,1710	0,2387
TGARCH-st	1,1414	0,1661	1,1984	0,2545

Source: Author's own processing

Table 7: Averages and deviations of averages *â/a* – GARCH-EVT models

	0,05		0,01	
	Average	SD	Average	SD
GARCH-evt	0,8119	0,1964	0,8246	0,2694
GJR-G-evt	0,8286	0,1813	0,8429	0,2665
TGARCH-evt	0,8518	0,1627	0,8673	0,2638

Source: Author's own processing

For a better idea of the quality of the tested models, we will further focus on the results of the CC test, which unlike the UC test provides a more comprehensive way of back testing. For this purpose, table 8 presents the number of failures of the VaR estimates followed in terms of the statistical significance of UC and CC tests. If we consider the maximum number of failures across the tests as a test quality indicator, then the results point to a clear preference of approaches with the application of the conditional volatility model. Specifically, at a lower level of reliability, the parametric approach with the application of the GJR-GARCH model with Student residue distribution shows the best performance. Within the 99% reliability level, the GJR-GARCH application approaches results are similar.

Table 8: Results of backwards testing

	0,05		0,01	
	UC	CC	UC	CC
VC	0	3	4	1
EWMA	0	3	3	2
HS250	0	3	3	3
HS500	1	3	2	3
GARCH-n	0	2	0	2
GARCH-t	0	0	0	2
GARCH-st	0	1	0	3
GARCH-evt	0	2	0	3
GJR-G-n	0	2	0	2
GJR-G-t	0	0	0	2
GJR-G-st	0	1	0	2
GJR-G-evt	0	2	0	3
TGARCH-n	0	2	0	3
TGARCH-t	0	0	0	2
TGARCH-st	0	1	0	3
TGARCH-evt	0	1	0	3

Source: Author's own processing

Discussion of results

In this part, the performance of the connection of conditional volatility models to the parametric and semi-parametric approach to the VaR estimation was verified. The results ascertained show that the application of these models tends to provide more accurate predictions of actual losses compared to both the parametric approach based on RiskMetrics and traditional approaches such as the variation-covariance method or historical simulation. Overall, the application of conditional volatility models ensures that VaR estimates are more flexible to adapt to changing market conditions – especially in the

periods associated with higher return volatility. The results also show that the differences between individual models the conditional volatility are primarily determined by selecting the specific distributions of the standardized return series.

In terms of predictive performance testing of individual models of conditional volatility, then models with the same distribution, but with different approaches to volatility, have similar features, unlike models with the same approach to volatility and different residue distributions. Thus, we are finding out that choosing a particular probability distribution is far more important than choosing the model itself. It is clear from the analysis conducted that there is a very good student distribution across the various risk market environments. If we compare the results obtained with the previously published works, for example, Bams et al. (2005); Hartz et al. (2006), So and Yu (2006), Mutu et al (2011), Abad et al. (2016) show a significant contribution of conditional volatility models to the accuracy of VaR or possibly ES estimates. Furthermore, the above-mentioned works did not primarily address the relationship between a particular model of conditional volatility and a specific distribution of returns. However, by a more detailed analysis of these texts we can trace a more pronounced predominance of positively evaluated approaches involving different models of conditional volatility with the application of the Student's distribution.

Conclusion

The aim of this paper is to determine the importance of choosing the conditional volatility model when estimating VaR. Specifically; the assumption was tested of whether the involvement of models taking into account the risk-adjusted return volatility model always refines the VaR estimates. Furthermore, whether the choice of the suitable type of revenue distribution is as important as choosing a suitable conditional volatility model. These assumptions have been verified through empirical research consisting of data analysis, namely stock index returns and exchange rates. Data was collected from publicly available sources.

It is clear from the results that the VaR estimates obtained in the context of the application of conditional volatility models are far more flexible to adapt to changing market conditions than traditional approaches. The results also show that the differences between individual models of contingent volatility are primarily attributable to the selection of specific residue distributions. In terms of predictive performance testing of conditional volatility models, models with the same distribution, but with different approaches to volatility, have similar features, unlike models with the same approach to volatility and different residue distributions.

Overall, the research carried out confirms the significance of the parametric and semi-parametric approach in measuring market risk. These approaches are not yet widely used by financial institutions. The research carried out complements these approaches with some innovative elements, more precisely; it has some characteristic features that make both parametric and semi-parametric approaches more accurate VaR estimates than traditional approaches.

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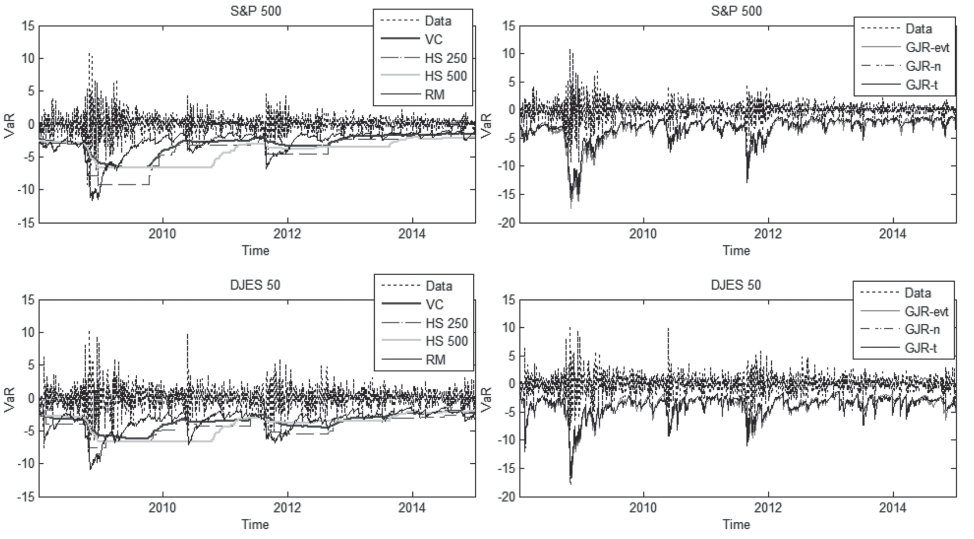
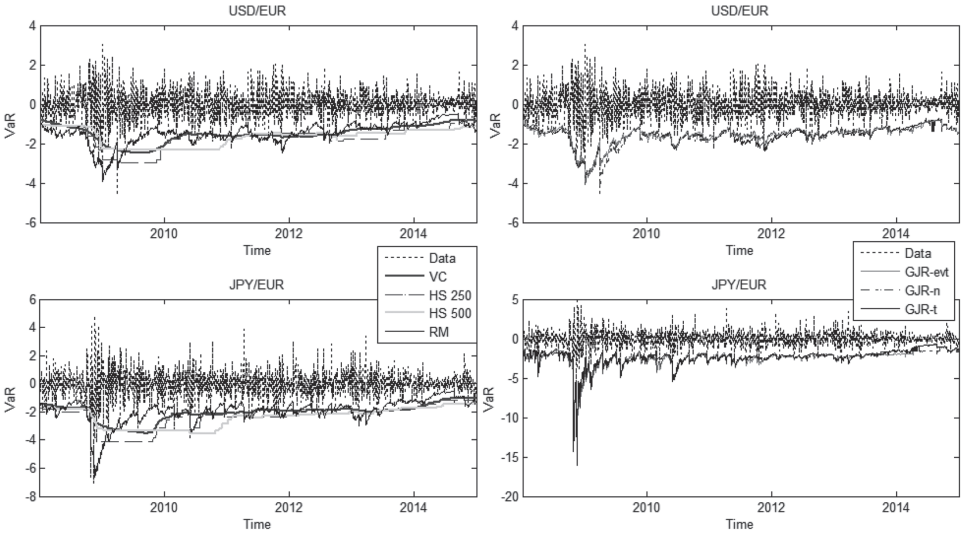
Appendix

Figure 3: 1-day 99% estimates of VaR returns of stock indexes and currency exchange rates





Source: Author's own processing

Contact address

Mgr. Tomáš Jeřábek, MBA
University of Finance and Administration / Vysoká škola finanční a správní, a.s.
Estonská 500/3, 101 00 Prague, Czech Republic
(jerabek@mail.vsfs.cz)

Quantification of the Impact of a Ban on the Use of Gender in Life Insurance

Kvantifikace dopadu regulace pohlaví v životním pojištění

ONDŘEJ POUL

Abstract

The paper explains the impact of insurance regulation to the pricing after ban of using sex life tables. On 1st March 2011, the Court of Justice decided that it is not possible for pricing to use lifetables based on sex differentiation. There would be a contradiction with the Directive 2004/113/ES that sets a principle of equal treatment between men and women in the access to and supply of goods and services. This conclusion forced the insurers all over the Europe to create new prices and made an information asymmetry in favour of the clients. According to the theory, the market participants' behaviour in imperfect information leads to a creation of a new market equilibrium. In practice, it results into the product designs adjustments. The impact of regulation into the final price of insurance is quantified on the case of European insurers group. The other impact is the change in the structure of the insurance class in terms of representation of men and women in the new business.

Keywords

life insurance, regulation, demand, discrimination between men and women, customer experience, Central and Eastern Europe

JEL Classification

G24, G28, K29, L15

DOI

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Abstrakt

Tento příspěvek kvantifikuje dopad regulace pohlaví v životním pojištění na finální cenu pro zákazníka. Soudní dvůr EU 1. března 2011 rozhodl, že již nelze při cenotvorbě využívat podklady založené na rozlišování pohlaví, neboť by došlo k rozporu se směrnicí Rady 2004/113/ES, kterou se zavádí zásada rovného zacházení s muži a ženami v přístupu ke zboží a službám a jejich poskytování. Toto rozhodnutí donutilo životní pojistitele v celé Evropě k vytvoření nových sazebníků pojistného a informační asymetrie ve prospěch klientů. Chování tržních subjektů při informační asymetrii dle teorie vede k vytvoření nové rovnováhy na trhu. V praxi pak k úpravám produktových designů. Na příkladu 6 pojistitelů, jejichž tržní podíl představuje v současné době 62,2 %, je kvantifikován dopad regulace do výsledné ceny pojištění. Dalším dopadem je změna struktury pojistného kmene z hlediska zastoupení mužů a žen u nově sjednaných smluv.

Klíčová slova

životní pojištění, regulace, poptávka, diskriminace pohlaví, klientská zkušenost, střední a východní Evropa

Introduction

Life insurance fulfils several functions. From the client's perspective, the key function is financial help if a serious life risk occurs. This may be a dread disease, disability, accidental permanent consequences or in an extreme case even death. Further, life insurance may cover the temporary loss of income of the family's wage earner as well as credit and mortgage instalments. As for long-term savings, life insurance used to be the cornerstone of the private pension insurance scheme; this function is, however, only marginal in Central and Eastern Europe currently. Similarly, the macroeconomic role of life insurance companies must not be forgotten; this lies in a long-term accumulation of funds.

Life insurance regulation protects primarily the public interest. Daňhel (2006) identifies its main objective as the regulation of insurance companies' economic activities ensuring that insurers meet the terms and conditions entered into. Daňhel and Ducháčková (2010) also stress the importance of customer security, mainly ethical aspects of economic environment. On 1 January 2016, Directive 2009/138/EC (Solvency II) entered into force and being the main regulatory instrument to guarantee the stability of life insurance. Customer protection regulation proceeds from the premise that customers are the weaker party to the insurance policy. Therefore, only external state interventions can create the necessary market balance, which lies in transparency, simplicity, intelligibility and above all fairness of products.

The objective of this study is to demonstrate the impact of regulatory measures on both the market price and the customer. The theoretical grounding of this study is based on an overview of studies on this topic as well as on life insurance development. The main part quantifies the impact of already implemented laws against gender discrimination, which has been documented by the impact on life insurance product prices. The method used in the present study was the collection of market data; data from both public and state databases (Insurance Europe, Eurostat and the Czech Insurance Association) as well as data from price calculators of individual insurers were used. The study also contents data collected by the author during his cooperation with both the European and Czech Insurance Associations and last but not least data on which six insurers have based their pricing and which are published for the first time. The final part sums up the study and presents its conclusions.

1 Theoretical Background and Present Results of Empirical Research

Studies on the impact of the regulation providing for equal treatment between men and women on insurance have been published only rarely so far. In the German-speaking countries is analysis done by Eling and Kilgus (2014). In Central and Eastern Europe, these are mostly diploma theses; the individual effects of this regulation were most specifically quantified by Korejs (2016). His thesis is primarily based on legal analysis; however, it also includes conclusions regarding the impact of premium rates on family budgets. Taking unit-linked products as an example, the author calculated a 16% to 28% price growth for a couple. He also elaborates on insurance offer. Hřebačka (2015) focuses on

capital assurance products and analyses the regulation impact on technical provisions of insurance companies, using Ducháčková's (2009) methodology.

Among foreign studies, the prize-winning dissertation of Chan (2014) stands out; based on data from England and Wales, he demonstrates that gender is a significant parameter of the risk of death. He further elaborates on local risk margins and other alternative risk factors that might replace gender. He uses market data by Gerrard and Dheir (2013), who acquired them from Moneysupermarket.com. Premium rates decreased by up to 9% for male policies and grew by up to 18% for female policies. What is also interesting regarding the issues addressed by this study is that a month after the ban on the use of gender, 67% of British insurers experienced higher than expected share of male policies in new business and in June 2013, the share of male policies in new business reached even 80%. Cicuttin (2013) quantifies the impact of the ban to use gender in insurance on Italian market, focusing on the pension insurance product offered by Allianz Italia. The author concludes that for the age of entry of 60 years and the period insured of 10 years, pension insurance premiums will grow by 6.8% for male policies and decline by 5.4% for female policies. OXERA report (2011) presents estimates of the regulation's future impact on selected European motor insurance and whole life insurance markets. The report estimates the prices of the latter compared insurance product will fall by 11% and 4% for men and rise by 30% and 9% for women on the German and Italian markets, respectively. The report is based merely on pre-regulation market data acquired from on-line price calculators in individual countries and on the authors' qualified estimates of future developments. Among qualitative studies, the work of Schmeiser, Störmer and Wagner (2014) is to be mentioned, it analyses the perception of the impact of the regulation providing for equal treatment between men and women by customers from 5 European countries. The study is based on the analyses of data from a survey with 5,108 participants.

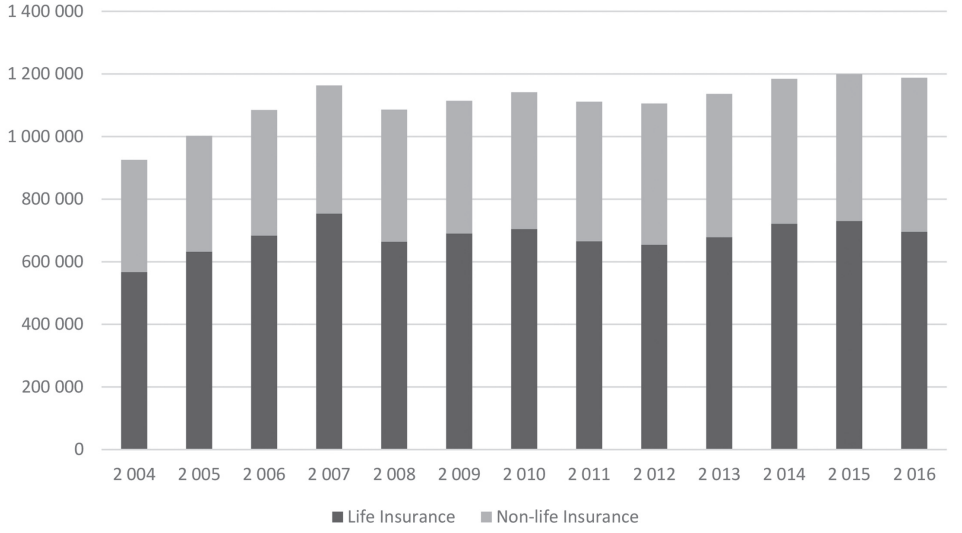
The most cited work on imperfect information is the study by Rothschild and Stiglitz (1976), which suggests that asymmetric information is to the benefit of customers and introduces the concept of two equilibria. The final equilibrium is called differentiation of policies. Follow-up studies suggest a different final market situation with no equilibrium at all. Buchmueller and DiNardo (2002) illustrate such market development with the example of low-risk customers. They conclude that by leaving the market, low-risk customers give momentum to an unfavourable premium collection, premium growth and market downturn. Some scholars, however, disagree with Rothschild and Stiglitz. Hoy (2005) argues that such a clear individual choice between two products must hardly be made in real life. Some scholars are of the opposite opinion as regards asymmetric information. In his published lecture, Daňhel (2002) observes that insurers may apply posterior probability of already incurred claims and the law of truly large numbers, which help to set premiums correctly. Therefore, he concludes that asymmetric information is to the benefit of insurers.

2 Life Insurance Development

According to Insurance Europe (2017), written premiums in life insurance amounted to EUR 696 billion in the European Union in 2016. EU life insurance density amounted to

EUR 1,159 in 2016. Traditional products with an 77% market share prevail over unit-linked products. Customers do not use unit-linked products to invest available funds but to cover risks. The average life insurance penetration decreased from 4.5% to 4.2% in 2016.

Figure 1: Written Premiums in the EU in 2004–2016 (in EUR mil.)



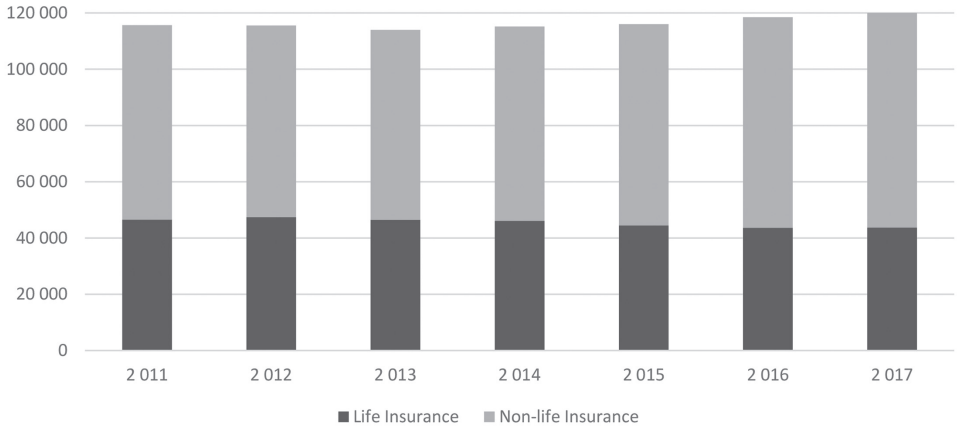
Source: Insurance Europe

Written premiums in life insurance amounted to CZK 43.7 billion (based on the methodology of ČAP, 2018) in the Czech Republic in 2017.Total insurance density reached EUR 479. The difference between this value and the European average can largely be attributed to the non-existence of a Czech health insurance market and naturally to a lower purchasing power of Czech customers. Unit-linked insurance is the major premium contributor in Central and Eastern Europe. It accounted for 51% of total premiums in the Czech Republic in 2016. The already well-established risk life insurance became even more popular in 2015 and started to take up the role of the up to then dominant unit-linked life insurance, which is nowadays also used primarily to cover biometric risks and not to create savings.

This change has been caused by several reasons; the key two factors being the following two. The first lies in the damaged reputation on the market, because most complaints about insurance products addressed to the Czech National Bank (ČNB) or the financial arbitrator concerned unit-linked life insurance in the past few years. Advisors and clients started to perceive a clear connection between mis-selling and unit-linked life insurance. The second reason is a growing number of statutory disclosures. Regulation (EU) No 1286/2014 (PRIIPs) has increased the number of disclosures by 27 compared to Solvency II. Directive (EU) 2016/97 (IDD), effective as of 1 Oct. 2018, will introduce further 36 disclosures related to the proper sale of capital assurance products. PRIIPs does not provide for term life insurance products; IDD provides for them only partly. What leads to an unnatural discrimination of certain products, is exactly this administrative burden specific only for selected insurance products. Paradoxically, such kind of market regulation may cause that customers choose a product, which is not optimal for them.

Figure 2 shows the development of written premiums, clearly indicating the not positive development in life insurance in the Czech Republic since 2011.

Figure 2: Written Premiums in the Czech Republic in 2011–2017 (in CZK mil.)



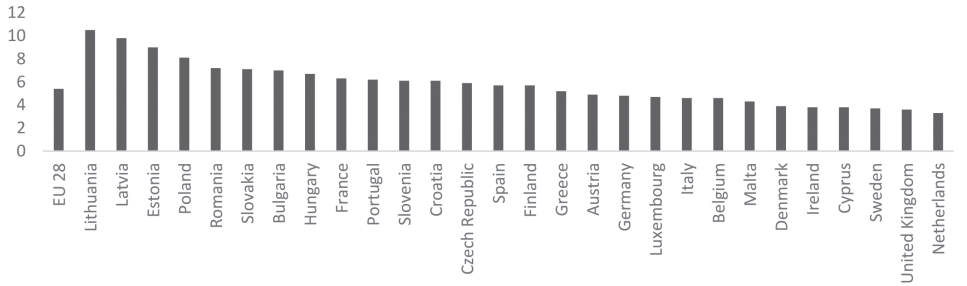
Source: Czech Insurance Association

3 Regulation Providing for Equal Treatment between Men and Women

3.1 Test Achat

There were three traditional risk-rating factors used in pricing insurance products. Brown (2004) considers age to be the most important factor influencing the insured amount. Further important factors are gender and whether the insured person is a smoker or a non-smoker. Actuaries used these key factors for dozens of years and it led to no differences between theory and practice. The differences between the mortality rates of men and women can easily be illustrated – see for instance the mortality tables published by the Czech Statistical Office or Figure 3. The primary genetic reason for different mortality rates in men and women is the human genetic make-up, where the XY pair of chromosomes goes through a number of biological processes in a different way, as is described e.g. Libert, Dejager and Pinheiro (2010).

Figure 3: Differences between Male and Female Life Expectancy in Europe in 2015 (years)



Source: Eurostat, author

As its name implies, Council Directive 2004/113/EC of 13 December 2004 implementing the principle of equal treatment between men and women in the access to and supply of goods and services stipulates uniform rates for men and women also in insurance, i.e. for policies entered into in the European Union after 21 July 2007. Article 5(2), however, gives the Member States the opportunity to permit differences in individuals' premiums between men and women also after this date if these are "based on relevant and accurate actuarial and statistical data".

Belgium was among the first Member States to adopt an act transposing this Directive and specifying Article 5(2). This act was opposed by Association belge des Consommateurs Test-Achats, Belgian non-profit organisation, and Mr. Bugt and Mr. Masselier because they suspected the act was contrary to Article 5(2). First, the case Test-Achats ASBL v Conseil des Ministres was heard in a court in Belgium. Later, it was heard in the European Court of Justice (ECJ). Following the opinion of Advocate General Kokott, the ECJ decided that this Article be viewed in the light of the EU Charter of Fundamental Rights, which prohibits any discrimination on grounds of sex. Similarly, the ECJ referred to Article 19(1) of the Treaty on European Union. The ECJ did not accept the argument that the respective paragraph is not incompatible with the above documents; on the contrary, the Court is concerned that the then applicable conditions might be applied forever. It was the permanent applicability that was contradictory to the objectives of Council Directive 2004/113/EC. This resulted in the ruling that Article 5(2) exemption shall be removed after the five-year period, i.e. as of 21 Dec. 2012. The ruling was made on 1 March 2011. Even though experts knew about the pending case, the final ruling was a surprise.

3.2 Rothschild-Stiglitz Model

The ban on the use sex for pricing is a classic example of regulation leading to imperfect information on the market. This situation is addressed by the economic model developed by Rothschild and Stiglitz (1976). Using the example of insurance market, the authors proved that even few imperfect information can have a substantial impact on market balance.

The model is based on 4 assumptions. The first assumption is based on a well-organised competitive market, where the authors conclude that insurers expect zero profits and are risk-neutral. If an insurance company generated profits, its competitors would copy its products. The second assumption is that there are two different groups of customers – low-risk individuals with accident probability p^L and high-risk individuals with accident probability s $p^H > p^L$. The fraction of high-risk customers is λ, so the average accident probability is:

$$\bar{p}=\lambda p^H+(1-\lambda)p^L. \quad (1)$$

The third assumption is that all insurers consider the steps of their competitors as given. Based on this assumption, the authors conclude there is an equilibrium because no insurance company is motivated to deviate from its original strategy, since it knows the steps of its competitors. The last assumption is most important; namely, asymmetric information is to the benefit of customers, since an insurance company does not know accident probabilities of its customers. Customers, however, know their accident probabilities perfectly.

The demand of individual customers for insurance is determined by the maximization of their expected money income:

$$\hat{V}(p,W_1,W_2)=(1-p)\mathrm{U}(W_1)+p\mathrm{U}(W_2), \quad (2)$$

where p = probability of a claim (an accident),
W_1 = income if there is no accident,
W_2 = income if an accident occurs,
U = utility of money income.

Customers are assumed to be risk-averse U' < 0, therefore indifference curves are convex.

Under the above assumptions on income maximization and risk neutrality, the supply is determined by expected incomes from the policy:

$$\pi(p,\alpha)=(1-p)\alpha_1-p\alpha_2, \quad (3) \quad (3)$$

where α_1 = premium,
α_2 = insurance benefit.

Based on the described assumptions, the authors defined two market equilibria. First is the so-called pooling equilibrium, where insurance companies determine both the premium rates and volume of sold policies (unlike to the well-organised market environment). The authors prove that this equilibrium may never occur, since low-risk customers overpay their insurance cover; therefore, competitors would launch a cheaper product to take over these customers. This would cause lowering the premiums on the market up to under the amount defined by the demand (3). From a long-term perspective, this in not sustainable, therefore there cannot be pooling equilibrium. An alternative equilibrium is the so-called separating equilibrium. A single price is replaced by the activities of a less-informed

stakeholder (screening), who tries to identify different customer types by offering various product designs, while maximizing the utility and profitability.

3.3 Impact on the Insurance Market

Insurers are concerned about two issues in such imperfect information market:

1) Shall a risk margin be implemented and if so, in what amount?
2) Will the ratio of male and female policies in the portfolio be the same after the regulation as it was before?

The concrete impact of the regulation on premiums paid by customers can be determined by actuarial calculations. The actuarial present value of whole life insurance is:

$$A_x = \sum_{k=0}^{\infty} {}_kp_x \, q_{x+k} v^{k+1}, \tag{4}$$

where ${}_kp_x$ = probability that man at the age of x will live k years,
q_{x+k} = probability the insured dies at the age of x+k,
v^{k+1} = discount factor.

Present value of temporary life insurance due equals:

$$A^1_{x\overline{n|}} = \sum_{k=0}^{n-1} {}_kp_x \, q_{x+k} v^{k+1}. \tag{5}$$

Present value of temporary annuity due equals:

$$\ddot{a}_{x\overline{n|}} = \sum_{k=0}^{n-1} {}_kp_x \, v^k. \tag{6}$$

Regular net premium in temporary life insurance due:

$$P_{x\overline{n|}} = \frac{A^1_{x\overline{n|}}}{\ddot{a}_{x\overline{n|}}}. \tag{7}$$

The change discussed in this study influences formula (7) due to a change of the applied probability of death at the age of x in formula (4) by introducing new probability of death at the age of x for men and women:

$$q_x^{unisex} = kq_x^M + (1-k)q_x^F, \tag{8}$$

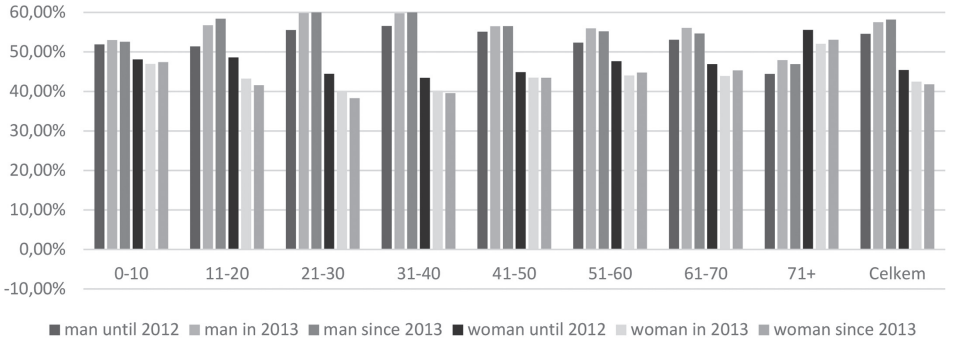
where k = weight of male gender incl. risk margin,
q_x^M = probability that man at the age of x will die within 1 year,
q_x^F = probability that woman at the age of x will die within 1 year.

Formula (8) represents the key relation that every European insurance company had to solve. There was uncertainty as to the value of *k*. There were even extreme approaches suggested before the regulation. An example might be Česká podnikatelská pojišťovna, from the Vienna Insurance Group; it considered the introduction of a very high risk margin, *k = 100*, as Korejs (2016) describes. From the perspective of risk management and risk

business mix, this would be a risk-free solution. The competitiveness of the insurance company would though be limited, on the other hand. A simplified approach with $k = 50$ is not correct either, since this value dos not correspond to the real distribution of female and male policies in the portfolio and moreover. The Czech Actuarial Society was the first to publish expert recommendation ČSpA No. 2 (2012). Appendix 1 states the estimated future ratio of male vs female policies (business mix) is 60/40 to 65/35; the Society recommends to apply an additional risk margin, which would adjust the male vs. female policy ratio to 70/30.

It is fair to set the value of k based on the real male to female policy ratio in the portfolio as shows the figure 4.

Figure 4: Share of Male and Female Policies before and after the Regulation Based on Individual Age Groups (%)



Source: author

The share of male policies in the portfolio until 2012 is amounted to 54.6% in total. The highest male policy share, namely 56.6% (ages of 31–40). The second above question is concerned about the business mix ratio stability. First, the change was announced 22 months prior to its legal force. During this period, most insurers tried to target women by their marketing campaigns. Second, after the regulation, above all external independent brokers were expected to use unisex pricing as a reason to visit their male clients and advise them to terminate the old and enter into new unisex policies.

From the above follows that question No. 1 is relevant; now, the amount of risk margin is to be determined not the question if it will be implied or not. The amount of risk margin depended on risk aversion of individual insurers. The decision on increasing risk margin was influenced by the concern that men would terminate their current policies. On the other hand, concerns about the competitiveness of new unisex rates led to setting a minimum risk margin. Moreover, since massive policy termination and conclusion of new unisex policies was expected, the managements of insurance companies wished to offer attractive new premium rates. An example may be certain European subsidiaries of the Dutch insurance group Aegon that introduced new unisex premium rates besides the present male and female premium rates as of 1 September 2012 already.

Table 1 gives the values of *k* for selected insurers on the market. These are both subsidiaries of global insurers (Allianz, Aegon, Generali) and an insurance group operating in Central and Eastern Europe (VIG). Acquiring the data and their verification with the responsible staff of individual insurance companies as well as the publishing of the values of k is unique, since the impact of the above regulation can be first quantified in such scope thanks to these. From the table is clear that the precautionary principle prevailed on the market. Figure 4 and columns "man since 2013" and "woman since 2013" suggest that the ratio of men vs women changed to the present value k2018. The real risk margin of insurers is listed in the last columns Table 1, where:

$$b=k_{ins} - k_{2018}, \tag{9}$$

Table 1: Weights of Male Probability of Dying

Insurance company	k_{ins}	B
Aegon	0,70	0,118
Allianz	0,70	0,118
Česká pojišťovna	0,70	0,118
Česká podnikatelská pojišťovna	0,66	0,078
Kooperativa	0,25[1]	n.a.
Pojišťovna České spořitelny	0,70	0,118

Source: author's enquiries responded by the listed insurance companies

When the weight of *k* and the given actuarial relationships (4) to (8) are determined, it is easy to determine the price impact on customers too. Unit-linked insurance has the most significant explanatory power with respect to the quantification of the ban on the use of gender in insurance, since it was the prevailing life insurance product then. Besides the calculation of net premium (7), we therefore need to know the fund value at the end of period insured too, with the same effective interest rate for all competitors. The fund value at the end of period insured Ft is defined by the following recurrent relation (Poul, 2003):

$$F_t=F_{t-1} + P_{t-1} - PF_{t-1} - L_{t-1} - R_{t-1} + G_t - MF_t, \tag{10}$$

where P_{t-1} = advance premium
PF_{t-1} = fixed administrative fee deducted at the beginning of period insured,
L_{t-1} = levy fee deducted at the beginning of period insured,
R_{t-1} = risk premium deducted at the beginning of period insured,
G_t = profit grow attributed from the fund at the end of period insured,
MF_t = administrative charge deducted at the end of period insured

1 *Kooperativa pojišťovna, a.s., Vienna Insurance Group did not apply a single value in percent for all age groups, instead it used different values for different age groups; the objective was obviously to use an upgraded product to enhance competitiveness. We therefore used the average value of k for all ages.*

There is a methodological advantage of comparing the fund value at the end of period insured, since we do not compare merely the probability of dying for one issue age *x* but for number *n* of issue ages. The change of the resulting fund value is thus enough representative provided that the same rate of interest, representing *n* values is used for all insurers.

4 Regulation Impact Quantification

Theoretically, the fund value at the end of period insured can be modelled as well (Poul, 2003), but if we do not have all data used for the calculation by individual insurers, we can obtain exact values only from modelling software of the insurers before and after the regulation. Table 2 gives the impact of unisex premium rates on the fund value of the customer with the rate of interest of 2.4%, taking as example a 35-year-old man with life insurance policy, the insured period being $n = 30$, the insured sum amounting to CZK 1,000,000 and monthly premium to CZK 1,200.

Table 2: Customer Endowment Fund Value before and after the Regulation

Insurance company	**Woman** before regulation	**Man** before regulation	**Unisex** after regulation	**Unisex** based on the state in 2012	**Relative difference**
(1)	(2)	(3)	(4)	(5)	(6) = $\frac{(4)-(5)}{(5)}$
Aegon – VIA	CZK 431,949	CZK 276,770	CZK 326,549	CZK 347,221	–6,0%
Allianz – Rytmus/ Mercury	CZK 453,251	CZK 270,963	CZK 325,513	CZK 353,722	–8,0%
Česká podnikatelská pojišťovna – Evoluce	CZK 428,758	CZK 266,281	CZK 326,549	CZK 340,046	–4,0%
Česká pojišťovna – Diamant	CZK 303,587	CZK 99,610[2]	CZK 116,378	CZK 192,216	–39,5%
Kooperativa – PERSPEKTIVA	CZK 391,672	CZK 190,139	CZK 264,083	CZK 281,635	–6,2%
Pojišťovna České spořitelny – Flexi	CZK 405,414	CZK 293,238	CZK 341,555	CZK 344,166	–0,8%

Source: modelling software of insurance undertakings, author

2 The premium had to be increased to CZK 1,321 so that the sufficiency of premium is reached.

Columns (2), (3) and (4) give the endowment fund values calculated by the modelling software of individual insurers and the compared products. Column (5) uses unisex rates for the original value of $k_{2012} = 0.546$, which is the value based on Figure 4 in the portfolio until 2012. Column (6) indicates the change of the fund value and this difference represents the impact of regulation on customers, i.e. the use of risk margin.

From column (6) of Table 2 is clear that in all insurance companies the endowment fund value has decreased. The arithmetic average of the selected insurers amounts to –10.7%. The weighted average, where the then market shares are used as weights, amounts to –18.3%. Figure 4 indicates that the assumptions about the change of the ratio of male vs female policies in the portfolio were correct; however, they were not so significant so that they could compensate the set risk margin. In 2018, the share of men in the portfolio accounted for $k_{2018} = 0.582$. The results based on this value are listed in Table 3. The weighted average decrease of the endowment fund value based on the present market shares amounted to –9.8%.

Table 3: Impact of the Regulation on the Customer Endowment Fund Value

Insurance company	**Unisex** after regulation	**Unisex** based on the state in 2018	**Relative difference**	**Market share** of insurers as of 30 Sept. 2017
(1)	(4)	(7)	(8) = $\frac{(4)-(7)}{(7)}$	(9)
Aegon – VIA	CZK 326,549	CZK 338,580	–3.6 %	2.9 %
Allianz – Rytmus/ Mercury	CZK 325,513	CZK 341,930	–4.8 %	6.4 %
Česká podnikatelská pojišťovna – Evoluce	CZK 326,549	CZK 334,404	–2.3 %	4.3 %
Česká pojišťovna – Diamant	CZK 116,378	CZK 160,515	–27.5 %	18.1 %
Kooperativa – PERSPEKTIVA	CZK 264,083	CZK 274,298	–3.7 %	15.5 %
Pojišťovna České spořitelny – Flexi	CZK 341,555	CZK 343,075	–0.4 %	15.2 %

Source: author, column (9) ČAP

The EU market has experienced further changes besides the unnecessary risk margin increase as well. The first one has affected prices again. In case of annuity products, longevity risk represents a significant source of potential loss of insurance companies presently; therefore k was set to zero in most cases. This is the maximum possible price growth unless fully new q_x^{unisex} are assumed. On the contrary, for example for juvenile life insurance in some cases $k = 100$, with the same objective.

A further market change does not lie in price increase but in reducing supply. A vast majority of European insurance companies reduced its product portfolio, since they were not willing to bear the costs of the change implementation for all the products they offered. Supply may be reduced in two ways. First, the sale of insurance products may be suspended. Second, amendments to already concluded policies may not be accepted. Any supply or diversity reduction on the market leads to a lower chance to meet the needs of customers.

Kooperativa was the only important player on the Czech market that concentrated on a detailed solution to unisex rates, with the exception of individual issue age groups. Other insurance companies used the same value of *k* with regard to cost optimization. Figure 4 shows this is not an optimal solution, since regulation affected individual age groups differently. The volume of male policies grew by only 2.5% for the ages between 41 and 50. European regulation has thus only caused another market distortion. The managements of business corporations have to act in the defeasible interest of the corporations and maximise their profits. A single value of *k* was therefore used, since the benefit of minimising the costs of regulation implementation on the supply side prevailed upon the benefit of an optimal solution from the customers' perspective.

Let us look at the above model of Rothschild and Stiglitz again. The implementation of unisex rates made European insurance companies view men as high-risk and women as low-risk customers when pricing whole life insurance. Customers exactly know to which group they belong, and asymmetric information is therefore to their benefit. In this case, paradoxically, insurance intermediaries and insurance companies know the sex of the person to be insured! They are only not allowed to use the information when pricing and decision making. Follow-up studies further elaborate on this model but its conclusion, namely the impact on product design, has remained valid. In practice, insurance companies have adjusted and modified their risk underwriting.

The theory about the identification of high- and low-risk individuals by various product designs, as presumed by the model, can be verified in practice when looking at the insurance market. Most often, insurance product managers create two different designs of dread disease cover policies that differ by the list of covered risks. Besides the usual risks, female policies cover female cancers or complications during delivery; male policies are designed similarly[3]. Each of the products has its own price. Both products are offered to all customers by the insurers so that Council Directive 2004/113/EC is adhered to. A general design of the product is the third option. The successful sale of such gender-specific products has proven that customers can identify which product design is suitable for them thanks to these gender-specific risks and the insurers are able to eliminate the business mix impact.

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3 *E.g. the product Diagnose Leben! by Würzburger Versinerungs AG (ABK rate (2016), the product PRO ŽENY (FOR WOMEN) by Allianz (Special Terms and Conditions for the Insurance of Individuals Rytmus risk (RP1) and rate NM22 PRO ženy), life insurance For You by NN Životní pojišťovna (Special Terms and Conditions for Breast Cancer and Female Reproductive System Cancer Rider CFR1) or products Pojištění maminka (Mum Insurance) and Pojištění tatínek (Dad Insurance) by ČSOB pojišťovna (Special Terms and Conditions ZENY 09/2015 and Special Terms and Conditions MUZI 09/2015).*

A further effect of the regulation prohibiting the use of gender in pricing might be a decrease in demand for life insurance in the Czech Republic. For the above described reasons, demand of women for life insurance has dropped, as illustrated by Figure 4. On the other hand, demand of men for life insurance has grown. However, it has not compensated the drop of women demand. By affecting prices and business mix, the regulation caused market imbalance; the market is now not perfectly competitive in terms of economic theory, since it has experienced a fall in demand for life insurance and a deviation from the balance that can be reached in a competitive market. Between 2012 and 2017, the life insurance market experienced a drop annually as illustrated by Figure 2, where the total decrease reached 8% in this period. Since not even expert studies have proven the reason for this drop sufficiently and if it was caused only by the regulation (Šindelář, 2016), it can only be concluded that the trend reversal in the Czech Republic exactly corresponds to the regulation implementation. Figure 1 clearly shows that the same conclusion cannot be made for the European market either. The markets in the United Kingdom, France, Germany and Italy account for 70% of the European market. The market growth in the UK and Germany after 2012 was caused by single paid insurance products. France experienced price competition among insurers and other financial institutions that ended after two years of market downturn (–13% in 2011 and –8% in 2012) and the market started to recover gradually from 2013 on. The Czech market did not experience such fundamental changes in the respective period.

Conclusion

The study discussed the impact of the European regulatory intervention on the life insurance market balance. Life insurance is irreplaceable in highly developed economies, which substantially contribute to long-term market balance thanks to the elimination of the negative impact of contingency, and therefore any imbalance is undesirable. The insurance market analysis was based on local branches of global and European insurance companies and their products that presently account for 62.2% of the Czech insurance market. Both big insurance market players and several smaller companies were included in the study. The study compared whole life products and 30 age groups. This study is unique thanks to the data on pricing acquired by the author. Calculations have proven the regulation impact on the average weighted endowment fund value of UL products. Premium growth reduced this value by –9.8%. Market shares were used as weights. Price growth has been caused mainly by the precautions of the insurers, who only estimated the future gender business mix. They thus applied risk margins on pricing in accordance with the required precautionary principle. The estimates of international insurance companies on the Czech market proved to be overestimated, and the market therefore experienced a price growth of whole life insurance industry. The study further concludes that the regulation led to a change of the ratio of male and female customers. The share of male policies increased by 6.6% after the regulation. A new market balance has thus been artificially created, which is under the previous balance from the life insurance demand perspective. Regrettably, the described market change did not result from a natural behaviour of market participants but from an artificial market interference by regulation.

Further discrimination bans are presently being discussed in the European Union. First, let us mention the factor of health and age. Age is the most crucial risk factor in pricing. A potential prohibition to use age for pricing could lead to a price spiral and market downturn. Theoretically, the market would be attractive only for elderly customers. Thanks to the present knowledge of the quantifi cation of the gender discrimination prohibition impact, individual eff ects can be used as a strong argument against a potential European Union ban of discrimination on the grounds of age or health.

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Contact address

Ing. Ondřej Poul, Ph.D.
University of Economics, Prague / Vysoká škola ekonomická v Praze
nám. W. Churchilla 4, 130 67 Praha 3
(opoul@vse.cz)

Economic Research Support – 7th Annual Competition for the Prize of prof. František Vencovský

Podpora ekonomického výzkumu – Sedmý ročník soutěže o Cenu prof. Františka Vencovského

MOJMÍR HELÍSEK

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At the end of April 2019, the Rector of the University of Finance and Administration announced the seventh year[1] of the competition for young economists, associated with the Prize of prof. František Vencovský. The aim of the competition is to support the research activities of young economists and at the same time to honour the memory of the prominent Czech national economist František Vencovský (1923–2006).

The prize was created with the permission of the family of this prominent monetary theory and practice expert. Professor JUDr. František Vencovský was a student of Karel Engliš (an important Czech economist in the period of the 1st Czechoslovak Republic, i.e. 1918–1938, Minister of Finance and Governor of the National Bank of Czechoslovakia) and later his friend and successor. He started his career at the branch of the State Bank of Czechoslovakia (SBCS) in Humpolec. Since 1968 he worked at the SBCS headquarters in Prague. From 1990 to 1992, he was an advisor to the Governor of the Czech National Bank (CNB) Josef Tošovský. He then decided to share his knowledge as a lecturer at the Department of Monetary Theory and Policy of the Faculty of Finance and Accounting of the University of Economics in Prague, where he started as an associate professor and was later awarded a professorship. In his professional work, prof. Vencovský focused on the issues of monetary theory, history and practice, about which he published a number of articles and several books. He rightly gained recognition as one of the most important theorists in our country. His research activities in the field of the history of Czech economic learning were also quite beneficial. The President of the Czech Republic, Václav Klaus, awarded prof. Vencovský with a second-degree Medal of Merit in 2003.

The rules of the competition require the participant to deliver an original scientific paper based on original research. The paper can be in Czech or English. The competition for

1 *Information about the previous sixth year of the competition (2017) is available in ACTA VŠFS No 1/2018 (in the Editorial section).*

this prize is announced every two years. It was first announced in 2007. The first prize winner is awarded 200 000 CZK (the prize can be divided), other winners are rewarded with material prices.

Here is a brief history of the competition for the Prize of prof. Vencovský (since 2007) with the thematic focus for each competition and the names of its winners and their winning works.

2007: New challenges for the economy in a globalising world
A. Geršl "Three Indirect Effects of Foreign Direct Investment: Evidence from the Czech Republic"
F. Novotný "The Adjusting Roles of the Exchange Rate in an Imperfect Competition Environment on the Example of the Czech Republic"

2009: Social Europe – current problems and perspectives
K. Pavloková "Intergenerational Solidarity in European Public Health Systems"

2011: Czech and world economy after global financial crisis
A. Geršl, J. Seidler "Excessive Credit Growth and Countercyclical Capital Buffers in Basel III"
F. Matějka "Information Frictions and Monetary Policy"

2013: European economy and its perspectives
B. Pertold-Gebicka "Job Market Polarization and Employment Protection in the Europe"
T. Konečný "Linkages Between the Financial and Real Sectors Across Interest Rate Regimes: The Case of the Czech Republic"

2015: The European economy – a return to growth or long-term stagnation?
V. Audzei "Information Acquisition and Excessive Risk: Impact of Policy Rate and Market Volatility"
H. Lipovská "Fiscal Placebo"

2017: Competitiveness in business in the context of fiscal and monetary policy
M. Hodula, L. Pfeifer "The Impact of Credit Boom and Economic Policy on Labour Productivity: a Sectoral Analysis"
V. Kajurová, D. Linnertová "The Impact of Loose Monetary Policy on Competitiveness of Czech Firms"

The seventh year of the competition (2019) was intended for doctoral students at universities in the Czech Republic and doctoral graduates within two years after graduation. The thematic focus of the competition papers was not narrowly defined this time. It encompassed a wide range of economic research such as economic theory, economic policy, financial markets, public finance, banking, entrepreneurship, business, marketing and more.

The competition was split into two sections:

1) Theoretically oriented research section with academically themed works, both in basic and applied research;

2) Practically oriented research section with works with potential application in practice in business and public sector.

The papers were judged by a committee appointed by the Rector of the University of Finance and Administration, which chose the winners of the competition. The committee included representatives from the University of Finance and Administration, as well as academics from other universities (University of Economics in Prague, VŠB – Technical University in Ostrava, Mendel University in Brno) and experts from non-academic institutions (Czech National Bank, Generali CEE Holding).

37 papers were submitted for the competition. Following consultations between the members of the committee, some of the competing papers were excluded due to their inappropriate thematic focus. In the end 25 papers were evaluated. These 25 works were divided into the above mentioned two sections, namely 12 works in the theoretical research section and 13 works in the practical research section. The members of the committee assessed the works anonymously, the names of the competitors were known only to the committee secretary.

The committee selected the following winning works.
In the theoretically oriented research section:
D. Ehrenbergerová, S. Malovaná "The Effect of Higher Capital Requirements on Bank Lending. The Capital Surplus Matters". This paper studies the impact of higher additional capital requirements on growth in loans to the private sector for banks in the Czech Republic. The analysis draws on a unique supervisory panel dataset and examines the relationship both at the aggregate level and the bank-specific level. The empirical results indicate that higher additional capital requirements have a negative effect on loan growth for banks with lower capital surpluses. In addition, the results confirm that the capital surplus is crucial in the transmission of the capital requirements and that the relationship between the capital surplus and loan growth is important also at times of stable capital requirements, i.e. it does not serve only as an intermediate channel of higher additional capital requirements.

In the practically oriented research section:
J. Grossmann "The Effect of Minimum Wage Increases in the Czech Republic in 2013–20017". This paper analyzes the employment effects of four minimum wage increases implemented in the Czech Republic during 2012–2017 that cumulatively increased the national minimum wage by 37 percent. Paper analyzes outcomes at the level of firm-occupation-county-specific job cells and apply an intensity-treatment estimator similar to that of S. Machin et al. "Where the Minimum Wage Bites Hard: Introduction of Minimum Wages to a Low Wage Sector" (2003). Specifications preferred by the author suggest that minimum wage increases led to higher wages of low-paid workers without a significant impact on their employment.

The evaluation of seventh competition for the Prize of prof. Vencovský traditionally took place at an international scientific conference in the Czech National Bank Congress Centre in Prague on 15 November 2019, where important economists and winners of the competition spoke.

This conference (as well as the competition) took place for the seventh time. The following important economists were the keynote speakers at previous conferences:
2007: prof. Sam Peltzman from the University of Chicago

2009: prof. Nicolas Barr from the London School of Economic

2011: prof. Michael Landesmann from the Wiener Institut für Internationale Wirtschaftsvergleiche

2013: prof. Václav Klaus, former president of the Czech Republic

2015: Miroslav Singer, Governor of the Czech National Bank

2017: Jiří Rusnok, Governor of the Czech National Bank

In 2019, the conference was opened by the Rector of the University, Bohuslava Šenkýřová, with a brief but concise overview of the development of the Czech economy since 1989. At the very end, she stated: "If the last 30 years were full of changes in society, politics and economy, I am convinced that the next 30 years will be no less turbulent."

Her contribution was followed upon by the Governor of the Czech National Bank Jiří Rusnok with his speech "Monetary Milestones of the Past 30 Years Through the Eyes of the CNB", where he summarised, among other things, the historical role of the Czech koruna. In 1991–1997, the Czech koruna was one of the few existing nominal anchors. In 1997, 2002 and 2008, it was the source of exchange rate shocks, and in 2009 it acted as a pillow to dampen the negative external demand shock. As an unconventional monetary policy instrument, the Czech koruna was used in terms of a lower zero bound in 2014–2017. The Governor also commented on the issue of the single European currency. According to him, its benefit lies in the foreign trade support, while the unfinished institutional form of the euro area and its political character represents its negatives. The conclusion of his contribution was quite clear: "Our own currency is an advantage if we know how to utilise it."

In his speech "Thirty Years after the Economic Transformation of the Czech Republic", Václav Klaus returned to the events of November 1989, which he considers to be completely unique historical moments that deserve to be commemorated and celebrated. Even before the touching upon the very theme of economic transformation, he inevitably returned to the previous period to point out that "the Czech Republic – of all countries with similar fate – least benefited from the extensive model of economic growth, which was a characteristic feature and an inevitable consequence of the centrally planned economy." November 1989, he said, forced upon us not only a better economic policy, but a fundamental systemic change and a fundamental change in the economic and political system. According to Václav Klaus, "The transformation of the 1990s was about a qualitative change in our country." And he foresees the same change in the future: "I am convinced that there must once again be a systemic change, the abolition of the dictatorship of politics over the economy, which we are once again dangerously approaching." Same as the CNB Governor, Václav Klaus drew attention to the excessive politicisation of the European Union and, according to him, a dangerous subsidy policy.

The second keynote speaker was Otmar Issing (Director of the Institute of International Economic Relations at the University of Erlangen – Nuremberg and former Chief Economist and Member of the Board of the European Central Bank) with a speech called "Twenty years of the euro". He took a critical stance on the functioning of the euro area and the European Central Bank (ECB). He also criticised the negative interest rates of the ECB.

The following panel discussion included Karel Havlíček, Deputy Prime Minister of the Czech Republic and Minister of Industry and Trade, and Miroslav Singer, Chief Economist of Generali CEE Holding. A number of interesting topics were discussed. Karel Havlíček recalled that in the 1990s, when the Czech economy underwent a fundamental transformation, there was no one with practical experience in free enterprise, free market, lending, etc. Likewise, he said that it was not possible to privatise the then companies into hand of the Czech people, because our country simply lacked managers. Miroslav Singer agreed that we are at a time when politics dominates all areas of life, including the economy. He even believes that politics can evolve in an unfavourable direction for us.

This was followed by the announcement of the competition results and the award ceremony. The winners then presented their winning entries.

The University of Finance and Administration considers the competition for the Prize of prof. F. Vencovský to be a significant support of economic research development in the Czech Republic. Therefore, it wants this competition to continue in the coming years.

Information about the competition (in Czech and English) can be found at www.vsfs.cz/price, about the conference at https://www.vsfs.cz/bienale/.

Contact address

prof. Ing. Mojmír Helísek, CSc.
University of Finance and Administration (VŠFS)
Estonská 500/3, 101 00 Prague, Czech Republic
(mojmir.helisek@vsfs.cz)

Human Capital and Investment in Education 2019: The Issue of Wealth and Poverty and Its Solution

Lidský kapitál a investice do vzdělání 2019: Bohatství a chudoba jako problém a jeho řešení

RADIM VALENČÍK

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In November 2019, the 22nd Scientific Conference was held at the University of Finance and Administration about the economics of productive consumption as an outreach of mainstream economic theory and key to a prospective solution to the problems of wealth and poverty.

The time since the first conference is greater than the number of years the VŠFS operates. The first year of the conference in 1998 took place within of one of the VŠFS founders – Banking Academy. The establishment of the tradition of conferences on the topic of Human Capital and Investment in Education specified in connection with the results of theoretical research and current social problems has significantly contributed to the position of our university in the academic world.

We have devoted the 22nd year to an attractive topic of the problem of wealth and poverty, both in terms of problems that may arise by dividing society into the rich and the poor and in terms of its solution. You can follow the discussion results on the pages to follow.

The very first couple of articles (which I prepared with my colleague O. Černík and doc. P. Wawrosz) try to find out why the divide between the rich and the poor creates problems and what causes this divide. The problem shifts the search to a question of, why the investment opportunities associated with the acquisition, preservation and utilization of human capital, are not used according to their rate of return, regardless of who owns them and who owns the investment funds. On this basis it defines the concept of investing in a social position, or more precisely positional investment and expands the apparatus available to the economics of productive consumption.

The second article by prof. J. Vostatek is devoted to extremely topical issues of pension reform. It is fundamentally related to the two introductory theoretical articles, as investment chains focused on exploiting investment opportunities related to the acquisition, preservation and utilization of human capital reach to the field of pension financing. Therefore, it is one of the key areas of comprehensive reforms that are necessary to substantially enhance the role of the productive services sector, i.e., services focused on the acquisition, preservation, and utilization of human capital. J. Vostatek proposes a transparent, stable, and motivating ongoing pension insurance system in line with some current efforts.

Another article written by prof. F. Zich reacts from the position of sociologist to the idea of economics of productive consumption. He comes with a number of stimuli, including critical ones, and analyses the original empirical material.

Doyen of science at VŠFS, doc. V. Pavlát, enriched the conference with a methodologically beneficial contribution devoted to the area of his traditional interest – interdisciplinary approach. His years of experience in research and education, which he reflected in the topic, are extremely valuable.

The topic of interdisciplinary approach was followed by doc. B. Štědroň with the topic of intercultural management; by which he has shifted the discussed issue considerably more towards action practice.

L. Knihová and doc. V. Pavlát added a specific level of the discussed issue by analysis of the knowledge transfer, methodology, and evaluation of educational services of selected Czech SMEs in the competitive market.

The classical view of the issue of wealth and poverty ensuing from an innovated theory of surplus value was explained in his paper by doc. M. Kroh.

Many interesting things were told even in the student section. Article written by M. Blahout was interesting from the perspective of behavioural economics. I was particularly pleased with the contribution of P. Sedláček, who developed an idea of the economics of productive consumption in the area of marketing and formulated original and beneficial ideas. D. Yusupova dealt with the role of tax system in reducing property inequalities, O. Novák brought an original view of the given issue in terms of barriers to the implementation of Industry 4.0, P. Suchý dealt with the relationship of ecosystem economics and human well-being.

Towards the economics of productive consumption

K ekonomii produktivní spotřeby

VLADISLAV PAVLÁT

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VALENČÍK, Radim a Petr WAWROSZ. Economics of productive consumption as an offshoot of main currents of economic theory. *ACTA VŠFS*. Praha, 2019, 13(2), 113–134. ISSN 1802-792X.

I read a comprehensive article by R. Valenčík and P. Wawrosz with great pleasure. A group of people interested in current issues of human capital development led by R. Valenčík has been dealing with this issue for many years and last autumn held its 22nd conference. In addition to the annual almanac, which contains several hundred contributions, since 2014, 6 specialized monographs have been published in VŠFS editions.

The fact that the submitted article of both authors is based on a thorough foundation is evidenced, inter alia, by a list of published selected references published in that article, containing more than thirty titles.

The published article is the result of long-term research. This time, however – unlike many previously published partial views on human capital issues, for the first time in a comprehensive form it summarizes/presents the basic ideas of the emerging theory of productive consumption, which the authors describe as an "outreach" of modern economic theory, or more precisely as one of their new offshoot of modern economic theory.

The article is not merely a summary of the foregoing considerations, but in many ways goes beyond their existing scope. A number of partial views, about the effectiveness and context of human capital of which the readers doubted in the quick reading, have now been comprehensibly explained and justified. I find it very important to find out the rationale, from which current trends in the development of economic learning, the question of the productive consumption economy arises, which directions it follows, and why it is these directions, i.e., classical economics and neoclassical economics with their many branches. It also explains where the new "offshoot" actually goes.

Critical interpretation of older theories occupies a significant part of the article. It is based on the knowledge of Milan Sojka's extraordinarily important and comprehensive work on the history of economic learning, with respect to which the late (prematurely deceased)

economist shifted the level of Czech history of economic learning closer to the world bar, represented for example by the work of Frenchman Emil James about the history of economic thinking in the 20th century or Schumpeter's famous history of economic analysis.

In this context, it is possible to state that many students of economics got enough of acquainting themselves with the development of economic theories, from which much of the timeless knowledge still valid today arises, as if the old Latin saying "historia magistra vitae" no longer applied today. It is too late to be outraged today over the disappointing results of the economic policy of some of the ills in the ranks of our political elite, note bene, when the consequences can hardly be remedied by punishing some minor offenders.

The authors of the published article deal with the criticism of certain opinions of the classics and neo-classics in many places to rid the economic theory of certain myths that have spread so far, and present the evolution of opinions, from which the economy of productive consumption arises.

From the discussions with some fellow economists, I have recently come to the impression that human capital conferences are seen as an attempt at "revolution" of negating existing theories, as an attempt to replace it with the (somewhat incomprehensible) economics of productive consumption.

In fact, in their article, the authors consistently follow the movement of economic theory in a spiral upward direction and strive to ensure that real economic development adequately translates into the field of economic theory so that it can be applied more effectively in economic policy practice and as a guide to economic purposeful behaviour of an individual.

In their paper, the authors remove some of the incomprehensibility and the gaps or ambiguities of the previous partial results of research on productive consumption, thus trying to weaken the reluctance of some traditionalists against new words and lessons. The emergence of a new "offshoot" of neoclassical theory stems from the needs of our times: it is not merely a verbal exercise, but is needed to explain new phenomena and processes; moreover, it has the potential of practical application.

However, as with any emerging new theory, there are unanswered questions and doubts about the right direction. For the new theory to really make sense, it must have a chance to be applied in practice. There are known cases where new theories had to wait many decades for practical application. How long can it take to incorporate the new "offshoots" into the overall stream of prior theories? Will it be possible at all if there are a number of barriers to its adoption?

I believe that on the home front a new offshoot must draw on the strength of teamwork, at which in a team of enthusiasts purposefully participate. There is no doubt that it can and must draw a certain position on the Czech home field where it has to create its base. Therefore, it will be important to demonstrate, as one of the first steps, that new ideas can indeed be gradually implemented in practice and, through a thorough analysis,

demonstrate that the existing Czech barriers can be overcome. An important step will inevitably comprise the effort of bringing the new theory to the attention of not only experts but also integrating it into the education system, which is likely to be quite lengthy. Also popularizing new ideas of productive consumption theory is one of the necessary ways to spread it. However, it will also be necessary to find a suitable active marketing approach as soon as possible, allowing for the widest possible spread and gradual adoption of the main new ideas not only among economists but also among technicians, lawyers, etc., including the general public.

Perhaps it would be suitable today to start marketing a new theory in the international arena, i.e., outside the unfavourable Czech environment, thereby reducing the risks and shortening the time needed to prove that the new theory has a "raison d´etre" (the right to exist) in the form of high added value resulting from the implementation issues of our times (e.g. poverty, religious intolerance, terrorism, migration, etc.) otherwise difficult to solve (or absolutely insoluble).

Since the text of the article was originally written in Czech, the original Czech terms could be given in brackets after the most important English terms. This would prevent any unnecessary misunderstanding, as the terminology used in the productive consumption economy is not yet fully established. It is a pity that the translation of the Czech text was not very successful in certain places.

Knowing that everything cannot be squeezed into one article, I regret a little that it did not mention the creation of the "own language" of the new discipline or the different layers of ideas representing different approaches, accents or – if you like – building blocks, of which the overall construction consists. After all, the applicability of individual approaches affects some of the notation of one or another theory (including micro-, macro-, qualitative or quantitative labels, economics vs. sector etc., etc. in the interpretation of some critics). With a bit of imagination, I can imagine, for example, how diametrically different the results of the discussion on the amendment to the Building Act could be from the perspective of various economic theories. It is good that so far we have been able to avoid the politicization of this or that knowledge, uncomfortable for the so-called mainstream or direct opponents of anything new.

I recommend to explicitly point out in other articles that the considerations of the economics of productive consumption currently concern mainly the most economically developed countries. I also consider it important because the Czech Republic has so far been ranked among developed countries only by the Organization for Economic Cooperation in Europe (OECD). This is also in line with the position of the Czech Republic in the EU, where it is placed in various contexts among the 27 member states.

Perhaps in other articles on the economics of productive consumption, it would be advisable to go back to the characteristics of certain concepts and clearly define or redefine them so that there is no doubt about their meaning. These include, for example, the understanding of productive and unproductive work (including possible measurement methods) or the concepts of economic science and economy, which are often ambiguously interpreted. According to the popular saying about the role of the

devil in details or well-known saying "we are talking cross purposes" it would be perhaps possible to limit the use of the usual juggling pieces of activist manipulators as well as scholastic discussions (in contemporary academic robe of correctness) about how many devils can dance on the tip of one needle.

It is clear to anyone who wants to think deeper into new knowledge that they should familiarize themselves with how the elements of the theory have gradually emerged (articles from individual conferences published in anthologies and in ACTA VŠFS).

In the end, it remains to wish the two authors further successful insights into the various aspects of the emerging structure, which still remain – figuratively speaking – hidden under the "scaffolding".

I have no doubts that further discussions of the proposed version of the economy of productive consumption can contribute to its further development in that a fresh breeze is better than the rattling of transient thunder and lightning.

The Prague Stock Exchange (1993–1997)
Burza cenných papírů Praha (1993–1997)

JOSEF BUDÍK

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There is a prevailing conviction as to the fact that economic growth and increased employment will be achieved through investments into information and communication technology and support for innovation, especially in the area of "the knowledge economy". The foundation of this trend involves the building of teaching organisations. There, emphasis is placed on the preservation, remembering and reuse of good practice, knowledge and tried-and-tested procedures, i.e. certain forms of know-how, which employees have acquired, created and applied prior to leaving a company or retiring. The preservation of various historical points of view of the development of the company, the state and society is an irreplaceable intellectual and spiritual treasure. A number of companies have even established their own museums and the Czech National Bank provides a unique view of the history of money. However, the development of the capital market in the Czech Republic, including the stock exchange, has yet to be comprehensively mapped out. Opinions of the current standing of the Prague Stock Exchange are somewhat negative in many respects. Questions are being ask amongst the lay and professional public as to whether this was always the case or whether a degree of optimism existed in the Czech capital market at the time of the establishment of the stock exchange in Prague and during its initial years. It is only possible to answer such questions by performing the detailed mapping out of the historical situation from various points of view, including the temporal dimension.

The book entitled "The Prague Stock Exchange (1993–1997)" by Vladislav Pavlát, which has been published by the University of Finance and Administration, has certainly performed just such a task. This is a monograph which summarises and develops the results of the author's long-term active scientific, research, organisational and publication activities from various points of view throughout the development of the capital market in the Czech Republic. The reviewers have named a number of his previous publications in the monograph. However, this monograph has a completely different quality than those other works. It differs from the previous books in that it presents highly detailed information from many meetings (including international ones), which V. Pavlát led or

which he attended during the preparation and commencement of the stock exchange's business séances. He uses citations from a wide range of published and unpublished texts to support his conclusions in the monograph. The intention of the author, V. Pavlát, would seem to be to summarise and make information from various types of period documents available to other researchers in the monograph in order to enable further research. The monograph has been divided into fourteen sections, i.e. thirteen chapters and a conclusion. Vladislav Pavlát's colleagues know that his professional texts also include perfect English terminology, amongst other things. For others, however, the guarantee of the linguistic accuracy of the text lies in the fact that the role of the linguistic editor was performed by Ladislava Knihová.

In the first chapter of the monograph, the author explains why he has chosen to look at the period of the first five years after the establishment of the Prague Stock Exchange. This also involves the period of economic transformation after the establishment of the Czech Republic. Both periods overlap. The author has used a number of sources from the aforementioned five-year period. This includes the annual reports from the stock exchange, yearbooks, recommendations by foreign consultants, period newspapers, minutes from the meetings of the Exchange Chamber and others. He has mostly worked with documents from his own archive and has presented the most reliable and most important documents from many sources to his readers.

The author of the monograph characterises the turbulent political developments of the day in a brief summary of the political and economic situation in the Czech Republic contained in the second chapter. He devotes a sub-chapter to the conditions pertaining to the coupon privatisation scheme and the reorientation of the business practices of Czech enterprises towards Western European markets.

The third chapter of the monograph is based on citations of documents from meetings which preceded the establishment of the Prague Stock Exchange (hereafter simply referred to as the PSE). Amongst other things, it is especially worth mentioning the passage in the monograph which informs readers of the selection procedure for the electronic trading system for the future stock exchange (page 23) and the information about the activities of the joint Franco-Czech team during the preparation of the feasibility study. This showed the necessity of also establishing the Securities Centre at the same time for recording dematerialised shares. The monograph's text clearly shows the emphasis which was placed on training the stock exchange management and on informing any future potential securities traders.

In the fourth chapter, the author sets out, amongst other things, the basic data about the Czech Republic and also the events which preceded or occurred in parallel with the establishment of the PSE. This involves the legislative framework for the capital market, the establishment of the Securities Centre, the establishment of the RM System to allow natural persons to trade in shares from the coupon privatisation scheme and so on. The monograph really only deals with the topic of the coupon privatisation in passing (for example, on page 35). This is a controversial topic, despite the fact that those who still remember this process experienced it relatively intensively. On the one hand, they had the opportunity to learn about the laws of the capital market relatively cheaply. On the other

hand, however, more than 1000 share emissions were accepted by the stock exchange in a highly non-standard manner. This influenced the capital market for a long time.

In the fifth chapter of the monograph, V Pavlát presents the basic statistics for trading on the PSE. When reading the monograph, not everyone will be able to imagine how the technology installed at the stock exchange managed to serve such an enormous and diverse market with almost four hundred traders, including banks, and more than four hundred privatisation funds without any errors or serious outages. We must also take into account the technological level of the computer and communications technology of the day. The monograph could therefore have suppressed the information about the trading processes and emphasised the problem of insufficient issuer information for investors. The author underlines the fact that this was a significant problem using a specific example presented in block no. 3 (page 41).

The PSE's priority was therefore, as V. Pavlát states in the sixth chapter, to draw up and adopt internal rules so that the stock exchange and its member companies could show that they were involved in ethical trading. The phenomenon of privatisation funds and the role of the Exchange Chamber in the process of the ethical operations of the PSE are characterised in the seventh and eighth chapters. The author of the monograph once again acquired the data for these chapters from both his own personal archive and from publicly accessible archive resources.

Despite the fact that the PSE dedicated itself to education and made use of foreign lecturers for this purpose, as the author states in the ninth chapter, and despite the fact that the trading was correct and the share prices were objectively set by the stock exchange systems, the operations of the PSE were not accepted unequivocally positively. A number of opinions and analyses were published in the media during the course of the first five years of trading on the PSE.

In the tenth chapter, V. Pavlát presents the results of his extensive research into the opinions published in period newspapers in almost thirty pages of the monograph. He quotes journalists, Czech and foreign experts and investors directly from the market. He makes use of a number of texts from his own archive which are now somewhat unique. The original documents are no longer available in many cases and it is therefore to the great credit of Vladislav Pavlát that he has preserved the most important information contained within them (either in the English original or in an English translation) in the form of a monograph for future researchers.

He has analogously analysed the PSE's printed materials, the discussions and opinions of various authors in professional periodicals and political initiatives aimed at legislative changes in the eleventh and twelfth chapters. I consider the last four chapters to be of the greatest value, because they enable readers to create their own, fact-based opinion of the majority of the influences which came to bear on the Czech capital market during its beginnings between 1993 and 1997.

The final pages of the monograph include the standard sections which can be found in any scientific publication. Almost 5 pages of references have been divided into two parts for

greater transparency. The first involves a list of PSE publications and selected documents. The second is a summary of the published articles and unpublished documents, including those from V. Pavlát's private archive. The list of seventeen tables and seven blocks on page 144 is followed by the index and the list of abbreviations. Unfortunately, the copy of a significant part of the PCE's Articles of Incorporation, including the list of the founding banks and individuals who signed the Articles on behalf of each bank, tends to get somewhat lost among them all.

I am of the opinion that this monograph is inspirational, especially for teachers. It enables those who have been around for a longer time to organise their own experiences and recall the situation of a number of years ago. Those teachers who are just starting out will find that the monograph contains interesting inspiration and the historical basis for teaching contemporary topics. The information on the establishment of the PSE and the preparations for trading on it is still of significance, especially in project teaching. In my opinion, reading the reviewed monograph will provide further categories of readers, including students, with a number of new pieces of information in the highly condensed form which contemporary readers prefer.

In conclusion, I would like to thank the University of Finance and Administration for publishing the monograph.

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