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Volume 7

ACTA VŠFS

Economic Studies and Analyses
Ekonomické studie a analýzy

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  Pomůže nám dekompozice závislostí na finančních trzích zlepšit jejich pochopení v krizi?
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JAROSLAV VOSTATEK

Dear Readers,

This year's first issue of ACTA VŠFS falls, among others, within the research activities of our University: we are more and more being involved in research in the area of finance, partly also due to the Finance doctoral study program. The current issue brings four papers.

The paper of J. Baruník "Can we Improve Understanding of the Financial Market Dependencies in the Crisis by their Decomposition?" is intended for computer scientists analyzing financial markets. The study of dependencies on financial markets has become one of the most successful research areas in the recent decades. The conclusions have a key impact on the portfolio diversification, particularly during crisis.

J. Daňhel and E. Ducháčková analyze the "Current Changes in the Role of the Insurance Sector". Unlike the first paper, you will not find a single formula or derivative here. The topic is conventional: analysis of changes arising from globalization and crisis.

J. Rajchlová authored the article "Managerial Support Provided by Venture Capital Investors in the Czech Republic". The research results are interesting, though not surprising: the area with the most substantial support provided on the part of such investors comprises strategic management, financial and communication management.

The paper "Outsourcing by Private and Public Organisations: How much Could Public Bodies Learn?" was prepared by a team of M. Šumpíková, J. Nemec, M. Petrová and B. Meričková. It comprises various analyses performed both in the Czech Republic and in Slovakia, and the results are also rather interesting.

P. Dvořák reviews the book "Platební služby" (Payment Services) by O. Schlossberger.

In the scientific reports section you can find information about Science Marketing in the Czech Republic.

I believe that anyone browsing through our magazine will find at least one interesting article that is worth reading in its entirety!

Jaroslav Vostatek
Head of CESTA (Centre for Economic Studies and Analysis)
University of Finance and Administration

Vážení čtenáři,

první letošní číslo ACTA VŠFS zapadá mj. do výzkumných aktivit naší univerzity: stále více věnujeme výzkumu v oblasti financí, i díky doktorskému studiu oboru Finance. V tomto čísle nabízíme čtenářům čtyři statě.

Stať J. Baruníka „Pomůže nám dekompozice závislostí na finančních trzích zlepšit jejich pochopení v krizi?" je určena informatikům, analyzujícím finanční trhy. Studium závislostí na finančních trzích se stalo jednou z nejúspěšnějších oblastí výzkumu v posledních dekádách. Závěry mají klíčový dopad na diverzifikaci portfolia, a to zejména v krizi.

J. Daňhel a E. Ducháčková analyzují „Současné změny v postavení odvětví pojišťovnictví". Na rozdíl od první stati zde nenajdete ani jeden vzoreček či derivaci. Téma je klasické: analyzují se změny vyplývající z globalizace a krize.

J. Rajchlová je autorkou článku „Manažerská podpora investorů rizikového kapitálu v podmínkách České republiky". Výsledky výzkumu jsou zajímavé, nikoliv však překvapivé: mezi oblasti s největší mírou poskytování podpory ze strany těchto investorů patří strategické řízení, finanční řízení a řízení komunikace.

„Outsourcing u soukromých a veřejných organizací – co se mohou veřejné organizace naučit?" byl vytvořen týmem ve složení M. Šumpíková, J. Nemec, M. Petrová a B. Meričková. Jde o analýzy provedené jak v Česku, tak i na Slovensku a i zde platí, že závěry jsou dosti zajímavé.

P. Dvořák recenzuje knihu O. Schlossbergera Platební služby.

V rubrice vědecká sdělení naleznete informaci o marketingu vědy v České republice.

Věřím, že každý, kdo otevře toto číslo našeho časopisu, zde najde aspoň jeden zajímavý článek, který se vyplatí přečíst až do konce!

Jaroslav Vostatek
vedoucí CESTA (Centrum pro ekonomické studie a analýzy)
Vysoká škola finanční a správní

Can we Improve Understanding of the Financial Market Dependencies in the Crisis by their Decomposition?

Pomůže nám dekompozice závislostí na finančních trzích zlepšit jejich pochopení v krizi?

JOZEF BARUNÍK

Abstract

Study of the financial market dependencies have become one of the most active and successful areas of research in the time series econometrics and economic forecasting during the recent decades. Current financial crisis have shown that understanding of the dependencies in the markets is crucial and it has even boosted the interest of researchers. This work brings new theoretical framework for the realized covariation estimation generalizing the current knowledge and bringing the estimation to the time-frequency domain for the first time. Usage of wavelets allows us to decompose the correlation measures into several investment horizons. Our estimator is moreover able to separate individual jumps, co-jumps and true covariation from the high frequency data, thus brings better understanding of the dependence. The results have crucial impact on the portfolio diversification especially in the crisis years as they point to the strong dynamic relationships at various investment horizons. Results suggest that understanding jumps and co-jumps is important for forecasting the covariance and the correlation as they have large impact on these measures. Our results have significant economic value as wrong assumption about the dependence process will have direct impact on the forecasting and portfolio valuation.

Keywords

correlation, multivariate realized volatility, covariation, jumps, co-jumping, wavelets

JEL Codes

C22, C51, C58, G01, G17

Abstrakt

Studium závislostí na finančních trzích se stalo jednou z nejaktivnějších a nejúspěšnějších oblastí výzkumu v ekonometrii časových řad a v ekonomických prognózách v posledních dekádách. Probíhající finanční krize ukázala, že porozumění závislostem na trzích je klíčové a ještě víc rozproudila zájem výzkumníků o problematiku. Tato práce přináší nový teoretický rámec pro odhad realizované kovariance. Hlavním přínosem této práce je zobecnění stávajících poznatků a možnost studia závislostí v časově-frekvenční doméně. Pomocí našeho odhadu založeného na waveletové analýze můžeme studovat dekomponované korelace dynamicky v čase a na různých časových horizontech zároveň. Náš odhad dále odděluje individuální skoky, společné skoky a skutečnou kovarianci od vysoko frekvenčních dat a tím umožňuje lepší porozumění závislosti. Výsledky mají klíčový dopad na diversifikaci portfolia a to zejména v krizi, jelikož poukazují na silné dynamické vztahy

na různých investičních horizontech. Výsledky naznačují, že pochopení skoků a koordinovaných skoků je důležité pro předpovídání kovariance a korelace, neboť mají velký dopad na tato měření. Naše výsledky jsou ekonomicky důležité, jelikož ukazují, jak velký vliv bude mít nesprávný předpoklad o dynamice závislosti na předpovídání a zhodnocení portfolia.

Klíčová slova
korelace, mnohorozměrná realizovaná volatilita, kovariance, skoky, společné skoky, wavelety

Introduction

One of the most fundamental issues in finance is research of the covariance generating process between asset returns. Demand for accurate covariance estimation is becoming more important for risk measurement and portfolio optimization than ever before. The increasing availability of high-frequency data for a wide range of securities has allowed a shift from parametric conditional covariance estimation based on daily data toward the model-free measurement of so-called "realized quantities" on intraday data. Using a seminal result in semi-martingale process theory, Andersen et al. (2003) show that realized variance becomes a consistent estimator of integrated variance with increasing sampling frequency under the assumption of zero microstructure noise. Barndorff-Nielsen and Shephard (2004) generalize the idea to a multivariate setting of so-called "realized covariation" and provide an asymptotic distribution theory for covariance (and correlation) analysis – again with the assumption of zero microstructure noise.

Although the theory is very appealing and intuitive, it assumes that the observed high-frequency data are the true underlying process. But real-world data are contaminated with microstructure noise and jumps, which makes statistical inference difficult. Realized measures suffer from large bias and inconsistency with the presence of noise and jumps in the observed data. The first approach to dealing with noise actually throws away a large amount of data. While this may not seem to be a logical step, the reason can be found quickly when one looks at the data at various sampling frequencies. The higher the frequency of the data we use (i.e., 1 second, 1 tick), the more microstructure noise they contain and the more biased the estimator is. Thus, a lot of researchers use lower frequencies (i.e., 5 minutes), which results in the throwing away of a very large amount of data directly. This is not an appropriate solution for a statistician to use. In the recent literature, a number of ways have been proposed to restore consistency through subsampling, for example Zhang et al. (2005)'s two-scale realized volatility estimator. Zhang (2011) generalizes these ideas to a multivariate setting and defines a two-scale covariance estimator. Barndorff-Nielsen et al. (2011) achieve positive semi-definiteness of the variance-covariance matrix using multivariate kernel-based estimation.

While inference under noise and jumps in realized variation theory has been widely studied in recent contributions, its generalization to covariation theory is only now emerging in the literature. Together with important contributions by Zhang (2011) and Barndorff-Nielsen et al. (2011), Griffin and Oomen (2011) and Aït-Sahalia et al. (2011) deal with microstructure noise and non-synchronous trading and propose a consistent and efficient es-

timator of realized covariance. Audrino and Corsi (2010) propose a forecasting model for realized correlations. This research is becoming very active and stands at the frontier of current research in financial econometrics.

In our work, we contribute to the current literature and provide a generalization of multivariate realized covariation theory. The theoretical results for the univariate setting motivate multivariate volatility modeling and forecasting based on realized covariation measures. While most time series models are set in the time domain, we enrich the analysis by the frequency domain. This is enabled by the use of the continuous wavelet transform. It is a logical step to take, as the stock markets are believed to be driven by heterogeneous investment horizons. In our work, we ask if wavelet decomposition can improve our understanding of co-volatility series and hence improve volatility forecasting and risk management.

Another very appealing feature of wavelets is that they can be embedded into stochastic processes, as shown by Antoniou and Gustafson (1999). Thus we can conveniently use them to extend the theory of realized measures. One of the issues with the interpretation of wavelets in economic applications is that they behave like a filter. Thus wavelets can hardly be used for forecasting in econometrics. But in the realized measures, we use wavelets only to decompose the daily variation of the returns using intraday information. Moreover, the approach suggests constructing a model from the wavelet decomposition.

We are not the first to use this idea. Several attempts to use wavelets in the estimation of realized variation have emerged in the past few years. Høg and Lunde (2003) were the first to suggest a wavelet estimator of realized variance. Capobianco (2004), for example, proposes to use a wavelet transform as a comparable estimator of quadratic variation. Subbotin (2008) uses wavelets to decompose volatility into a multi-horizon scale. Next, Nielsen and Frederiksen (2008) compare the finite sample properties of three integrated variance estimators, i.e., realized variance, Fourier and wavelet estimators. They consider several processes generating time series with a long memory, jump processes as well as bid-ask bounce. Gencay et al. (2010) mention the possible use of wavelet multiresolution analysis to decompose realized variance in their paper, while they concentrate on developing much more complicated structures of variance modeling in different regimes through wavelet-domain hidden Markov models.

One remarkable exception which fully completes the current literature on using wavelets in realized variation theory is the work of Fan and Wang (2007), who were the first to use the wavelet-based realized variance estimator and also the methodology for the estimation of jumps from the data. In our work, we generalize the results of Fan and Wang (2007) in several ways. Instead of using the Discrete Wavelet Transform we use the Maximum Overlap Discrete Wavelet Transform (MODWT), which is a more efficient estimator and is not restricted to sample sizes that are powers of two. We also use the Daubechies family of wavelets instead of the Haar type. The most significant contribution is generalization of this approach to covariation and correlation estimation. Moreover, we also present a new theory for estimation of co-jumping in the stock markets.

This paper is organized as follows. Due to the limited space, the first chapter briefly introduces the realized measures of variance-covariance matrix. The second chapter introduces our new wavelet-based covariation theory together with a methodology for detecting multivariate co-jumps using wavelets. Wavelet decomposition is also used to define wavelet-based realized correlation. In the third part, our theory is used to study the dynamics of the dependence in the stock markets while we decompose the dependence into the several investment horizons, individual jumps and co-jumps. Finally, we build a forecasting model based on decomposed measures and study the impact on jumps and co-jumps on the correlation forecasting.

1 Realized Measures

Andersen et al. (2003) suggest estimating the quadratic covariation matrix by taking the outer product of the observed high-frequency return over the period. The realized covariance of the returns process $\mathbf{r}_{t,h}$ over the time interval $[t- h,t]$, for $0 \le h \le t \le T$, is estimated by

$$\widehat{RC}_{t,h} = \sum_{i=1}^{n} \mathbf{r}_{t-h+\left(\frac{i}{n}\right)h} \mathbf{r}'_{t-h+\left(\frac{i}{n}\right)h}, \tag{1}$$

where is the number of observations in $[t - h,t]$. Details of these results can be found in Andersen et al. (2003) and Barndorff-Nielsen and Shephard (2004) who show that the *ex-post* realized covariance $\widehat{RC}_{t,h}$ is an unbiased estimator of the *ex-ante* expected covariation $RC_{t,h}$. With increasing sampling frequency, the realized covariance is, moreover, a consistent estimator of the covariation over any fixed time interval $h > 0$, as $n \to \infty$.

In practice, we observe only discrete prices, thus bias from discretization is unavoidable. Much more damage is caused by market microstructure effects such as price discreteness, bid-ask spread and bid-ask bounce. Thus, when using this estimator in practice, one is left with advice not to sample too often. While the optimal sampling frequency resulting from the vast research on the noise-to-signal ratio, nicely surveyed by Hansen and Lunde (2006), Bandi and Russell (2006), McAleer (2008) and Andersen and Benzoni (2007) can be used, this approach still causes a large amount of available data to be discarded. As in the univariate case of Zhang et al. (2005)'s two-scale realized volatility estimator, multivariate generalization addresses the problem Zhang (2011).

Another significant bias brought into the estimation is caused by jumps. Barndorff-Nielsen and Shephard (2006) introduce a test based on the difference between the bipower variation and the quadratic variation, but the work is currently unfinished. Andersen et al. (2007) and Huang and Tauchen (2005) present a study of multipower variations in order to assess the proportion of the quadratic variation attributable to jumps. Andersen et al. (2007) and Lee and Mykland (2008) introduce two very similar procedures, which compare intraday returns to a local volatility measure. Fan and Wang (2007) develop the wavelet methods for jump estimation. Jiang and Oomen (2008) construct a test based on the hedging error of a variance swap replication strategy. Aït-Sahalia and Jacod (2009) propose an estimator of truncated power variations computed at different sampling frequencies. Finally, Andersen et al. (2009) introduce a test for jumps constructed using the MedRV and MinRV measures. Other tests include Mancini (2009) and Lee and Hannig (2010). The

harm imposed by ignoring jumps and co-jumps in assumed price processes can be large, especially with regard to forecasting, option pricing, portfolio risk management and credit risk management. In our work, we will propose a novel method utilizing wavelets to consistently estimate jumps and co-jumps in the data.

One last important assumption about the theory we did not mention is that the data are assumed to be synchronized, meaning that the prices of the assets were collected at the same time stamp. In practice, trading is non-synchronous, delivering fresh prices at irregularly spaced times which differ across stocks. Research of non-synchronous trading has been an active field of financial econometrics in past years - see, for example, Hayashi and Yoshida (2005) and Voev and Lunde (2007). This practical issue induces bias in the estimators and may be partially responsible for the Epps effect a phenomenon of decreasing empirical correlation between the returns of two different stocks with increasing data sampling frequency. In this work, we use refresh time scheme (Barndorff-Nielsen et al., 2011) to synchronize the data.

2 Decomposition of Realized Measures by Wavelets

Let us introduce the decomposition of the realized measure by wavelets. Due to the limited space of this paper, we introduce just the basic idea while we refer reader to the dissertation where the mathematical background is derived Barunik (2011). The realized wavelet covariance (using the MODWT) is a scale by scale decomposition of the realized covariance defined by Definition 1. The realized wavelet covariation of the -th and -th asset return from the *m*-dimensional vector of returns $\mathbf{r}_{t,h}$ over $[t-h,t]$, for $0 \leq h \leq t \leq T$, can be defined as

$$\widehat{RC}_{(l,q)t,h}^{(WRC)} = \sum_{j=1}^{J_s+1} \sum_{k=1}^{n} \widetilde{\mathcal{W}}_{(l)j,t-h+\frac{k}{n}h} \widetilde{\mathcal{W}}_{(q)j,t-h+\frac{k}{n}h}, \tag{2}$$

where n is the number of intraday observations over $[t-h,t]$ and J_s is the number of scales considered. $\widetilde{\mathcal{W}}_{(q)j,t-h+\frac{k}{n}h}$ are the MODWT coefficients on scales $j = 1, \ldots, Js + 1$, where $Js \leq \log_2 n$. The proof is provided in Appendix A.1.

While this estimator is just decomposition of 1, we need to make adjustments for the noise and jumps. In the Appendix A.1, we describe the methodology of jumps estimation using wavelets. On the jump-adjusted data, our final estimator is defined as follows. Let $\widehat{RC}_{(l,q)t,h}^{(estimator,J)}$ denote an estimator of the realized covariance between the -th and -th asset return on the jump-adjusted observed data, $\mathbf{y_{t,h}}^{(J)} = \mathbf{y}_{t,h} - \widehat{\mathbf{MWJC}}$.. The jump-adjusted wavelet two-scale realized covariance estimator (JWTSCV) is defined as:

$$\widehat{RC}_{(l,q)t,h}^{(JWTSCV)} = c_N \left(\widehat{RC}_{(l,q)t,h}^{(WRC,J)} - \frac{\bar{n}_G}{n_S} \widehat{RC}_{(l,q)t,h}^{(S,J)} \right), \tag{3}$$

where $\widehat{RC}_{(l,q)t,h}^{(WRC,J)} = \frac{1}{G}\sum_{g=1}^{G}\sum_{j=1}^{J_s+1}\sum_{k=1}^{n} \widetilde{\mathcal{W}}_{(l)j,t-h+\frac{k}{n}h} \widetilde{\mathcal{W}}_{(q)j,t-h+\frac{k}{n}h}$ obtained from wavelet coefficient estimates using the MODWT on a grid of size on the jump-adjusted observed data, $\mathbf{y_{t,h}}^{(J)} = \mathbf{y}_{t,h} - \widehat{\mathbf{MWJC}}$., and c_n is a constant that can be tuned for small sample performance. The proof of consistency and unbiasedness of our estimator can be found in Appendix A.3. Estimator 3 converges in probability to the *true* integrated covariance, which is of primary interest in this analysis. Thus we have defined a new wavelet-based Covariation

theory which is able to estimate realized covariation consistently in the presence of noise and jumps. In the next section, we use this theory to propose estimators of covariance and realized beta, which are important for financial practitioners.

Once we estimate the variance-covariance matrix, we can easily transform it to the correlation measure which we will use in the empirical part.

3 Decomposition of Stock Market Dynamics

The main motivation of the theory is to bring a new view on the dynamics of the stock markets. The main power of our wavelet-based estimator is that it is able to decompose the realized measures into several investment horizons as well as study the individual jumps and co-jumping. Thus let us have a look at data.

3.1 Data Description

Foreign exchange future contracts are traded on the Chicago Mercantile Exchange (CME) on a 24-hour basis. These markets are among the most liquid, so they are suitable for testing our estimator. We will estimate the realized covariance of British pound (GBP), Swiss franc (CHF) and Euro futures (EUR), while we will focus on the GBP-CHF, GBP-EUR and CHF-EUR futures pairs. After estimating the covariance, we will study the correlations between the currencies. All contracts are quoted in the unit value of the foreign currency in US dollars, which makes them comparable. The cleaned data are available from Tick Data, Inc.[1]

It is important to understand the trading system before we begin the study. In August 2003, CME launched the Globex trading platform, which generated a large increase in the liquidity of currency futures. For the first time ever in a single month, the trading volume on the electronic trading platform exceeded 1 million contracts every day. On Monday, December 18, 2006, the CME Globex(R) electronic platform started offering 23-hours-a-day trading. The weekly trading cycle begins at 5:00 pm on Sunday and ends at 4:00 pm on Friday, while every day the trading is interrupted for one hour from 4:00 pm until 5:00 pm. These changes in the trading system had a dramatic impact on trading activity. For this reason, we restrict ourselves to a sample period extending from January 5, 2007 through November 17, 2010, which contains the most recent financial crisis. The futures contracts we use are automatically rolled over to provide continuous price records, so we do not have to deal with different maturities.

The tick-by-tick transactions are recorded in Chicago Time, referred to as Central Standard Time (CST). Therefore, in a given day, trading activity starts at 5:00 pm CST in Asia, continues in Europe followed by North America, and finally closes at 4:00 pm in Australia. We exclude potential jumps due to the one hour gap in trading from our analysis by redefining the day in accordance with the electronic trading system. Moreover, we eliminate Saturdays and Sundays, US federal holidays, December 24 to December 26, and December 31 to January 2 because of the very low activity on these days, which would bias the estimates. Finally, we are left with 944 days in the sample.

1 *http://www.tickdata.com/*

For the analysis of relations between the currencies, it is crucial that they are synchronized in time. We use the refresh time scheme to synchronize the data. Looking more closely at the higher frequencies, we find that a large amount of transactions have a common time stamp, so we use the arithmetic average for all observations with the same time stamp. Finally, we redefine the clock according to the refresh time scheme so that we can work with the data that are synchronized. We use the refresh time scheme for each pair separately in order to keep as much data as possible in the analysis.

4 Multivariate Unconditional Volatility Distributions

Having prepared the data, we can proceed to study the dependencies. For each pair, we estimate the covariance and correlation using our jump wavelet two-scale realized covariance estimator (JWTSCV) and for the reference, also the realized covariance (RC) estimator for each futures pair under the study.

Table 1 provides the average estimated covariation and correlation among the three currencies. As the benchmark, we use unconditional open-to-close measures computed as the outer products of the open-to-close returns. Interestingly, the unconditional measures are not far from the realized measures. This seems to be a feature of currency data, as other authors, e.g. Barndorff-Nielsen et al. (2011), have found significant differences on large samples of US stocks.

Table 1: The average covariation ($\times 10^4$) and correlation among the three currencies, GBP-CHF, GBP-EUR and CHF-EUR.

	covariance			correlation		
	GBP-CHF	GBP-EUR	CHF-EUR	GBP-CHF	GBP-EUR	CHF-EUR
RC	0.305	0.384	0.434	0.472	0.605	0.738
JWTSCV	0.249	0.322	0.346	0.506	0.629	0.770
Open-Close	0.245	0.325	0.4217	0.458	0.623	0.787

Source: Author's computations.

All the correlations are positive. The average relationship between the studied currencies is strong, pointing to a strong degree of integration among these European countries. Our findings are consistent with those of Aït-Sahalia et al. (2011), who use the same data set as we do, with the only difference that their data sample ends in June 2009.

The RC estimator shows lower correlation on average. While the correlations are generally strong, it seems that co-jumps do have an impact on the currency data. When compared with the JWTSCV estimating only the dependence of the true, continuous part without jumps, it estimates the correlation to be a little higher. Economically, these differences may lead to improved results in portfolio theory. We will study this impact in more depth in the last part by proposing a forecasting model.

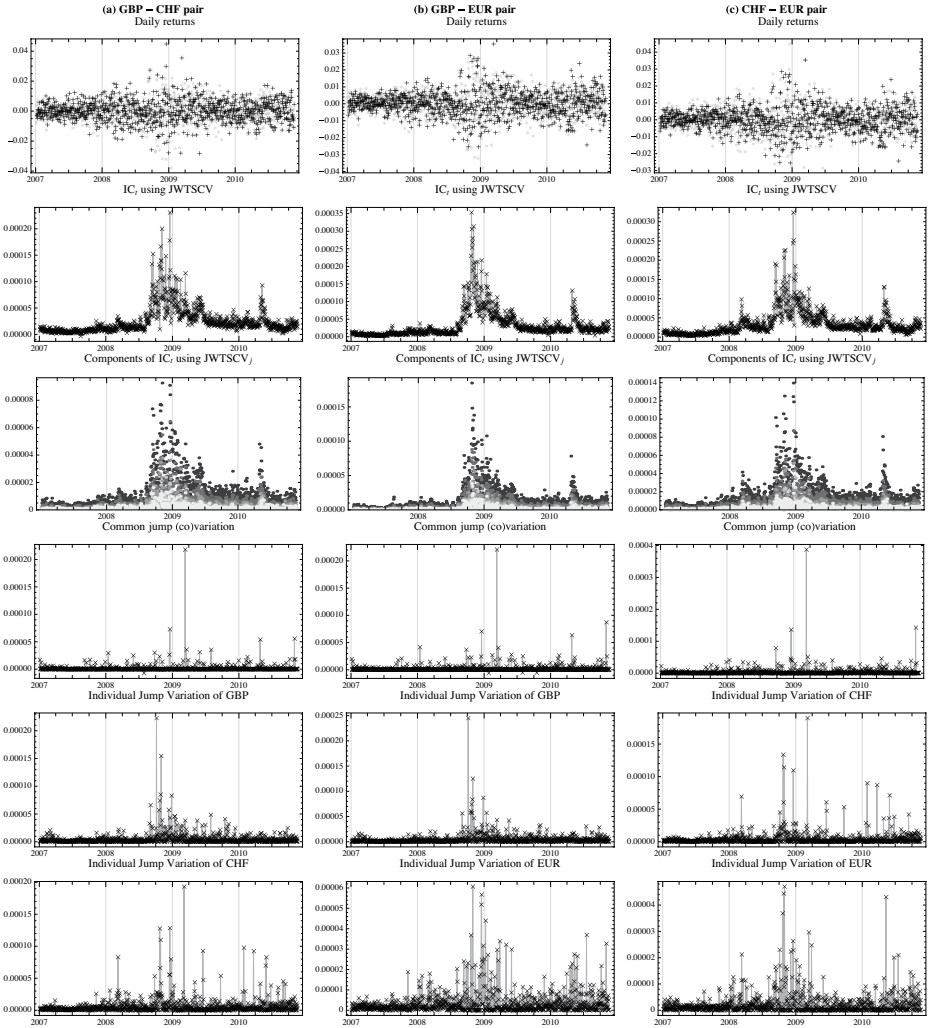
Before we do so, let us look at the decomposed dependencies using wavelets. We decompose the covariance and correlation measures into four scales, corresponding to investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes and 40–80 minutes, and the rest (80 minutes up to 1 day). We remind the reader that the sum of these components will always add to the estimator.

5 Dynamics of Decomposed Dependencies

The previous section provided us with a basic statistical overview of the dependence between the currencies. While looking at the averages, we did not show the considerable variation of all the measures. Such variation points to interesting dynamics, which we further uncover. In addition, we take advantage of wavelet theory and study the dynamics of the decomposed measures as well. More specifically, we decompose the covariance and correlation measures into four scales corresponding to investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes and 40–80 minutes, and the rest (80 minutes up to 1 day). Finally, we use wavelet theory to disentangle co-jumps and individual jumps from the series.

Figure 1 provides us with the decomposition of the estimated covariance for all the currency pairs. The first row provides the bivariate time series plots and the second row the covariance estimated by our JWTSCV estimator. The third row presents the decomposition of the covariance into the various investment horizons, while the last three rows give estimates of the co-jumps and individual jump variations of both series.

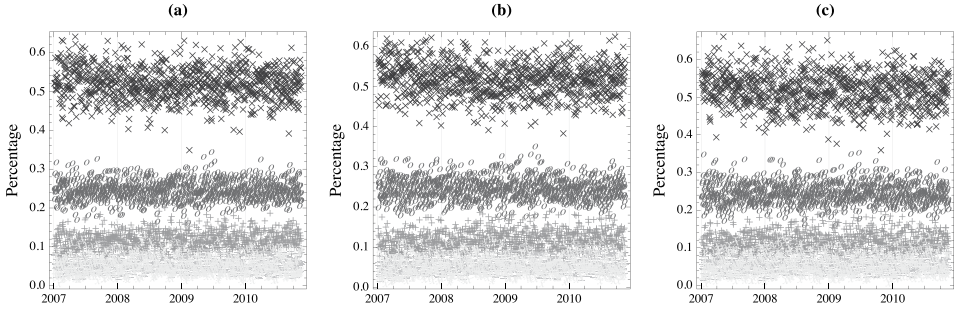
Figure 1: Daily returns, covariation estimated by JWTSCV, decomposition of covariation using $JWTSCV_j$ for $j = 1,\ldots,5$ correspondingcorresponding to investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes, 40–80 minutes and 80 minutes up to 1 day, JWTSCV estimated common jump variation, individual jump variations of both time series. (a) GBP-CHF futures pair, (b) GBP-EUR futures pair and (c) CHF-EUR futures pair.



Source: Author's computations.

The most of the covariance comes from the 5–10 minute frequency, which accounts for about 50% of the total covariance, and the 10–20 minute frequency, which accounts for about 25% of the total, which is strikingly similar to the univariate case. The full picture of the contributions for all pairs can be seen in Figure 2.

Figure 2: $JWTSCV_j$, $j = 1,\ldots,5$, contributions of components of integrated covariation CV_t corresponding to investment horizons of 5-10 minutes, 10–20 minutes, 20–40 minutes, 40–80 minutes and 80 minutes up to 1 day. (a) GBP-CHF futures pair, (b) GBP-EUR futures pair and (c) CHF-EUR futures pair.



Source: Author's computations.

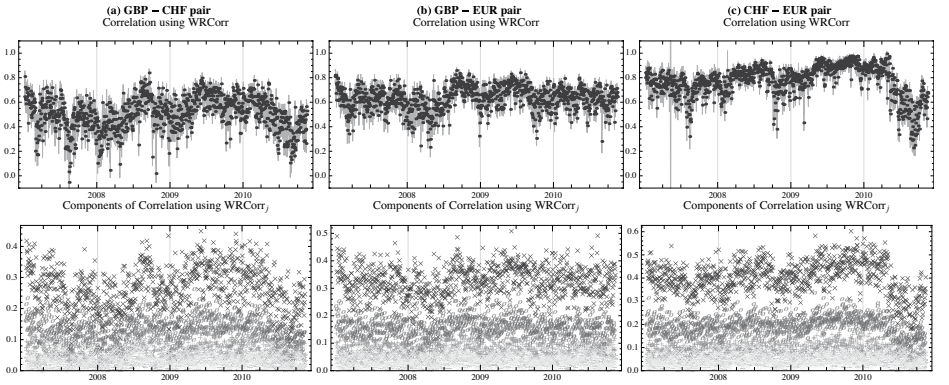
Our method of estimation also allows us to study jumps and co-jumps in the currencies. Interestingly, the jump variation is much stronger than the co-jump variation in the studied currencies. Still, the co-jumps are significant and should not be ignored in any further analysis. These results suggest that if the jumps are ignored, the covariation will be downward biased, as we saw in the previous analysis (Table 1).

Having computed the variances and covariances, we can take a look at the correlation dynamics. Figure 3 presents the estimate of wavelet-based correlation (WRCorr) with 95% confidence intervals, as well as its decomposition. We can see that the correlation of all the pairs vary substantially. While during 2007, the correlation of all three currencies was decreasing, it increased during 2008. At the end of 2008, during the largest stock market falls, which lasted approximately two weeks, the dependence in the currencies weakened. This finding is interesting, as the correlations are expected to grow during large drops. While the currencies show a strong degree of common dependence with the European Union, it seems that the recent financial crisis did not affect the dependence, while it of course substantially increased the variation of all series. Interestingly, the correlation of CHF with both GBP and EUR weakened substantially during 2010.

The decomposition of the correlations again shows an interesting result. Most of the correlation comes from the highest scale of 5–10 minutes. For example, of the total 0.506 average correlation of the GBP-CHF pair, the correlation on the 5–10 minute horizon is 0.26, the correlation on the 10–20 minute horizon is 0.13, and the rest corresponds to 0.06, 0.03 and 0.03 (note that by simply summing these correlations we get the total correlation for the pair).

Figure 4 provides a comparison of the correlation dynamics computed using two estimators: the basic realized correlation and our jump-adjusted wavelet correlation (WRCorr) estimator. It is noticeable that our WRCorr estimator provides an estimate with lower variance (basically due to jumps) and confidence intervals.

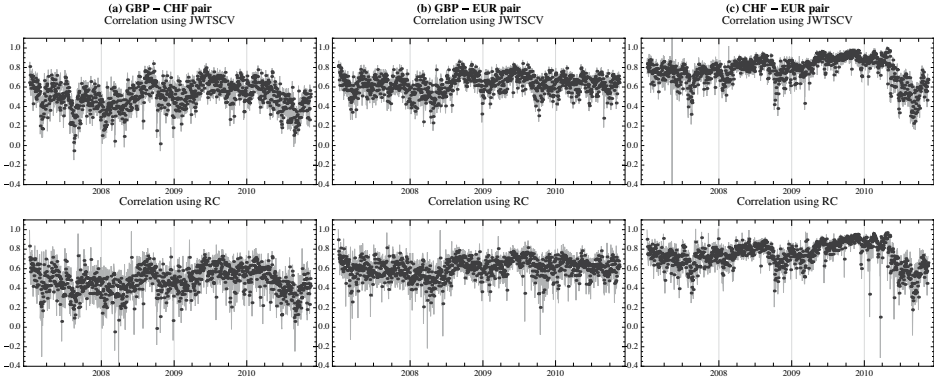
Figure 3: Correlations with 95% confidence interval and decomposition of correlations using $WRCorr_j$ for $j = 1,\ldots,5$ for corresponding to investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes, 40–80 minutes and 80 minutes up to 1 day. (a) GBP-CHF futures pair, (b) GBP-EUR futures pair and (c) CHF-EUR futures pair.



Source: Author's computations.

To be precise, the GBP-CHF futures pair, the GBP-EUR futures pair and the CHF-EUR futures pair have average estimated WRCorr correlations of 0.506 (0.069), 0.629 (0.053) and 0.769 (0.051), respectively (95% confidence intervals in parentheses). The average correlations for the same pairs estimated using the standard RC method are 0.47 (0.1), 0.602 (0.086) and 0.738 (0.062), respectively. Even though the correlations change significantly over time, the average correlation estimated using our method is approximately 0.03 larger than that using the simple RC. This result is economically significant and can have direct impact on portfolio diversification. Moreover, our method provides much narrower confidence intervals for the estimates.

Figure 4: Comparison of correlations with 95% confidence interval using in first row and using in second row. (a) GBP-CHF futures pair, (b) GBP-EUR futures pair and (c) CHF-EUR futures pair.



Source: Author's computations.

6 Forecasting Model Based on Decomposed Integrated Covariances

Motivated by the results from the previous analysis, we turn to building a forecasting model for covariances. Since the realized covariances show strong long memory behavior, we make use of this feature to build an ARFIMA-type long memory model. Moreover, we decompose the covariance into several investment horizons and jumps, and forecast the decompositions separately in hope it will bring improvement in forecasting. Forecasting model is described in detail in the 6.4.

6.1 Forecast Evaluation

To analyze the forecast efficiency and information content of the different covariance estimators, we employ the popular approach of Mincer and Zarnowitz (1969) regressions on both the realized covariance and its logarithmic transformation. The regression takes the form:

$$V_{t+1}^{(m)} = \alpha + \beta_1 V_t^{(k)ARFIMA} + \varepsilon_t, \tag{4}$$

with $V_{t+1}^{(m)}$ being the integrated covariance (or its logarithmic transformation) estimated using the th estimator, namely, realized covariance and our jump wavelet two-scale realized covariance estimator. $V_t^{(k)ARFIMA}$ denotes the 1-day ahead forecast $V_{t+1}^{(m)}$ of using the *k* - th estimator based on ARFIMA (1, *d*, 1), while we consider the same estimators and independently identically distributed error term. We report in-sample as well as rolling out-of-sample results. If the forecast is unbiased, we expect to $\alpha = 0$ and $\beta = 1$.

After testing the forecasting efficiency of the different covariance estimators, we would also like to test the information content of the wavelet decomposition of the realized covariance. For this purpose, we separately estimate ARFIMA (1, *d*, 1) for all components $JWTSCV_j$ for j = 1, ...,5 of the realized covariance as well as the estimated jumps. We should note that in the case of logarithmic transformation of the realized covariance, we also take logarithms of the decomposed levels $JWTSCV_j$. After obtaining the forecast for each level, we transform the forecasts back to be able to compare the results.

Finally, we test the information content of the separate decomposed realized covariances by running the following regressions:

$$JWTSCV_{t+1} = \alpha + \beta_1 W_{t,j}^{ARFIMA} + \varepsilon_t, \tag{5}$$

where $W_{t,j}^{ARFIMA}$ denotes the one-day ahead forecasts of the individual components $JWTSCV_j$ for j = 1, ...,5 corresponding to investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes, 40–80 minutes and 80 minutes up to 1 day, respectively, and

$$JWTSCV_{t+1} = \alpha + \beta_1 J_t^{ARFIMA} + \varepsilon_t, \tag{6}$$

where J_t^{ARFIMA} denotes the forecasts of the jumps. For now, we consider to include both co-jumps and individual jumps and we will test its separate impact in the following section.

Thus we test the information content of the long memory forecasts of the realized covariance estimators using the coefficient of determination, R^2, of the regression.

6.2 Does Decomposition Bring any Improvement in Covariation Forecasting?

We use the period from January 5, 2007 to December 31, 2009 to perform the estimations of all the models. We refer to this period as the in-sample period and it contains the GBP-CHF, GBP-EUR and CHF-EUR pairs. The year 2010 is saved for comparison of the out-of-sample forecasts, which are done on a rolling basis.

Table 2 presents the results of the realized covariation forecasts. JWTSCV is the easiest to forecast in terms of having the highest for all cases except the GBP-EUR pair, where RC results in a slightly higher . Thus JWTSCV seems to carry the most significant information in comparison with the other estimators. It confirms that the continuous part of the realized covariance has the highest information content.

Table 2: Results for *RCt: R^2* for the Minzer-Zarnowitz regressions regressing ARFIMA forecasts of RC, JWTSCV and JWTSCV on its estimates.

	in-sample								
	GBP-CHF			GBP-EUR			CHF-EUR		
	RC	JWTSCV	JWTSCV	RC	JWTSCV	JWTSCV	RC	JWTSCV	JWTSCV
RC	0.733	0.738	0.737	0.836	0.842	0.837	0.741	0.747	0.743
JWTSCV	0.773	0.787	0.787	0.862	0.871	0.867	0.796	0.806	0.802
	out-of-sample								
	RC	JWTSCV	JWTSCV	RC	JWTSCV	JWTSCV	RC	JWTSCV	JWTSCV
RC	0.338	0.354	0.322	0.365	0.366	0.365	0.413	0.401	0.383
JWTSCV	0.419	0.402	0.378	0.415	0.402	0.393	0.516	0.468	0.451

Source: Author's computations.

When we decompose the realized covariation, forecast its components individually and then use the sum of the forecasts, it does not seem to bring the improvement in forecasting. Table 3 presents the results of the decomposed models. The separate realized covariances also carry quite large information content, as the first three are able to forecast the realized covariance similarly well. In other words, the 5–10 minute covariation component is able to forecast the total covariation JWTSCV with a similar forecasting power as if the total JWTSCV was used. Thus, even though decomposition does not bring an overall improvement, we can see that the realized covariation at the higher frequency carries the most important information also for forecasting. In other words, the main part of the realized covariation comes from the highest frequency.

Finally, we can see that jumps carry important information which may help to forecast the realized covariation. When we use only jumps to forecast realized covariance, the is relatively high. All the estimated parameters are significantly different from zero and the in-sample fits describe the data well. For reasons of space, we do not provide all the re-

sults here and we proceed to test the impact of further decomposition of the jumps into individual jump and co-jump components.

Table 3: Results for *RCt: R^2* for the Minzer-Zarnowitz regressions regressing ARFIMA forecasts of decomposed covariances.

	in-sample					
	W1	W2	W3	W4	W5	Jumps
GBP-CHF	0.788	0.777	0.749	0.742	0.736	0.593
GBP-EUR	0.864	0.864	0.844	0.829	0.830	0.715
CHF-EUR	0.805	0.796	0.766	0.757	0.755	0.510
	out-of-sample					
	W1	W2	W3	W4	W5	Jumps
GBP-CHF	0.377	0.391	0.384	0.231	0.208	0.134
GBP-EUR	0.394	0.385	0.335	0.276	0.339	0.187
CHF-EUR	0.451	0.449	0.445	0.261	0.322	0.277

Note: W j denotes JW T S CV j , j = 1, . . . , 5 components of realized covariance and Jumps all jumps including co-jumps and individual jumps.
Source: Author's computations.

6.3 Impact of Jumps and Co-jumps on the Covariance Forecasts

We would like to see if further decomposition to co-jumps and individual jumps can help to forecast the realized covariances. For this purpose, we construct an ARFIMA (1, *d*, 1) model for the jump and co-jump components of the realized covariance estimated using our methodology and test for the informational efficiency of each of them to the realized covariance forecast using the encompassing regression:

$$JWTSCV_{t+1} = \alpha + \beta_1 JWTSCV_t^{ARFIMA} + \beta_2 J_{co-jumps,t}^{ARFIMA} + \beta_3 J_{1,t}^{ARFIMA} + \beta_4 J_{2,t}^{ARFIMA} + \varepsilon_t, \quad (7)$$

where $JWTSCV_t^{ARFIMA}$ denotes the one-day ahead forecast of $JWTSCV_{t+1}$ and $J_{co-jumps,t}^{ARFIMA}$ denotes the forecast of co-jumps, while $J_{1,t}^{ARFIMA}$ and $J_{2,t}^{ARFIMA}$ denote the forecasts of individual jumps of both assets in the forecasted pair.

With the help of the encompassing regressions, we can test if jumps contain any information relevant to the covariation forecasts. We will first test the information content of $J_{co-jumps,t}^{ARFIMA}$, $J_{1,t}^{ARFIMA}$ and $J_{2,t}^{ARFIMA}$ separately by setting all other β s to zero. Then, we will add parameters to the regression, starting with α and β_1, and adding β_2, β_3 and β_4 gradually to see if they bring any information, which is not contained in the realized covariation forecast itself. If, for example, common jumps carry information important for the forecast, parameter β_2 will be significantly different from zero, even if parameter β_1 is significantly different from zero.

Table 4 summarizes the results for the realized covariances. Striking evidence of the significance of the co-jumps for the forecasts is found in all cases (in only two cases the parameter has p-values of 0.103 and 0.104, so we can consider it to be marginally significant at the 89% level of significance). The presence of co-jumps in the encompassing regression

also significantly improves the R^2 in comparison with the JWTSCV estimate. In the case of CHF-EUR pair, even presence of the EUR individual jumps improves the forecast of realized covariation.

To conclude, we have shown that the decomposition of the realized covariation into a continuous part and co-jumps using our wavelet-based methods can help improve the forecasting significantly. This result has strong economic implications for portfolio valuation as our theory helps to understand the dependencies deeper than standard econometric models.

Table 4: R from encompassing regression of ARFIMA on RC_t estimator JWTSCV, co-jumps (Jcom) and individual jumps (J1 and J2). p-values of estimated parameters in parentheses.

	const.	JWTSCV	Jcom	J1	J2	R2
GBP-CHF	**0.003**(0.000)		**1.342**(0.000)			0.118
	0.003(0.000)			0.677(0.174)		0.015
	0.005(0.000)				-0.286(0.409)	0.006
	0.001(0.002)	**0.722**(0.000)				0.402
	0.001(0.004)	**0.665**(0.000)	**0.608**(0.034)			0.424
	0.001(0.234)	**0.667**(0.000)	0.585(0.103)	0.052(0.913)		0.424
	0.001(0.262)	**0.664**(0.000)	0.586(0.104)	0.065(0.892)	-0.071(0.794)	0.424
	const.	JWTSCV	Jcom	J1	J2	R2
GBP-EUR	**0.004**(0.000)		**1.031**(0.000)			0.104
	0.004(0.000)			0.676(0.138)		0.018
	0.000(0.975)				**2.909**(0.000)	0.160
	0.001(0.000)	**0.694**(0.000)				0.402
	0.001(0.004)	**0.648**(0.000)	**0.627**(0.006)			0.439
	0.002(0.018)	**0.654**(0.000)	**0.697**(0.004)	-0.296(0.434)		0.442
	0.002(0.162)	**0.656**(0.000)	**0.703**(0.012)	-0.300(0.443)	-0.031(0.963)	0.442
	const.	JWTSCV	Jcom	J1	J2	R2
CHF-EUR	**0.003**(0.000)		**1.695**(0.000)			0.267
	0.006(0.000)			**-0.610**(0.054)		0.030
	0.005(0.000)				-0.217(0.696)	0.001
	0.001(0.016)	0.794(0.000)				0.468
	0.001(0.015)	0.670(0.000)	**0.615**(0.019)			0.491
	0.001(0.106)	0.666(0.000)	**0.614**(0.020)	-0.044(0.852)		0.491
	-0.000(0.951)	0.725(0.000)	**0.504**(0.056)	-0.191(0.432)	**0.932**(0.033)	0.511

Source: Author's computations.

6.4 Forecasting of Correlations

While co-jumps cause large bias in the covariance measures, individual jumps may cause bias to the correlation. Thus, we would like to complete our forecasting exercise by creating a forecasting model of the realized correlations, utilizing an ARFIMA (1, *d*, 1) model.

In the previous sections, we have shown that realized correlation estimated using a wavelet-based estimator is much smoother with lower confidence intervals than the correlation estimated using the standard realized variance and covariance measures. Thus we would like to see if our estimate carries better information for forecasting correlations. For this purpose, we again employ encompassing regression. This time, we will test the informational efficiency of each of the two measures. Moreover, we would like to see if decomposition of realized correlation generates any significant improvement. Thus we will forecast the decomposed correlations individually, and then compare the sum of the forecasts with the latter two estimates in the following way:

$$Corr_{t+1} = \alpha + \beta_1 RCorr_t^{ARFIMA} + \beta_2 WRCorr_t^{ARFIMA} + \beta_3 \sum_{i=1}^{5} WRCorr_{t,i}^{ARFIMA} + \varepsilon_t, \quad (8)$$

where $RCorr_t^{ARFIMA}$ denotes the one-day ahead forecast of correlation using the standard realized correlation, $WRCorr_t^{ARFIMA}$ denotes the forecast using wavelet-based correlation and $\sum_{i=1}^{5} WRCorr_{t,i}^{ARFIMA}$ denotes the sum of the individual forecasts of decomposed correlation using our wavelet estimator.

We also run individual regressions testing the forecasting power of the individual estimators:

$$Corr_{t+1}^{(m)} = \alpha + \beta_1 V_t^{(k)ARFIMA} + \varepsilon_t, \quad (9)$$

where $Corr_{t+1}^{(m)}$ is the realized correlation estimated using the *m*th estimator, and $V_t^{(k)ARFIMA}$ denotes the one-day ahead forecast of $Corr_{t+1}^{(m)}$ using the th estimator, while we consider the same three estimators, $RCorr_t^{ARFIMA}$, $WRCorr_t^{ARFIMA}$ and $\sum_{i=1}^{5} WRCorr_{t,i}^{ARFIMA} + \varepsilon_t$,.

Table 5 in Appendix A.5 summarizes the results of the individual regressions as well as the encompassing regressions for both the in-sample and the out-of-sample periods, which are the same as in the covariance forecasting exercise.

The results from the in-sample fits tell us that our WRCorr is a very efficient estimator for forecasting of realized correlations, as its coefficient is significantly different from zero but is not significantly different from 1, while the forecast is unbiased as the constant coefficient is not significantly different from zero, except in some cases. Moreover, the WRCorr forecasts also carry the highest R^2. The sum of the individual correlation forecasts do not seem to be as efficient as the WRCorr estimator and it also gives slightly biased results. The realized correlation also seems to be quite an efficient and unbiased estimator, even though its coefficient is rather higher than 1 in some cases. It still has the lowest R^2. When looking at the results from the encompassing regressions, we can see that the WRCorr estimator remains the only significant estimator in the regression. Its coefficient is slightly lower than 1, but the coefficients of the other two estimators are not significantly different

from zero. This means that these estimators do not generate any other significant information for the correlation forecasts.

When looking at the results for the out-of-sample period, which are much more important as these are the real forecasts, we still have a very similar picture. WRCorr is unaffected in the encompassing regressions, being the only significant estimator. In the individual regressions, the sum of the decomposed forecasts surprisingly seems to be the most efficient estimator, as its coefficient is closest to one, but it has a lower coefficient of determination, R^2, than the WRCorr estimator. To summarize the results from this section, we show that the wavelet-based estimator of the realized correlation is able to bring a significant improvement to the forecasting of correlation.

Conclusions

In this work, we present a new, wavelet-based realized covariation theory. We use wavelets to disentangle jumps from co-jumps, which is crucial in the study of multivariate dependencies. Having defined the estimators of variance and covariance, we also define the transformation of interest for portfolio theory: the wavelet-based realized correlation measure. The main contribution is in providing a new type of multivariate estimators in the time-frequency domain which are able to estimate the dependence of studied assets with highest precision and are unaffected by noise and jumps in the process. Moreover, our theory is able to disentangle jumps and co-jumps from the continuous part of the covariance.

We apply our multivariate theory to study the decomposition of integrated covariation and correlation on the currency markets. Here we note that the theory is able to decompose the realized measures into any arbitrary investment horizon, i.e., from one minute up to one month, when estimating monthly measures. In our analysis performed on forex data, we limit ourselves to illustrating the theory on the decomposition of daily realized measures. Specifically, we decompose the realized covariance and correlation into investment horizons of 5–10 minutes, 10–20 minutes, 20–40 minutes and 40–80 minutes, and the rest (80 minutes up to 1 day). The analysis uncovers interesting dynamics. Most of the action in the stock markets comes from higher frequencies. We find that on average, about 50% of the co-volatility of the forex markets examined is created on the 5–10 minute investment horizon, approximately 25% comes from the 10–20 minutes investment horizon, and only 12%, 7% and 6% correspond to the horizons of 20–40 minutes, 40–80 minutes and the rest (80 minutes up to 1 day), respectively. Note that by adding the contributions of the different investment horizons we always get 100%.

We also bring an important analysis of co-jumping of the currencies. We separate jumps, co-jumps and true covariation between the studied currencies. The results suggest that proper understanding of jumps and co-jumps in a multivariate setting is crucial for studying the dependencies. While individual jumps bring some bias to the covariance, co-jumps introduce large bias into the covariation measure. The impact on correlation is even more crucial. Individual jumps in the processes bring large downward bias to the correlation measure, while co-jumps introduce upward bias with a smaller magnitude.

Finally, we build a forecasting model for covariation and correlation based on wavelet decomposition. Our model outperforms simple realized correlation measure in-sample as well as out-of-sample. As the space of this paper is limited, we do not provide comparison to other methods, but the results can be found in *citation blinded*, where all estimators currently available in the literature are compared and our wavelet-based theory brings the best results. Interesting result is also that we found significant impact on the individual jumps as well as co-jumps on the covariance and correlation forecasts and we find that proper accounting for jumps and co-jumps bring significant improvement in the forecasting of covariance and correlation measures.

In conclusion, this work presents a new theoretical framework generalizing the popular concept of realized covariance. Our results have significant economic value, as a wrong assumption about the dependence process will have a direct impact on the portfolio valuation. The dynamics of the decomposed dependencies reveal interesting results. Our wavelet-based realized theory generates a more precise correlation measure with narrower confidence intervals than the standard realized correlations.

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Appendix A. Technical Part

Appendix A.1 Disentangling jumps from co-jumps

Fan and Wang (2007) first proposed the use of wavelets to estimate jumps in high-frequency data. In this part, we generalize this concept to a multivariate concept. We detect all jumps in the *m* assets separately using wavelet decomposition, and then we estimate the co-jumps. Let us define the procedure.

Definition 1 *Multivariate jump estimation using wavelets*
Let $\widetilde{\mathcal{W}}_{(q)1,k}$ be the 1st level wavelet coefficients of $(y_{(q)t})_{t\in[0,T]}$. If for some $\widetilde{\mathcal{W}}_{(q)1,k}$

$$|\widetilde{\mathcal{W}}_{(q)1,k}| > \frac{median\{|\widetilde{\mathcal{W}}_{(q)1,k}|,k=1,\ldots,n\}}{0.6745}\sqrt{2\log n}, \tag{A.1}$$

for $q = 1, \ldots, m$ assets, then $\hat{\tau}_{(q)l} = \{k\}$ is the estimated jump location with size $\bar{y}_{(q)\hat{\tau}_{l+}} - \bar{y}_{(q)\hat{\tau}_{l-}}$ (averages over $[\hat{\tau}_{(q)l}, \hat{\tau}_{(q)l} + \delta_n]$ and $[\hat{\tau}_{(q)l}, \hat{\tau}_{(q)l} - \delta_n]$, respectively, with $\delta_n > 0$ being the small neighborhood of the estimated jump location $\hat{\tau}_{(q)l} \pm \delta_n$; 0.6745 is a robust estimate of the standard deviation).
The jump variation of the -th asset is then estimated by the sum of the squares of all its estimated jump sizes:

$$\widehat{MWJC}_{(q)} = \sum_{l=1}^{N_t} (\bar{y}_{(q)\hat{\tau}_{l+}} - \bar{y}_{(q)\hat{\tau}_{l-}})^2. \tag{A.2}$$

Following the theory in Fan and Wang (2007), we can say that $\widehat{MWJC}_{(j)}$ will be a consistent estimator of the jumps for all assets in $\mathbf{p_t}$.

Proposition 1 *Consistency of multivariate wavelet jump estimator*
With

$$plim_{n\to\infty}\widehat{MWJC}_{(q)} = \sum_{l=1}^{N_t} J_{(q),l}^2, \tag{A.3}$$

with the convergence rate $N^{-1/4}$.

Once we have estimated all independent jumps in the studied $\mathbf{p_t}$ vector, we can propose an analysis of co-jumping in the series. The idea is to compare all the jump locations, and those which are the same across all $q = 1, \ldots, m$ assets in some small neighborhood will be co-jumps.

Definition 2 *Wavelet co-jump estimation*
Let $\hat{\tau}_{(q)l}$ be the estimated jump locations of $(y_{(q)t})_{t\in[0,T]}$ for all $q = 1, \ldots, m$ using Definition 1. Then co-jump location $\hat{\tau}_l^* = \{k\}$ can be estimated as:

$$\hat{\tau}_{(q)l} - \delta_n < \hat{\tau}_l^* < \hat{\tau}_{(q)l} + \delta_n, \quad forallq = 1, \ldots, m. \tag{A.4}$$

Co-jumps are particularly important in portfolio theory. For a well diversified large portfolio in the sense of the Arbitrage Pricing Theory, idiosyncratic jumps are diversified away, but common jumps, or co-jumps, remain a problem. Thus in the following subsection, we illustrate our technique on a portfolio multivariate extension.

Appendix A.2 Proof of WRC

The realized covariance for the *l*-th and *q*-th asset return from an *m*-dimensional vector $\mathbf{r}_{t,h}$over $[t-h,t]$, for $0 \le h \le t \le T$,, can be computed using Definition 1

$$\widehat{RC}_{(l,q)t,h} = \sum_{i=1}^{n} r_{(l)t-h+\left(\frac{i}{n}\right)h} r_{(q)t-h+\left(\frac{i}{n}\right)h}, \tag{A.5}$$

while estimator 1 is an unbiased and consistent estimator of realized covariance.
For a particular level *j* we define the realized wavelet covariance over $[t-h,t]$, for $0 \le h \le t \le T$, as the sample covariance between the MODWT wavelet coefficients at level *j*, hence we have:

$$WRCov_{(l,q)t,h,j} = \sum_{t=L_j-1}^{N-1} \widetilde{W}_{(l)j,t-h+\frac{k}{n}h} \widetilde{W}_{(q)j,t-h+\frac{k}{n}h}, \tag{A.6}$$

where we use the $M_j = N - L_j + 1 > 0$ wavelet coefficients at the *j*-th level for both processes which are unaffected by the boundary conditions.
In case $J \to \infty$, the realized covariance $\widehat{RC}_{(l,q)t,h}$ is simply the sum of all wavelet realized covariances:

$$RC_{(l,q)t,h} = \sum_{j=1}^{\infty} WRCov_{(l,q)j,t-h+\frac{k}{n}h}\,. \tag{A.7}$$

Since we have datasets of a finite length, the contribution of the realized covariation of the scaling coefficients is still relatively high (we cannot ignore it), so we use a similar approach as with the wavelet covariance, i.e., the realized wavelet covariance has two parts, the first one being the realized covariance of the MODWT scaling coefficients $\tilde{V}_{(l)t,h,J}$ and $\tilde{V}_{(q)t,h,J}$ at the maximum level of decomposition , and the second one being the sum of the realized wavelet covariances up to the maximum level . Thus, for the maximum level of decomposition $J \le log2(N)$we have:

$$\begin{aligned} RCOV_{(l,q)t,h} &= \sum_{t=L_j-1}^{N-1} \tilde{V}_{(l)J,t-h+\frac{k}{n}h} \tilde{V}_{(q)J,t-h+\frac{k}{n}h} + \sum_{j=1}^{J} \sum_{t=L_j-1}^{N-1} \widetilde{W}_{(l)j,t-h+\frac{k}{n}h} \widetilde{W}_{(q)j,t-h+\frac{k}{n}h} \\ &= \sum_{t=L_j-1}^{N-1} \tilde{V}_{(l)J,t-h+\frac{k}{n}h} \tilde{V}_{(q)J,t-h+\frac{k}{n}h} + \sum_{j=1}^{J} WRCov_{(lq)j,t-h+\frac{k}{n}h}, \end{aligned} \tag{A.8}$$

where for a specific level we use only the $M_j = N - L_j + 1 > 0$ MODWT wavelet or scaling coefficients unaffected by the boundary conditions.
Denoting by $\widetilde{\mathcal{W}}_{(q)j,k}$ the MODWT coefficients on scales $j = 1,..., J_s + 1$, which include both parts of the wavelet covariance, we have

$$\widehat{RC}^{(WRC)}_{(l,q)t,h} = \sum_{j=1}^{J_s+1} \sum_{k=1}^{n} \widetilde{\mathcal{W}}_{(l)j,t-h+\frac{k}{n}h} \widetilde{\mathcal{W}}_{(q)j,t-h+\frac{k}{n}h}, \tag{A.9}$$

where *n* is the number of intraday observations and J_s is the number of scales considered.
Finally, from the presented theory we know that the estimator $\widehat{RC}^{(WRC)}_{(l,q)t,h}$ will converge to the integrated covariation as

$$\widehat{RC}_{(l,q)t,h} = \sum_{i=1}^{n} r_{(l)t-h+\left(\frac{i}{n}\right)h} r_{(q)t-h+\left(\frac{i}{n}\right)h} = \sum_{j=1}^{J_s+1} \sum_{k=1}^{n} \widetilde{\mathcal{W}}_{(l)j,t-h+\frac{k}{n}h} \widetilde{\mathcal{W}}_{(q)j,t-h+\frac{k}{n}h} = \widehat{RC}_{(l,q)t,h}^{(WRC)}. \quad \text{(A.10)}$$

Thus, it is an unbiased estimator of integrated covariation:

$$E\left[RC_{(l,q)t,h}|\mathcal{F}_t\right] = E\left[\widehat{RC}_{(l,q)t,h}|\mathcal{F}_t\right] = E\left[\widehat{RC}_{(l,q)t,h}^{(WRC)}|\mathcal{F}_t\right]. \quad \text{(A.11)}$$

As the wavelet-based covariance estimator is in fact the sample covariance without $1/M_j$ adjustment, $plim_{n\to\infty}\widehat{RC}_{(l,q)t,h} = plim_{n\to\infty}\widehat{RC}_{(l,q)t,h}^{(WRC)} = \int_{t-h}^{t} \Sigma_{(l,q)s} ds$ and $\widehat{RC}_{(l,q)t,h}^{(WRC)^j}$ provides a consistent estimator with increasing sampling frequency $n \to \infty$.

Appendix A.3 Proof of JWTSCV

The construction of this proof is very similar to the univariate JWTSRV 1.3. As all the theory has been introduced, we just use it to produce a new estimator which combines these ideas. We summarize the logic here.

Generalizing the idea of Fan and Wang (2007), which can consistently estimate the jump variation part, we simply introduce the idea of an $\widehat{MWJC}$ estimator (Definition 1). Jumps estimated using this estimator enable us to work with jump-adjusted data, $\mathbf{y}_{\mathbf{t,h}}^{(J)} = \mathbf{y}t,h, -\widehat{\mathbf{MWJC}}$, in a multivariate setting.

We have shown that $\widehat{RC}_{(l,q)t,h}^{(WRC)}$ is able to estimate integrated covariance consistently.

Finally, we plug the wavelet decomposition of the jump-adjusted vector into the TSCV estimator (Zhang, 2011), which is able to estimate realized covariance in the presence of noise.

Appendix A.4 Details of the ARFIMA models for forecasting

If we assume that covariation series belong to the class of ARFIMA processes introduced into econometrics by Granger (1980) then the *d*th difference of each series is a stationary and invertible ARMA process where parameter *d* may be any real number such that -1/2 < *d* < 1/2to ensure stationarity and invertibility. More precisely, $\sigma_{(1)t}\sigma_{(2)t}$ is an ARFIMA (*p, d, q*)process if it follows:

$$\alpha(L)(1-L)^d(\sigma_{(1)t}\sigma_{(2)t} - \mu) = \beta(L)v_t, \quad \text{(A.12)}$$

where $\alpha(z) = 1 - \alpha_1 z - \cdots - \alpha_p z^p$ and $\beta(z) = 1 + \beta_1 z + \cdots + \beta_q z^q$ are polynomials of order *p* and *q*, respectively, in the lag operator $L(L\sigma_{(1)t}\sigma_{(2)t} = \sigma_{(1)t-1}\sigma_{(2)t-1})$, which roots strictly outside the unit circle, v_t is *iid* with zero mean and σ_v^2 variance, and (1 - *L*)^d is defined by its defined by its binomial expansion

$$(1-L)^d = \sum_{j=0}^{\infty} \frac{\Gamma(j-d)}{\Gamma(-d)\Gamma(j+1)} L^j, \tag{A.13}$$

using gamma function, Γ(.).

The parameter *d* determines the memory of the process. For *d > 0*, the process is said to have long memory, since its autocorrelations die out at a hyperbolic rate and are no longer absolutely summable, in contrast to the much faster exponential rate in the weak dependence case of *d = 0*, where the process captures the behavior of the short-memory ARMA model.

Once we have estimated the ARFIMA (*p, d, q*) model with the maximum likelihood estimator, forecasting is carried out by extrapolating the estimated model. As in the univariate counterpart, we estimate a simple ARFIMA (*1, d, 1*) model on both the realized covariation and its logarithmic transform.

Appendix A.5

Table 5: R^2 M-Z regression of ARFIMA on Correlations. RCorr denotes realized correlation estimate, WRCorr wavelet-based realized correlation and WRCorr sum of individual forecasts of decomposed correlation. p-values of estimated parameters in parentheses.

GBP-CHF

	in-sample					out-of-sample				
	const.	RCorr	WRCorr	WRCorr	R2	const.	RCorr	WRCorr	WRCorr	R2
RCorr	-0.02(0.47)	**1.04**(0.00)			0.33	0.04(0.46)	**0.83**(0.00)			0.22
WRCorr	-0.00(0.92)		**1.01**(0.00)		0.42	0.04(0.42)		**0.85**(0.00)		0.26
WRCorr	**-0.08**(0.00)			**1.16**(0.00)	0.41	-0.02(0.78)			**0.98**(0.00)	0.24
WRCorr	-0.02(0.55)	0.13(0.29)	**0.91**(0.00)		0.42	0.03(0.63)	0.29(0.40)	**0.61**(0.05)		0.27
WRCorr	0.01(0.76)	0.21(0.14)	**1.17**(0.00)	-0.38(0.21)	0.43	0.09(0.30)	0.44(0.25)	**1.14**(0.07)	-0.79(0.32)	0.27

GBP-EUR

	in-sample					out-of-sample				
	const.	RCorr	WRCorr	WRCorr	R2	const.	RCorr	WRCorr	WRCorr	R2
RCorr	-0.04(0.26)	**1.07**(0.00)			0.28	0.12(0.44)	**0.80**(0.00)			0.08
WRCorr	-0.01(0.75)		**1.02**(0.00)		0.36	**0.23**(0.06)		**0.62**(0.00)		0.07
WRCorr	**-0.20**(0.00)			**1.31**(0.00)	0.33	0.09(0.66)			**0.86**(0.01)	0.06
WRCorr	-0.02(0.64)	0.04(0.72)	**0.99**(0.00)		0.36	-0.05(0.80)	0.13(0.67)	**0.96**(0.03)		0.11
WRCorr	-0.00(0.93)	0.07(0.63)	**1.03**(0.00)	-0.08(0.74)	0.36	0.07(0.79)	0.43(0.48)	**0.97**(0.03)	-0.51(0.57)	0.11

CHF-EUR

	in-sample					out-of-sample				
	const.	RCorr	WRCorr	WRCorr	R2	const.	RCorr	WRCorr	WRCorr	R2
RCorr	-0.00(0.92)	**1.00**(0.00)			0.50	0.06(0.29)	**0.86**(0.00)			0.38
WRCorr	0.00(0.93)		**1.00**(0.00)		0.56	0.08(0.17)		**0.85**(0.00)		0.41
WRCorr	**-0.16**(0.00)			**1.20**(0.00)	0.51	0.02(0.78)			**0.90**(0.00)	0.34
WRCorr	-0.00(0.94)	0.08(0.33)	**0.93**(0.00)		0.57	-0.03(0.64)	0.08(0.77)	**0.96**(0.00)		0.46
WRCorr	0.03(0.36)	0.12(0.18)	**1.04**(0.00)	-0.19(0.19)	0.57	0.00(0.96)	0.28(0.48)	**0.93**(0.00)	-0.22(0.50)	0.46

Source: Author's computations.

Current Changes in the Role of the Insurance Sector

Současné změny v postavení odvětví pojišťovnictví

JAROSLAV DAŇHEL, EVA DUCHÁČKOVÁ

Abstract

The authors analyze changes resulting from impacts of the globalization process and the crisis on the financial markets, particularly on the conservative insurance sector, which is forced to accelerate the dynamics of structural changes. The adequacy of the current regulatory measures for the financial/banking markets, and the insurance sector in particular, is discussed, together with the consequences of implementing measures aimed at consumer protection/anti-discrimination measures, including the search for balance between higher internal stability and client safety on the one side, and efficiency of insurance for clients and effectiveness of the activity itself on the other side. Furthermore, the article addresses current internal problems of the sector. An opinion is expressed in conclusion that the insurance sector has potential to remain a stable sector, in spite of the outlined problems.

Keywords

financial, economic and debt crisis, financial markets, insurance sector, regulatory projects, risk based approach/risk management, new architecture of the financial market regulation, consumer protection, anti-discrimination measures

JEL Codes

A 110, B 410, G 010, G 200, G 210, G 220, G 280, G 290, D 690, K 290

Abstrakt

Autoři analyzují změny z dopadů procesu globalizace a projevů krize na finanční trhy a zejména na konzervativní odvětví pojišťovnictví, které je nuceno k rychlejší dynamice strukturálních změn. Diskutována je adekvátnost aktuálních regulačních opatření pro finanční potažmo bankovní trhy a pojišťovnictví zvláště, důsledky zavádění opatření na ochranu spotřebitele a antidiskriminačních opatření včetně hledání polohy mezi vyšší vnitřní stabilitou a klientskou bezpečností na straně jedné a účinností pojištění pro klienty a efektivností své činnosti na straně druhé. Diskutovány jsou i současné vnitřní problémy odvětví. V závěru je vysloven názor, že pojišťovnictví, přes naznačené problémy, má potenciál zůstat stabilním odvětvím.

Klíčová slova

finanční, ekonomická a dluhová krize, finanční trhy, odvětví pojišťovnictví, regulatorní projekty, řízení rizika, nová architektura regulace finančních trhů, ochrana spotřebitele, antidiskriminační opatření

Introduction

Throughout the modern history, the insurance market has appeared to be the most stable segment of the financial markets in the long term. This repeatedly historically-proven fact is given partly by the strong, generally applicable motivation to take out insurance coverage in order to maintain financial stability of economic entities or their close relatives in case of adverse incidents, partly by the strongly conservative nature of financial interactions carried out by the insurance sector on financial markets. Nevertheless, the current global problems characterized by high volatility of economic indicators, increased risk level, and negative selection, particularly on financial markets, have also started to undermine, to a certain degree, the stability of the insurance sector within the overall changes in the role of individual financial market segments.

The objective of this article is to analytically summarize the latest changes experienced by the global insurance sector in the past decade as a result of the financial and economic crisis and resulting inclination to more intensive government regulation on the one part and internal problems of the sector on the other part. These significant changes are apparent on the Czech insurance market as well, as it had to deal with the declining value of assets held by commercial insurance companies during the critical period and still has to cope with supranational regulation imposed by the Brussels' administration that impairs the effectiveness of the sector. A separate problem area is the occurrence of tariff imbalance resulting from the price war within the national insurance market as well as certain deformation of mediated sales of insurance products. The article also indicates predictions of further development on insurance markets.

1 Current State of the Financial Markets

The financial market has undergone the most significant changes as a result of the intensive globalization process in the last two decades and due to the financial, economic, and debt crisis of the past decade. Of all market segments, it has lost the most of the markets' natural ability to restore balance after deviations, thus becoming highly autonomous with significant virtual features, a financial cycle has broken away from the real economy cycle, and based on these new properties thus becoming – as essentially confirmed by the latest crisis – a major threat for the real economy, instead of its original function of serving the real economy.

In addition to the traditional general causes that established the environment for the crisis outbreak, i.e. overheating global economy due to a boom and massive credit expansion and associated overconsumption within the "welfare state" ideology, there were particularly specific causes of the crisis that resulted in the fact the first stage of the crisis, unlike the previous cycles, mainly took place on financial markets, i.e. did not start as the state of the real economy.[1] Innovative financial instruments and failures of rating agencies added to the highly imbalanced, virtual environment as a breeding ground for radical solutions aimed at passing through the severe crisis.

1 *In more detail, see Daňhel, J.; Ducháčková, E. (2010), pp. 17-29.*

The existing utilitarian model of capitalism has also significantly contributed to the onset of the crisis, as it causes historically unprecedented income polarization and views money as the final goal of economic interactions.[2] In this regard, it is necessary to add that the contemporary economic science – striving for higher level of exactness and rigorousness under the influence of excessive implementation of math as a non-dialectic scientific discipline – leaves ethics aside from the focus of the mainstream economists, thereby contributing to the creation of speculative and often incorrect economic environment with uncontrolled prevalence of negative selection and moral hazard. The resulting enormous income polarization then impairs political stability, social peace, and unfolds questions regarding the ability of a democratic society to efficiently face tendencies to speculative and corrupt economic environment.

Although the first stage of resolving the financial crisis through massive fiscalization of losses of private institutions with the use of public finance prevented the seriously imminent collapse of the global financial system, the solution infected the public finance of the leading global economies; the negative aspects of such solution comprise the intensification of the third stage of the crisis (i.e. debt crisis) that may no longer be resolved by further fiscalization due to its scope, and also the fact that the measures aimed at preventing the financial markets default were financially purposeful – i.e. they were not aimed at starting the real economy towards growth.

The cross-sectoral integration and implementation trends, which commenced in the Nineties in respect of regulatory projects that initially seemed effective, were considered to be the instruments for sustaining the economically favorable period of "great moderation" with high economic growth, low volatility of economic figures and low level of risk of economic interactions at the turn of the millennium. However, they have been recently undergoing a serious revision process, as they have not succeeded in fulfilling their role.

The cross-sectoral integration, which first appeared to be the strategy for the future, had apparently already peaked. The crisis has revealed some of its weaknesses – namely substantial differences in the consequences of crisis symptoms in respect of the economic results of individual financial services sectors; the highest differences developed within the most important institutional segments of the financial market: banks on the one side and insurance companies on the other. The crisis has also partially disputed the strategy of dominance of multifunctional financial conglomerates on financial markets. It has been proven that markets with relatively lower rate of concentration faired held up better during the crisis; similarly, medium-sized corporations did better than giants. The cross-sectoral integration seems to be working well in times favorable for the economy – i.e. in the period of the upper amplitude of economic cycles; during downturns, negatives stand out, i.e. the consequences of differences in the business models of individual financial services sectors, namely banks and insurance companies. However, it is necessary to add that the capitally strong "bancassurance" companies that were not significantly exposed to toxic assets overcame the crisis relatively without problems (e.g. BNP Paribas, HSBC, and Crédit Agricole); in principle, the aforementioned statement also applies to bancassurance companies on the Czech insurance market.

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2 In more detail, see Daňhel, J.; Ducháčková, E. (2010), pp. 17-29, and MLČOCH (2010).

The inability (proven by the financial crisis) of regulatory projects and specific risk management models to deal with exceptional or unlikely events produces the need for their revision and modernization. As mentioned above, this mainly applies to specific causes of the crisis: prevention of evasion with regard to the necessary conservative regulation by means of innovative speculative financial instruments as well as the modernization of the method of assessing the standing of financial institutions and financial instruments in general. The internal consistency of regulatory projects for individual financial markets segment on the basis of the so-called "risk-based approach", relying on mathematical models, also continues to be a serious problem.

2 Current State of the Global Insurance Sector

The role and position of the insurance sector in the current global world has been significantly changing at the beginning of the second decade of the new millennium, within the environment of persisting debt crisis. The past century was characterized by rather harmonious development of the global and national insurance markets – in general, individual regional markets functioned separately, they were nationally oriented and protected by legislation. The traditional conservative protectionist markets were only minimally affected by the rather strongly volatile conduct of other segments within the financial markets in the past century; a price paid for the aforementioned continuous development was the stagnating effectiveness of the insurance sector during the past several decades.

Global processes, integration and product convergence, declining significance of geographic borders separating national insurance markets, liberalization of economic interactions, fading borders between individual segments of financial markets, etc. – all these factors have been forming new environment for the insurance sector that is subject to fierce competition and forced to higher dynamics of structural changes in the light of the global developments. The historically conservative insurance sector is asked – namely on the basis of a political dictate – for further transfer of risks, such as, for example, insurance coverage of environmental damages or IT failures, etc. This is passed off as new challenges for the insurance sectors aimed at dynamic reactions. We believe the traditional transfers of insurable risks – namely of natural disasters – also define barriers of the commercial operation of the insurance sector to such extent that the assumption of other insurance coverage risks does not seem to be realistic and/or effective in terms of insurance efficiency.

Signs of vulnerability of modern technologies associated with various natural disasters have recently been the catalyzer of the scope of damage to health, lives, and destruction of material assets, including infrastructure. One example: failure of nuclear technology arising in connection with the consequences of the devastating earthquake and resulting tsunami in one of the technologically most advanced countries in the world – Japan. The disaster was virtually immediately reflected in the financial markets weakened by the crisis – namely in terms of the falling stock prices for insurance/reinsurance companies with exposure in the given geographic area.

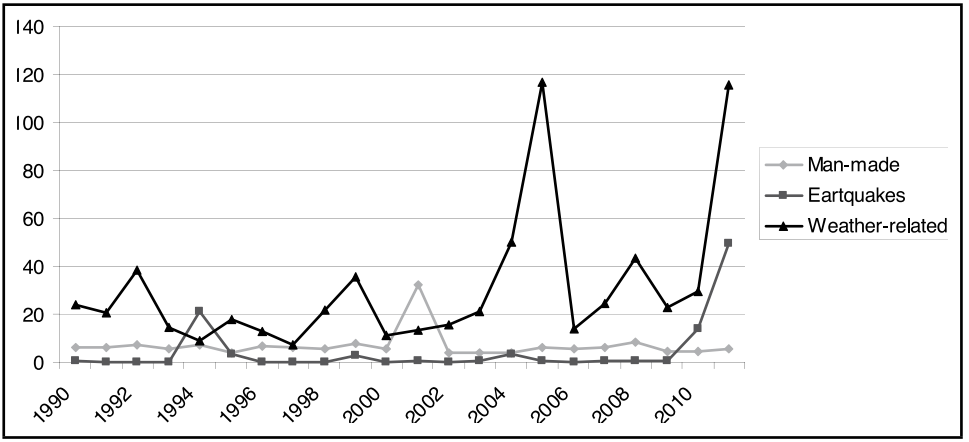
The "unchained" contingency in the form of natural disasters – with progressively increasing scope compared to the existing experiences – shows itself especially vigorously in this regard, with natural disasters of unprecedented dimensions, with indirect damage caused by radioactivity from a damaged nuclear power plant in Japan. It is a paradox that following the Chernobyl nuclear disaster (i.e. in 1980s already), specialized press discussed a question whether a technology as dangerous as production of nuclear energy should not have a failure probability of zero prior to being launched. Therefore, it is also logical that, following the nuclear disaster in Japan – i.e. something no one would expect in such a technologically advanced country, there is a worldwide campaign aimed at banning nuclear technology. However, the requirement for zero probability of contingencies with catastrophic consequences cannot be fulfilled in today's complex global world. Just remember the overly expressive pictures of the demolished World Trade Center buildings in New York with a caption below the photograph reading "an event with a zero probability prior to 11 September".

The earthquake in Japan shows how difficult it is for insurers to estimate the scope of catastrophic risks relying on probability based on historical data. Indemnification payments amounted to 1 134 billion yen, with the previously highest indemnification of mere 78 billion yen for the 1995 earthquake[3]. The high progression in the amount of damages, though not this intense, is also apparent for the consequences of American hurricanes (see Figure 1 Insured damages from global perspective). Situations symbolized by the Japanese earthquake in 2011 or Hurricane Katrina in 2005 virtually refute the application of inductive method for analyzing future contingencies, in other words: existing statistical data and posterior probabilities relying on and depicting past conditions of incident catastrophes cannot used to forecast future using exact (scientific) methods at the current knowledge level.

In this regard, it is a new relevant fact for the commercial insurance sector that this concerns significant changes in the quality of risks, which had traditionally been subject to insurance, and insurance markets had absorbed such contingencies without any major problems (until recently). The current effort aimed at resolving the impact of changes in the nature of insured risks due to catastrophic events comprises several problem areas: need to react to the trend of increasing financial funds necessary to eliminate the catastrophic damages from the perspective of the insurance sector economy; enhancement of stability and client safety of the sector as part of the financial markets suffering from crisis symptoms. However, the cardinal problem is the location of additional financing sources to cover the consequences of disasters in excess of the scope that may be resolved by commercial insurance.

3 *BLABLA, J. (2012).*

Figure 1: Insured damages as a result of disasters[4] from global perspective (in bn. USD)



Source: Bevere, L., Enz, R., Mehlhorn, J. (2012), p. 7.

However, in addition to the catastrophic contingency, the present-day insurance sector also has to deal with subjective human preferences and aversions. Research shows that people are afraid of incorrect "improbable" events in connection with the problem of arranging insurance/ignoring potential adverse effects of contingencies. Heuristics, cognitive psychologists Kahneman and Tversky[5] studied the structure of insurance taken out, concluding that people neglect strongly improbable events when inquiring after insurance. The researches called this effect, which contradicts the primary role of insurance – i.e. to maintain financial continuity in the course of events that impair an entity's financial stability, "preference against small but probable losses" – to the detriment of the less probable but more substantial losses. When preparing prognoses, people generally tend to disregard extreme values and their negative consequences (Kahneman states that we are not usually inclined to risk out of courage, but rather due to lack of knowledge or blindness regarding the real probability of catastrophic events[6]).

On the other hand, insurers mostly fear the so-called unknown unknowns, which have not occurred in the past – i.e. there are no past probabilities available and it is not possible to apply formalization using mathematic models to them; however, their consequences often correspond to the consequences of the usually insured risks. Take the example of the American 9/11: this type of terrorist attack was an absolutely new phenomenon; however, not so its consequences: fire, explosion, collapse of buildings. Therefore, the problem is that if insurers failed to declare in advance that their insurance does not cover fire, explosion, etc. if resulting from an act of terrorism, they must bear the subsequent damages.

4 *Swiss Re defines catastrophe for 2011 by the amount of the total damages/insured damages from or total number of casualties of 20.*

5 *Kahneman, D.; Tversky, A.; Slovic P. (1982).*

6 *Kahneman, D.; Tversky, A.; Slovic P. (1982).*

3 Impact of the Financial and Economic Crisis on the Insurance Sector

The traditionally conservative insurance sector was not immediately affected; however, naturally, it was not immune to serious problems of other segments of the financial markets. Therefore, though the immediate effects of the crisis on the global/national insurance markets were not as fatal as in case of the banking sector, the insurance sector has been affected in certain regards. The most significant case immediately prior to the crisis outbreak was the AIG insurance company – standing on the verge of bankruptcy – that provided insurance coverage of securitized innovative instruments CDS. AIG eventually had to be bailed out through fiscalization of losses using public finance. Specialized insurance companies providing financial guarantees (so-called monoliners) experienced overwhelming problems at the moment the credit ratings of securities issuers were lowered; their business model – relying on undiversified, highly speculative portfolio and, as such, significantly different from the conservative technical model of traditional insurance companies - failed completely.

Allianz and Aegon (the insurance company had to receive financial aid from public finance) experienced substantial losses of asset value, namely due to writing off the bonds of the bankrupt bank Lehman Brothers or overexposure to Iceland's banks that had the highest ratings possible prior to the crisis. British group Lloyds had severe problems as well: the bank, in which it had deposited its reserves, was severely endangered; however, it eventually received government aid at the end. Insurance companies, which were involved in the area of investment banking and underestimated the risks of financial instruments and which insufficiently diversified their investments, were affected the most (Yamato Life, Japanese insurance company, even became bankrupt as a result of insufficient portfolio diversification). The losses of insurance companies were also reflected in the negative results of several prominent reinsurance companies, including but not limited to Swiss Re (2008 results: -864 million CHF) or the German Hannover (-134 million EUR)[7].

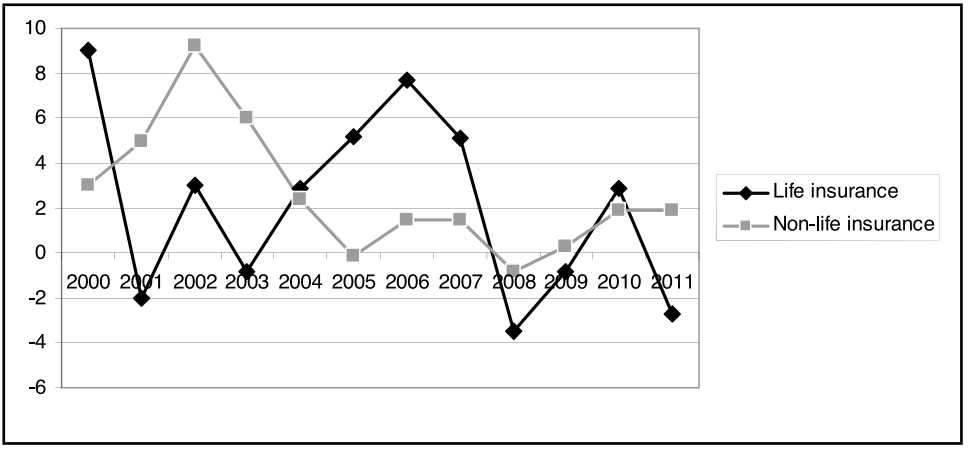
In reaction to the crisis and knowing which activities generated the highest losses during the crisis, insurance companies reduced their noninsurance operations, which were lately becoming more important within the globalization process, cross-sectoral integration, and product convergence. This does not mean insurance companies abandoned them in general, but they have started to return to their "core" business more rigorously and much more cautiously than before the crisis. When assuming the transfer of risks from their clients, insurance companies have started assessing such risks much more carefully, increasing their reserves, while accommodating their clients' requests more by modernizing and improving the quality of products offered. On the other hand, the efficiency of insurance is being impaired by the frequently implemented insurance indemnification limits and insurance exclusions. A separate problem area is the current effort of commercial insurance companies to specify the insurance premium calculations closer to the assumed risk: on the one side, it is possible to trace tendency to an increase of insurance premium tariffs; on the other hand, recession of the real economy further contributes to increasing competition and more tense relations among economic entities. The market pressures push the insurance premium tariffs down – even to or below the adequacy level

7 Horáčková, J. (2011).

in some cases. To give an example: problematic development of the third party motor vehicle insurance in the Czech Republic and Slovakia.

Figure 2 documents changes in the development on global insurance markets by the fact that individual factors affecting the development are reflected differently in the life/non-life insurance market segment.

Figure 2: Real year-to-year change of insurance premiums underwritten from the global perspective (%)



Source: Fann, I.; Seller, T.; Stalb, D.(2012), p. 33.

4 Impact of Enhanced Regulation

It has already been stated that, in general, the financial and economic crisis did not dramatically affect the global and/or national insurance markets; however, there are currently strong political ambitions apparent in developed economies and integration bodies (including the EU), aimed at intensifying the regulation imposed on financial markets and "punishing" the parties guilty of the crisis outbreak, namely bankers[8], all this without prior efficiency analysis of such conduct. This "Friedmanistic" improvisation of bureaucracy also strongly affects the insurance sector. Strict regulatory measures are being designed against hypothetical culprits of the crisis, namely against banks and rating agencies, which should prevent another crisis amplitude. In addition to the already imposed regulation on the bankers' remunerations, regulation of rating agencies and hedge funds, etc., another "legislative tornado" is expected to come from Brussels in this regard. Higher level of regulation (in various stages of preparation and implementation) is being prepared for OTC derivatives, central depositories, audit, and the so-called shadow banking, which also comprises leasing companies.

At the G-20 summit, which took place in Cannes at the beginning of November 2011, a list of 29 systemically important financial institutions (banks) was created, the bankruptcy of which would – according to the list authors – substantially impair the entire global

8 *In more detail, see Mandel, M.; Tomšík V. (2011), p. 61.*

financial system. According to the authors, these "too big to fail" banks will have to adopt more stringent regulatory rules and provide regular semi-annual reporting in exchange for the guarantee of a government aid in case of a risk of default. It is somewhat interesting that the list of selected banks does not include the largest bank in the world according to market capitalization – the Chinese Industrial and Commercial Bank of China, as it is not systemically important according to the Financial Stability Board (FSB). Conversely, Dexia, a Belgian bank that passed the EU-wide (?!) stress testing in summer of 2011 only to experience significant problems in October, being saved from default by financial injections, is firmly among the selected banks. The list does not comprise any institutions other than banks; the fact the list does not include any of the important insurance companies (in spite of the original presumptions) apparently documents that the insurance business is considered, historically and traditionally, to be more conservative than banks even in the present hectic times.

However, the insurance business will be most significantly affected by the continuation of the Solvency II regulatory project, International Financial Reporting Standards 4 (IFRS 4) application, and guarantee scheme within the insurance sector. Add to the list the fact that new central Pan European authorities were created within the process of forming architectures of supervision over the financial markets, with extensive rights vested but no liability; consequently, the insurance sector will have to accept these changes.

The legislative tornado comprising new regulation, which is currently being implemented on both international and local level, represents the most significant risks insurance companies are currently facing. This is apparent from the outcome of the latest "Insurance Banana Skins"[9] study, which has been traditionally performed by the Centre for the Study of Financial Innovations in cooperation with the audit firm PwC. New rules the government use to increasingly regulate capital adequacy or market conduct of insurance companies may enormously increase the sector-specific costs and paralyze the ability of individual companies to meet such regulatory requirements. This may also distract insurance companies' managements from much more important tasks – i.e. from restoring profit-generating activities in a situation, when the sector that is known for stagnating productivity on a long-term basis is under significant pressure. In addition to the continuation of the Solvency II project, which leads to great concerns on the part of professionals and insurance company managers, the research has also identified another swelling agenda for insurance companies, such as new international financial reporting standards or various new tax and regulatory requirements. Furthermore, managers taking part in the research often quote problems regarding the availability of capital that might be needed by insurance companies as a result of more stringent regulatory requirements for capital adequacy as

9 *The list of the highest risks for the insurance companies according to Insurance Banana Skins 2011: (with 2010 results in parentheses): 1. Regulation (5); 2. Availability of capital (3); 3. Macroeconomic trends (4); 4. Return on investments (1); 5. Natural disasters (22); 6. Availability of key talents (-); 7. Liabilities arising from damages reported late (10); 8. Corporate governance (17); 9. Distribution channels (16); 10. Interest rates (11); 11. Political risks (18); 12. Premises of actuarial models (9); 13. Cost management (14); 14. Quality management (13); 15. Risk management (6); 16. Reputation of the insurance sector (15); 17. Back office quality (24); 18. Retail practices (25); 19. Comprehensive financial instruments (8); 20. Climatic changes (28); 21. Reinsurance (20); 22. Insurance frauds (23); 23. Terrorism (26); 24. Development of new products (29), etc.*

well as due to the still uncertain prognosis of the direction the volatile financial markets might take. All these factors represent additional pressures on the sector, which is – even now – decimated by low rates and increasing competition.

The 2012 ranking of risks was also affected by the enormous financial consequences of the natural disasters in New Zealand and particularly in Japan, events in the Arab world, and problems of the euro area, which also contributed to the perception of political risks. The new HR issue is the concern about sufficient number of professionals with adequate capabilities and skills, which emerged as the main theme in all regions. Disregarding the frequency of floods, bomb attacks or oil disasters in the recent years, concerns about climatic changes, terrorism, and pollution remain relatively low. Insurance company executives believe these factors, which can be controlled through management, present considerably lower risk to the insurance sector than regulatory changes. It is not necessary to add anything else.

5 Discussing Efficiency of the Regulatory Schemes Being Implemented, Namely of Solvency II

We believe the continuation of the Solvency II project implementation within the insurance sector (implementation postponed to 2015) without necessary modifications and modernization will further intensify pending problems signalized by theoreticians and insurance companies themselves: this namely concerns higher capital requirements in relation to insured risks. We particularly object to the fact the Solvency model only works with past probabilities of events that have already occurred and is not able to (and cannot) anticipate future qualitative changes in the nature of insured risks or completely new risks emerging. These unknown unknowns feared by insurance companies cannot have a prior probability, as they are not even included in the past probability quantities of the probability calculation discipline, represent future state of the world and, so far, no actuary has been able to take previous conditions, under which past claims occurred, as well as the characteristics probabilities for such claims and predict the future. One of the basic methodological paradoxes applies to the calculation of such unknown events – how to make the future (i.e. future claims) the subject of scientific research, even though it does not exist yet. Models for insurance premium tariffs in the area of insurance technical risk of changes, including the unknown unknowns, require invention and subjective empathy regarding the future conditions on the part of a calculating actuary. Consequently, it is not possible to task mathematics to resolve such economic problems, as it cannot manage this as a non-dialectic scientific discipline; therefore, even the implementation of the mathematical models from the Solvency II arsenal will not be able to precisely anticipate the problem concerning future changes of conditions for claims.

Another objection of experts, which we endorse, relates to the fact mathematical models for capital requirements work better for homogenous insurance samples. Consequently, if insurance companies wish to use such approaches more effectively for determining the capital adequacy requirements (even stricter under the second stage of the Solvency project), they must homogenize, as much as possible, the insurance policy portfolios. Higher homogeneity may be achieved by "trimming" claims through strict exclusions within the insurance terms, imposing maximum insurance indemnification limits, etc.;

this may eventually be considered as significant reduction of the insurance coverage efficiency. In the light of these circumstances, we feel the initiative of reinsurance brokers[10] aimed at detailed and exact, as much as possible, modeling of natural risks is somewhat problematic: the most important part of (above-limit) damages will not be covered by insurance/reinsurance companies as a result of imposing insurance indemnification limits and insurance exclusions in order to comply with capital requirements. It will still be necessary to find alternative methods of transferring such risks for this important part of financial consequences of various catastrophes not covered by commercial insurance, due to their multi-source or multi-layer coverage. The problem of tightening capital requirements coupled with the necessary increase in costs of relatively detailed transparent reporting under the third pillar of the project may result in the risk for the business profitability of smaller insurance companies.

The internal inconsistency of regulatory projects for individual segments of the financial services is further increasing, including cross-sectional projects. The given outputs document the clear autonomy of authors within individual regulatory areas: the preparation of implementation of the second stage of IFRS 4, which is to significantly affect accounting practices for life insurance in particular (e.g. rigorous separate reporting of investment life insurance), unify valuation of insurance liabilities, cancellation of accruals and deferrals in respect of indirect acquisition costs, etc., is absolutely inconsistent (if not controversial in some cases) with the reporting requirements under the third pillar of the Solvency II project. It is clear that individual regulatory projects have taken on a life of their own, which does not really regard the needs of real business and real economic life and, it seems, does not even regard the common sense requirements in some cases.

6 Other Regulatory Schemes under Preparation

Measures of the European Commission aimed at higher protection of financial services consumers are likely to increase inherent costs of the insurance operations in Member States of the EU. Although the guarantee schemes for insurance services are going to further increase stability of insurance markets and client safety, it is debatable whether or not this exceeds reasonable limit. In order to reduce the likelihood of default of financial institutions and promote the protection of financial services consumers, capital and other guarantee requirements imposed on insurance companies within the application of mathematical models are further increased, resulting in higher costs for insurance companies. Since insurance companies are not prone to sudden runs, for example, funds invested in guarantee schemes do not seem to be adequate to expected benefits.

Furthermore, insurance professionals with many years of experience do not consider reasonable the discussion about the possibility to "return" nonlife insurance policy during a trial period and whether or not the automatic annual renewal of insurance coverage is an unfair competition practice, etc. All these measures may consequently seem to be factors adversely affecting the sector efficiency; this is all the more problematic, because specialized studies suggest, as already mentioned, that the productivity of the insurance sector has been stagnating (if not declining) in the past decades. Although the insurance

10 Materials from the 4th Guy Carpenter CEE Seminar in Prague, 27 March 2012.

sector did not suffer any fatal losses as a result of the crisis and, generally speaking, held up during the crisis, the nearest future may be complicated for the sector in some regards. The number of uninsured prospective clients is decreasing and insurance companies will thus have to resort to fierce competition practices in order to gain higher market share.

Another example of attempt at bureaucratic reregulation on the part of EU is the final judgment of the Court of Justice of the European Union (March 2011), according to which the consideration of gender as a risk factor in providing insurance services (namely in terms of life insurance products) is discriminatory.[11] We believe the fact that the process preceding the implementation of unisex tariffs did not reflect the idea the distinguishing of gender in insurance calculations is unfair, but rather that the existence of similar legislation endangers one of the moral principles of the Union functioning, is symptomatic. As a result of this decision, nationals may take out life insurance in countries, where (insurance) technical principals are not restricted and which offer lower insurance premiums; consequently, this may lead to efflux of insured persons from the common European insurance market. In all these contexts, it seems almost unbelievable the EU plans other "anti-discrimination" measures that would forbid the consideration of age and/or health. Such approach that opposes common sense would result in the extinction of certain traditional and historically proven products offered by commercial insurance companies.

Effectiveness of financial institutions, high client safety, and moral hazard/negative selection form the magical triangle, all three vertices of which cannot be reached at the same time. It is easier to achieve high effectiveness of insurance companies within a society with certain level of ethics. Conversely, in case it is necessary to increase pressure on client safety and reduce prevalence of moral hazard/negative selection through government regulation within a unethical environment, it may result in a situation, where the regulatory measures go against the insurance business itself (and, unfortunately, sometimes also against common sense), with high costs of such regulation and, consequently, adverse impact on the economy. It is becoming evident that the reaching of the magical triangle vertices comprising higher level of client safety and prevention of moral hazard/adverse selection will always be achieved at the expenses of the third vertex, i.e. effectiveness of financial institutions – specifically of insurance companies. Furthermore, we also believe that more extensive regulation does not translate into its higher quality and may not prevent reoccurrence of defaulting financial institutions in the future. Innovative risk embracing conduct of investors and thus creation of brand new types of instruments/formation of price bubbles during optimistic investor period, when financial institutions particularly underestimate credit risks, can hardly be ruled out for the future.

7 Selected Other Factors of Changes in the Role of the Insurance Sector

One of the other problem areas is the relation of insurance companies and various brokers/middlemen, which is far from idyllic at the turn of the second decade. The same applies to mutual relations of the brokers themselves. Therefore, it is not surprising that insurance sector representatives are concerned about the work practices of some brokers/

11 In more detail, see Čechová, J., Přikryl, V. (2012).

middlemen, especially in the area of life insurance. The motivation of brokers/middlemen, who work on commission basis, is not always identical with the objectives of an insurance company or client. Furthermore, the brokers/middlemen often act as financial advisors. Therefore, they are in a position to significantly affect the clients' decision, which may not always have to correspond with their interests. Just to provide an example: a new phenomenon may be encountered on the market – renegotiation of existing insurance policies in order to collect a substantial commission again. Life insurance policies cease to be profitable for insurance companies, which will eventually be reflected on clients. This practice has more or less been "customary" in the area of insurance for businesses; however, in case of life insurance, it is a new, strongly negative factor going against the very substance of life insurance – the longer clients remain with the system, under which their individual insurance reserve is valuated, the more beneficial life insurance policies are for clients.

Climate changes may also represent another problematic factor for the future insurance sector development, as they may not only result in an increased number of natural disasters, but also extend or reduce the human life span. It is difficult to predict what consequences climatic changes may have in terms of insurance protection and how these facts should be considered in actuarial calculations, the product tariffs rely on. It is becoming evident that insurance companies are still unable to (and cannot) predict the scope of potential natural disasters with sufficient accuracy and exactly approach the calculation of correct insurance premium tariffs. This fact affects not only the adequate price of non-life insurance products but also the ability of insurance companies to meet their obligations.

The insurance sector – similarly as the banking sector as well as other segments of the financial markets – is further affected by the volatility relating to the financial standing of instruments that were considered to be risk-free in terms of the investment safety prior to the crisis – e.g. particularly government securities. Concerns about the future development relating to the standing of bonds of "frivolous southern" countries undermine the financial market stability and promote investors' nervousness. Naturally, this also leads to a serious problem for the investment policy of insurance companies, which – until the beginning of the crisis – thoroughly fulfilled the safety principle of their deposits by purchasing government securities for their portfolios, reflecting (insurance) technical reserves[12]. To search for a safe instrument that would meet the requirements of conservative investors (such as commercial life insurance company or pension fund) within the present hectic environment – this is a current requirement imposed on the portfolio managers of such institutional investors.

Nevertheless, despite all the indicated problems, the commercial insurance sector practically continues to be the most stable financial sector, which was also documented in the past crisis period. However, it will have to face unprecedented new problems in the near future, posed by the current turbulent global world. It is positive that the starting posi-

12 For example, the Allianz Group had to write off EUR 931 million worth of investments in the Greek financial sector following the quasi bankruptcy of Greece in October 2011 (ČIA NEWS, October 2011).

tion of the sector provides the necessary prerequisites for successfully overcoming the aforementioned challenges.

Conclusions

The latest developments, especially in the past decade, have significantly affected the functioning of financial markets. The banking sector that substantially contributed to the onset and progressing of the crisis was affected the most. Due to increasing pressures of the globalization process and symptoms of the crisis, the role and functions of one of the most conservative – and thus the least affected by the crisis – financial sectors, i.e. of the insurance sector, change, as it is forced by the environment to ensure higher dynamics of structural changes.

In the near future, the insurance sector will target its "core" business more as part of its main activities, while more cautiously considering the construction of various products – both from the perspective of risk selection and the scope coverage thereof. In this regard, certain regulatory measures within the continuation of the Solvency project will also be important, namely the pressure for an arbitrarily determined ratio of insured risks and available funds of insurance companies. In this connection, we can expect incorporation of indemnification limits and insurance exclusions that will homogenize the insured portfolio, thereby making it more suitable for the application of mathematical regulatory models; however, at the expense of reduced insurance efficiency. In this environment, it will be crucial for insurance company managers, who fear increasing regulation, to find balance between higher internal stability and client safety on the one side, and efficiency of insurance for clients and effectiveness of the activity itself on the other side. The resolution of the dilemma regarding the guarantee schemes, anti-discrimination measures, etc. will be on the same note. A separate area is the search for new investment strategies of insurance companies under the current state of the financial markets; safe management of clients' disposable financial funds will be a key challenge for portfolio managers. Compared to other financial market segments, the global insurance sector has surpassed the crisis without fatal impacts; it is thus well qualified to hold up in the future, which is likely to be more complicated for the sector.

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Managerial Support Provided by Venture Capital Investors in the Czech Republic

Manažerská podpora investorů rizikového kapitálu v podmínkách České republiky

JAROSLAVA RAJCHLOVÁ

Abstract

The paper focuses on the investigation of providing of managerial support to companies, offered by domestic venture capital investors, as regards factual domains and forms of such support.

Most usually such involvement concerns strategic management, financial management and communication management. Among most frequently provided forms of managerial support can be ranked: co–operation on business strategy formulation, supervision of company financial development, consultancy in the issues of company expansion, consultancy or participation in formulation of company marketing or production strategy, assistance with drawing up financial plans and budgets, support in external fund acquisition, support in establishment of company organizational structure, consultancy services connected with planning for internationalization, help with recruitment of company management staff, sharing of contacts with companies contained in the portfolio of investors, arrangement of contacts with attorney and advisors.

The publication of research results shall facilitate the improvement of knowledge in the field of company financing with alternative funds and their exploitation both in practical and theoretical levels.

Keywords

corporate financing, venture capital, non–financial value added, managerial support

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Abstrakt

Článek je zaměřen na zkoumání poskytování manažerské podpory ze strany tuzemských investorů rizikového kapitálu podnikům, a to na faktické oblasti a formy této podpory.

Mezi oblasti s největší mírou poskytování podpory jsou oblasti strategického, finančního řízení a řízení komunikace. Mezi nejčastěji poskytované formy manažerské podpory patří: spolupráce na stanovení obchodní strategie, dohled nad finančním vývojem podniku, poradenství v otázkách expanze podniku, poradenství, eventuálně podílnictví při stanovení marketingové či výrobní strategie podniku, pomoc při sestavování rozpočtů nebo finančních plánů, podpora při získání cizího kapitálu, podpora při vytvoření organizační struktury podniku, poradenství při plánování internacionalizace, pomoc s výběrem členů managementu podniku, zprostředkování kontaktu na podniky v rámci portfolia investorů, zprostředkování kontaktu s advokáty nebo poradci.

Prostřednictvím publikace výsledků výzkumu lze prohloubit znalosti v oblasti financování podniků alternativními způsoby a využívat je jak v rovině praktické, tak rovině teoretické.

Klíčová slova
financování podniků, rizikový kapitál, nefinanční přidaná hodnota, manažerská podpora

Introduction

One of the alternative methods of company funding is an injection of the so–called "venture capital".

On the basis of conclusions reached after analysing the scientific literature and her own research work (Schefczyk, 2006, Pernsteiner, 2003, Zinecker, Rajchlová, 2010) the author defines the term "venture capital" as follows: a venture capital is the form of own external resource, posing risks. Its investment is burdened neither with cost interests nor investment amortization in contrast with common forms of external financial funds. The risk, which investors face, is perceived especially as the loss on investment. The investment is usually made for the period solely contractually negotiated, mostly for the period covering 4 - 6 years. Venture capital investors concentrate on companies which can quickly and highly increase their values. Nevertheless, company funding, exploiting venture capital, does not necessarily result in the increase of company value (therefore, the author refuses the description of such form of the company funding as venture and "development" capital), or – as the case may be – in its growth and development. Venture capital investors provide companies with their managerial support, which can be identified as a non–financial value added offered by these investors. Such an attribute is the important and unique characteristic of venture capital financing.

The absence of research studies dealing with non–financial value added in the context of that company funding, applying venture capital, has been identified in the Czech Republic; therefore, the raison d'être of conducted research project was the effort to fill the gap in this particular sphere of research programmes.

The objective of empirical research is the survey examining the fact whether domestic venture capital investors provide their managerial support to companies, financed by venture capital.

Two levels of the forms of managerial support, offered by domestic investors, have been investigated: in the first level the monitoring focuses on the search for those domains of managerial support, provided by investors most frequently.

Research objective to be accomplished in the second level is the finding which factual forms of managerial support investors show in the Czech companies most frequently.

The author examines her assumption that established domains and forms of managerial support would differ from domains and forms extracted from selected foreign studies. On the grounds of her analysis of foreign studies, being the basis for conducted empirical

research, a question remains unanswered as regards domains and forms of provided non–financial value added offered by venture capital investors most frequently. Many authors, involved in their studies in monitoring of forms and domains of expert help, significantly differ in their conclusions (see chapter "Discussion on Empirical Research Results").

There are also other examples – e.g., Frederiksen contradicts results, reported in his earlier research, by publishing his research findings, summarized later.

As some examples of conclusions from foreign studies, demonstrating a positive influence and existence of the transfer of value added from venture capital investors to companies, can be cited: Brophy (1988), Rosenstein et al. (1989), Frederiksen et al. (1990), Sapienza, Timmons (1989), Frederiksen (1992), MacMillan et al. (1988), Frederiksen (1991), Busenitz et al. (2004), Ehrlich (1994), Boué (2005).

Having analysed foreign studies, two basic data collection methods were identified: interviewing of respondents (in writing, controlled interviews) in case of qualitative research and company data analysis, or (as the case may be) analysis of company business development in the stock market in case of quantitative research.

Rosenstein et al. (1989), Sapienza, Timmons (1989), Boué (2005) employed the method of interviewing of respondents; MacMillan et al. (1987), Rosenstein et al. (1989), Frederiksen (1990, 1991, 1992), Ehrlich (1994), Busenitz et al. (2004) applied interviewing involving written form.

Research based on company data analysis was carried–out by Frederiksen (1991, 1992); Brophy (1988) and others analyzed development of exchange quotation rates.

MacMillan et al. (1988) defined 20 forms of the expert help. Other authors (Ehrlich et al., 1994; Sapienza et al., 1996) partially adapted these forms. Landström (1991) defines 14 forms of the expert help and the EVCA (2002) specifies other 15 non–financial contributions.

Most usually such expert help concerns strategic management, financial management, human resource management, commercial sphere, operative management, communication management and the so–called "Sounding Board" (role of a mentor, coach, trustee). MacMillan et al., Ehrlich et al., Sapienza et al., Landström and the organization EVCA summarized the forms of managerial support; subsequently, below mentioned file of potential forms of managerial supports was formally developed to serve the needs of carried–out research. A definition of the forms of expert help was supported by its categorization into the individual domains.

The forms of provided expert help in the domain of strategic management are as follows: co–operation on business strategy formulation; support in establishment of organizational structure; support in formulation of corporate processes; consultancy services connected with planning for internationalization; consultancy on expansion; participation in development of products (services), participation in formulation of marketing or production strategy.

The forms of provided expert help in the domain of financial management include: assistance with drawing up financial plans and budgets; supervision of financial development; support in equity capital acquisition; support in external fund acquisition; support in grant acquisition.

The forms of provided expert help in the domain of human resource management relate to: recruitment of team members; selection of management staff; selection of key staff involved in technical sector; participation in negotiations dealing with employment contracts; staff motivation.

The forms of provided expert help in the domain of commercial sector can be: customer acquisition; acquisition of reference customers; acquisition of business partners; consultancy on selection of suppliers.

The forms of provided expert help in the operative domain include most usually: crisis management, solutions to routine operating problems and supervision of standard business activity.

The forms of provided expert help in the domain of communication management include: sharing of contacts with companies contained in the portfolio of investors; establishment of contacts with the CEOs of companies included in the portfolio of investors and managers of research and development departments; maintaining of contacts with investment banks; arrangement of contacts with media; arrangement of contacts with legal representatives and advisors; contact point (interface) with investors (investment group).

The role of investor as a coach and trustee is emphasized in the interpersonal sector.

Profiles of individual, above mentioned forms, constitute contents of the questionnaires used for the research, involved in the survey of forms of managerial support.

1 Applied Methodology and Empirical Research Material

Mixed methods research was used in the context of stated objective. Mixed methods research was applied in the form of data conversion – qualitative data were processed quantitatively.

A limiting condition, applied to the selection of research sample (consisting of venture capital investors), was the necessity of their registered seats situated in the territory of the Czech Republic. Limiting condition was set out so as to be able to investigate specific features of domestic venture capital market.

The organization CVCA (Czech Private Equity and Venture Capital Association), with full membership of venture capital investors, was inquired to find the identity of institutional investors. Moreover, those investors, not being the CVCA members, but whose investments were reported as the investments of the type "private equity" and "venture capital", were addressed, too. The research did not monitor industrial focus of these investors. 7 managerial companies (out of 19) were excluded on account of mentioned limiting con-

dition. A base file of respondents consisted of 19 managerial companies; 12 managerial companies formed selective file.

Data collection was organized via on-line questionnaire, posted in the web pages administrated by the Faculty of Business and Management
http://dotazniky.fbm.vutbr.cz/venture_investori/.

A personalized e–mail message, containing cover letter and link to this questionnaire, was sent to factual representatives of venture capital investors in the middle of October 2011. Investors were asked to identify the form of support provided in the period of their activity.

The first part of distributed questionnaire introduced research plan. Respondents could voluntarily add their contacts in the form of their e–mail addresses and company identification. 31 lines followed, containing the characteristics of forms of managerial support as specified in the introduction. A check mark, inscribed in the field next to the line, expressed their approval with such form of the support, offered to companies. The approval was registered by the export into Excel file, and was expressed by the figure 1.

Respondents were asked – if none of offered possibilities was correct, resp. was not provided by them – to identify the activity, which they really provided, in the field entitled "Write Your Message". Those investors, not responding in 14 days following the questionnaire distribution, were repeatedly electronically invited to complete it. The questionnaire was closed in the middle of November 2011. 10 (out of 12) addressed venture capital investors responded. A response rate of questionnaire amounted to 83.34%. Data were processed by a descriptive statistics of the programme Excel.

To accomplish partial objective in the level focusing on the identification of individual domains of support, provided by venture capital investors most frequently, qualitative data were processed by means of the application of statistical function frequency in absolute and relative expression of identification in the particular sphere. Statistical functions of arithmetic mean and standard deviation were applied to identify the significance level of particular sphere for investors and to improve the information capability of captured data.

To identify the form of managerial support, provided by investors most frequently, qualitative data were processed by the Microsoft Excel COUTIFS, as absolute frequency of positive responses and, subsequently, were modified into relative frequency of positive answers. Moreover, descriptive statistics "arithmetic mean" and "standard deviation" were further used to increase the information capability of collected data.

2 The Results of Empirical Research

Tables 1 and 2 contain results of the research identifying domains and forms of managerial support provided to companies, financed by venture capital. Research results are divided into two parts to provide a better illustration.

The first part presents results of survey focusing on the domains managerial support, provided most frequently, and, at the same time, survey focusing on the providing of factual forms of managerial support by means of the determination, of frequencies, of identified positive responses.

The second part presents results of survey focusing on the factual forms of support given to companies, financed by venture capital, offered by involved investors most frequently.

PART 1: Identification of Domains of Managerial Support, Provided by Investors Most Frequently

Table 1 consists of six columns: the first column contains identification of domains of managerial support, the second column specifies investigated individual forms of supports of companies financed by the venture capital, data contained in the third column specify the absolute frequency of positive responses. Data collected in the fourth column represent a relative expression of the values contained in the third column; i.e., relative frequency of positive responses.

The arithmetic mean of percentage of positive responses (fifth column), completed with the value of standard deviation in the sixth column, provide the information on the sequence of significance of particular domains of managerial support from the side of investors.

Strategic management is the domain of managerial help, most frequently provided by investors. The arithmetic mean of percentage of positive responses displayed in this field is in the level of 83% with the standard deviation 10%, which means the variance of values in the range 10% from the arithmetic mean. Obtained result can be interpreted in such a way that on average 83% of respondents identified providing of some or all forms of their help in the domain of company strategic management. Such value is the highest held. The lower the value of standard deviation, the higher information capability of the arithmetic mean; i.e., the values of the file are distributed around the arithmetic mean value.

The second most frequently mentioned domain of support lent to management, offered by investors, was the financial management. The arithmetic mean value was detected in the level 74%; i.e., on average 74% of respondents provided some or all forms of managerial support contained in the domain of company financial management. The standard deviation value was then specified in the level 28%. In this particular case the standard deviation value is high, reporting the variation of calculated values; i.e., unevenly distributed positive responses in case of providing of the individual forms of support offered by investors.

The third field of managerial support, most frequently identified by investors as provided, was the communication management. The arithmetic mean value of percentage of positive responses reached 60%; i.e., on average 60% of investors provided some of mentioned forms. The standard deviation value equals to 20%. The standard deviation value can be considered as higher; i.e., the values of relative frequency of number of positive responses

of the individual forms of the managerial support are not around the arithmetic mean value.

The arithmetic mean of percentage of positive responses in the interpersonal field was found out in the value 45%; i.e., on average 45% of respondents were perceived as coaches and/or trustees. The standard deviation takes the value 5%, such value can be considered as low; i.e., the values of individual frequencies vary around the value of arithmetic mean of percentage of positive responses and the information capability of the result is high.

Identified level of the arithmetic mean of percentage of positives responses in the domain of the support to management, offered by investors in the form of human resource management, was 44% and the standard deviation value 20%. On average 44% of respondents expressed themselves positively as regards their support to company management in the sphere of human resource management.

Commercial sphere is one of the least frequently highlighted domains of support to management, the arithmetic mean value of the percentage of positive responses equals to 38%; i.e., on average 38% of respondents confirmed providing of the forms of their support in the commercial sphere. The standard deviation value, ranging around the arithmetic mean, reached the level 21%.

The least frequently identified domain of involvement of investors, specifying provided forms of managerial support, was the field of operative management. The sum of arithmetic mean value reached 25%, while the relative deviation was low, amounting to 5%. The smallest number, on average 25% of venture capital investors, was involved in company operative management.

In the domain of strategic management all respondents unambiguously marked their help with formulation of business strategy. 90% of respondents expressed themselves positively in the issue of providing of consultancy in the questions dealing with the expansion and consultancy ev. co–partnership in the formulation of marketing or production strategy, 80% of respondents specified providing of their support offered for the planning for internationalization and support in the establishment of organization structures. 70% of respondents expressed their approval with the providing of managerial support to companies as regards definition of company corporate processes and participation in the development of product or service.

In the domain of financial management 100% of respondents highlighted their support, provided to companies, by supervision of company financial development. 90% of respondents emphasized their support in the form of their assistance with the drawing up budgets and financial plans and external fund acquisition. Seven respondents, in relative expression 70% of respondents, supported companies in the alternative equity capital acquisition. Totally 20% of respondents offered their support in the applying for subventions or grants.

Table 1: Domains and Forms of Managerial Support Offered to Domestic Company by Venture Capital Investors

1	2	3	4	5	6
Strategic management	Co-operation in business strategy formulation	10	100%	83%	10%
	Consultancy with company expansion	9	90%		
	Consultancy/co-partnership in formulation of marketing or production strategy	9	90%		
	Support with organizational structure establishment	8	80%		
	Consultancy - planning for internationalization	8	80%		
	Support with definition of corporate processes	7	70%		
	Participation in development of product /service	7	70%		
Financial management	Supervision of financial development	10	100%	74%	28%
	Assistance in drawing up budgets/financial plans	9	90%		
	Support with external fund acquisition	9	90%		
	Support with alternative acquisition of own equity	7	70%		
	Support with subsidy acquisition (grants, subventions)	2	20%		
Communicati on management	Contacts with companies included in the portfolio	8	80%	60%	20%
	Contacts with lawyers/consultants	8	80%		
	Contact with investment banks	7	70%		
	Contact with press	6	60%		
	Contact point (interface) with investors (investment group)	5	50%		
	Contacts with the CEOs of companies included in the portfolio and managers of research and development	2	20%		
Interpersonal function	Role of coach	5	50%	45%	5%
	Role of trustee	4	40%		
Human resource management	Help with recruitment of management staff	8	80%	44%	20%
	Help with recruitment of team members - generally	5	50%		
	Active help – improvement of staff motivation	4	40%		
	Selection of key staff (technical sphere)	3	30%		
	Co-operation in negotiating of employment contract contents	2	20%		
Commercial sphere	Active help in attracting customers	5	50%	38%	21%
	Active help in attracting reference customer	5	50%		
	Active help in attracting business partners	5	50%		
	Consultancy – selection of suppliers and equipment	0	0%		
Operative management	Solution to crises and routine operation problems	3	30%	25%	5%
	Supervision (feedback) of operative businesses	2	20%		

Source: own research.

The following forms of managerial support are included in the domain of communication management. Establishment of contacts with companies, included in the portfolio of investors, and negotiation of contacts with lawyers or advisors were mentioned most usually (80% of respondents). Seven respondents (70% of respondents) initiated contacts with investment banks. Six respondents (in relative expression 60% of respondents) offered contact with the press. 20% of respondents emphasized their support in the form of handing–over of personal contacts to the CEOs of companies, contained in their portfolio, and managers of research and development department.

50% of respondents carried out the interpersonal function by means of the role of coach and 40% of respondents held the role of trustees.

In the domain of human resource management 80% of respondents specified following forms of their support: help with selection of management staff; 50% of respondents mentioned their help with recruitment of team members. 40% of respondents offered their expert help with solution to the improvement of the staff motivation. 30% specified their support in the recruitment of key technical staff and 20% of respondents emphasized their partnership in the negotiations about the contents of employment contracts.

50% of respondents marked three (out of four) types as provided forms of their support in the commercial sphere. These are: active help in attracting customers, active help in attracting reference customers, active help in attracting business partners. None of the respondents quoted consultancy activity undertaken for the selection of suppliers and equipment.

Within the framework of the operative management 30% of respondents helped to solve crises and problems in routine operation and 20% of respondents supervised operative businesses.

Part 2: Research of Factual Forms of Transfer of Managerial Support to Companies Provided by Venture Capital Investors

Table 2 summarizes the results of partial research. The first column of the Table 2 shows factual forms of managerial support, lined up from the forms with the highest reached frequency to the least ones. The second column specifies found–out values of absolute frequency; the third column identifies found–out values of relative frequency.

The most frequently mentioned provided form of managerial support was the help of investors with business strategy formulation – identified by 100% of investors, as well as their supervision of financial development.

Nine responses (out of total possible 10), resp. 90% of all investors, agreed with providing of their support within the framework of consultancy services offered in the issues of company expansion, and participation (or co–partnership) in formulation of company marketing or production strategy. The identical frequency of affirmative statements identified providing of help in the drawing up company budgets or financial plans and support

in acquisition of external funds. 80% of investors offered their help in the establishment of company organizational structure and personal consultancy rendered for planning for internationalization. The identical percentage of investors confirmed sharing of know–how in the form of their aid in the selection of members of management. Moreover, totally 80% of investors also stressed the establishment of contacts with companies included in their portfolio and contacts with lawyers/advisors.

70% of venture capital investors highlighted transfer of managerial know–how as regards the definition of company processes and co–partnership in the development of product or service, equity capital acquisition and establishment of contacts with investment banks.

Six investors, in relative expression 60% of investors, mentioned making of contacts with the press.

Totally 50% of investors formed a sort of contact point, or interface, with other investors, or investment groups, as the case may be. The same relative number of investors participated in recruitment of team members, actively contributed to the acquisition of customers, reference customers and business partners.

Five investors (50% of investors) acted as coaches of company management.

Four respondents, representing totally 40% of respondents, actively assisted with the staff motivation strengthening. The identical number of respondents emphasized their role of trustees.

30% of respondents highlighted transfer of managerial know–how in the form of their help with solution to crises and problems with the routine operation and help with key technical staff recruitment.

The absolute frequency 2, corresponding with 20% of respondents, was investigated in case of managerial support in the form of the establishment of contacts with the CEOs of companies included in the portfolio of investors and managers from research and development departments, co–participation of investors in negotiating of contents of employment contracts, support offered by investors as regards subsidy awarding process (grants, supports) and supervision, or feedback, of operative businesses.

None of the investors identified the field of selection of suppliers and equipment as provided domain of their consultancy services.

Table 2: Forms of Managerial Support Provided by Venture Capital Investors Offered to Domestic Companies

Provided form of managerial support	Frequency of affirmative marking	Relative frequency
Co–operation in business strategy formulation. Supervision of financial development of company	10	100%
Consultancy as regards company expansion. Consultancy/ participation in identification of marketing or production strategy; help with drawing up budgets/financial plans; support to acquisition of external funds	9	90%
Support to establishment of organizational structure; consultancy in planning for internationalization; help with recruitment of management staff; contacts with companies included in the portfolio; contacts with lawyers/advisors	8	80%
Support to defining of company processes; participation in development of product/service; support to alternative acquisition of equity capital; contact with investment banks	7	70%
Contact with the press	6	60%
Contact point (interface) with investors (investment group); help with recruitment of team members – generally; active help in attracting customers; active assistance in attracting reference customers; active help in acquisition of business partners; role of coach	5	50%
Active help in staff motivation improvement; role of trustee	4	40%
Assistance in solution to crises and operative routine problems; help with recruitment of key technical staff	3	30%
Establishment of contacts with the CEOs and managers of department of research and development included in the portfolio; participation in negotiating of employment contracts; support in grant acquisition (grants, subsidies); supervision (feedback) of operative business	2	20%
Consultancy – selection of suppliers and equipment	0	0%

Source: own research.

3 Discussion of Results of the Empirical Research

To say a few words by way of introduction, a statement can be made – on the basis of achieved results of the research carried-out by the author – that venture capital investors with registered seats of their companies situated in the territory of the Czech Republic do provide non–financial value added to domestic companies.

The results of various research projects, aiming at the issue of the existence of non–financial value added in the financing of companies by venture capital and their analysis, represent the point of departure for the following debate.

Works of MacMillan (1987), Sapienza, Timmons (1989), Rosenstein et al. (1993), Ehrlich et al. (1994), Boué (2005) are frequently mentioned studies presented in the expert literature, and also part of the studies, being the starting points of the research of value added financing by venture capital funding.

In the results of his analysis MacMillan (1987) asserts that most frequently provided form of the investor's support, or role of the investor in the company, is the so–called "Sounding Board". The help with alternative acquisition of equity capital, establishment of contacts with investment group, monitoring of financial development, monitoring of company development and active assistance in acquisition of alternative foreign funds are the key domains of support provided to companies.

Sapienza, Timmons (1989) identify the Sounding Board, advisor and coach as the most important forms of the company support, provided by venture capital investors. Afterwards, their roles of the so–called financier, friend or trustee and establishment of contacts follow.

Rosenstein et al. (1993), consistently with the findings of Sapienza, Timmons (1989), monitors the support offered to companies as regards know-how transfer in the form of the so–called Sounding Board, establishment of contact with investment groups, operative supervision of company development, appointment or removal of company management and help of investor with solution to short–term, operative problems.

According to Ehrlich et al. (1994), the most important types of support, given by venture capital investors to company management, are the establishment of contacts with investment groups, advisory role in acquiring of alternative equity capital, supervision of financial development, Sounding Board, operative supervision of company development and business strategy formulation.

As regards the non–financial value added, Boué (2005) publishes that domains and forms of support, most frequently provided by investors, are monitoring of company development and supervision of strategic planning application, rendering of consultancy services, access to information, establishment of contacts and coaching.

A comprehensive analysis of foreign studies indicates that the support, provided by foreign venture capital investors, is often received in the domains of the so–called Sounding Board, establishment of contacts, financial management, strategic and operative management and consultancy services.

A summary of results of selected foreign studies – see Table 3.

Table 3: Most Frequently Provided Forms of Managerial Support - Outcomes of Selected Foreign Studies

Identification of authors	MacMillan (1987)	Sapienza, Timmons (1989)	Rosenstein et al. (1993)	Ehrlich et al. (1994)	Boué (2005)
Return rate	18%	24%	26%	Addressed 12 investors - return rate 100%	Interview with 20 investors – quorum 100%
Forms of professional help as regards their significance	Sounding Board	Sounding Board	Sounding Board	Contact with investment group	Monitoring of company development and supervision of strat. plan implementation
	Help with alternative own equity funding acquisition	Financier	Contact with investment group	Arrangement of acquisition of alternative own equity funding	Consultancy services
	Contact with investment group	Friend, trustee	Operative supervision of company development	Supervision of company financial development	Providing of information
	Monitoring of financial development	Establishment of contacts	Appointment or removal of management	Sounding Board	Maintaining of contacts
	Monitoring of company development	x	Help with solution to short-term, operative problems	Operative supervision of company development	Coaching
	Help with acquisition of external foreign funds	x	x	Formulation of company strategy	x

Source: own research.

Subsequently, on the basis of analyses of outcomes, confirmed by foreign studies, we can come to the logical conclusion that the role in the post of the so–called Sounding Board, contacts with other investors, support in search for alternative equity capital and external funds and monitoring – operative control function are the forms of support offered by venture capital investors to company management most commonly.

The results of research, undertaken by the author, give evidence of different situation existing in the providing of non–financial value–added as regards company venture capital financing in the territory of the Czech Republic.

The research suggests that most frequently provided domains of managerial support offered in the Czech Republic are:

- strategic management,
- financial management,
- communication management.

Specifically, these are the forms of managerial support[1] within the meaning of the:

- co–operation in business strategy formulation,
- supervision of company financial development,
- advisory services connected with company expansion,
- consultancy or (as the case may be) participation in formulation of marketing or production strategy of company,
- assistance in drawing up budgets or financial plans,
- support in collecting of external funds,
- support in establishment of company organizational structure,
- consultancy dealing with planning for internationalization,
- support in selection of company management staff,
- arrangement of contacts with companies included in the portfolio of investors,
- contacts with lawyers or advisors.

Five out of ten investors highlighted the activities within the meaning of the Sounding Board (i.e. coaching, mentoring) along with the liaison between investors (investment group), thus not ranking among most frequently offered activities. Investors marked their supervision of operative activity resp. activities in the field of operative management, with the least frequency, compared with results of mentioned studies.

Hence, differences can be noticed in the transfer of non–financial value added provided by the Czech investors. They focus on strategic management, financial management and activities undertaken in the sphere of communication management, in contrast with foreign investors, who emphasize their roles of coach, mentor and more usually are involved in operative management (compared with the Czech investors). An agreement can be traced in the support aiming at the acquisition of external, ev. alternative equity capital.

The assumption on differences in the providing of non–financial added value, offered by domestic venture capital investors, can be accepted on the grounds of above described acquired knowledge.

Moreover, the research conclusions support the findings of facts that venture capital investors do not substitute professional managements of the companies; as appears from the personal experience of the author, operative management of company is the domain where domestic investors are not involved.

On the contrary, company owners as well as company managements frequently do not want the investors to take-over direct management of their companies.

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1 *A minimal limit (80% of respondents) was established to determine most frequently provided form of the support.*

An investor joining agreement modifies investor's authority in the company. The Sounding Board, within the meaning of coaching and mentoring, is the domain which cannot be included in such agreement easily. Can such finding mean greater openness of professional management towards investors? Formulation of such answer would demand more in-depth investigation of such phenomenon.

Nevertheless, the fact must be underlined that reported results of presented research monitor the situation and specific features in the venture capital market in the Czech Republic; the ambition is not to notify venture capital investors of different aiming of their activities in the companies by following the examples from abroad.

Divergences in the results of foreign studies and the results of domestic research should be perceived rather as the survey of situation existing in the venture capital market in the Czech Republic, not as a guideline suggesting venture capital investors to direct their activities differently, using the examples from abroad. The results of presented research should be supported by obtained results of subsequent research, identifying in what way the intensity of support of any venture capital investor would be reflected in company development and whether just between the intensity of his support and company development would exist any link in our conditions.

Conclusions

The result of empirical research, based on the questionnaire survey undertaken among domestic venture capital investors, identified domains of managerial support provided by venture capital investors most frequently, and forms of managerial support offered most frequently.

Strategic, financial and communication managements rank among domains with the highest rate of support provision. Co–operation on business strategy formulation, supervision of company financial development, advisory services connected with company expansion, consultancy or (as the case may be) participation in formulation of marketing or production strategy of particular company, assistance in drawing up budgets or financial plans, support in collection of external funds, support in establishment of company organizational structure, consultancy dealing with planning for internationalization, support in selection of company management staff, contacts with companies included in the portfolio of investors and mediation of contacts with lawyers or advisors are the forms offered most frequently.

The analysis of conclusions of foreign studies showed that managerial support, provided by foreign venture capital investors, often focused on the so–called "Sounding Board", building contacts, financial management, strategic management, operative management and consultancy.

Thus, an agreement can be found in the strategic management, financial management and communication management. The results of the research indicate that domains of the Sounding Board and operative management are negligible as regards the managerial support offered by investors. Thus, expressed assumption of the author on the existence

of variances in providing of non–financial added value, as offered by domestic venture capital investors, has been proved.

Especially owners and company managements, considering serious possibilities of funding for their corporations' activities, can exploit effectively the outcomes of research. Venture capital itself represents the so–called "smart money"; an investor is personally involved in good development of his company and allocates not only his financial funds, but also his knowledge, contacts, information. In the sphere of theory, science and research we can talk about the clearing up the grey areas in the sphere of the investigation of company funding, specifically broadening of the knowledge of alternative funding methods as represented by venture capital.

The field studying the professional help offered by venture capital investors demands an in-depth survey, especially in relation to the intensity of transfer of non–financial value added and degree of company development.

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Outsourcing by Private and Public Organisations: How much Could Public Bodies Learn?

Outsourcing u soukromých a veřejných organizací – co se mohou veřejné organizace naučit?

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Abstract

Outsourcing is already for longer period used in private sector as a tool of rationalization of internal processes. As the result of New Public Management changes it was started to be implemented also in public organizations. The paper starts with brief introduction of the concept of outsourcing, both in relation to private and public sector practices. Its core parts are devoted to analysis of experience with outsourcing of internal services in private and public organizations in the Czech Republic and Slovakia.

Some interesting conclusions are derived from the research. First, outsourcing is relatively frequently used by private firms in the Czech Republic. Second, we may argue that the "quality" of implementation of outsourcing in the private sector in the Czech Republic is a bit limited.

Results from our analysis support general expectations that in conditions where the private sector is not able to deal with outsourcing perfectly (and risk of corruption is relatively high), the practice of outsourcing in the public sector is of limited quality.

Keywords

outsourcing, internal services, public sector, private sector, Slovakia, Czech Republic

JEL Codes

H41, H30

Abstrakt

V soukromém sektoru je outsourcing používán dlouhou dobu jako nástroj zefektivnění interních procesů. Jako výsledek změn v New Public Managementu začalo zavádění outsourcingu také ve veřejných organizacích. Článek začíná stručným úvodem do konceptu outsourcingu ve vztahu k praxi v soukromém a veřejném sektoru. Hlavní část je věnována analýze zkušeností s outsourcingem interně zajišťovaných služeb v soukromých a veřejných organizacích v České republice a na Slovensku.

Z výzkumu jsou vyvozeny některé zajímavé závěry. Za prvé, outsourcing je relativně často používán soukromým sektorem v ČR. Za druhé, lze říci, že „kvalita" zavádění outsourcingu v ČR je částečně omezená. Výsledky předložené analýzy potvrzují očekávání, že v podmínkách, kde soukromý sektor není schopen dokonale provádět outsourcing (riziko korupce je relativně vysoké), tak kvalita zavádění outsourcingu ve veřejném sektoru má své limity.

Klíčová slova
outsourcing, interní služby, veřejný sektor, soukromý sektor, Slovensko, Česká republika

Introduction

To be able to achieve planned goals in our research projects, we have to realise many theoretical and practical tasks. For sure, one of them is to discover if the private sector practice could serve as the important benchmark for the public sector and to serve as an example of the good practices which should be implemented also in the public sector.

In this paper we firstly briefly introduce the concept of outsourcing (with focus on the public sector practice). Then we analyse the practice of outsourcing in the public sector (Czech Republic and Slovakia). The third step is the analysis of outsourcing in the private sector in the Czech Republic. The final is to compare situation and to draft conclusions on this base.

1. Outsourcing and Outsourcing in the Public Sector – Brief Theory Review

Outsourcing represents situation of delegating of originally own activities of an economic subject to an external supplier. Graever (1999) defines following purposes of outsourcing – organizational, process, financial, incomes, decreasing costs and employment. Other authors (like Fanta, 2005, Manning et al., 2008) add also other purposes for outsourcing, as (for example) the following.

Focus on Core Business — Resources (for example investment, people, and infrastructure) are focused on developing the core business. For example often organizations outsource their IT support to specialised IT services companies. *Cost restructuring* — Outsourcing changes balance of this ratio by offering a move from fixed to variable cost and also by making variable costs more predictable. *Improvement of quality* — to achieve steep change in quality through contracting service with new service level agreement. *Knowledge* — Access to intellectual property and wider experience and knowledge. *Operational expertise* — Access to operational best practice that would be too difficult or time consuming to develop it in-house. *Access to talent* — Access to larger talent pool and sustainable source of skills; in particular in science and engineering. *Capacity management* — Improved method of capacity management of services and technology where risk in providing excess capacity is borne by supplier. *Catalyst for change and innovations* — An organization can use outsourcing agreement as a catalyst for major change step that cannot be achieved alone. *Risk management* —Approach to risk management for some types of risks is to partner with outsourcer who is better able to provide mitigation.

Outsourcing is used in the private sector as a tool of rationalization of internal processes already for long time and experience with it is relatively well evaluated in existing economic, logistics and management literature.

Outsourcing in the public sector started to be introduced in larger scale as the part of New Public Management (NPM) initiatives during last two decades of the previous century. Its theoretical base - the issue of privatization and contractualisation in public services was

investigated by many authors (for example Cullis and Jones, 1987; Knapp and Missiakoulis, 1982; Stiglitz, 1997; Caves and Christensen, 1980; Weisbrod, 1988; Yarrow and Jasinski, 1996).

One dimension of NPM (see for example Pollit and Bouckaert 2000, 2004 and 2011; Lane, 2000; Cooper, 2003, and many others) is the introduction of market type mechanisms (MTM) into the public sector and marketization of public service. The marketization of public services aims at continuous increase in public expenditure efficiency, continual improvements in public services quality, implementation of professional management tools in the public sector, emphasis on devolution and delegation, emphasis on audit and inspection and, last but not least, plurality system of ownership forms in public service delivering and emphasis upon contracts and market. Introduction of compulsory competitive tendering and market testing lead to contracting-out of some in-house produced services in the public sector.

Contracting and outsourcing (we distinguish between these two terms in the following way: contracting = external production of public services, outsourcing = external delivery of internal services) represent one of the most prevalent types of privatization, mainly at the local government level. Under this arrangement, the government retains responsibility for provision of the service but hires private firms to produce the service. Contracting and outsourcing can also be explained as binding agreement in which public institution pays private firm or non-profit organization to produce specific level and quality of public service or of internal service in public organisations.

Contracting and outsourcing begin with the "organizational decision to make or buy a good or service" (Prager 1994, p. 176). As such, it is fundamental decision faced by both public and private sector organizations. "To make or buy?" is a question faced by public organizations when considering how public services should be delivered to their citizens. Public organizations must decide whether to produce goods and services internally or to acquire them from external sources.

To put contracting and outsourcing in perspective, it is necessary to consider pros and cons of internal and external forms of delivery. Possible positive results from outsourcing in the public sector are very similar to these in the private sector (see above), but the main focus is on optimising costs and quality. According to Prager, the general rule of public sector organization is to "internalize operations to the point where the costs of further expansion are perceived to be greater than the costs of acquiring the components or services in the market" (Prager 1994, p. 84). Important element of contracting and outsourcing is the process involved in establishing and maintaining legal contractual relationship with a private firm.

According to Shetterly (1998, p. 23), this process occurs in three phases; pre-solicitation, contractor selection and contract management. Two problems occur when action and information of private partner are not directly observable by public partner: "moral hazard or the problem of hidden action and adverse selection or the problem of hidden information" (Arrow, 1985, p. 37). Moral hazard occurs because behaviour of the private partner is imperfectly controlled. When behaviour is imperfectly controlled, it creates

situation where either shirking in performance of duties or inappropriate actions by the private partner adversely impacts the goals of the public partner. In the adverse selection problem, the private firm has some information that is not shared with the public sector organization and uses the information to make decisions that affect the public organization. The public sector organization in many cases has not enough information for ex ante evaluation of private offers.

Crucial issue for success of contracting and outsourcing are transactions costs that may overweight direct costs savings from switch to external delivery (Pavel, 2007).

From all above it is apparent that contracting and outsourcing may, but need not, improve the performance of the public sector. Final outcome depends on local conditions, including capacity of implementing body to execute the contracting process, as many empirical studies, like Brown and Potoski (2003), Brudney, Fernandez and Wright (2005), Romzek and Johnston (2002) and many other confirm.

2. Outsourcing in Public Organizations: Czech Republic

We map the situation in the Czech Republic via two different field researches in 2011 - 2012, but still some time is needed to process all obtained data. Because of this we have to rely on older data collected by our team. Table 1 provides first original data on small sample of public organisations.

Table 1: Frequency of use of contracting-out of internal services in Czech Republic

Services contracted-out						
Type of organization	Cleaning	Catering	IT systems	Accounting	Legal services	Other
Educational bodies – total 11 organizations	1	2	0	1	0	2
Hospitals – total 4 organizations	3	1	0	0	0	4
Culture – total 5 organizations	2	0	1	0	1	2
Local government offices – total 17 org.	3	0	4	2	6	1
State administration offices – total 19 org.	9	0	0	1	0	1

Note: figures describe number of organizations that contracted internal service.
Source: own research, 2000.

Table 2 provides more recent data from 2009 from bit larger scale with slightly different methodology. From 500 contacted public organisations 162 responded, frequently not to all questions.

Table 2: Frequency of use of contracting-out of internal services – the Czech Republic

Service	Number of responses	Percentage of outsourced services
Cleaning	158	6.96
Catering	25	31.20
Maintenance	132	11.36
IT	125	38.40
Transport	111	18.02
Security	92	26.09

Note: figures describe percentage of organisations that contracted given internal services.
Source: own research, 2009.

From both tables it is visible that outsourcing is relatively frequent solution in all types of public organisations in the Czech Republic. Unfortunately, precise data about outcomes from public sector outsourcing in the country would be available only in late 2012 or early 2013 and we can just show one problem, highlighted by 2008 research – non-competitive awards of contracts to external supplier (Table 3). From 162 organisations that sent their responses to the questionnaire, only 31 responses by public administration bodies can be used (indicating that many organisations do not want to show that non-transparent and non-competitive awards are very frequent).

Table 3: Methods of awarding contracts to external suppliers

Procurement method	Number of organizations	In %
Open tender	0	0
Restricted tender	0	0
Direct award	2	6.45
Small scale procurement	13	45.16
Unclear response	15	48.39

Source: own research.

3. Outsourcing in Public Organizations: Slovakia

3.1. General Characteristics of Outsourcing in Slovak Public Organizations

Because of temporary limited availability of "outcomes" data from the Czech Republic we decided to provide our data from the Slovak Republic. We argue that these data are very much representative also for the Czech Republic (because of joint history and similar approaches to the public sector reforms and management).

The research was realised by our team in 2008 and 2009 and focused on most important dimensions of outsourcing of selected internal services - cleaning, catering, maintenance, IT, transport, and security the scale of outsourcing, deciding about outsourcing and way of selecting supplier, costs and quality of outsourced services. On the base of data obtained, we tried to compare efficiency of outsourced and in house produced services.

Table 4: Final research sample

	Number of evaluated responses
Administrative bodies	30
Education	62
Health care	14
Social care/ services	13
Culture and sports	8
Total	127

Source: own research.

The calculation of efficiency is done by the multifactor analysis, with following main factors:

- unit costs per employee (weight 20%),
- unit costs per production unit (weight 20%),
- quality (weight 30%) – measured by satisfaction of users and
- method of awarding contracts to external supplier (weight 30%) – scale from 100 for open tender to 0 for direct award, in house production = 0).

The planned sample was 300 public organisations from main sub-sectors - education, health care, social care/ services, culture and sport, general administration; unfortunately only 127 organisations responded (Table 4).

Table 5: Selected production units indicators

Service	Indicator
Cleaning	m^2
Catering	Number of users
Maintenance	Number of actions
IT	Number of actions
Transport	Average km yearly
Security	m^2 of protected area

Source: own research.

Because of the purpose of this article we do not provide all findings in absolute figures for all selected internal services (for details see Merickova et al., 2010). The summary data are presented by Tables 6 and 7.

Table 6: Weighted results – efficiency of internal versus outsourced services (all four criteria)

		Administration	Education	Health care	Social	Culture	Total
Cleaning	Internal	63.72	83.32	87.81	-	100.00	83.71
	External	100.00	100.00	100.00	-	94.85	98.71
Catering	Internal	57.65	50.40	100.00	40.65	55.50	60.84
	External	100.00	100.00	87.94	100.00	100.00	97.59
Maintenance	Internal	38.61	73.19	88.20	63.93	77.68	68.32
	External	100.00	100.00	100.00	100.00	100.00	100.00
IT	Internal	53.10	49.79	82.93	63.20	62.35	62.27
	External	100.00	100.00	100.00	100.00	100.00	100.00
Transport	Internal	98.38	55.20	66.66	-	-	73.41
	External	100.00	100.00	100.00	-	-	100.00
Security	Internal	59.88	48.34	72.54	-	51.60	58.09
	External	100.00	100.00	100.00	-	100.00	100.00

Source: own research.

Data obtained by questionnaires indicate that external delivery – outsourcing is more effective solution for most cases. Is this really true?

The first set of problem is, for sure, connected with our methodology, especially with the decision to evaluate in house production as fully non-competitive solution (value 0). To show the impact of such decision, we calculated results only for first three criteria (Table 7). Weights for both cost indicators were set to 30%, quality received 40%.

Table 7: Weighted results – efficiency of internal versus outsourced services (three criteria, award method excluded)

		Administration	Education	Health care	Social	Culture	Total
Cleaning	Internal	94.88	82.48	100.00	-	100.00	94.34
	External	100.00	100.00	70.33	-	94.85	91.30
Catering	Internal	90.09	70.91	100.00	56.50	78.60	79.22
	External	100.00	100.00	87.03	100.00	100.00	97.41
Maintenance	Internal	53.06	100.00	100.00	91.01	100.00	88.81
	External	100.00	90.52	70.01	100.00	85.61	89.23
IT	Internal	75.16	69.76	100.00	63.20	62.35	74.09
	External	100.00	100.00	76.27	100.00	100.00	95.25
Transport	Internal	98.38	51.06	100.00	-	-	83.15
	External	100.00	100.00	93.00	-	-	97.67
Security	Internal	84.94	67.84	100.00	-	51.60	76.10
	External	100.00	100.00	85.16	-	100.00	96.29

Source: own research.

The second even more important problem is the quality of cost data provided by public organisations. First, very few of them use accrual/full cost accounting and because of

this fact, it is impossible for them to know their real costs (normally only direct costs are calculated) – we react to this issue in the last part of this subchapter.

If we abstract from above mentioned limitations, the data collected seems to tell that outsourced internal services are more effective. The consequence should be that outsourcing is the primary form of delivery. The reality is described by Table 8 and may indicate that quite many public organisations do not assess their internal service delivery decisions.

Table 8: Scale of outsourcing (in %)

	Administration	Education	Health care	Social	Culture	Total
Catering	90.00	17.74	21.43	20.00	62.50	42.33
Maintenance	27.59	14.52	35.71	42.86	25.00	29.14
IT	25.00	27.59	42.86	25.00	37.50	31.59
Transport	3.70	15.15	7.14	0.00	0.00	5.20
Security	64.00	42.50	45.45	0.00	42.86	38.96

Source: own research.

3.2. Management of Outsourcing in Slovak Public Organisations

In the following text we investigate selected aspects of „outsourcing management" – selection of external supplier, length of contract, payment methods and ways of monitoring contract. All our data indicate that quality of outsourcing processes is limited. Table 9 shows that non-competitive selection of external suppliers dominates (the same as in the Czech Republic – see previous subchapter).

Table 9: Methods of selecting external suppliers (in %)

	Administration	Education	Health care	Social	Culture	Total
Open tender	14.10	15.25	7.69	0.00	0.00	7.41
Restricted tender	10.26	0.00	0.00	0.00	0.00	2.05
Negotiations	6.41	1.69	34.62	0.00	0.00	8.54
Price bid	10.26	6.78	0.00	40.00	14.29	14.27
Direct award	11.54	10.17	34.62	20.00	0.00	15.27
No information = direct award	47.43	66.10	23.07	40.00	85.71	52.46

Source: own research.

For the competitive selection in the ratio of cases when criterion of the most economically advantageous bid compared to the lowest price criterion is approximately 50:50 (we do not feel that the lowest price is optimum criterion for service contract award).

Another interesting contract management issue is the length of contract – situation is described in Table 10. Proportion of contracts with unlimited length is "fascinating".

Table 10: Lenght of contracts for outsourced services (in %)

Up to one year	24.03
1 – 2 years	9.30
Up to 5 years	13.18
Unlimited contracts	53.49

Source: own research.

Method of payment is also important aspect indicating quality of contract management. Data provided by Table 11 are again not very positive.

Table 11: Method of payment to the external supplier (in %)

Performance based payments	37.21
Combination of performance and fixed payment	6.20
Fixed payment	56.59

Source: own research.

The last issue is contract monitoring. Table 12 again indicates important deficiencies in contract management.

Table 12: Frequency of services delivery monitoring (in %)

Regular monitoring according to contract	23.26
Irregular monitoring according to need	51.94
No monitoring	24.80

Source: own research.

All data above indicate that there exist important problems connected with „outsourcing management" in public organisations. To check the real situation we visited two public organisations in 2008 and we checked all 10 decisions (two organisations times 5 services). For sure, two organisations are not the representative sample, but results are depressive. All ten decisions to outsource or to keep in-house production were wrong, based on almost no ex-ante analysis and costs/quality calculations. The most visible case was IT maintenance in a local government office, where the yearly costs were higher that the market price for all computer stations in the office.

Table 13 provides calculations of selected versus optimum solution in one of these two bodies (several estimates, especially for overheads have been necessary, but the data should be close to reality).

Table 13: Estimated costs for selected versus optimum way of delivery

	Selected form	Estimated yearly costs thousands €	Optimum form	Estimated yearly costs thousands €	Inefficiency level (in %)
Catering	Internal	150.00	Outsourcing	93.00	38.00
Cleaning	Outsourcing	40.00	Internal	27.00	32.50
Security	Outsourcing	79.67	Internal	44.12	44.62
IT	Internal	350.00	Outsourcing	100.00	71.43
Maintenance	Internal	512.49	Outsourcing	300.78	41.31
Transport	Internal	113.84	Outsourcing	66.24	41.81

Source: own research.

Relatively comprehensive picture about outsourcing in the public sector in Slovakia (almost fully valid also for Czech conditions – as already visible from our new research data) may be summarised by following statements. Firstly, outsourcing is relatively frequent solution in the public sector in the Czech Republic and Slovakia. Secondly, global figures indicate that outsourcing should be more effective solution compared to internal delivery. Thirdly, "outsourcing management" processes in public organisations are of very low quality – ex-ante analysis is not regularly realised, unit costs are not known, suppliers are selected dominantly in non-competitive way, contract management is of very low quality.

Such findings are partly contradictory to results of another of our questionnaire (Table 14) – many municipal officers tried to respond in much more positive way compared to reality (for possible explanations see Nemec et al., 2011).

Table 14: Selected responses from municipalities (in %s)

	Strongly disagree /disagree			Agree/strongly agree		
	EST	CR	SR	EST	CR	SR
1. There is strong commitment in my municipality to seek continually improvements in service delivery	3	4.11	7.32	96	95.89	92.68
2. My authority reviews the need for the services we provide at least once every three years.	12	37.20	29.27	87	62.80	70.73
3. Municipal employees are encouraged to question the continued need for each service to be provided.	13	25.79	39.03	87	74.21	60.97
4. My local authority delivers high quality services.	7	18.32	19.51	93	81.68	80.49
5. My authority regularly compares the costs of internal and external delivery alternatives of internal services (cleaning, catering, etc.).	x	17.37	35.37	x	82.63	64.63
6. My authority compares the costs of its services with other local authorities.	5	51.41	45.12	94	48.59	54.88
7. My authority regularly compares the quality of internal and external delivery alternatives of internal services (cleaning, catering, etc.).	x	22.05	35.37	x	77.95	64.63
8. My authority compares the quality of its services with other local authorities.	7	45.98	39.15	92	54.02	60.85
9. In my authority there is a zero level of corruption.	x	5.43	17.07	x	94.57	82.93

Source: Authors` research for Czech Republic and Slovakia in 2008; Tonnisson and Wilson (2007) for Estonia.

4. Outsourcing in the Private Sector in the Czech Republic

To obtain information about practice of outsourcing in the private sector in the Czech Republic we decided to use standard questionnaire based on quantitative research. The questionnaire was sent in the beginning of 2010 to more than 1000 firms from ten selected sectors (agriculture + forestry + fishing, food production, textile production, building, manufacturing, other processing, retail trade, wholesale trade, IT+ telecommunications, other activity). List of firms to be contacted was created on the base of their size and their regional distribution with target to obtain representative sample. The response rate was relatively limited; total of 142 questionnaires are included into the final sample (minimum 14 per selected sector). Such sample is not fully representative, but still provides effective picture of the situation.

The first issue was to find proportion of firms that use contracting. From the total sample 108 firms at the time of research used outsourcing, the rest (24%) did not use contracting in given period, but some of them have had already previous experience.

Outsourced activities

The firms from the first group provided data about types of internal activities/services which are outsourced by external suppliers. Following is list of main categories for which outsourcing is used:

- Area protection – 12.4%,
- Cleaning – 11.5%,
- IT services – 10.6%,
- Work security, logistics, catering – each 8.8%,
- Maintenance, accounting – each 6.2%,
- Waste management, salaries administration – each 5.3%,
- Marketing – 4.4%,
- HRM – 3.5%.

Reasons for outsourcing

The questionnaire used semi-open questions to obtain information why firms outsource. Main standard reasons known from the literature were presented, plus there was open space for describing other reasons available. Listed factors were evaluated as follows: costs reduction: 41%, lack of qualified staff: 13%, transfer of responsibility to supplier: 23%, access to new know-how: 11%, outsourcing activity is branch general practice: 4%.

Especially small firms might be expected to cope with lack of qualified staff for some activities (accounting, IT), but the results of our research do not confirm this. Transfer of responsibility was mainly connected with waste disposal and security services. Very few other reasons for outsourcing were indicated by the sample (e.g. need to focus on core business as contracted firms are more specialized).

Deciding about outsourcing

Decision making processes for outsourcing were significantly correlated with reasons of outsourcing. Because the main goal of firms was costs savings, the core base for decisions was economic calculations of in-house versus external production (64%). Other non-economic parameters were used in 28% of cases. The data suggests that firms normally try to compare their own internal (full) costs with bids of external firms as the main decision making factor. From other methods risk analysis, quality analysis, disponibility of human resources and SWOT analysis were mentioned. If we summarize all responses, the findings are as follows: 39% of firms use only economic calculations to decide about outsourcing, 22% of firms use only non-economic calculations to decide about outsourcing, 37% of firms use complex (economic and non-economic) calculations to decide about outsourcing, 2% of firms do not use any ex-ante analysis to decide about outsourcing.

Structure of used methods for decision does not depend on size of a firm; all firms that do not use ex-ante analysis belong to small and medium enterprises group. The methods used also do not depend on type of the outsourced activity/service.

Some firms realize complex assessment of potential supplier already during ex-ante evaluation process (few of them as the main criterion for outsourcing decision). Main criteria are timelines, prices, volume of supplies and quality references. The open question is if such evaluations should be part of tender and not of ex-ante analysis.

Body making decision about outsourcing in firms differs significantly – owner, top management, delegated person, project team. Only in 15% of cases specialized project team was created. In many cases – 51% of firms (almost all small and medium firms) – did not designate any concrete person to be responsible for process of decision making.

Selection process

Tender of outsourced activities is generally compulsory in the public sectors and one might expect that this would be dominant strategy in the private firms too, dealing with their own resources. However, the results of our research do not confirm such assumption. Open or restricted tender was used only in 57% of cases (average number of competing firms was in majority of cases only 2-3, thus competition was not guaranteed), direct selection in 27% of cases and in 13% of cases the outsourcing was realized as the response to the concrete offer by external firm.

Contract management

Findings in this category are also relatively surprising. About 26% of firms stated that they do not sign contracts with external supplier. Most of contracts were signed for unlimited period of supply. The question is obvious – how to penalize non-compliance if the contract does not exist? Responses from firms also indicate that regular systematic control of results achieved by outsourcing is not always in place. Control processes during contract realization focus dominantly on costs analysis and supplies evaluation (timelines, scope and quality).

Opinion of firms about outsourcing

The firms were also asked to provide their global opinion about outsourcing, based on their data and experience. Results are as follows: outsourcing is economical decision – 60%, outsourcing is effective because of non-economic reasons – 34%, outsourcing is non-economic solution – 3%, outsourcing is not effective because of others (non-economic) reasons – 3%.

The results indicate that Czech firms have very positive opinion about outsourcing and also really positive experience with outsourcing (79% of firms evaluated their outsourcing experience as positive), and accept this method mainly as cost-containment tool. Main experienced pros and cons of outsourcing are summarized in Table 15.

Table 15: Opinion of Czech firms about pros and cons of outsourcing (in %)

Pros of outsourcing	Frequency of answers
Cost containment	28
Possibility to focus on "core business"	19
Savings – labour	11
Transfer of responsibility	11
Increased flexibility	6
Better access to information	6
Quality improvements	6
Fast recruitment of new employees	3
New technologies	3
Know how	3
Time savings	3
Cons of outsourcing	
Implementation problems	6
Information leaks	6
Delivery problems and difficulties to handle them	3
Misuse of internal information	3
Limited availability of representatives of supplier	2
"Human factor failures"	8

Source: own research.

Reasons for not using outsourcing

Second part of our questionnaire was for firms that do not use outsourcing. These firms were asked to provide reasons for their decisions. The most frequent argument was that outsourcing is non-economic solution (almost all firms answered in such way). The second important argument was that there are no activities/services to outsource (50% of responses). Other reasons mentioned were: limited information about outsourcing, limited supply, risks and lack of trust.

Only one firm with previous experience with outsourcing stated that the main reason is bad experience (supplier in IT area misused access to internal information). This firm does not plan any outsourcing in future.

5. Comparing Outsourcing in the Private and Public Sector

As indicated in our introduction, knowing that the public sector approaches to outsourcing include many reserves (highlighted by data provided in the analytical part of our text), we tried to check if the private sector practice can serve as the positive benchmark and learning source for public organisations. This can be only partly confirmed.

The data collected in the Czech Republic, despite of limited size of our sample, indicate two core facts. First, outsourcing is relatively frequently used by private firms in the country. Second, we may see that "quality" of implementation of outsourcing in the private sec-

tor in the Czech Republic is a bit limited. In comparison with more developed countries, most firms use outsourcing as cost savings method and are not aware of more complex (mutual) benefits connected with outsourcing. Many firms do not use fully systematic approach to outsourcing process. Ex-ante analysis, outsourcing project preparation are frequently very amateur processes, mainly in small and medium size firms.

Selection of supplier is not sufficiently competitive. Contract management failures are also visible. Despite of all realization problems, Czech firms trust outsourcing; important majority of them feels that outsourcing is positive tool supporting their global performance.

In brief this means that the situation in the private sector is only slightly better compared to public practices of outsourcing. Even private managers, especially in small and medium firms, do not have sufficient knowledge and skills to manage outsourcing decisions and operations. If we include the factor of much higher potential to corruption and "channelling" in the public sector, it cannot be surprise that such large reserves are highlighted by our data.

Conclusions

Our main goals are to improve the micro-economic theory about outsourcing in conditions of Central European economy with its important (post-transitional?) specifics and to draft management models for processes of outsourcing in public organizations, on the base of main factors identification influencing the efficiency of outsourcing in the respective branch (with focus on the Czech Republic).

The paper is based on analytical data about outsourcing in the public and private sectors in the Czech Republic and Slovakia. Its main conclusions are straightforward. Outsourcing in the public sector is frequently used solution, with obvious potential, which is significantly limited by large scale implementation/contract management problems and corruptive behaviour of some public officials. Unfortunately, private sector approaches cannot be commonly used as examples of best practice and direct learning source – private firms have very positive attitudes to outsourcing, but many of them are not sufficiently aware about the complexity of outsourcing processes and tools to deal with it.

Acknowledgement

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Science Marketing in the Czech Republic
Marketing vědy v České republice

MARTIN PODAŘIL

Connection between marketing and science is not very common. There are just a few books and articles about it. It's because Science marketing is a quite new discipline. In 2011 the Science Alliance organized the very first international conference on Science marketing in Netherland[1].

Science marketing is a process by which research organizations create technologies or knowledge for customers and build strong customer relationships in order to capture value from customers in return[2]. Who are the costumers? In a science marketing we have three main target groups. The first is application sector (companies). The second is government or science funders and the third is society in general.

Good quality marketing can bring research organizations additional finance through the sale of technology or knowledge (licenses, patents, utility models, etc.) to the application sector. Being seen in a good shape means also additional resources from the state budget.

Science and its results should be shown to the general public so the society know how meaningfully are used money from their taxes. Another reason for the promotion of science to the public is to attract talented young people to study science and eventually become a scientist or researcher.

Science marketing is by the most research organizations perceived as inefficient, unnecessary and money wasting. There is distrust and therefore a resistance to it. Important and relevant information like science topics market research and market intelligence is missing. Integrated marketing communication like professional visual style, corporate identity, high quality web pages, clear key messages, structured offers or champion scientists usually does not exist.

Research organizations and its results are often presented unprofessionally. Internal processes for cooperation with companies are in most organizations not set up, causing unsystematic and non-conceptual sell of research and scientific outcomes. There is also lack of communication with the general public. All these negatives are caused by the lack of experts.

While state support for science is declining, it is necessary to find another sources of financing (diversification of sources), thus the effort to enhance funds from elsewhere – by the sale of scientific outcomes to the application sector and by the technology transfer. Additionally, large projects from Research and development for innovations Operational

1 Science marketing konference (2011).

2 Podařil, M. (2012).

Programme are approaching its sustainability terms and will therefore need to "sell" the capacity and the results. For a successful sale is desirable to have a ready-quality marketing mix.

For the research organization is absolutely necessary to be identifiable by the application sector in order to offer and sell them the scientific results and outcomes. Research organization should have a good image, should be known as a reliable partner. This can be achieved through integrated marketing communication with the outside world (via website, promotional materials, PPT presentations, videos, newsletters, profiles on social network sites, blogs, etc.), organization brand building, uniform visual style and brand personality - a top scientist (so-called champions) and through presenting the scientific results and major research projects. Of course everything professionally processed. On the other hand, it is also necessary to communicate with the general public and to popularize science.

I believe that Czech research organizations can't succeed in a global world without quality science marketing. They have basically three options. The first is to hire foreign science marketing experts. The second is to cooperate with a professional marketing agency and the third is to educate and bring up own marketing experts. The financial costs of the first two options are high. The third option is a long term solution but in my opinion the best one. It is up to each organization to choose the way. But one thing is sure. The research organizations cannot survive in the knowledge economy without the marketing approach. The competition is huge and never sleeps.

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Otakar Schlossberger: Payment Services
Otakar Schlossberger: Platební služby

PETR DVOŘÁK

Otakar Schlossberger. Platební služby [Payment services]. The First Edition. Praha: Management Press, 2012. ISBN 978-80-7261-238-3.

Payment system has always been and will be one of commercial banking mainstay. From an relatively simple payment transactions and instruments, mainly due to the rapid development of new technologies, expansion of international trade and tourism and euro implementation has now extensive and in terms of economic, legal and technical complex area, cross-border banking.

Payment Services - Monograph by Otakar Schlossberger - finally fills a major gap on the book market which there existed for a long time, and allows a wide range of readers in detail enter into the mysteries of modern payment instruments and national and international payment systems.

A guarantee that the reader takes in the hands quality publication is already the author name itself. Otakar Schlossberger has been dedicated to payment system for more than twenty years. During his extensive career, he has worked in management positions in the section of payment system of commercial banks, where he met the practical side of the payment system operation, in a wider context he had the opportunity to see the area within his activities in the Commission for payment system of the Czech Banking Association, not the least he formed the practice of extrajudicial settlement of disputes arising from the payment system as the first financial arbiter. In addition, for many years he also operates in the academic sphere, which positively reflected in the monograph didactic level. Undoubtedly a very important role played also the fact that the combination of economic and legal education enabled him to pursue the issue of payment system balanced in economic and legal terms.

The main benefit of this monograph can be seen in my opinion that gives a detailed and complex explanation of the payment system from the economic and legal perspective. Just detail with which the author deals with various topics, while an interpretation based on a valid legislative regulation allows to become familiar with payment services, systems, and their regulation, not only those who are more users of these services, but it will certainly be a valuable resource for all who work in the payment system and need to know all the necessary details including the legal aspects, i.e. practitioners. E.g. very helpful for them may be the fact that they will find clear answers to a number of important questions that may be met in everyday practice. However, the author does not forget the historical context and shows the current situation in the context of development of the payment system in the broader context of the development of economic, legal and political, and ultimately, it is particularly valuable for students who can meet not only the current prac-

tice of payment services, but a deeper understanding how this practice gradually were created and what and how it was affected.

The monograph is divided into nine chapters. These first two chapters give an overview of the basic legal norms regulating the payment system and the definition of the most important concepts, which we further meet throughout the publication. The extensive third chapter deals with the payment account, which is the basic product of the providing payment services. Already in this section it is evident that interpretation does not only offer product description, but offers also erudite legal interpretation, with notices with a number of very practical questions that may occur in the context of payment account. The fourth chapter defines and explains the elements that the orders for executing payments services must contain. The fifth chapter describes the basic instruments used within the payment system - in addition to cash transactions they are domestic and foreign transfers and payment cards, including electronic money. Regarding the regulation, which provides the law on payments to providers of payment services, the sixth chapter describes the entities which can provide payment services and especially the conditions under which they can obtain license to provide these services. The seventh chapter deals extensively on payment services related to internal payments system, which not only closely regard to payment services, but also to payment systems ensuring their implementation. In the eighth chapter, the author then logically follows the interpretation of the international payment system, particularly focusing on the current situation in the area of payment system in the EU. The completion of a monograph in the ninth chapter is dedicated to an extrajudicial settlement of disputes in payment services and the role of the Financial Arbitrator. There is of course, a detailed index, English abstracts and links to important resources.

What to say in conclusion? We can only recommend this book to all bankers and clients, but of course, to business school students. It will show them not only economic and legal complexity of contemporary payment system, but what is essential, allowing them to understand this complex system and its segments, and instruments thoroughly.

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PREVIEW /PŘIPRAVUJEME:

Next issue of the journal ACTA VSFS will focus on the public economy in particular. It will contain papers on the taxation of non-residents, on budget transparency and fiscal performance and quality management in the public sector. The last paper is devoted to the development of the economic sector of self-employed in recent years in the Czech Republic.

Další číslo vědeckého časopisu ACTA VŠFS se zaměří zejména na veřejnou ekonomiku. Bude obsahovat stati o zdanění nerezidentů, o rozpočtové transparentnosti a fiskální výkonnosti a o řízení kvality ve veřejném sektoru. Poslední stať je věnována vývoji ekonomického sektoru OSVČ v posledních letech v ČR.

INSTRUCTIONS FOR AUTHORS /POKYNY PRO AUTORY:

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

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

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