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e-mail: kapounek@ejobsat.cz

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LABOUR TURNOVER, EMPLOYMENT DENSITY AND EMPLOYER PROVIDED TRAINING: EVIDENCE FROM VIENNA

Francisca Bremberger[1], Rudolf Hochholzer[2], Peter Huber[3,4]

[1] *Vienna University of Economics and Business*
[2] *Wiener ArbeitnehmerInnen Förderungsfonds*
[3] *Österreichisches Institut für Wirtschaftsforschung*
[4] *Mendel University in Brno*

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ABSTRACT

We analyse the impact of regional and sectoral labour market characteristics as determinants of the supply of employer financed training using a unique data set on employer provided training in Vienna. According to the results labour turnover has a robust negative impact and employment density a slightly less robust but also negative impact on the probability of a firm to provide employer financed training. Policies directed at increasing employer provided training may therefore face substantial challenges in sectors and regions with high labour turnover and employment densities. These challenges are likely to be even larger when it comes to providing employer financed training for less skilled workers.

KEY WORDS

employer financed training, urban labour markets, density

JEL CODES

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1 INTRODUCTION

One of the central predictions of human capital theory (Becker, 1964) is that employers pay for training in firm specific human capital, while employees pay for training in general skills. Although this prediction has been refuted in many empirical investigations economists until recently did not realize how strongly it hinges on the assumption of a frictionless labour market. If this assumption is relaxed (as for instance in Acemoglu, 1997; Acemoglu and Pischke, 1999) employers will have an incentive to also finance general training. Since these seminal contributions, quite a few articles have attempted to test the so called Acemoglu-Pischke model (see e.g. Brunello et al., 2005 and Leuven, 2005 for surveys). These papers mostly confirm its' predictions.

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One consequence of the Acemoglu-Pischke model is that the incentives for enterprises to finance general training depend on the sector and regional labour market conditions in which employers operate. Brunello and Gambarotto (2007) and Brunello and de Paola (2008) argue this point at the example of employment density. They suggest that a high employment density in a region will generate positive knowledge spillovers, so that – all else equal – firms will be more productive in denser labour markets. If the gains from training are complementary to productivity this will also increase training incentives for firms in denser labour markets. This is, however, countered by the fact that workers are also more likely to be recruited by other employers in denser labour markets. This so called poaching effect (Moen and Rosen, 2004; Majumdar, 2006 and Lene, 2002) reduces employers' training incentives. Both Brunello and Gambarotto (2007) as well as Brunello and de Paola (2008) find a significant negative correlation between local labour market density and employer financed training activities in Italy and Great Britain. The positive effects of knowledge spillovers thus do not seem to be strong enough to dominate the negative effects of the higher poaching risk in denser labour markets.

One contribution of the current paper is to show that similar countervailing tendencies can arise with respect to labour turnover. For instance Fallick et al. (2006) argue that increased labour turnover on the one hand increases the probability of a worker to leave an employment relationship. This would reduce training incentives for firms. On the other hand mobility of in particular high skilled-workers, can act as a form of knowledge transfer. If this knowledge transfer increases the productivity of employers and if, as before, returns to training increase with productivity this will once more increase training incentives. Thus if the positive incentive effects of labour turnover dominate the negative ones, increased labour turnover could also lead to higher employer financed training in a region.

In the face of these countervailing theoretical predictions, a second contribution of this paper is to use a large scale employer level survey to empirically test whether high employment density and/or high labour turnover in an industry is associated with higher or lower training activities of employers. A third contribution is to analyse whether these variables have a differential impact on the probability of an employer providing training for high and low skilled workers, respectively. This has important policy implications as the results inform policy makers whether high employment density and turnover labour markets have particular difficulties in securing a sufficient level of participation in lifelong learning. In the conclusion, aside from providing suggestions for future research, we therefore also discuss whether regional governments in such places need to provide additional incentives for training to firms or individuals to achieve life-long learning goals.

2 THEORY AND HYPOTHESES

The starting point of our analysis is a simplified version of Acemoglu's (1997) model. This models an imperfect labour market on which employers in a first period decide on a training intensity τ, which can be obtained at a cost of $c(\tau)$. After this initial period a share of s workers leaves the firm and is replaced by workers from other firms. In the second period, the (self-trained and newly recruited) workers produce output and receive a share of β of what they produce in the form of wages.[1] Following Brunello and de Paola (2008) we assume that the productivity of workers (y) in this second period depends on a series of region, industry and firm specific characteristics (x) and on the level of training received in the first

[1] This share can be considered to be the result of wage bargaining between employers and workers at the beginning of the second period, with β the bargaining power of workers. It is thus determined by institutional factors.

period such that $y = y(x)\tau$.[2] The separation probability s, by contrast, depends on a number of (potentially different) region, industry and firm specific factors (z), i.e. $s = s(z)$.

Acemoglu (1997) shows that under these assumptions the expected second period profit (β) of employers in the first period can be written as:

$$\prod = \frac{[1-s(z)](1-\beta)y(x)\tau}{1+r} + \\ + \frac{s(z)(1-\beta)y(x)\overline{\tau}}{1+r} - c(\tau). \quad (1)$$

Profits thus are equivalent to the, discounted (by the market rate of interest r) and retention probability weighted, sum of the profits when the employee, who received τ units of training in the first period, stays with the employer in the second period $(1-s)(1-\beta)y(x)\tau$ and the expected profit if the worker has to be replaced by a worker from another firm, who has the average amount of training prevailing in the region $(\overline{\tau})(s(1-\beta)y(x)\overline{\tau})$, minus the costs of training $c(\tau)$.

The firm maximizes this expected profit (under the assumption of a given $\overline{\tau}$) by choosing the optimal training level (τ^*). Thus the optimal level of training provided in the first period solves:

$$c'(\tau^*) = \frac{[1-s(z)](1-\beta)y(x)}{1+r}. \quad (2)$$

Under the assumption of positive and increasing marginal costs of training (i.e. $c'(\tau^*) > 0$ and $c''(\tau^*) > 0$), by equation (2), the optimal intensity of training in period one (τ^*) is positively related to the firms' productivity (y) and negatively to its labour turnover (s). As a consequence all elements of the vector x which increase a firm's productivity also increase the intensity of training. By contrast, all elements of the vector z that increase labour turnover reduce the intensity of training.

Different theoretical contributions suggest different factors (x and z) that may impact on productivity and labour turnover. Thus a number of contributions to the theory of economic geography (e.g. Fujita et al., 1999) and urban economics (e.g. Glaeser et al., 1992) propose that different kinds of externalities (triggered by the density of labour markets) drive the localisation of industries and the productivity of firms in a region. Following this proposition Ciccone and Hall (1996) and Ciccone (2002) find that the productivity of firms – all else equal – increases with labour market density, while Glaeser and Mare (2001) show that regions with higher employment density also have more efficient labour market matching and thus also higher labour turnover.

Brunello and Gambarotto (2007) and Brunello and de Paola (2008) build on these findings by presenting a model in which high employment density increases productivity either through specialisation advantages or through knowledge spillovers. This increases firms' incentives to train workers. At the same time, however, the poaching risk is higher in denser labour markets. This reduces training incentives for firms. As a consequence the effect of employment density on firm funded training is ambiguously signed.

Other strands of the regional and industrial economics literature (e.g. Saxenian, 1996) argue that in particular in high technology sectors labour mobility contributes to productivity increases. As non-codified knowledge is bound in workers, mobility of workers between firms leads to knowledge transfer. This will lead to learning effects on the side of the receiving firms and thus increase productivity. Fallick et al. (2006) model this channel of knowledge transfer. In their model increased labour mobility on the one hand, by definition, increases the probability of workers to leave firms, but on the other hand, by fostering exchange of knowledge, increases productivity. Thus the impact of labour turnover on firm level training incentives is also ambiguous, as increased turnover reduces training incentives

[2] The functional form of this production function assumes that more productive firms profit more strongly from training than less productive ones. This complementarity is central to the results below as the positive correlation between productivity and training applies only if the productivity of a firm is determined by a function $\gamma(y,\tau)$ for which $\frac{\partial^2\gamma}{\partial y \partial \tau} > 0$.

while the increased productivity increases them. Similar arguments could also apply to other variables related to the structure of a sector at a location. For instance Porter (2003) argues that the competitiveness (and productivity) of firms depends on the intensity of product market competition in its location. Yet, higher product market competition is also likely to lead to higher labour market competition which, in turn, may once more increase labour turnover. This will lead to similar countervailing effects of the intensity of product market competition on employer financed training as for employment density.

In addition, the empirical literature has identified a number of further variables that determine the intensity of employer financed training, which will also be considered in the current contribution. For instance many studies (e.g. Katz and Ziderman, 1990; Chang and Wang, 1996) identify firm size as one of the most important determinants of the probability that a firm finances training for its employees. Larger employers provide more training than smaller ones. Some contributions also find a connection between the organisation of a firm and the likelihood that it offers firm provided training. According to Elias and Healy (1994), Schüler and Meyer (2006), and Hughes et al. (2004) multi-enterprise corporations as well as export oriented and foreign owned firms provide more training than others.[3] Similar findings apply to more innovative firms (Arulampalam et al., 2004 and Brunello et al., 2005), with the type of innovation having an important impact on both the type and extent of training, as product and process innovations require different types of training and often have to be targeted at different participants. The link between investments and employer financed training is less clear cut. Schüler and Meyer (2006) find no significant impact of total firm level gross investments on the probability of employer financed training but an important impact of the structure of investments. In particular ICT investments increase the training probability at a firm (see Lynch and Black, 1998 for similar results). In addition Brunello et al. (2005) find important business cycle effects on training probabilities, with training being less frequent in boom phases of the business cycle than in recessions. Mühlemann et al. (2007), by contrast, show that firms facing problems in finding qualified employees train more frequently than others.

A number of analysts also argue for a link of the employment structure of a firm and its probability to provide training to its employees. This applies in particular to the link between the average educational attainment of firms' employees and the probability of employer financed training. From a theoretical perspective this link could be positive (if more highly educated workers are more efficient at learning) or negative (if highly qualified staff needs more expensive trainings to profit from new knowledge). Most of the empirical literature, however, finds a significantly positive correlation (Asplund, 2005).[4]

Finally, regional and sectoral characteristics could also have a differential impact on the provision of employer financed training for high and low skilled workers. In particular – although previous literature has seldom analysed this issue – one could hypothesize that the knowledge externalities that trigger positive effects of labour turnover on firm level productivity are likely to be more relevant for highly qualified workers, that also have more knowledge to share, than the less qualified workers. The negative effects of increased turnover and poaching risks, by contrast, could apply more strongly to less qualified workers. This would lead to a less positive (more negative) impact of all regional variables on the probability of employer financed training for less than for high skilled workers.

The theoretical and empirical literature thus provides two empirically testable hypotheses on the impact of regional and sector labour market characteristics on the supply of employer financed training. The first is that labour

[3] Schüler and Meyer (2006), however, find no significant impact of exports on the probability that a firm offers employer financed training.

[4] As an exception Ariga and Brunello (2006) find a negative correlation in Thailand. This is explained by the specific development of Thailand and the substantial need to train the less qualified in this country.

market density, turnover and labour market competition should have an impact on the supply of employer financed training by the firms in a region, although the sign of this impact is ambiguous. The second is that this impact is smaller for less than for high skilled workers.

3 DATA AND DEFINITIONS

3.1 The Vienna Employment and Qualification Monitor

The current study aims to empirically analyse these hypotheses for the city of Vienna. This case study is of particular interest as Vienna – after taking into consideration interaction with the areas of Lower Austria – is a clearly delimited region that accords more closely to a regional labour market than the countries considered in most other studies. It is also interesting because according to the unanimous results of previous research (e.g. Huber et al., 2002; Mayerhofer, 2007) Vienna is marked by a particularly high employment density, strong labour market competition and a high turnover of workers and thus provides an ideal testing ground for these hypotheses.

We use the Vienna Employment and Qualification Monitor (WAFF-VEQM) as a primary data source. This is a questionnaire conducted by the Vienna Employment Agency (WAFF) among chief personnel managers, persons responsible for personnel management or (plant) managers or owners[5] among 500 Viennese enterprises with at least one employee each month in the time period 2003 to 2007.[6] In telephone interviews, these firms were asked questions referring to their vacancies, personnel management strategies, employee training activities and expectations in the next year. The sampling of this questionnaire – with the exception of a small share of very large enterprises, which were interviewed each time – was based on a revolving random sample drawn from a CD of the telephone numbers of all Viennese enterprises (the Herold Business CD). Enterprises in the non-market service sector (public administration, health and education) were excluded from the sample. Although this excludes a substantial part of the employees in Vienna, the dataset thus collects a representative sample of annually slightly more than 6,000 enterprises, of the Viennese private sector employers. It thus provides information on a large set of enterprises which are arguably most likely to exhibit the behaviour modelled in our underlying theoretical model. In addition the disproportionate stratification, which undersamples employers with up to 5 employees in favour of employers with more than 100 employees, implies that we have a de facto full inventory count of the larger enterprises in Vienna. This is justified by the small number of large enterprises in Vienna, which in total account for only 10% of all employers in the city.

Tab. 1 displays the number of observations and the distribution of the sample by employer characteristics for the years 2003 to 2007. Of the 24,262 interviews conducted in this period around 20% concerned manufacturing employers and around a third was with employers in the trade and repairs sector. A little less than half of the interviewed employers were associated with other service sectors. Comparing this with the Viennese sector structure reported in the Austrian structural enterprise statistics[7], manufacturing and trade enterprises are slightly oversampled at the expense of

[5] In 62% of the cases the owner or chief manger was interviewed, in 17% the personnel manager responded and in 22% the this was the highest ranking person responsible for personnel management.

[6] In 2003 only two waves were collected and in 2004 only 10. Therefore in total 48 waves are available.

[7] This is the only official data source allowing for an evaluation of the enterprise structure on a regional level in Austria. According to this source 12% of the enterprises (including those which have no employees and are thus not sampled in the VEQM) are active in manufacturing and 26% in trade. Around 61% operate in other service industries.

Tab. 1: Sample size and distribution of employers in the Vienna Employment and Qualification Monitor

	2003	2004	2005	2006	2007	Total
Sector						
Manufacturing	20.3	19.1	19.9	20.1	19.9	19.8
Trade and repairs	31.8	33.4	33.0	33.9	33.8	33.5
Services	47.9	47.5	47.1	46.0	46.3	46.7
Employer age (in years)						
Less than 5	7.7	5.9	4.1	3.4	2.9	4.2
5 to 10	17.1	21.0	19.4	17.0	17.2	18.5
10 or more	75.2	73.1	76.5	79.6	79.9	77.3
Number of employees (persons)						
Less than 5	32.9	34.6	32.2	35.8	39.0	35.3
5 to 19	33.8	33.1	33.7	32.6	31.8	32.8
20 to 99	23.3	23.6	24.4	22.9	21.7	23.1
100 to 249	6.1	5.1	5.7	5.3	4.7	5.2
250 and more	3.9	3.6	4.0	3.5	2.8	3.5
Total	987	5,077	6,083	6,066	6,049	24,262

Source: WAFFy Vienna Employment and Qualification Monitor (WAFF-VEQM).

enterprises in other services. This can be explained by the large share of enterprises that do not have an employee in the service industries; as such enterprises are not sampled in the WAFF-VEQM. Consistent with the structure of the Viennese economy, the majority of the enterprises sampled have less than 20 employees, with 35% of these enterprises belonging to the group of micro-enterprises (with less than 5 employees). The segment of small firms, which is of particular relevance in the Viennese economy, is thus well represented in the questionnaire with the data providing close to 4,000 observations on such enterprises. The equally important segment of young firms is, however, less well represented. Only around a fifth of the enterprises were founded less than 10 years ago. This is due to many young enterprises not (yet) having an employee and thus not being part of the sampling in the WAFF-VEQM.

The WAFF-VEQM also asked employers on whether they were active internationally or only nationally, whether they had a product or process innovation in the two years preceding the interview or were subjected to a reorganisation, if they were a part of a multi-enterprise corporation and if they employed mainly highly or lowly qualified workers as well as if the majority of their workers had a high school diploma. For the purpose of this study the most important question asked, however, concerned employer provided training. In this employers were asked whether their company had offered professional training courses in the last 12 months. Respondents could answer to this by stating that they had undertaken such courses for highly qualified, for less qualified or for neither, with less qualified workers being defined as workers who had compulsory education or less. We therefore code enterprises that conducted training in the last 12 months for either high or low skilled workers as employers with training and those who had no such training as employers without training. Furthermore, we also code two further variables which separately indicate whether a firm did or did not conduct training for highly or less qualified, respectively. These three variables (i.e. the indicator for providing training overall, for high-skilled, and for low-skilled) are the dependent variable in our econometric analysis below.

In this econometric analysis the WAFF-VEQM is also used to construct a series of control variables. In particular, in accordance with the literature cited in the previous sec-

tion, we use the logarithm of the number of employees and its square, indicator variables for whether the employers existed for 5 to 9 years or 10 or more years (with employers that have existed for less than 5 years as the reference group) and for whether the employer is part of a multi-enterprise corporation or is internationally active. In addition we construct indicator variables for employers that either employ mainly highly qualified or an about equal amount of highly and less qualified employees (with employers employing mainly less qualified as the base category). Similar variables are also included for employers that mainly employ workers with high school diploma or about an equal amount of employees with and without high school diploma (with employers, employing mainly employees without a high school diploma as the base category). Finally, also the economic situation of the employer is considered by including a total of 48 wave dummies (which measure the business cycle situation common to all enterprises), a variable measuring the vacancies as a share of total employment (as an objective indicator of future employment developments) as well as a series of indicator variables on the expected future development of the employer.

3.2 The Austrian Social Security Data

The WAFF-VEQM also collected information on the industry affiliation of employers at the NACE 4-digit level. This allows merging this data with information from the Austrian Social Security Data (ASSD). This is a much used administrative dataset for labour market analysis in Austria (see Card et al., 2007 and Ichino et al., 2007 for applications and Schöberl, 2004 for a description). It reports detailed information on the beginning and end date of all employment relationships held by all Austrian employees since 1970. These data therefore allow for a measurement of labour turnover, as well as the NACE 4-digit and regional affiliation of an employer.[8] For the current paper these data were used to calculate the number of employers and employees in a NACE 4-digit industry and province in Austria as well as the number of employment relationships that were terminated or taken-up within a year in a NACE 4-digit industry and province in Austria. From this we calculated indicators related to the employment density, the intensity of labour market competition and labour turnover of a NACE 4-digit industry in a particular province.

To measure the intensity of labour market competition we on the one hand assume that labour market competition among employers increases with the number of potential employers working in a NACE 4-digit industry in Vienna and use the logarithm of the number of employers located in a province and its' square. On the other hand we use the logarithm of the Herfindahl-Hirschmann-Index (HHI)[9] on employment shares of employers within a NACE 4-digit industry. This is used because previous literature (e.g. Glaeser et al., 1992; Henderson et al., 1995; Combes, 2000) shows that – given the size of an industry – industries with a large number of small firms (i.e. where the HHI is small) experience more intense labour market competition than industries with only a few large and many small employers (where the HHI is large). To measure labour turnover we use the sum of all employment relationships that were either terminated or started in a NACE 4-digit industry in a year in % of the employment of that industry. This indicator (see Huber and Smeral, 2006) is referred to as labour turnover. To measure the employment density, the logarithm of the employment share of a NACE 4-digit industry in total employment in Vienna is used. This variable is referred to as the industry employment share. Finally, to control for time-invariant NACE 4-digit characteristics, which cannot be observed in our

[8] These data are cleaned from labour turnover arising for purely administrative reasons at the Austrian Institute for Economic Research.

[9] The HHI is the sum of the squared employment shares among firms in an industry and region. It thus measures the inequality of the firm size distribution in a region and industry, with the minimal value of $1/n$ (with n the number of firms in the industry of a region) indicating complete equality and the maximum value of 1 indicating strong inequality.

Tab. 2: Descriptive statistics and variance decomposition of sector characteristics

	Total	Variance total	Variance across sectors	Variance across years
Labour turnover	1.094	1.081	0.988	0.435
ln (Industry share)	−6.783	1.792	1.723	0.168
ln (Employers)	3.743	1.591	1.572	0.135
ln (Herfindahl)	−1.887	1.247	1.242	0.181
		Total	**Sectors**	**Years**
Observations		1,305	261	5

Source: Austrian Social Security Data (ASSD)

data, we also include a set of NACE 4-digit industry dummy variables.

Tab. 2 shows the descriptive statistics for these variables. These confirm the high labour turnover prevailing in Vienna also found in other studies (e.g. Huber et al., 2002). In the average of all NACE 4-digit industries this labour turnover exceeds 100%, with the average labour turnover being driven up by the high turnover in a number of important industries (such as for instance construction or tourism). In addition these statistics also show that the industry characteristics used in this study do not vary very strongly across time periods, as only around 10% to 40% of the total variance in all indicators is due to the variability of the indicators over time.[10]

3.3 Descriptive Analysis

Tab. 7 (in the Annex) provides a detailed definition of for all variables in our analysis (except for wave and industry dummies) and Tab. 3 shows the descriptive statistics separately for all employers, employers with training and employers without training. It also reports results of a t-test testing for whether enterprises with and without training statistically significantly differ from each other for these variables. Due to the large number of observations, these t-tests indicate statistically significant differences for all variables. Consistent with previous results, the quantitatively most important of these are that employers providing training are larger and have better qualified employees than employers not providing training. Among the employers providing training, the share of employers that mainly employ employees with a high school diploma is 44%, among employers not providing training it is only 29%. Employers providing training are also more often a part of a multi-enterprise corporation (39%) and are more often active on international markets (40%) than employers not providing training. In addition employers providing training are also more innovative (both in terms of product and process innovation), have experienced restructuring more often, invest more often (in particular in ICT) and are also more optimistic about their future. In terms of firm age and the share of vacancies in total employment the differences between employers providing and not providing training are, however, somewhat smaller. With respect to the variables of central interest for this paper (industry share, labour turnover, HHI and number of enterprises) employers without training more often operate in NACE 4-digit industries with higher labour turnover, lower industry share, more employers and a lower Herfindahl-Hirschmann-Index.

[10] This low variability over time causes analytic problems as our industry characteristics are highly correlated with other time invariant NACE 4-digit characteristics (captured by industry dummies). As a consequence similar estimations as below were also conducted including only NACE 3-digit industry dummies. This leaves qualitative results unchanged. We, however, give preference to the specifications reported in this paper, since the Akaike information criterion suggest controlling for NACE 4-digit dummies. In section 4.3 we, however, also report one additional specification using NACE 3-digit dummies to illustrate the robustness of our results.

Tab. 3: Descriptive statistics

	All		With training		Without training	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Training	0.44	0.50				
Turnover	1.19	1.00	1.07***	0.87	1.28	1.08
ln (Industry share)	−0.14	0.75	−0.05***	0.76	−0.20	0.74
ln (Herfindahl)	−3.22	1.44	−3.08***	1.39	−3.32	1.47
ln (No. employers)	5.58	1.66	5.48***	1.63	5.67	1.67
ln (Size)	2.28	1.53	2.98***	1.53	1.73	1.30
Employees mostly High School Dipl.	0.35	0.23	0.44***	0.25	0.29	0.20
Employees mostly without High School Dipl.	0.54	0.50	0.44***	0.50	0.62	0.49
Employees about equal with & without	0.11	0.31	0.12***	0.33	0.10	0.29
Employees mostly low qualified	0.13	0.11	0.06***	0.06	0.17	0.14
Employees mostly highly qualified	0.72	0.45	0.80***	0.40	0.66	0.47
Employees about equal high and low qualified	0.15	0.36	0.13***	0.34	0.17	0.38
Part of a company	0.27	0.44	0.39***	0.49	0.18	0.39
Internationally active	0.29	0.45	0.40***	0.49	0.21	0.41
Firm age <5 years	0.04	0.04	0.03***	0.03	0.05	0.05
Firm age 5–9 years	0.19	0.39	0.17***	0.38	0.19	0.40
Firm age 10 and more years	0.77	0.42	0.79***	0.41	0.76	0.43
Invested in computers	0.47	0.50	0.62***	0.48	0.36	0.48
Invested in production	0.06	0.23	0.08***	0.27	0.04	0.20
Other investments	0.28	0.45	0.38***	0.49	0.21	0.41
Product innovation	0.16	0.37	0.23***	0.42	0.11	0.32
Process innovation	0.09	0.29	0.14***	0.35	0.06	0.24
Firm reorganisation	0.25	0.43	0.36***	0.48	0.16	0.37
Vacancies/employee	0.02	0.07	0.016**	0.07	0.018	0.08
Very optimistic about future	0.17	0.14	0.22***	0.17	0.12	0.11
Optimistic about future	0.49	0.50	0.52***	0.50	0.47	0.50
Less optimistic about future	0.24	0.43	0.19***	0.40	0.27	0.45
Not optimistic about future	0.08	0.27	0.04***	0.19	0.12	0.32
Expectation about future unknown	0.02	0.13	0.02***	0.13	0.02	0.14
Number of observations	24,109		10,510		13,599	

Source: WAFF-VEQM and ASSD, own calculations.
Notes: Std. Dev. = Standard Deviation; *t*-test for difference between employers with and without training is significant at the 1% (***), 5% (**) or 10% (*) level.

4 METHOD AND RESULTS

4.1 Aggregate Results

Using this data Tab. 4 reports marginal effects[11] of a number of different probit estimates with the probability of an enterprise to have offered training in the last 12 months as a dependent variable. The first column reports results when regressing the dependent variable on all

[11] These report the estimated percentage point change of an otherwise average firm to provide training if the respective independent variable increases by one unit. The underlying regression coefficients are available from the authors upon request.

independent variables in Tab. 3 and 260 NACE 4-digit industry dummies as well as 48 wave dummies. The results suggest a statistically highly significant relationship between labour turnover and the industry employment share in a NACE 4-digit industry and the probability of a firm to provide employer financed training. An increase in the labour turnover by one percent reduces the probability of an (otherwise average) employer to provide training by three percentage points. An increase in the industry employment share by one percent, by contrast, reduces the training probability by 6 percentage points. This suggests that the effect of increased worker mobility on training probabilities dominates any positive effects arising from increased productivity. Similar observations apply to the industry employment share. Here the negative impact of the increased poaching risk on training probabilities also dominates any positive effects resulting from increased productivity. Our results are therefore in line with those of Brunello and Gambarotto (2007) and Brunello and de Paola (2008). This is interesting as these authors use the variance in industry share across regions to identify effects, while we use the variance across industries within a region. Yet, despite these different approaches results are comparable. The other industry characteristics (i.e. the number of employers and the Herfindahl-Hirschmann-Index) are insignificant, however. This suggests a rather weak impact of product market competition on training probabilities.

There are a number of reservations that could be held against these baseline results. For instance one could argue that the city of Vienna is likely not to be an isolated area both in terms of the labour market and localisation conditions, on account of the substantial linkages of the city with its' environs. This would imply that results could be driven by a wrong delimitation of the regional labour market. To assess the potential error from this, column 2 of Tab. 4 shows a similar regression as in column 1 in which Vienna and Lower Austria (which is the province that surrounds Vienna) are considered to be one region. In this regression, industry characteristics (i.e. labour turnover, industry share, HHI and number of enterprises) are measured for both Vienna and Lower Austria in sum.

As can be seen from this column results with respect to labour turnover hardly differ from those in column one. Even when the labour market characteristics of Lower Austria are included in the analysis, the correlation between labour turnover and training probability remains highly significantly negative. The correlation between the industry share and training probability, by contrast, remains negative but turns insignificant, while the HHI is weakly negatively significant. This on the one hand indicates strong competitive relationships between the Viennese and Lower Austrian labour markets. On the other hand it also hints at a less robust relationship between industry employment share and training probabilities than between labour turnover and training probabilities.

A further reservation could be the potential endogeneity of the industry variables. This is particularly worrying in the case of the industry employment share, as this is also determined by the mobility of enterprises across regions. Column 3 in Tab. 4 thus instruments industry share in Vienna by the density in all provinces other than Vienna and NACE 2-digit dummies.[12] These results also suggest an effect of labour turnover on enterprise level training probabilities but a weaker one with respect to labour market density. The co-efficient of labour turnover remains highly significant and negative in this specification, while the industry employment share is only weakly significant and the HHI turns strongly significantly negative.

The other explanatory variables in the estimates are highly robust. They suggest that employers who employ mainly workers without a high school diploma have a 5 to 14 percentage

[12]The rational for using this instrument is that the employment density in other provinces is strongly correlated to that in Vienna, but that it should not have any effect of the training probability in Vienna. Results of the first stage equation suggest a highly significant negative correlation between employment density in Vienna and the rest of Austria. The instrument explains 45% of the variance in the industry level employment density and the R^2 value of the first stage regression is 0.95.

Tab. 4: Marginal effects for probit results (dependent variable: training)

	Regional variables Vienna		Regional variables Lower Austria		Instrumented Industry share[a]	
	Coef.	**S. E.**	**Coef.**	**S. E.**	**Coef.**	**S. E.**
ln (Turnover)	−0.03***	0.01	−0.03**	0.01	−0.02**	0.01
ln (Industry share)	−0.06**	0.02	−0.02	0.07	−0.02*	0.01
ln (Herfindahl)	0.01	0.02	−0.02*	0.01	−0.07***	0.02
ln (No. employers)	0.11	0.11	0.13	0.12	−0.04	0.06
ln (No. employers)^2	−0.01	0.01	−0.01	0.01	0.01	0.00
ln (Size)	0.18***	0.01	0.18***	0.01	0.47***	0.02
ln (Size)^2	−0.01***	0.00	−0.01***	0.00	−0.03***	0.00
Employees mostly High School Dipl.	*Base category*		*Base category*		*Base category*	
Employees mostly without High School Dipl.	−0.05***	0.01	−0.05***	0.01	−0.14***	0.03
Employees about equal with & without	−0.06***	0.01	−0.06***	0.01	−0.15***	0.03
Employees mostly low qualified	*Base category*		*Base category*		*Base category*	
Employees mostly highly qualified	0.17***	0.02	0.17***	0.01	0.43***	0.04
Employees about equal high and low qualified	0.07***	0.02	0.07***	0.02	0.16***	0.04
Part of a company	0.08***	0.01	0.08***	0.01	0.20***	0.03
Internationally active	0.04***	0.01	0.04***	0.01	0.09***	0.02
Firm age <5 years	*Base category*		*Base category*		*Base category*	
Firm age 5–9 years	0.04**	0.02	0.04***	0.02	0.11**	0.05
Firm age 10 and more years	0.03*	0.02	0.03***	0.02	0.08***	0.05
Invested in computers	0.13***	0.01	0.13***	0.01	0.33***	0.02
Invested in production	−0.03	0.02	−0.03	0.02	−0.09*	0.05
Other investments	0.05***	0.01	0.05***	0.01	0.14***	0.02
Product innovation	0.08***	0.01	0.08***	0.01	0.20***	0.04
Process innovation	0.05***	0.02	0.05***	0.02	0.12***	0.04
Firm reorganisation	0.07***	0.01	0.07***	0.01	0.19***	0.02
Vacancies/employee	0.08	0.05	0.08	0.05	0.20	0.13
Very optimistic about future	*Base category*		*Base category*		*Base category*	
Optimistic about future	−0.08***	0.01	−0.08***	0.01	−0.21***	0.03
Less optimistic about future	−0.09***	0.01	−0.09***	0.01	−0.25***	0.03
Not optimistic about future	−0.15***	0.02	−0.15***	0.02	−0.40***	0.04
Expectation about future unknown	−0.15***	0.02	−0.15***	0.02	−0.41***	0.07
Wave	Yes		Yes		Yes	
Sector	NACE 4-digit		NACE 4-digit		ÖNACE 4-digit	

Source: WAFF-VEQM and ASSD.
Notes: Coef = Marginal Effect; S. E. = Cluster robust standard errors of the estimate; t-test is significant at the 1% (***), 5% (**) or 10% (*) level; [a]Industry share instrumented with Austrian industry share and NACE 2-digit dummies, fixed effects for waves and NACE 4-digit industries not reported.

point lower probability to offer training than employers whose personnel mainly consists of workers with high school diploma, which are the reference category. Similarly employers with mainly highly qualified personnel have a 17 to 43 point higher training probability than employers with mainly less qualified personnel. Employers that are part of a multi-enterprise corporation and that are active internationally have a (8 to 20, respectively 4 to 9 percentage

point) higher probability to offer a training to their employees, than independent employers and employers that are only nationally active. Investments in computers also increase the training probability (by 12 to 33 percentage points) as do other investments (by 5 to 14 percentage points). Only investments in production have no significant impact on the training probability in all regressions except for when instrumenting the industry employment share. Furthermore innovative employers have higher training probabilities throughout. Different forms of innovation, however, have a rather different impact. Employers facing a reorganisation in the previous year have a 7 to 19 percentage point higher training probability, employers with a process innovation a 5 to 12 percentage point higher training probability and employers with a product innovation an 8 to 20 percentage point higher training probability, than employers without an innovation.

The training probability also decreases with reduced optimism about the future and depends on the age of employers in a nonlinear manner. Employers that have existed for 4 to 9 years are most likely to offer training to their employees. Their training probability is 4 to 11 percentage points higher than among employers that have existed for less than 5 years. Employers that have existed for 10 or more years have a 3 to 8 percentage points higher training probability than employers that have existed for less than 5 years. Employers who are not optimistic about the future have an up to 40 percentage point lower training probability than very optimistic employers. The only variable that remains insignificant throughout is the number vacancies as a percentage of total employment.

4.2 Results by Qualification Groups

Tab. 5 extends these findings to a separate analysis for employers that financed training for less and for highly skilled workers, respectively. According to these results the industry employment share and labour turnover have a much stronger negative impact on the probability that firms provide training for the less qualified, while for the highly qualified the impact of labour turnover is only weakly significant and that of the industry employment share – following the lower robustness of the variable – is insignificant throughout. This could be explained by the knowledge externalities that trigger positive effects of labour turnover on firm level productivity being less relevant for less qualified workers. Alternatively it could also be indication of higher marginal costs of training for less skilled workers. Irrespective of the concrete reason for these results, this does suggest that high density and high turnover industries and regions are particularly likely to face problems in motivating firms to finance training for low skilled workers.

In addition the results also point to some interesting differences in the firm level determinants of the training probability of firms for less and high qualified workers. Thus the impact of firm size, positive expectations about the future and investments as well as internationalisation and reorganisation on the probability to offer employer financed trainings is substantially larger for highly qualified than for the less qualified. This suggests that in particular investments and internationalisation tend to increase training requirements among the high skilled. By contrast, product innovations are more closely linked to increased training requirements of the less skilled. Furthermore, as could be expected, also firms with a higher share of highly qualified workers provide more training for highly qualified workers, while they provide less training for less qualified workers.

4.3 Robustness

In sum, our results suggest a negative impact of labour turnover on firm provided training that is most pronounced for the low skilled. Results pertaining to our measure of employment density (the industry employment share) are somewhat less robust but also mostly suggest a negative impact that is more pronounced for the training probability of the low skilled. This could, however, be due to a number of idiosyncratic developments of individual industries in the Viennese labour market or to the specifics of our data. For instance, as mentioned above, the

Tab. 5: Probit results for high and less qualified workers (dependent variable: training of high and less skilled workers)

	Training for less skilled				Training for high skilled			
	Regional variables Vienna		Regional variables Lower Austria		Regional variables Vienna		Regional variables Lower Austria	
	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.	Coef.	S. E.
ln (Turnover)	0.12**	0.05	−0.18**	0.09	−0.04*	0.02	−0.08*	0.05
ln (Industry share)	−0.22**	0.10	−0.26*	0.14	−0.16	0.10	−0.16	0.20
ln (Herfindahl)	0.11	0.09	−0.05	0.06	0.00	0.04	−0.03	0.02
ln (No. employers)	−0.63	0.57	−0.20	0.78	0.35	0.28	0.38	0.32
ln (No. employers)^2	0.07	0.06	0.01	0.07	−0.04	0.03	−0.04	0.03
ln (Size)	0.36***	0.04	0.36***	0.04	0.48***	0.02	0.48***	0.02
ln (Size)^2	−0.02***	0.00	−0.02***	0.00	−0.03***	0.00	−0.03***	0.00
Employees mostly High School Dipl.	*Base category*		*Base category*		*Base category*		*Base category*	
Employees mostly without High School Dipl.	0.17***	0.05	0.17***	0.05	−0.15***	0.03	−0.15***	0.03
Employees about equal with & without	0.24***	0.06	0.24***	0.06	−0.16***	0.03	−0.16***	0.03
Employees mostly low qualified	*Base category*		*Base category*		*Base category*		*Base category*	
Employees mostly highly qualified	−0.48***	0.05	−0.48***	0.05	0.69***	0.04	0.69***	0.04
Employees about equal high and low qualified	−0.27***	0.05	−0.27***	0.05	0.35***	0.05	0.36***	0.05
Part of a company	0.18***	0.03	0.18***	0.03	0.20***	0.03	0.20***	0.03
Internationally active	0.01	0.03	0.01	0.03	0.10***	0.02	0.10***	0.02
Firm age <5 years	*Base category*		*Base category*		*Base category*		*Base category*	
Firm age 5–9 years	0.08	0.08	0.07	0.08	0.10*	0.06	0.10*	0.06
Firm age 10 and more years	0.01	0.07	0.01	0.07	0.07	0.05	0.07	0.05
Invested in computers	0.13***	0.03	0.13***	0.03	0.32***	0.02	0.32***	0.02
Invested in production	−0.02	0.06	−0.02	0.06	−0.07	0.05	−0.07	0.05
Other investments	0.03	0.03	0.03	0.03	0.14***	0.02	0.14***	0.02
Product innovation	0.33***	0.05	0.33***	0.05	0.13***	0.03	0.13***	0.03
Process innovation	0.02	0.06	0.02	0.06	0.14***	0.04	0.14***	0.04
Firm reorganisation	0.073**	0.03	0.07**	0.03	0.20***	0.02	0.20***	0.02
Vacancies/employee	0.68***	0.20	0.68***	0.20	0.19	0.13	0.19	0.13
Very optimistic about future	*Base category*		*Base category*		*Base category*		*Base category*	
Optimistic about future	−0.06	0.04	−0.06	0.04	−0.16***	0.03	−0.16***	0.03
Less optimistic about future	0.02	0.04	0.02	0.04	−0.22***	0.03	−0.22***	0.03
Not optimistic about future	−0.09	0.07	−0.09	0.07	−0.37***	0.05	−0.37***	0.05
Expectation about future unknown	−0.02	0.09	−0.03	0.09	−0.39***	0.07	−0.39***	0.07
Wave	Yes		Yes		Yes		Yes	
Sector	NACE 4-digit		NACE 4-digit		NACE 4-digit		NACE 4-digit	
Number of observations	23,490		23,490		24,109		24,109	

Source: WAFF-VEQM and ASSD.
Notes: Coef = Coefficient; S. E. = Cluster robust standard errors of the estimate; t-test is significant at the 1% (***), 5% (**) or 10% (*) level; fixed effects for waves and NACE 3 or 4-digit industries not reported.

time variation of the industry characteristics included in our data is rather low on account of the short time dimension. This could lead to biased results due to the co-linearity of the data with industry fixed effects. In addition, as also mentioned above, the high labour turnover in Vienna is due to the very high levels of turnover in a few industries. This may bias results if these industries are outliers with respect to training. Finally our data is also less representative for newly founded enterprises, which may once more lead to biased results when inferring to the population of Viennese firms.

Tab. 6 therefore reports results for a number of additional specifications, which were estimated to check for the robustness of results to these caveats. In these specification we first replaced NACE 4-digit by NACE 3-digit dummies (col. 1) to increase the within group variance of the time varying industry characteristics. In a second step, we excluded the construction sector from the data (col. 2) to assess the potential impact of this high turnover industry on results and finally in a further specification (col. 3) we also excluded firms that have existed for less than 5 years from the sample.

Tab. 6: Probit results (dependent variable: training, regional variables Vienna)

	NACE 3-digit controls		Excluding construction		Excluding 1–4 year old employers	
	Coef.	**S. E.**	**Coef.**	**S. E.**	**Coef.**	**S. E.**
ln (Turnover)	−0.19***	0.04	−0.09**	0.04	−0.10***	0.04
ln (Industry share)	−0.06*	0.03	−0.15*	0.08	−0.16*	0.09
ln (Herfindahl)	0.01	0.02	0.04	0.04	0.04	0.05
ln (No. employers)	−0.15**	0.06	0.31	0.28	0.21	0.29
ln (No. employers)^2	0.02***	0.01	−0.02	0.03	−0.01	0.03
ln (Size)	0.47***	0.02	0.472***	0.02	0.476***	0.02
ln (Size)^2	−0.03***	0.01	−0.0280***	0.00	−0.0287***	0.00
Employees mostly High School Dipl.	*Base category*		*Base category*		*Base category*	
Employees mostly without High School Dipl.	−0.14***	0.03	−0.14***	0.03	−0.14***	0.03
Employees about equal with & without	−0.14***	0.03	−0.15***	0.03	−0.15***	0.03
Employees mostly low qualified	*Base category*		*Base category*		*Base category*	
Employees mostly highly qualified	0.46***	0.04	0.45***	0.04	0.49***	0.04
Employees about equal high and low qualified	0.18***	0.04	0.17***	0.04	0.15***	0.04
Part of a company	0.20***	0.03	0.19***	0.03	0.19***	0.03
Internationally active	0.08***	0.02	0.09***	0.02	0.09***	0.02
Firm age <5 years	*Base category*		*Base category*		*Base category*	
Firm age 5–9 years	0.11**	0.05	0.10*	0.05	0.03	0.03
Firm age 10 and more years	0.08*	0.05	0.07	0.05		
Invested in computers	0.32***	0.02	0.32***	0.02	0.33***	0.02
Invested in production	−0.07	0.05	−0.09*	0.05	−0.08*	0.05
Other investments	0.14***	0.02	0.13***	0.02	0.13***	0.02
Product innovation	0.21***	0.03	0.21***	0.04	0.21***	0.04
Process innovation	0.13***	0.04	0.11***	0.04	0.14***	0.04
Firm reorganisation	0.18***	0.02	0.18***	0.02	0.19***	0.02
Vacancies/employee	0.21	0.13	0.22	0.14	0.19	0.13
Very optimistic about future	*Base category*		*Base category*		*Base category*	
Optimistic about future	−0.20***	0.03	−0.22***	0.03	−0.22***	0.03
Less optimistic about future	−0.24***	0.03	−0.25***	0.03	−0.25***	0.03
Not optimistic about future	−0.39***	0.04	−0.44***	0.05	−0.42***	0.05
Expectation about future unknown	−0.41***	0.07	−0.45***	0.07	−0.42***	0.07
Wave	Yes		Yes		Yes	
Sector	NACE 4-digit		NACE 4-digit		ÖNACE 4-digit	

Source: WAFF-VEQM and ASSD.
Notes: Coef = Coefficient; S. E. = Cluster robust standard errors of the estimate; *t*-test is significant at the 1% (***), 5% (**) or 10% (*) level; fixed effects for waves and NACE 3 or 4-digit industries not reported.

These changes in specification reconfirm the robustness of the results. When including only NACE 3-digit fixed effects the only differences relative to the baseline specification are a significant positive effect of the number of enterprises in an industry on the training probability. This can be explained by the extremely low variation of this variable over time. When excluding the construction sector from the sample, by contrast employers that have existed for more than 10 years do not differ in their training probability from employers that have existed for less than 5 years any more. Finally an exclusion of the employers that existed for less than 5 years leads to very similar results as in the baseline specification, but suggests that employers which have existed for 10 years or more do not differ significantly from employers that have existed for 5 to 9 years any more.[13]

[13] Additional robustness checks (available from the authors) included changes in the functional form by including levels rather than logs of the industry employment share and the HHI. These changes lead to qualitatively similar results but once more highlight the lower robustness of the industry employment share.

5 SUMMARY AND DISCUSSION

In times of continued technical progress as well as changing demands on qualifications of employees training is a prerequisite for the competitiveness of enterprises and regions. Therefore, appropriate economic policies to increase both privately as well as employer financed training are important elements of consistent life-long learning strategies. To understand the determinants of enterprise financed training a number of models such as the model by Acemoglu and Pischke (1999) can be used. One consequence of these models is that the incentives of employers to finance training will depend on regional and sector labour market characteristics. Two important labour market characteristics in this respect are the industry share and labour turnover. The direction of the impact of these variables on training probabilities is, however, indeterminate from a theoretical perspective. With respect to the industry share one could on the one hand argue that this variable increases labour productivity and thus also increases incentives for employer financed training. On the other hand a negative impact could be predicted if localisation of an industry in a region leads to an increased poaching risk. Similar arguments apply to labour turnover. A higher turnover of workers increases the exit probability of workers and thus reduces incentives for employers to finance training. At the same time higher mobility may also lead to knowledge spillovers between firms. This increases productivity and training incentives.

This paper aimed to empirically analyse the industry specific effects of employment density (as measured by the industry employment share) and labour turnover on the supply of employer financed training at the example of the city of Vienna. The results show a robust negative effect of labour market turnover and a somewhat less robust negative impact of the industry employment share on employer financed training activity levels, with both of these effects being more pronounced for training probabilities of the less skilled. The positive incentive effects on employer financed training arising from knowledge spillovers are thus dominated by the negative effects of increased poaching. Similarly the advantages of increased knowledge spillovers through labour mobility are not sufficient to countervail the negative effects of an increased separation rate of workers from their employer.

The results therefore confirm the hypothesis that the decision of employers to pay for training of their employees, next to being determined by firm level characteristics, also depends on regional and sector labour market characteristics. High labour turnover and potentially high density are a disadvantage in this respect. This implies that policies aimed at increasing employer financed training are up against serious challenges in industries and regions with high labour turnover and high employment density. These challenges are likely to be even larger when it comes to providing employer financed training for less skilled workers. Policy makers may thus consider providing additional incentives for firm financed training in such regions or industries. Alternatively they could also strengthen incentives for privately financed training.

Determining which of these alternatives is more efficient in high labour turnover, high employment density industries and regions could thus be a rewarding topic for future research. Furthermore, our results with respect to employment density and even more so the Herfindahl index and the number of employers in a region remain less conclusive than for labor turnover. Future research, therefore, could also explore the role of density and competition between employers and training by either using alternative measures of these variables or by exploring the appropriate level of sector aggregation (which was the NACE 4 digit level in this paper) in more detail.

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7 ANNEX

Tab. 7: Variable definitions

Variable	Definition	Source
Dependent variables		
Training	Indicator variable if firm undertook employee training in last 12 months	WAFF-VEQM
Training for skilled	Indicator variable if firm undertook employee training in last 12 months for high skilled	WAFF-VEQM
Training for unskilled	Indicator variable if firm undertook employee training in last 12 months for low skilled	WAFF-VEQM
Independent variables		
ln (Turnover)	(log of) sum of separation and hires in a year relative to total employment in a (3- or 4-digit) in Vienna	ASSD
ln (Industry share)	(log of) share of all employed working in a (3- or 4-digit) industry in Vienna	ASSD
ln (Herfindahl)	log of herfindahl index over firm level employment shares in an (3- or 4-digit) industry	ASSD
ln (No. employers)	log of Number of employers (firms) in a (3- or 4-digit) industry in Vienna	ASSD
ln (Size)	log of number of employees at the firm	WAFF-VEQM
Average education of employees	Indicator variables if firm employs mostly employees with high school diploma or without high school diploma or equal shares of both, respectively	WAFF-VEQM
Average qualification of employees	Indicator variables if firm employs mostly lowly or highly qualified employees or equal shares of both, respectively	WAFF-VEQM
Part of a company	Indicator variables equal to one if firm is part of a larger company and zero else	WAFF-VEQM
Internationally active	Indicator variables equal to one if firm is internationally active (i.e. an exporter) and zero else	WAFF-VEQM
Firm age	Indicator variables for firms aged less than 5 years or 5–9 years or 10 or more years respectively	WAFF-VEQM
Invested in computers	Indicator variable if firm invested in computers in the last year	WAFF-VEQM
Invested in production	Indicator variable if firm invested in machinery in the last year	WAFF-VEQM
Other investments	Indicator variable if firm had other investments in the last year	WAFF-VEQM
Product innovation	Indicator variable if firm claimed a product innovation in the last year	WAFF-VEQM
Process innovation	Indicator variable if firm claimed a process innovation in the last year	WAFF-VEQM

(to be continued on the next page)

Variable	Definition	Source
Firm reorganisation	Indicator variable if firm underwent a major reorganisation in the last year	WAFF-VEQM
Vacancies/employee	Number of open positions per employee at the firm	WAFF-VEQM
Expectations about the future	Indicator variables for firms that are very optimistic, optimistic or not optimistic about the future	WAFF-VEQM
Expectation about future unknown	Indicator variable for firms that had no expectation about the future or did not respond to the question on expectations about the future	WAFF-V

AUTHOR'S ADDRESS

Francisca Bremberger, Vienna University of Economics and Business (WU), Welthandelsplatz 1, 1020 Vienna, e-mail: Francisca.Bremberger@wu.ac.at

Rudolf Hochholzer, Wiener ArbeitnehmerInnen Förderungsfonds, Nordbahnstr. 36, 1020 Wien, e-mail: rudolf.hochholzer@waff.at

Peter Huber, Österreichisches Institut für Wirtschaftsforschung (WIFO), Arsenal, Objekt 20, 1030 Wien, e-mail: huber@wifo.ac.at

FINANCIAL VULNERABILITY, CAPITAL SHOCKS AND ECONOMIC GROWTH: EVIDENCE FROM CHINA (2005–2014)

Chun-peng Zhang[1], Rong Kang[1], Chen Feng[1]

[1] *School of Economics and Management, Northwest University, Xi'an*

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ABSTRACT

Taking the leading role of the banking industry in the financial system into consideration, this paper constructed a financial vulnerability index by using the method of principal component analysis, and found China's financial vulnerability showed a slightly upward trend in general. In order to confirm the macro factors affecting financial fragility, dynamic regression models were constructed. As a result, the authors obtained seven major macro factors. Finally, the authors determined that an overheated economy, increasing inflation, excessive growth of the country's fiscal expenditures, and export shocks will increase financial vulnerability. However, the increasing investment in real estates and fixed assets may reduce the risk in the financial market. Therefore, China needs to adapt to the new normal economic development model, weaken government intervention in the financial markets, deepen financial reforms, and maintain steady development in the financial system.

KEY WORDS

banking industry, financial vulnerability, capital shocks, economic growth, China, measurement

JEL CODES

C13, E10, G21

1 INTRODUCTION

With the deepening reform of China's financial system in recent years, the efficiency of financial services has gradually improved. Obviously, this industry plays an important role in the rapid development of the Chinese economy. However, a lot of problems have hindered the healthy development of the financial industry, such as an unbalanced structure, incomplete reforms, and poor quality financial institutions. In addition, a series of problems caused by the rapid economic development have been passed on to the financial system and have

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formed potential risks. Moreover, upgrading to the international level has also introduced risks. Therefore, it is important to accurately measure China's financial vulnerability, formulate effective solutions, and establish preventive mechanisms.

The vulnerability of the financial system includes the vulnerability of financial institutions and markets. In the meantime, financial system has become increasingly fragile (Johnston et al., 2000; Liu, 2012; Tropeano, 2013). Explaining the financial fragility hypothesis from the perspective of the enterprise, Minsky (1982) thought that the intrinsic characteristics of an organization creating private credit could lead enterprises to face the dilemma of bankruptcy caused by a cyclical crisis; furthermore, the dilemma may have a negative impact in other areas and result in economic crisis. From the perspective of banks, Kregel (1997) proposed the security boundary theory, and he argued that financial fragility was negatively related to security boundaries. In a financial system dominated by banking, the fragility of banks represents fragility in the financial system to a great extent. Diamond and Dybvig (1983) thought that the uncertainty of liquidity demand and the liquidity shortage on banking assets would lead to banking vulnerability. Mishkin (1991) believed that asymmetric information in the credit market caused the problem of adverse selection. Due to information asymmetry in the information deposit market, a "prisoner's dilemma" will be created, causing a run on deposits. Therefore, inherent fragility exists in financial institutions. After the Asian financial crisis in 1997, some studies showed that macroeconomic shocks, fluctuations in asset prices, and inappropriate monetary and exchange rate policies may increase financial risks and result in financial instability (Orlowski, 2008). According to Beck et al. (2003), the financial crisis occurred in countries with relatively fragmented banking structures generally. Tornell et al. (2004) studied the relationship between financial liberalization and risk. Bekaert and Harvey (2000) found financial liberalization reduced capital costs and promoted economic growth. Fell and Schinasi (2005) believed that, the financial stability index should not only include the information of various departments in the financial system, but also consider the dynamic factors. That is, we should consider the relationship between financial and economic. Then A Financial Stability Index (FSCI) is proposed to study financial instability by van den End and Tabbae (2005), Hatzius et al. (2010) and Brave and Butters (2011).

Some scholars have studied the Chinese financial system. Chen and Wu (2004) conducted a quantitative analysis on China's banking system vulnerability[1] and concluded that the banking system was unstable for 11 years between 1978 and 2000, especially around 1992 and 1998. Wan (2008) used the dynamic factor analysis method to build a financial vulnerability index and found that it showed a downward trend from 1987 to 2006. Chen et al. (2011) studied the change in financial vulnerability by using the smoothing mechanism transfer model. As a result, they determined that the Chinese banking system had a higher degree of vulnerability after 2007. He and Lou (2011) studied Chinese financial system and analyzed financial stability by principal component analysis.

Throughout the financial vulnerability studies, the literature mostly focused on the vulnerabilities surrounding the subprime crisis (2008), but there has been limited research on changes in the financial system vulnerability after 2010. Also, in terms of research content, authors tend to concentrate on exploring the trend of financial system vulnerability while few have studied the macro factors affecting vulnerability.

[1]Chen Hua and Wu Zhiwen selected some indicators to measure the vulnerability of the banking system, including the rate of change in the savings deposits of urban and rural areas, bank loans to non-government sector growth rate, CPI index and the CMAXt index.

2 DATA AND METHODOLOGY

In this article, the authors will use the principal component analysis method to measure and analyze the trends of financial fragility in China from 2005 to 2014. Then the authors will establish several regression models to identify some of the macroeconomic factors which affect vulnerability.

2.1 Financial fragility index

The broad functions of banks have a significant impact on all social and economic activities. Data show that total assets in China's financial industry amounted to 50.27 trillion RMB in 2005, and banking sector assets accounted for 74.5% of this total. To the end of 2011, the proportion of banking industry assets in financial industry assets had been more than 90%. Although it can be seen that the total assets of the banking industry absolutely occupied the dominant position in the country's financial industry, it should also be recognized that the risks in China's financial system were concentrated in the banking system to a large extent. Therefore, it is both necessary and scientifically sound to select a banking system index as a proxy index to measure financial industry vulnerability.

The authors selected five indicators to synthesize a financial vulnerability index (represented by JRC in below). These are the loan growth rate[2], the proportion of medium and long term loans in total loans, the loan and deposit ratio, the growth rate of inter-bank credit, and the foreign asset growth rate. The reasons for choosing these indicators will be explained in section 2.1.1.

2.1.1 Variable description and data sources

In China, as some bad loans are extended or moved out from the balance sheet, the authenticity and reliability of the non-performing loans ratio requires further investigation. Consequently, the authors measured the credit risk of the banking system by using the loan growth rate and the proportion of medium and long term loans in total loans. Liquidity risk is an important risk for banks, so in this paper the authors selected the deposit and loan ratio to measure it. When the ratio is lower, liquidity risk is smaller; but if the asset-liability ratio is at a very high level, banks are more likely to face bankruptcy risks resulting from external shocks. If this happens, the risk will quickly pass through the entire banking system, and may even have a serious impact on the macro economy. Therefore, it is necessary to measure the possibility of contagious risks by using the growth rate of bank credit. As economic globalization has developed, small changes in the international market may affect the stability of the domestic banking system, therefore the foreign asset growth rate must be considered as an important indicator of risk measurement.

Taking the availability of data into account, authors selected data from the first quarter of 2005 to the third quarter of 2014, and these data are chosen from the Chinese economic and financial database (CCER).

2.2 Regression model of macro factors

In order to further explore the factors influencing financial fragility, the authors selected several macro variables and then created dynamic regression models to filter out suitable variables. Finally, a regression model was established to analyze the influence of these macro variables on financial fragility.

2.2.1 Selection and description of macroeconomic variables

The trend line of the JRC index depicts the overall change in risk in the Chinese banking industry over the past ten years. Due to the significance of the banking industry in the financial sector, it is reasonable to use the index to measure the financial system risk. The JRC index can only describe changes in risk, it cannot judge the impact of macro factors on

[2] In this paper all growth indicators are the year-on-year growth rates.

the financial system. On the basis of drawing lessons from international experience and related research results, the authors selected the following macro factors.

Economic cycle indicators are mainly the nominal GDP growth rate (NGDP), actual GDP growth rate (SJGDP), and export growth rate (ET). It is well known that GDP indicates the state of the current macro economy. Rapid economic development will increase production and sales, further improving the repayment performance of corporations. As a result, it is effective in reducing the liquidity risk of the banking industry. At the same time, banks can also provide loans to enterprises, so that enterprises can expand production, forming a virtuous circle which stimulates the economy to further prosperity. Since China joined the WTO, the rapid growth of export trade has stimulated China's investment and consumption, expanded employment, and enhanced economic and social stability.

Price indicators include M2 growth rate (M2), the inflation rate (CPI), stock market price index (SMI), and the one-year deposit interest rate (ODR). M2 reflects the realistic and potential purchasing power, and also reflects middle market activity. The inflation rate is measured by the consumer price index CPI, which directly affects investment and consumption levels as well as government policy. The stock market price index reflects fluctuations in the stock market and the one year fixed deposit rate (ODR) will have an impact on the deposits and loans of banks.

From the perspective of international indicators, foreign exchange reserves can regulate and control the economy, and further influence internal and external balance. Hot money[3] is short-term speculative funding which flows rapidly into the market in the pursuit of high returns. If the amount of hot money inflows (HM) is too much, the economic system will not operate normally, and the economy will fluctuate severely. The real exchange rate of the RMB (EXR) reflects the purchasing power in the international market. If the financial liberalization index (MFR) , the ratio of M2 and foreign exchange reserves is larger, the degree of financial liberalization will be higher, as will the degree of capital inflows.

Other indicators are set according to the actual Chinese situation, including the growth rate of real estate development and investment (EDI), fiscal expenditure (FS), and the growth rate of fixed asset investment (FAI). Chinese infrastructure construction, especially the development of real estate investment, stimulates the economy. The subprime crisis revealed that the collapse of the real estate market will have a serious effect on the country's economy. Changes in fiscal spending reflect the adjustment of government investment projects; and a growth rate of fiscal expenditure that is too fast reflects overheated government investment.

3 RESULTS

3.1 JRC index construction and trend analysis

Based on the principal component analysis method, the authors used SPSS17.0 to construct a JRC index. As can be seen from Tab. 1, the contribution rate of the loan growth rate is 49.034%, and the contribution rate for the proportion of medium and long term loans in total loans is 24.827%. These variables, whose characteristic value is greater than 1, were counted by the authors and it was found that the cumulative contribution rate reached 73.861%. Thus these two variables can be used to measure the vulnerability of the financial system. The authors then weighted the contribution rate to get the JRC index:

$$\mathrm{JRC} = 0.66387a + 0.33613b \tag{1}$$

By calculation, the range of JRC is found to be $[1.523, 2.164]$. The authors then mapped it to $[0, 10]$. As can be seen in Fig. 1, China's

[3]The amount of hot money inflows = foreign exchange reserves − foreign direct investment − trade surplus.

Tab. 1: The principal component analysis results

	Initial eigenvalues			Extraction sums of squared loadings		
Component	**Total**	**% of variance**	**Cumulative %**	**Total**	**% of variance**	**Cumulative %**
1	2.452	49.034	49.034	2.452	49.034	49.034
2	1.241	24.827	73.861	1.241	24.827	73.861
3	0.642	12.838	86.700			
4	0.483	9.663	96.362			
5	0.182	3.638	100.000			

Notes: 1 – the loan growth rate; 2 – the proportion of medium and long term loans in total loans; 3 – loan and deposit ratio; 4 – the growth rate of inter-bank credit; 5 – the foreign asset growth rate

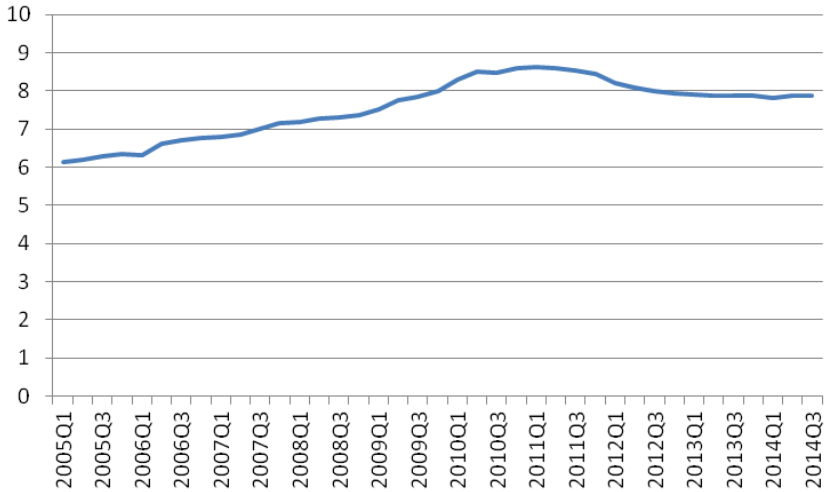

Fig. 1: The financial fragility index JRC

financial system vulnerability shows a slight upward trend in general, but the trend has its own characteristics in different stages. Generally speaking, the financial system after 2009 is more vulnerable than during 2005 to 2009. To be specific, the financial system vulnerability index is at a low level from Q1 2005 to Q1 2006. Compared with 2005, the financial fragility index rises slightly but still maintains relative stability in 2006. In this stage, several banks[4] have been listed, which indicates that the reform of the banking industry in China tends to be deepening and becoming more mature. From 2007 to Q1 2008, the JRC index shows a slightly upward trend. During this period, the economic investment growth rate accelerates, with monetary and credit growth increasing too quickly. At the end of Q1 2008, the cooling external environment and shrinking global demand causes a drag on China's exports because of the international financial turmoil. In the second quarter of 2009, the financial fragility index increased significantly. From 2011 to the second quarter of 2012 the index falls as both the global economy and exports have gradually been recovering. In 2011, the first year of the 12th Five-Year Plan in China, major infrastructure construction projects were started and these provided strong support for investment growth. The JRC index is at a stable level from 2012 to the third quarter of 2014. Within an environment of good macroeconomic development, deepening financial reform, and along with the implementation of real estate regulation and control measures, the financial system maintained a smooth performance.

[4]Bank of Communications, China Construction Bank, Industrial and Commercial Bank, and Bank of China

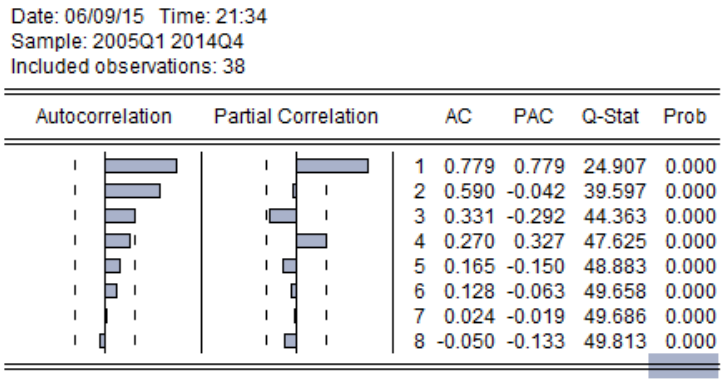

Fig. 2: The self correlation of DJRC sequence graph

Tab. 2: Dynamic regression models

Variable				**Explanatory variable**					**Adjust**
X	**Intercept**	y_{t-1}	y_{t-2}	X	X_{t-1}	X_{t-2}	X_{t-3}	X_{t-4}	R^2
NGDP	—	0.49081	—	−0.1879	—	—	0.2596	—	69.28
SJGDP	—	0.8009	—	—	—	−0.213	—	—	54.9
ET	—	0.4652	0.3386	−0.086	0.09	—	—	−0.048	71.86
M2	−0.0446	—	0.3972	0.0064	0.0016	—	—	—	75.09
CPI	—	0.4647	0.39921	−0.2843	—	—	0.4042	−0.3309	72.42
SMI	−0.0247	0.6809	—	—	—	—	—	—	60.85
ODR	—	0.8085	—	—	—	—	—	—	52.37
EXR	—	0.8145	—	—	—	—	—	—	55.78
FER	—	0.7203	—	—	—	—	—	—	55.56
DHM	—	0.9160	—	—	—	—	—	—	56.60
DMFR	—	0.8099	—	−0.0055	—	—	—	—	58.03
DFAI	—	0.8353	—	—	—	—	—	0.24596	64.63
DEDI	—	0.5462	—	0.2054	0.093	—	—	—	69.6
DFS	—	0.7528	—	—	—	−0.00088	−0.00083	0.00158	62.13

Note: The above regression models are self correlated. Therefore, Newey-West estimation was used and the significant level was 10%.

Tab. 3: Outcomes of model fitting and test statistic

Explanatory varible	**Coefficient estimation**	t**-statistic**	p**-value**
Intercept	−0.093083	−5.891421	0.0000
NGDP(−2)	0.280095	3.654928	0.0011
ET	−0.081376	−3.543551	0.0014
CPI(−3)	0.291982	2.832038	0.0085
M2(−2)	0.004379	7.103841	0.0000
DFAI(−1)	−0.268938	−2.882377	0.0075
DEDI(−1)	−0.010541	−2.249420	0.0349
DFS(−2)	0.000957	2.433468	0.0216
Other statistics	$R^2 = 0.283$	$A\text{-}R^2 = 0.779$	DW = 2.0136

3.2 Macroeconomic variable selection

In order to avoid a false regression, authors made a stability test on the above indexes and the JRC sequence. According to the results of the ADF test, the variables are stable at the 95% significance level except the indexes of JRC, EDI, FAI, FS, HM, and MFR; the authors also found that the first order difference of these six sequences are stable.

From Fig. 2, it can be seen that there is second-order correlation for DJRC[5]. In order to ascertain the authenticity of the result, the authors established a self regression model on y_t and found that the t-statistic will be more significant if the coefficient of lag order is 2. Therefore, it is concluded that the DJRC sequence is a second-order autocorrelation.

So the following regression model is established:

$$\begin{aligned} y_t &= \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \\ &\quad + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \\ &\quad + \beta_3 X_{t-3} + \beta_4 X_{t-4} + \mu_t. \end{aligned} \tag{2}$$

Since the impact of macroeconomic factors on the financial system is lagging behind, the authors constructed 14 dynamic regression models. The results are shown in Tab. 2.

3.3 Regression model

The authors constructed a new model using the macro variables mentioned above having a high goodness of fit and gradually removed insignificant variables. After several adjustments, the model was obtained, and the results are shown in Tab. 3:

The model is as follows:

$$\begin{aligned} y_t &= -0.067442 + 0.238917\,\mathrm{NGDP}_{t-2} + \\ &\quad + \mathrm{ET}_t + \mathrm{CPI}_{t-3} + \mathrm{M2}_{t-2} + \\ &\quad + X_{2_{t-1}} + X_{3_{t-1}} + X_{4_{t-2}} + \mu_t \end{aligned} \tag{3}$$

In Equation 2, X_2 refers to DFAI, X_3 refers to DEDI, and X_4 refers to DFS.

4 DISCUSSION AND CONCLUSIONS

According to Equation 2, we can see the relationship between these variables (NGDP, CPI, M2, FS, ET, FAI and EDI) and financial fragility, as discussed in section 4.1. Taking the national situation into account, the authors will make recommendations on the basis of the research findings in 4.2.

4.1 Conclusion

The coefficient values of NGDP, CPI, M2 and DFS are positive which indicates that these variables are positively correlated with the financial fragility index.

Compared with the index of actual GDP, NGDP has a more significant influence on financial system vulnerability. NGDP has a negative correlation with the financial fragility index, which means that economic growth which is too fast will accelerate the fragility of the financial system. Previous studies generally considered rapid economic development to be helpful in improving the efficiency of financial services and reducing risks in the financial system. This study suggests that although economic overheating could promote financial innovation, it will breed a series of problems such as unreasonable economic structures and serious environmental pollution. As a result, financial risk increases.

A rising inflation rate will bring about an asset price bubble. The increase in the money supply will accelerate inflation, and further exacerbate the rate of inflation causing the bubble to become larger, a situation which is extremely unfavorable for the stability of the financial system. At present, China faces great inflationary pressure.

[5] In this article, D means the first order difference sequence. Such as DJRC, DHM, DMFR, DFAI, DEDI.

Fortunately, the central bank has taken prudent monetary policy measures which helped to curb inflation and effectively reduce risk in the financial system. The excessive growth of fiscal spending indicates that central and local governments may invest too much. If the government's scale of investment expands rapidly, it will increase the government's scale of debt financing and cause an implicit debt problem. As a result, solvency risks may be passed into the financial system and increasing vulnerability.

The negative coefficients for exports (ET), fixed assets investment (DFAI), and real estate development investment (DEDI) indicate that they are negatively correlated with the financial fragility index.

Export shocks will affect the healthy operation of the financial system, increasing financial vulnerability. Since the beginning of the reform and opening process in 1978, China's dependence on foreign trade has increased significantly. As is well known, China operates under the environment of an export-led growth model. Thus, small movements in the international community will have a serious impact on the country's exports, though the international competitiveness of export products is limited. The impact of the international environment caused profits of export enterprises to decline; as a result, bank loans cannot be paid back in a timely manner, and at the same time credit is constrained. From the companies' points of view, they will operate with great difficultly, or even collapse, and for the banks there will be an increase in bad debts, increasing financial risk. Increased investment in fixed assets and real estate by government will reduce vulnerability in the financial system since investment in fixed assets will transfer the social capital from the virtual economy to the real economy. In terms of the real estate industry, the focus is on a large number of bank loans but because of the increase in collateral, the banks' losses caused by default risks will decrease. So it is in line with China's current economic growth model to bring macro variables into the regression model.

4.2 Suggestions

In consideration of the present situation regarding China's macroeconomic and financial system risk, the authors put forward the following suggestions.

First of all, the possibility of an outbreak of systemic financial risk is not high at present, but the overall risk in the financial system is increasing. This paper shows that the macro economic growth has double effects on financial system fragility and economic growth that is too fast will increase financial system vulnerability. Therefore, China urgently needs to adapt to the new normal economic development model and avoid expanding the economy too quickly.

Secondly, the implicit guarantee of government is the provision of credit in China's financial market. In China, government can intervene in the market, and investors can enter the financial market and easily assume high risk, practices which increase market risk. Therefore, it is important to reduce government intervention in the financial market and deepen financial system reform, thereby ensuring the steady development of the financial system.

In summary, the accurate measurement of financial system fragility in China has great theoretical value and practical significance, and can assist in developing effective strategies for prevention mechanisms. In this way the healthy development of China's financial system can be promoted, and the country's competitiveness in the international market and the ability to deal with adverse external shocks can be enhanced.

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AUTHOR'S ADDRESS

Chun-peng Zhang, Department of world economy and trade, School of Economics and Management, Northwest University, 710127, Xi'an, China, e-mail: 15902925706@163.com

Rong Kang, Department of world economy and trade, School of Economics and Management, Northwest University, 710127, Xi'an, China, e-mail: kangrong@nwu.edu.cn

Chen Feng, Department of world economy and trade, School of Economics and Management, Northwest University, 710127, Xi'an, China, e-mail: fengchen@stumail.nwu.edu.cn

THE AGE MANAGEMENT PHILOSOPHY AND THE CONCEPT OF WORK-LIFE BALANCE IN THE SELECTED CZECH BANKING INSTITUTIONS

Jiří Bejtkovský[1]

[1] *Tomas Bata University in Zlín*

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ABSTRACT

The article focuses on the Age Management philosophy and the concept of Work-life balance in the selected Czech banking institutions. The objective of the article is, inter alia, to determine whether the selected Czech banking institutions are dominated by stereotypical perception of the employees and further to reflect over how the concept of the Work-life balance can affect the context of aging of the population and the Age Management philosophy. The article presents a view of some of the results of quantitative and qualitative research conducted in the selected Czech banking institutions in the Czech Republic. The research group of the questionnaire survey included in total 180 employees of banking institutions working in and responsible for the area of human resource management and 282 employees of the 50+ age category. The results of the inquiries show that these institutions are more or less not dominated by prejudices and the corporate culture is welcoming and friendly to all the employees regardless of their biological age. The satisfaction with the measures carried out in the Czech Republic in association with the 50+ employees was assessed rather negatively. The concept of Work-life balance is supported across the board, not based on the context of the Age Management philosophy.

KEY WORDS

age management, commercial banks, employee 50+, labor market, population ageing process, prejudices, stereotypes, work-life balance

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1 INTRODUCTION

The aim of this article is, inter alia, to determine whether the selected Czech banking institutions are dominated by stereotypical perception of the employees and further to reflect over how the concept of the Work-life balance can affect the context of aging of the population and the Age Management philosophy.

The aging of the world population is driven by two trends. First, there has been a dramatic increase in life expectancy. Globally, the increase in life expectancy reflects both a reduction in deaths from infectious and parasitic diseases (e.g., smallpox, polio, measles) and a general movement toward healthier lifestyles.

Second, as a result of more effective birth control and improved education, there has been an equally dramatic decline in fertility rates. The world's total fertility rate has already dropped by about half, from 5.0 children per woman in 1950–1955 to 2.5 children per woman in 2010–2015; it will fall below replacement by 2050.

Most of the developed world already displays an older demographic profile. Ranked by median age, Europe is currently the oldest region in the world and should retain that distinction through 2050. Globally, the number of older persons is expected to more than double, from 841 million people in 2013 to more than 2 billion in 2050. But the relative size of this group is even more important than its absolute numbers: the global share of people aged 60 years or over increased from 9.2%, in 1990, to 11.7%, in 2013, and is expected to reach 21.1% by 2050. (Kulik et al., 2014)

The aging of the European population is a demographic trend that is expected to continue in the coming decades, and is reflected in the ever growing number of older workers. (Principi et al., 2015)

The Czech society is growing old, that being more significant than in the case of populations in other countries of our cultural circle. If the Czech Republic wants to be achieving economic growth in the future, it will need to make use of the potential of 50+ employees more. But also the employees themselves will be forced to working until the older age. If the standpoints of the two parties do not change, the labor force will significantly reduce. By 2050, according to estimates, by up to 40%. (Jílková and Prokopová, 2014)

Then if the banking corporations want to ensure stability on the market and remain competitive in the future, they must create workplace conditions suitable for aging employees in all the aspects, get rid of the ingrained age stereotypes or myths and make use of their skills and life experience. (Jílková and Prokopová, 2014)

The institutionalization of ageism has its roots in the increasingly negative way the United States (and to a lesser degree, other countries) views older adults. Older adults in the United States tend to be marginalized, institutionalized, and stripped of responsibility, power, and, ultimately, their dignity. It wasn't always this. In most prehistoric and agrarian societies, older people were often held in high regard. They were the teachers. By virtue of their age and greater experience, they were regarded as wise and they were the custodians of the traditions and history of their people. In biblical times, if one lived beyond age 50, it was believed he or she was chosen by God for a divine purpose. However, attitudes toward older people began to shift dramatically with two major developments in civilization. First, the advent of the printing press was responsible for a major change in the status of elders. The culture, tradition, and history of a society or tribe now could be repeated innumerable times, in exact detail through books, and the status and power elders once had as the village historians was greatly reduced and, in many cases, eliminated.

The second major development in society that led to a shift in attitudes toward the elderly was the industrial revolution. The industrial revolution demanded great mobility in families – to go where the jobs were. In light of this new pressure to be mobile, the extended family structure (with grandparents in the household) was less adaptive. Older people were not as

mobile as younger people. These jobs tended to be oriented toward long, difficult, manual labor, and the jobs were thus more suited to younger, stronger workers. Experience in a position was not as valued as the ability to adapt to changes and changing technology. Around this time, great advances in medicine were taking place, extending life expectancy significantly. Society was not prepared to deal with this new large population of older adults. Society began to associate old age with negative qualities, and older adults were regarded as non-contributing burdens on society. These negative attitudes have persisted in our society, and have in fact, only increased. Older persons today are treated as second-class citizens with nothing to offer society and the negative attitudes about aging that give rise to ageism tend to manifest themselves in subtle ways in the daily life of the average older person. (Nelson, 2005)

The employees want a meaningful job and a continued career, although they exceed the age of fifty. It is high time to get rid of the cult of the youth. This human resources strategy has no future with regard to the demographic changes in the society. It is necessary to have regard for every talent regardless of the age, therefore actively apply the Age Management philosophy. (Jílková and Prokopová, 2014)

Within the frame of the entire economy, the modern conception of Age Management philosophy enables each and every employee to use their full potential without being put at a disadvantage for age reasons. Despite the fact that this area is important in terms of current demographic development, there are organisations that do not implement its measures. (Urbancová and Hlavsa, 2014)

The Age Management philosophy therefore stresses that employing older people has its advantages and in this context it also deals with demographic changes at the workplace. (Ng and Law, 2014)

According to the European Age Management Network (2007) and Fabisiak and Prokurat (2012), the content of the Age Management philosophy observed may be defined at three levels: (1) social and political level, (2) corporate level, and (3) individual level.

The Age Management philosophy may be defined as measures that combat age barriers and/or promote age diversity. The Age Management philosophy does not target seniors (the 50+ employees), as policies targeting specific age groups can be counterproductive. Younger employees (the 50− employees) will find affirmative action toward senior staff to be unjust, and they will react negatively if given a greater workload; moreover, the seniors themselves will find that they are labeled, pigeon-holed, and stigmatized.

In a broad sense, the Age Management philosophy is therefore about the efforts to maintain employability and workability over the entire course of employee life. (Jensen and Møberg, 2012)

The Age Management philosophy measures or recommendations relate to many personnel activities and areas, such as (Novotný, 2011): (1) health care, (2) restructuring of posts, (3) development of work environment, (4) adaptation of work organization, (5) ergonomics at work, (6) management of shifts according to employees' inputs, (7) development of intergenerational cooperation, (8) support and promotion of development of employees' physical condition, and (9) development of personnel strategies considering the Age Management philosophy requirements.

To implement the Age Management philosophy successfully into the corporate practice, it is necessary to remove various barriers or take the following measures (Pillinger, 2008): (1) management of aging workforce to ensure its sustainability and competitiveness, (2) valuation and keeping skills of employees of the age 50+, (3) creation of workforce age diversity and struggling with age barriers and age discrimination at the workplace, (4) creation of organization culture supporting the strategic comprehensive approach to the Age Management philosophy, (5) providing effective training of managers to be able to implement organizational procedures and promote age diversity, and (6) include methods and strategies of the Age Management philosophy in social dialogue between unions and employers.

In this context, three pillars of personnel work with the 50+ employees can be considered: the area of work organization, stimuli of work motivation, and the area of education and development of qualification of the employees. (Bejtkovský, 2013)

The application of the Age Management philosophy in corporate practice includes, for example, non-discriminatory recruitment and hiring of employees, higher flexibility of working time, educational activities focused on aging employees, creation of atmosphere of aging employees recognition – acceptance of aging, preventive actions to keep work ability should be taken, etc. (Kotsopoulosová, 2013)

Within the philosophy of equal opportunities (the Age Management philosophy) for all the employees, and not only those of the banking corporations and in order to preserve work performance, activities, flexibility (in terms of time), increased motivation and loyalty in a broader context, for instance, we can talk about the concept of Work-life balance.

There is no agreed definition of Work-life balance. Work-life balance is about people having a measure of control over when, where and how they work. It is achieved when an individual's right to a fulfilled life inside and outside paid work is accepted and respected as the norm, to the mutual benefit of the individual, corporation and society. (Klöpping, 2011)

Work-life balance practices are deliberate organizational changes in programs or organizational culture that are designed to reduce work-life conflict and enable employees to be more effective at work and in other roles. The transition from viewing work-life balance practices solely as a means of accommodating individual employees with care giving responsibilities to recognizing their contribution to organizational performance and employee engagement is an important paradigm shift that is still very much 'in process'. (Lazăr et al., 2010)

But work-life balance is not limited to family members' assistance; it also includes other fields in individuals' life such as managing studies, travel, sports, volunteering, personal development and leisure. (Benito-Osorio et al., 2014)

Measures to support the concept of Work-life balance should be the result of a clear vision and strategy, which is a combination of the overall visions and goals of the (banking) institutions and the needs of employees in all the age categories. The examples of the measures to promote alignment and harmonization of professional and private life within the context of the Age Management philosophy, for example, can include the following (Junová, 2012): (1) flexible work arrangements and flexible working hours, (2) home-office, (3) strategic plan for workplace, (4) changing the job description (job sharing, job rotation, team work, job enlargement or job enrichment), (5) plans of gradual return to work after a long pause or, on the other hand, a gradual reduction of workload before the planned retirement, (6) organizing of meetings in a clearly defined timeframe suited also to persons caring of a dependent family member, (7) personal development plan, (8) corporate and intergenerational education and trainings, programs focused on diversity, skills necessary for the use of required technologies, stress management, (9) possibility of individual consulting and coaching, (10) provision of support to employees associated with the care for children or elderly relatives, (11) various forms of provision of childcare (kindergarten), (12) possibility to work for the local community, non-profit sector, (13) unpaid leave for drawing new strengths – mostly over a longer period (so-called career break or sabbatical), (14) wellness programs, events or free medical examinations, and (15) psychological, financial or legal consulting to assist in difficult situations of the employees.

Flexible working arrangements may be a solution to retaining employees in the workforce, although their abilities to access these may be limited by a manager's attitude to flexibility or to the capabilities of employees. (Earl and Taylor, 2015)

The flexibility is drawn upon by organizations as a means of reducing early workforce exit and prolonging the working lives of older employees (Taylor et al., 2013). In the context of managing older workers, flexibility usually refers to reduced hours and part-time work

patterns that enable them to maintain their employment and achieve a work-life balance by having greater control over their time. It can also refer to a reduction in job demands in the forms of different tasks and reduced levels of responsibility which enable an older worker to continue working in challenging, stressful, or physically demanding jobs. Some of these arrangements are offered in the form of a pre- or post-retirement contract. (Earl and Taylor, 2015)

2 METHODOLOGY AND DATA

The objective of this article is, inter alia, to determine whether the selected Czech banking institutions are dominated by stereotypical perception of the employees and further to reflect over how the concept of the Work-life balance can affect the context of aging of the population and the Age Management philosophy. This holistic idea should then be actively manifested in the fields of motivation, satisfaction and work performance which factor should increase or be improved and, on contrary, the fluctuation, loss and idle times or absences of personnel of a bank institutions should decrease.

Partial objectives of the article include answering research assumptions and research questions (RQ_1, RQ_2, RQ_3 and RQ_4) associated with the area of strategic management of human resources in the selected Czech banking institutions.

The article presents a view of some of the results of quantitative and qualitative research conducted in selected banking institutions in the Czech Republic. The aim of the researches includes without limitation: (1) verify the position of the 50+ employees in the addressed banking institutions, (2) determining how the corporate culture is perceived in the addressed banking institutions, (3) identifying of the opinions on the attitude of the Czech Republic to the population aging process, and (4) determining to what extent the addressed banking institutions have implemented the modern Work-life balance concept.

On grounds of an analysis of domestic and foreign expert resources, four research assumptions and research questions have been formulated.

RQ_1: Most of the addressed respondents agree that they perceive their employer (a banking institution) as an entity that is dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

RQ_2: Most of the addressed respondents agree with the fact that their corporate culture is not welcoming to employees of any age.

RQ_3: Do you think that the Czech Republic is taking sufficient steps to support and find application of 50+ employees on the labor market?

RQ_4: Does your banking institution actively support the modern Work-life balance concept?

Employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) and employees of banking institutions from the 50+ age category were confronted with these research assumptions and research questions.

From research methods, questionnaire survey and observation were used. These methods were further supplemented with a semi-structured interview with the employees of banking institutions.

Within the performed quantitative and qualitative research, five banking institutions were addressed: Česká spořitelna, a. s.; Československá obchodní banka, a. s. (including Era – Poštovní spořitelna); Komerční banka, a. s.; GE Money Bank, a. s. and Raiffeisenbank a. s. These banking institutions were selected according to the number of clients in the Czech Republic. The respondents were employees of headquarters in the Czech Republic, branches and client centres. The research group of the questionnaire survey included in total 180 employees of banking institutions working in and responsible for the area of human resource management and 282 employees of the 50+ age

category. Validity of the assumptions was verified by using a one-sample test of proportions corrected for continuity.

The research group of the semi-structured interview included 20 employees of banking institutions working in and responsible for the area of human resources management. By means of the interview, more general categories were defined that covered statements of the addressed employees and consequently it was identified what claims were repeated in their responses. At the end, summary and interpretation of the identified facts was performed.

3 RESULTS

Based on the analysis of the secondary resources it is possible to state that not only the society but also the corporate practices are still dominated by prejudice towards the 50+ employees. This idea has been scientifically examined and verified in addressed banking institutions by means of the defined assumption. The assumption has been verified from perspective of HR managers (specialist or leaders) and the 50+ employees within complex assessment. Finally, a standpoint was formulated to verify validity of the assumption.

RQ_{1A}: Most of the addressed respondents (HR managers, specialists or leaders) agree that they perceive their employer (a banking institution) as an entity that is dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

Validity of the assumption RQ_{1A} was verified by using a one-sample test of proportions corrected for continuity. The Tab. 1 contains data that characterize the assumption RQ_{1A}. On the 5% significance level, the RQ_0 assumption is rejected in favour of the RQ_A assumption. A reliability interval of proportion estimate can be determined: $\pi \in \langle 0.000; 0.064 \rangle$. Maximum 6.4% HR managers (specialist or leaders) agree that they perceive their employer (a banking institution) as an entity that is dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones. This is the evidence to reject the assumption RQ_{1A}. It can be generally stated that most HR managers (specialist or leaders) believe that they perceive their employer (a banking institution) as an entity that is not dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

RQ_{1B}: Most of the addressed respondents (the 50+ employees) agree that they perceive their employer (a banking institution) as an entity that is dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

Validity of the assumption RQ_{1B} was verified by using a one-sample test of proportions corrected for continuity. The Tab. 1 contains data that characterize the assumption RQ_{1B}. On the 5% significance level, the RQ_0 assumption is rejected in favour of the RQ_A assumption. A reliability interval of proportion estimate can be determined: $\pi \in \langle 0.000; 0.462 \rangle$. Maximum 46.2% the 50+ employees agree that they perceive their employer (a banking institution) as an entity that is dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones. This is the evidence to reject the assumption RQ_{1B}. It can be generally stated that most the 50+ employees believe that they perceive their employer (a banking institution) as an entity that is not dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

On grounds of the one-sample test of proportions with corrected continuity performed in the assumptions RQ_{1A} and RQ_{1B} it can be stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that they perceive their employer (a banking institution) as an entity that is not dominated by positive prejudice towards the 50− employees and negative prejudice towards the 50+ ones.

Corporate culture (values, norms, artifacts, etc.), in-house communication, relations be-

tween the employees, inter alia, are also reflected in the overall employee performance, level of satisfaction and loyalty and thus in the success and competitiveness of not only the banking institution. Therefore an assumption focusing on the corporate culture and its importance in the addressed banking institutions was surveyed in this context.

The assumption has been verified from perspective of HR managers (specialist or leaders) and the 50+ employees within complex assessment. Finally, a standpoint was formulated to verify validity of the assumption.

RQ_{2A}: Most of the addressed respondents (HR managers, specialists or leaders) agree with the fact that their corporate culture is not welcoming to employees of any age.

Validity of the assumption RQ_{2A} was verified by using a one-sample test of proportions corrected for continuity. The Tab. 1 contains data that characterize the assumption RQ_{2A}. On the 5% significance level, the RQ_0 assumption is rejected in favour of the RQ_A assumption. A reliability interval of proportion estimate can be determined: $\pi \in \langle 0.000; 0.051 \rangle$. Maximum 5.1% HR managers (specialist or leaders) agree with the fact that their corporate culture is not welcoming to employees of any age. This is the evidence to reject the assumption RQ_{2A}. It can be generally stated that most HR managers (specialist or leaders) believe that their corporate culture is welcoming to employees of any age.

RQ_{2B}: Most of the addressed respondents (the 50+ employees) agree with the fact that their corporate culture is not welcoming to employees of any age.

Validity of the assumption RQ_{2B} was verified by using a one-sample test of proportions corrected for continuity. The Tab. 1 contains data that characterize the assumption RQ_{2B}. On the 5% significance level, the RQ_0 assumption is rejected in favour of the RQ_A assumption. A reliability interval of proportion estimate can be determined: $\pi \in \langle 0.000; 0.192 \rangle$. Maximum 19.2% the 50+ employees agree with the fact that their corporate culture is not welcoming to employees of any age. This is the evidence to reject the assumption RQ_{2B}. It can be generally stated that most the 50+ employees believe that their corporate culture is welcoming to employees of any age.

On grounds of the one-sample test of proportions with corrected continuity performed in the assumptions RQ_{2A} and RQ_{2B} it can be stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that their corporate culture is welcoming to employees of any age. The Tab. 1 contains data that characterize the research assumptions.

Present society is characterized by rapidly changing demographic situation and prolonging of human life. The mean life expectancy (length of life) has been extending thanks to the modern health care, a healthy diet, improved infrastructure, economics and a better environment. This fact is irreversible and should be taken into consideration not only by corporate entities (for example, banking institutions), but also by the Czech Republic. It is therefore necessary to actively promote this trend and to generate supportive conditions for the employment and employability of 50+ employees on the labor market.

According to the addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) it can be said that the Czech Republic is not taking sufficient steps to support and find application of 50+ employees on the labor market.

There is presently a National Action Plan to support positive aging in the period from 2013 to 2017, and this trend is also subjected to a greater interest of the media. In any case the majority of the respondents is rather dissatisfied with the specific measures adopted by the entities representing the Czech Republic.

Alignment and harmonization of the professional and the private life (the concept of Work-life balance) is supported in the addressed banking institutions across the board, not based on the Age Management philosophy context. The tools of the Work-life balance concept include specifically the following: (1) employees development plans for the period spent on maternity/parental leave, (2) 5 additional

Tab. 1: The data that characterize the research assumptions

Assumption	Number of respondents	χ-squared	p-value
RQ_1 (HR managers)	180	84.3784	$4.4 \cdot 10^{-18}*$
RQ_2 (50+ employees)	282	5.1822	$8.1 \cdot 10^{-3}*$
RQ_3 (HR managers)	180	420.1802	$< 2.4 \cdot 10^{-18}*$
RQ_4 (50+ employees)	282	48.3974	$< 2.4 \cdot 10^{-18}*$

days of paid leave after childbirth (so-called Daddy's Leave), (3) various forms of provision of childcare (kindergarten), (4) flexible work arrangements and flexible working hours, (5) corporate events including family members of employees, (6) open days for employees' children (for example, headquarters), (7) wellness programs and events, (8) corporate and intergenerational education and trainings, (9) personal development plan, and (10) advice and assistance for employees.

4 DISCUSSION AND CONCLUSIONS

This article, inter alia, analyzed and subsequently verified two research assumptions (RQ_1 and RQ_2) and looked for answers to two research questions (RQ_3 and RQ_4).

Employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) and employees of banking institutions from the 50+ age category were confronted with these research assumptions and research questions.

It can be stated that the addressed respondents (HR managers and the 50+ employees) agree with the statement that they perceive their employer (a banking institution) as an entity that is not dominated by positive prejudice towards the 50-employees and negative prejudice towards the 50+ ones.

However, the research exposed that the degree of disagreement with the assumption RQ_1, from the perspective of the 50+ employees, is 46.2%, therefore it is not possible to be completely strict in drawing a conclusion. The addressed employees of banking institutions that are active in and responsible for the area of human resources (HR managers, specialists or leaders) do not use the direct term prejudice, but strengths: experience (work-related and life), personal know-how, approach to work and corporation, background and life priorities, higher level of loyalty to a particular corporation, lower fluctuation and weaknesses: lower level of language knowledge and skills, lower flexibility in relation to changes of used operational procedures, lower self-confidence, lower capacity of physical efficiency.

The strengths and weaknesses are also tackled by the example: Bočková et al. (2011), Loretto and White (2006), Riach (2009), Vostrovská (2009), Wheatmanová (2009) and others. The extent to which this characteristic is present in the 50+ employees in the addressed banking institutions remains a question. The only (correct) approach remains the individuality of every 50+ employee mainly in the eyes of the managers, because the opinion of the leaders rather inclined to the disagreement with the assumption RQ_1. This finding implies that the HR managers, particularly, should throw out prejudices, which is also confirmed by Chum (2012).

Before an employer dismisses a 50+ employees, it should calculate the costs associated with that. The employer must address a new employee with a job offer, select them, train them at their positions, complement their trainings and certificates, submit the agenda to them and wait for their due professional inclusion. That alone costs tens to hundreds of thousands of Czech Crowns. However it does not count with the losses in the transition period and the

know-how of the dismissed employee. (Novotný, 2014)

The helpful and healthy nature of the corporate culture in relation to all the employees was testified by the assumption RQ_2. However, the HR managers were more positive here again. It is necessary to realize that the corporate culture is very important and its quality affects the existence of the whole not only of a banking institution. The formulated rules and philosophy not only of a banking institution should correspond with the actual atmosphere and practices in the workplace, which is also documented by the following: Morawitzová (2014), Mezinárodní projekt MUME (2014), Principi et al. (2015) and others.

Another finding associated with the corporate culture and the employees aged 50+ is the opinion of the HR managers that all the employees can apply their abilities, knowledge and skills in the addressed banking institutions, regardless of their age.

Validity of the research assumptions (RQ_1 and RQ_2) was verified by using a one-sample test of proportions corrected for continuity.

The issues of the 50+ employee cannot be effectively addressed only at the corporate level, but also requires state synergies. All the involved entities must learn to work with the population aged 50+. It is necessary to look for such jobs for the employees aged 50+, in which they can be as productive as possible. Based on the international practice, one of the possible solutions applicable by the state seems to be the stimulating mechanism of tax exemptions or reductions in levies. (Fojtů, 2011)

The policy of preparing for the aging in the Czech Republic should react to two major challenges: integration of the older people within the economic and social development and creation of the age-inclusive society. It is important to accommodate the employment policy, retirement policy and other policies and services to the ongoing social and demographic changes. (Ministerstvo práce a sociálních věcí, 2015)

Within the reply to the research questions (RQ_3) it can be stated that the respondents perceive the activity of the Czech Republic related to the 50+ employees as relatively little intense. This fact has also been confirmed by Chum (2012) or Malinen and Johnston (2013).

In the consequence of securing the necessary qualified human resources, the concept of Work-life balance in the addressed banking institutions is implemented across the board, not based on the context of the Age Management philosophy. The addressed banking institutions seek not only to have the right employees in the right job positions, but also require their satisfaction and loyalty. Therefore, the conditions not only of a banking institution allowing, they try to offer their employees a variety of benefits and advantages within the modern concept of Work-life balance. The advantage resulting from the concept is obvious – in fact it is aimed at all age categories of the employees not only of a banking institution.

However, employer decisions about flexible working options are also influenced by their attitudes to the efficacy of forms of flexibility, on the one hand, and to the perceived productivity of older workers, on the other. Kelly and Kalev (2006) found that human resource managers across industry sectors negotiated flexible working options (such as flex time, compressed working weeks, telecommuting, and reduced hours) as perks for valued workers of any age and they were determined at the discretion of the manager even when there were formal policies in the organization.

Manager decisions, as Karpinska et al. (2013) contend, are affected by their own discriminatory attitudes toward older workers (the 50+ employees), particularly perceptions of their low productivity. Managers also appear to have fixed views of the potential of flexibility and of older workers (the 50+ employees) to meet business demands. Furunes and Mykletun (2005) point out that in customer-oriented industries, such as hospitality, managers feel that flexible working options are difficult to organize and that, due to the high physical demands of the job and customer orientation of positions, flexibility centered on reduced working hours rather than a change in job tasks or job rotation is preferable. These options involve lower wages and, for older workers particularly, impact on retirement security.

It is possible to conclude that there is not only one correct solution to solving or addressing the issue of the aging population. There is definitely the need for active cooperation between the state, corporations and other entities involved. But there is also a possibility for the Czech Republic to seek inspiration in the foreign best practices. The Age Management philosophy, the modern concept of Work-life balance and the foreign best practices are also tackled by the example: Earl and Taylor (2015), Hill and Augoustinos (2001), van Dalen et al. (2015) and others.

The Age Management philosophy is not only about elderly people, it also deals with the challenges faced by all generations during their specific life period. (Rašticová et al., 2013)

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AUTHOR'S ADDRESS

Jiří Bejtkovský, Department of Management and Marketing, Faculty of Management and Economics, Tomas Bata University in Zlín, Mostní 5139, 760 01 Zlín, Czech Republic, e-mail: bejtkovsky@fame.utb.cz

DETERMINANTS OF RETURN ON EQUITY FOR A SUSTAINABLE GROWTH OF THE MANUFACTURING INDUSTRY IN THE CZECH REPUBLIC

Daniel Anarfi[1], Kofi Ampadu Boateng[1], Kwabena Adu-Ababio[2]

[1] *Mendel University in Brno*
[2] *University of Ghana*

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ABSTRACT

The aim of this study was to examine the factors that determine return on equity (ROE) in the Manufacturing industry in the Czech Republic over a 10-year period of 2005 to 2014. The study combined firm level variables (DuPont model) and macroeconomic variables (Multifactor Arbitrate Pricing Theory – APT) to regress data obtained from Amadeus (Bureau van Dijk) and the World Bank respectively. The results show that profit margin and net asset turnover have a positive and significant effect on ROE. However, financial leverage had a negative and significant impact on ROE. With regard to macroeconomic variables, none of them affected ROE positively. GDP growth and Interest rate impacted negatively on ROE whilst unemployment, inflation and exchange rate do not have any impact on ROE. These results suggest that the firms can improve their ROE by developing cost leadership strategies and increasing sales revenue.

KEY WORDS

return on equity, company performance, manufacturing industry, Czech Republic

JEL CODES

G32, G39

1 INTRODUCTION

An analysis of economic performance and growth in a business or company is one of the pertinent aspects that must be met to ensure that the business is run properly. The accountant, investor, IT specialists, economists as well as shareholders have to assess these indicators to make sound adjustments and models accordingly (Damodaran, 2016). According to Lazonick and O'Sullivan (2000), return on equity (ROE) is one of the measures that is used in measuring the profitability of a business in relation to the book value of shareholder equity. It is therefore a parameter that is considered essential in decision making

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processes as companies and shareholders make appropriate decisions that are related to an entity's model.

The manufacturing industry is one of the most competitive and highly invested industries in the market (Goddard et al., 2005). The initial outlay that is required is very high making an analysis of the different models and aspects in the market critical towards giving the analysts a chance to make critical decisions on the best models that are to be adopted by the company. Depending on the products that are deemed necessary in the market, there are different figures that can be appropriated and developed to highlight the important aspects that are needed in the market (Král, 2004).

This paper assesses the factors that determine the return on equity in the Czech Republic. This means that there a need for an analysis of the differentiated aspects in the European market and how the external and internal conditions affect the manufacturing sector in the country (Damodaran, 2016). Literature review on these aspects will have to be assessed and differences in the models that are given will also be appropriated to have a proper perspective of the determinants that are critical to ROE.

2 LITERATURE REVIEW

Return on equity is equal to the net income that a company or business makes after there have been payment for preferred stock before the common stock dividend has been paid divided by the total equity. It is defined as the measure of return for the investments from equity that has been placed in the company by the shareholders (Portes and Rey, 2005). Businesses have to assess the market opportunities and models before making a decision on an industry to invest in since the industry in the market where the company invests determines the level of return on equity that the company stands to gain due to the market forces.

The manufacturing sector in Czech Republic is affected by the external forces and market models in the European Union (EU). Damodaran (2016) asserts that, the EU has a significant influence in the market since the Czech Republic is part of the EU and is affected by the same models and aspects of the market. Since the manufacturing sector requires coordination and interaction between different countries it is important to assess the market conditions in the area (Wagner, 2005). The level of income is affected by how well a company does in the market, with the international controls and models being important in highlighting the different models that are appropriated and created in these markets.

Pasiouras and Kosmidou (2007) observe that the performance of a company in the manufacturing sector in the Czech Republic is as similar in other countries and determines the level of ROE in the market. The cost of production of products is critical since it determines the level of income that can be appropriated and created in the same market. The cost of production affects the level of profits and income that is important in creating a proper model for the company (Damodaran, 2016). Depending on the availability and cost of raw materials therefore, it is important to ensure that the economic indicators and models that are needed in the market have been ascertained and create a working prospect that can help in differentiating the position of the companies in the industry (Wagner et al., 2002).

The ratio of equity that has been raised to support the company in the manufacturing sector is also a major aspect that determines ROE (Dunning, 2012). Depending on the level of control that has been supported by equity and the level driven by debt it is important to ensure that the two aspects are critically evaluated before coming up with a single structure that is meant to ensure that the market models are supported. The level of competition in the market is also a major determinant of ROE in the manufacturing sector. Although most companies do not face stiff competition

due to the level of investment required in the manufacturing sector, competition is also a major determinant of ROE in the market (Caner and Kontorovich, 2004). Competition determines the profits that companies stand to make and the level of creativity and modelling that is appropriated in the market. There are differences that can be cited and models that need to be addressed however, since the market models are appropriately controlled. It is therefore, critical to establish the position of a company in the market in comparison to other companies and derive the best models and strategies that can be used in giving the entity a competitive edge in the larger industry (Goddard et al., 2005). This helps the company in gaining a higher level of income and in turn ROE (Caves, 1974).

There are companies within the manufacturing sector that are critical in giving the people the best models and aspects that are significantly addressed. Depending on individual models, there are differentiated aspects that can be assessed and cases where ROE is not a measure of how well, or how bad a company has done in the market (Jermann, 1998). According to Arnold et al. (2011), a company may control a large ROE in respect to another entity but this does not represent the best models for change accordingly. Since the Czech Republic is perfectly poised to take advantage of the larger market, there are different models and critical controls that are significantly poised. Beck (2002) reiterates that the manufacturing sector in the country is affected by the region's advancement in technology and economic indicators respectively. The EU affects and reflects on all the countries that are member states, making manufacturing in the region advanced therefore, increasing the changes that are poised in the market as a result accordingly (Lyn and Zychowicz, 2003). It is important to ensure that the market indicators are perfectly developed and with a country that is in the EU it is easier to control the market forces and indicators to the company's advantage (Antoniou et al., 2002).

The manufacturing in the Czech Republic has all the ingredients for success, making the ROE in the region to be very high as a result. It is important therefore, to ensure that the market models and attributes that are derived are created in a way to ensure that all the controls are poised to take advantage of the market. The different determinants of ROE are measured before important decisions are made and companies need to have better approaches to take advantage of these market models.

3 METHODS AND DATA

3.1 Data Description

This paper chose the Manufacturing Industry in the Czech Republic as the population of study because of the availability of data and the success of the current growth of the industry. In total, 1,328 firms were sample from the population for a period of 10 years (2005–2014). To achieve a balanced data, all manufacturing firms who had operated for this period and had asset valuing 5,000 and above were considered. Therefore the sample consists of 12,935 observations.

3.2 Variables

In an attempt to identify the determinants of ROE of a firm from the panel data, most early writers have relied on ROE as the dependent variable (Boyd et al., 2007; Hagerman and Ratchford, 1978; Ndlovu and Alagidede, 2015) which is repeated in this study. Following the work of Ndlovu and Alagidede (2015), this study first considers the micro level independent variables which is the DuPont model to include Profit Margin (PM), Asset Turnover (AT) and Financial Leverage (FL):

$$\begin{aligned} \mathrm{ROE}_{it} &= \alpha + \beta_1\,\mathrm{PM}_{it} + \beta_2\,\mathrm{AT}_{it} + \\ &\quad + \beta_3\,\mathrm{FL}_{it} + \mu_{it}, \end{aligned} \tag{1}$$

where ROE is the dependent variable, i and t both represent the firm and time, α represents the constant in the study and the coefficients of the variables are the β_1, β_2, β_3. The error term is represented by μ. The micro-level data were extracted from European micro database Amadeus provided by Bureau van Dijk. The Amadeus database contains annual accounts for about 1.5 million firms in Europe. The data extracted were already in a computed ratios of the firms. However, a firm's performance and profitability is not only affected by the internal factors but external factors as well. This study also adopts the APT model in other to include the Macro level variables in the DuPont model (Ndlovu and Alagidede, 2015). The model is specified below:

$$\begin{aligned} \mathrm{ROE}_{it} &= \alpha + \beta_1\,\mathrm{PM}_{it} + \beta_2\,\mathrm{AT}_{it} + \\ &\quad + \beta_3\,\mathrm{FL}_{it} + \beta_4\,\mathrm{UnR}_t + \\ &\quad + \beta_5\,\mathrm{ExR}_t + \beta_6\,\mathrm{GDPgR}_t + \\ &\quad + \beta_7\,\mathrm{InR}_t + \beta_8\,\mathrm{InfR}_t + \mu_{it} \end{aligned} \tag{2}$$

The new macro-economic variables which are included in the model are the Unemployment Rate (UnR), Exchange Rate (ExR), GDP growth Rate (GDPgR), Interest Rate-REPO (InR) and Inflation Rate (InfR). The macro-level data were also extracted from the databank of the World Bank. The panel level of the data sample allows the the application of fixed-effects methods on the micro level (Dischinger, 2010).

$$\begin{aligned} \mathrm{ROE}_{it} &= \alpha + \beta_1\,\mathrm{PM}_{it} + \beta_2\,\mathrm{AT}_{it} + \\ &\quad + \beta_3\,\mathrm{FL}_{it} + \beta_4\,\mathrm{UnR}_t + \\ &\quad + \beta_5\,\mathrm{ExR}_t + \beta_6\,\mathrm{GDPgR}_t + \\ &\quad + \beta_7\,\mathrm{InR}_t + \beta_8\,\mathrm{InfR}_t + \\ &\quad + \rho_t + \phi_i + \mu_{it} \end{aligned} \tag{3}$$

The new terms included in the model ρ_t and ϕ_i represents year effect dummy and firm fixed effect dummy respectively. The year effect dummy controls the unobserved common changes in the profitability of all firms in a given year and the firm fixed effects controls the unobserved characteristics of the firm that do not change over time (Dharmapala, 2014). According to the Hausman test, the fixed-effects OLS model is more preferable than the random-effects model. The following are the definition and description of the data variables.

Return on Equity: The ROE is one of the traditional profitability ratio that measures the ability of a firm to generate profits from its shareholders investments in the company.

$$\text{ROE (DuPont formula)} = \frac{\text{Net profit}}{\text{Revenue}} \cdot \frac{\text{Revenue}}{\text{Total assets}} \cdot \frac{\text{Total assets}}{\text{Shareholder's equity}}$$

Therefore ROE = Net profit margin · Asset turnover · Financial leverage.

Profit Margin: The profitability ratio which indicates the amount by which revenue from sales exceeds costs in a business.

$$\mathrm{PM} = \frac{\text{Net Income}}{\text{Sales}} \cdot 100$$

Net Asset Turnover: The efficient way a company can use its assets to generate sales.

$$\mathrm{NAT} = \frac{\text{Net Sales}}{\text{Average Total Assets}}$$

Financial Leverage (Equity Multiplier): The equity multiplier shows the percentage of assets that are financed or owed by the shareholders (denominated in EUR).

$$\mathrm{FL} = \frac{\text{Total Assets}}{\text{Total Shareholder's Equity}}$$

The World Bank definition of the Macro-level data are as follows:

Unemployment, total (% of total labour force): Unemployment refers to the share of the labour force that is without work but available for and seeking employment.

Exchange rate (CZK per USD, period average): The exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U. S. dollar).

GDP growth (annual %): Annual percentage growth rate of GDP at market prices based on constant local currency.

Interest rate (%): Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector.

Inflation, consumer prices (annual %): Inflation as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

4 RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics is first presented showing both the financial variables and the macroeconomic indicators.

Tab. 1 shows mean, standard deviation, minimum and maximum values. On the average, manufacturing companies in Czech Republic representing our sample had a Return on Equity (ROE) of about 9.55 over the entire time period from 2005 to 2014 as used in the study. The mean of ROE varied greatly across the companies and periods, the standard deviation of ROE is 44.64, minimum and maximum values are −871.21 and 870.305, respectively. Whiles the mean of Profit Margin (PM) is 5.19, minimum value is −96.65 and maximum value is 100%. The averages of Net Asset Turnover (NAT) and Financial Leverage (FL) are approximately 3.94 and 3.32, respectively. Liquidity ratio which is one of the important ratios for the banks amounts to 31.5% on average, while it varies between 8.6% and 56.5%.

On the other hand, Tab. 1 also summarize the averages of the macroeconomic variables over the year 2005 through 2014. The average growth rate of real GDP is approximately 2.16% (minimum −4.8 in year 2005 and maximum 6.9 in year 2014). When the mean of inflation rate is 1.2%, real interest rate has a 5.61 mean value for 2005–2014 periods. Also exchange rate for the 10-year period from 2005–2014 is 19.969 while the mean of unemployment rate is 6.548.

4.2 Correlation Matrix

Secondly, correlation matrix for the variables is presented in Tab. 2 to measure the degree of association between them.

Correlation between ROE and an independent variable which shows a positive would mean that the two variables move together, on the other hand a negative correlation between ROE and an independent variable would indicate the opposite. From the Financial (Micro) variables, Tab. 2 shows in the correlation matrix that ROE has a positive correlation with only profit margin (PM) because the correlation between ROE Net Asset Turnover (NAT) as well as financial leverage (FL) were all negative. The Czech Manufacturing Industry (MI) has traditionally been an important contributor to economic growth and employment (PwC, 2016) therefore the industry is quite stable, high sales volume and enjoys economies of scale. Total revenues (CZK bn) from sales in 2008 and 2014 amounted to 3,960 and 4,097 respectively (according to Panorama of the manufacturing industry of the Czech Republic, 2014).

Operating cost in the MI in Czech Republic is also favourable since most of the raw materials are produced locally and firms are consumer of products and services from each other. According to the Czech Ministry of Trade the Automotive division which manufactured a total of 1,246,506 personal automobiles in 2014 depends on other manufacturing industry divisions like the electrical engineering, metal industry, chemical industry, rubbers and plastics industry, glass, textile and general engineering industry and other related branches and services. The negative correlation between ROE and NAT is largely due to the consistent increase of assets (short-term receivables) in the industry which is relative to sales growth. The report by the Czech Ministry of Trade revealed that between the period of 2008–2014 the Manufacturing Industry (MI) increased its

Tab. 1: Descriptive statistics for variables

Variable	Mean	Std. Dev.	Min	Max
roe	9.5464	44.6433	−871.217	870.305
pm	5.1923	10.0900	−96.645	100.000
nat	3.9438	18.7408	0.000	920.249
fl	3.3180	31.4663	−605.500	2705.645
unemp	6.5480	0.9774	4.390	7.930
int_rate	5.6100	0.4721	4.600	6.300
infl_rate	1.2500	1.4264	−1.500	3.500
growth	2.1600	3.4184	−4.800	6.900
exchg_rate	19.9690	1.9755	17.070	23.960

Tab. 2: Correlation matrix with significance levels

	roe	pm	nat	fl	unemp	int_rate	infl_rate	growth	exchg_rate
roe	1.0000								
pm	0.4511* (0.0000)	1.0000							
nat	−0.0221* (0.0117)	−0.0427* (0.0000)	1.0000						
fl	−0.1079* (0.0000)	−0.0333* (0.0001)	0.3058* (0.0000)	1.0000					
unemp	0.0110 (0.2087)	0.0222* (0.0109)	−0.0036 (0.6781)	−0.0031 (0.7237)	1.0000				
int_rate	−0.0453* (0.0000)	−0.0245* (0.0050)	−0.0098 (0.2623)	−0.0115 (0.1834)	−0.2360* (0.0000)	1.0000			
infl_rate	0.0264* (0.0026)	0.0183* (0.0363)	0.0153 (0.0803)	−0.0006 (0.9453)	−0.6328* (0.0000)	−0.1567* (0.0000)	1.0000		
growth	−0.0131 (0.1337)	0.0094 (0.2803)	−0.0085 (0.3319)	−0.0040 (0.6455)	0.0126 (0.1452)	0.0932* (0.0000)	−0.2086* (0.0000)	1.0000	
exchg_rate	0.0256* (0.0035)	0.0486* (0.0000)	0.0008 (0.9313)	−0.0090 (0.3004)	0.5791* (0.0000)	−0.2672* (0.0000)	−0.0769* (0.0000)	0.5567* (0.0000)	1.0000

asset short-term assets by 37% whilst revenue grew by 39%.

Although basically a lower level of assets is better in calculating NAT holding sales constant to improve the ROE but in this situation assets (short term receivables) needed to be consistently increased resulting from mass production to boost sales revenue. Although firms with higher leverage positions tend to have a capital structure that translates into a better performance according to Brealey et al. (2012). In other words, high leverage and profitability or performance should be positively correlated but the case is different in the Czech Manufacturing Industry. Equity-to-Asset in terms of interest on capital in the MI in the Czech Republic is much better than debt-to-total assets. This affirms the case of Rhyne and Otero (1992) who observed that firms with high capital structure with equity, tend to be more profitable. A higher debt over equity would mean more would be incurred in paying the cost of this capital than acquiring equity. The equity/assets in 2008 of the MI in Czech Republic was 26.82% compared to 2.98% of debt/assets. Again in 2014, debt/assets was 1.89% as against 39.81% equity/assets in the industry according to the Czech Ministry of Trade. This indicates that most equity forms the largest composition of the capital structure in the industry which is making the industry highly profitable.

Moreover, on the Macro level indicators, ROE is positively correlated with unemployment rate, inflation rate and exchange rate while the correlation between ROE and Growth rate and interest rate were negative.

Tab. 3: Determinants of return on equity

	(1)	(2)	(3)
Variables	**FE_Model roe**	**RE_Model roe**	**BE_Model roe**
pm	2.247***	2.131***	1.811***
	(0.045)	(0.039)	(0.079)
nat	0.508***	0.525***	0.653***
	(0.038)	(0.035)	(0.091)
fl	−1.213***	−1.197***	−1.192***
	(0.058)	(0.053)	(0.128)
unemp	−1.108	−1.142	36.908
	(1.246)	(1.245)	(40.401)
int_rate	−3.062***	−3.060***	−33.241**
	(0.730)	(0.729)	(13.082)
infl_rate	−0.385	−0.353	43.316**
	(0.638)	(0.637)	(21.200)
growth	−0.432*	−0.423*	22.882***
	(0.240)	(0.239)	(7.236)
exchg_rate	0.541	0.595	−27.770
	(0.554)	(0.553)	(17.084)
Constant	14.390**	14.008**	397.149***
	(6.524)	(6.529)	(134.605)
Observations	12,935	12,935	12,935
R-squared	0.214		0.365
Number of id	1,328	1,328	1,328

Notes: standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.3 Empirical Results from Panel Data Analysis

For empirical results we run three different but related models to ascertain the impact of some micro and macro indicators on the ROE on manufacturing firms in the Czech Republic. We first run a Fixed Effect model where we assume that unobserved effects are correlated with our macro and micro level indicators. We then specify a Random Effects model where the initial assumptions of correlation are reversed on the same covariates. To select the best model among these we run a Hausman specification test to select one model that best suits the scenario in the Czech Republic. Our final model tries to look at the averages of the dependent variable for all the manufacturing companies as one. In this case the research is able to gauge the effect of an average ROE on the interest indicators.

Tab. 3 shows the parameters of estimation and standard errors obtained from the application of fixed effects model, random effects model and the between effects model with the ROE as the dependent variable.

For the FE model we observed that with the firm level variables, profit margin (PM) is highly significant and positively related to ROE. This positive relationship shows that the Profit Margin (PM) have significant positive impact on Equity return. Also, Net Asset Turnover (NAT) is found to be significantly affecting the return of equity (ROE) in the Manufacturing Industry in Czech Republic. The results shows that the impact of Financial Leverage (FL) has a significant negative impact on ROE.

On the macro level indicators both GDP Growth and Interest rate were found to have negative significant level impact on ROE. The negative relationship of GDP is in contradiction to theory of Economics which assumes that that economic growth enhances profitability, however the reason may be attributed to the fact (but not limited to) two reasons. First

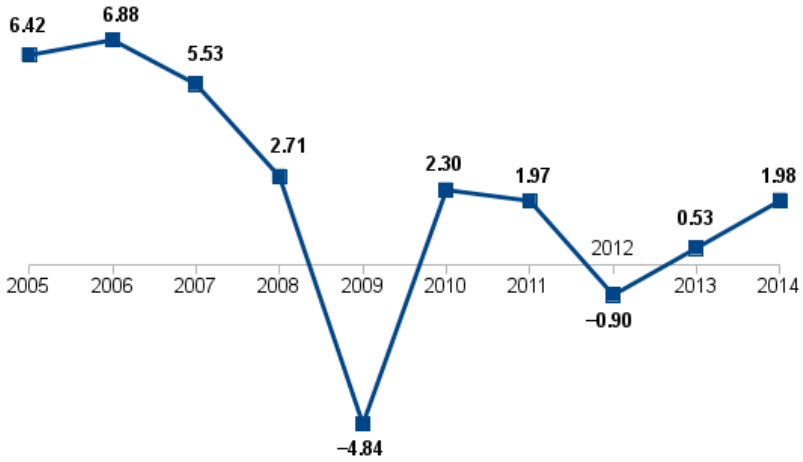

Fig. 1: GDP growth in % (from World Bank Data)

the GDP growth in Czech Republic under the period of study did not see any steady growth and stability. For instance, the GDP growth in 2006 was 6.87% but sharply declined and as at 2009 it was −4.822% according to the data from the World Bank as shown graphically in Fig. 1. It appears that the net effect of the GDP growth under the period of study could have resulted in the negative significant impact on ROE.

Another reason which could have accounted for the negative relationship between GDP and ROE is that, since the biggest firms in the sector are multinationals, their earnings or profit do not mostly contribute to aggregate GDP in the host country but rather repatriated to the home country and this sometimes create a discrepancy between the company's performance and the local economy. The remaining macroeconomic variables (Unemployment, Inflation rate, Exchange rate) all showed no impact on ROE. The negative effect of GDP is in line with results of Khrawish (2011), Sharma and Mani (2012) and Sufian (2011).

For the RE model the research observes that with the micro level variables, there is a significant positive relationship between Profit Margin (PM) and ROE. This indicates the positive impact PM has on ROE in the Manufacturing sector in Czech Republic. Net Asset Turnover (NAT) is also impacting positively on ROE at a high significant. Among the micro level variables only Financial Leverage (FL) which was found to be impacting significant negatively on ROE. On the macro level indicators both GDP Growth and Interest rate were found to have negative impact on ROE and the later having high significant level. The remaining macroeconomic variables (Unemployment, Inflation rate, Exchange rate) all showed no impact on ROE.

For the BE model the results showed a significant positive relationship between NAT, PM and ROE with a negative relationship with FL just as the FE model and RE model indicated among the micro-level indicators. On the macro-level, the results was slightly different from FE and RE models. The relationship between inflation rate, GDP growth and ROE is significantly positive whilst interest rate impacted negatively on ROE.

The Hausman test performed the Fixed and Random effect model calculated a χ^2 of 83.05 ($p > \chi^2 = 0.000$). With this result the study confidently rejected the null hypothesis for the alternate which confirms the results for the Fixed Effects model.

5 CONCLUSIONS

One of the important measure of a firm's performance is the Return on Equity. The ROE is therefore used in this paper to examine the determinants of performance in manufacturing industry in Czech Republic. For the purpose of this paper, panel data method (fixed effects model) is applied to data of 1,328 companies operating in the industry for a 10-year period of 2005–2014. It was found that profit margin and ROE has a significant positive relationship and this can be improved further if cost leadership strategies are employed by this companies. Also the results showed a positive relationship between Net Asset Turnover and ROE. This can also be enhanced by increasing their sales revenue either through increasing volume of sales or increasing prices depending on the level of elasticity. The impact of Financial Leverage on ROE was found to have a negative relationship. This indicates that having more debt than equity in the business impact negatively on return on equity.

However, macroeconomic variables such as GDP Growth and Interest rate has a negative impact on ROE whilst Unemployment, Inflation rate and Exchange Rate have no impact on the ROE in the Manufacturing Industry in Czech Republic.

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AUTHOR'S ADDRESS

Daniel Anarfi, Department of Accounting and Taxation, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: anarfidaniel@ymail.com

Kofi Ampadu Boateng, Department of Forest and Wood Products Economics and Policy, Faculty of Forestry and Wood Technology, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: kofikab@yahoo.com

Kwabena Adu-Ababio, Department of Economics, University of Ghana, Legon Boundary, Accra, Ghana, e-mail: kobbyaduababio@yahoo.com

MEASURING THE DEVELOPMENT OF EFFICIENCY AND PRODUCTIVITY OF BANKS IN THE VISEGRAD GROUP: AN APPLICATION OF HICKS-MOORSTEEN TOTAL FACTOR PRODUCTIVITY INDEX

Lucie Chytilová[1]

[1] *Technical University of Ostrava*

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ABSTRACT

The research on the banking efficiency all around the world has been one of the main topics for the international financial sectors over the last years. The special case is in Europe. Some of the countries are in the European Union. The European Commission creates the rules for safer and sounder financial sector in these countries. In the past, these rules brought a lot of controversy whether they help to all countries in the European Union or just some of them. The purpose of this article is to determine the development of different types of efficiencies for banking industry in the Visegrad Group. Generally, the development is measured by the Malmquist approach. Different type of index is used in this article, more precisely the Hicks-Moorsteen Total Factor Productivity index. It is one of the alternative indexes. The results have showed that the model with the variable return to scale assumption is better for the use in banking industry in the Visegrad Group, as this model is more precise about the results.

KEY WORDS

CCR model, VRS model, the Visegrad group, Hicks-Moorsteen TFP index, efficiency

JEL CODES

G01, G21

1 INTRODUCTION

The situation in countries at the European Union (EU) in recent history has been problematic. The crisis, wars and all kinds of conflicts in the past have affected the EU not only demographically, politically but mainly economically.

Since the World War II countries as Czechoslovakia, Hungary and Poland were part of a social bloc. The social block was influenced mainly by the Soviet Union. Economically it was characterized by a centrally planned economy with a focus on economic relations of

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countries within the block. This had changed when the social block had fallen apart in 1989. The countries of the social block have to integrate into the international political and economic environment. This brought mutual cooperation in the region. In February 1991 the Visegrad Group (V4) was established. Since the split of Czechoslovakia in 1993, the Visegrad Group is consisted by four countries – the Czech Republic, Hungary, Poland and Slovakia. According to the new situation, it was necessary to create a market economy and gradually to open to the rest of the world. The transformation of the banking system was an essential part of the transformation, as banks play crucial role of financial intermediaries in market economies. Since 2004, all countries of the V4 are part of the EU. They are in the common internal market which includes the financial sector. This is good for further development of financial institutions. There may be problem with the new situation of the competition. In the EU the possibility of foreign financial institutions to enter domestic market is higher than it was in the past. Slovakia also joined the third stage of the European Monetary Union. They adopted the common European currency (euro) in 2009. The rest countries of V4 are still without the euro and they are preparing for the stage.

Nowadays, in time of the world wide globalization there are still differences between countries. These differences affect the structure, development and stability of the financial system. The V4 countries are geographically and historically close. So it should be assumed that the properties of their financial and banking systems should not show major differences. Identification of potential differences of the development in the V4 countries is one of the objectives of this paper.

This paper mainly focuses on a use of Hicks-Moorsteen Total Factor Productivity (TFP) index. It is one of the alternative TFP indexes instead of the popular Mamlquist productivity index (MPI) for measuring the TFP changes. This is due to the work of O'Donnell (2012). He had demonstrated that the MPI cannot be used to reliably measure TFP changes except in some special cases. The work of Kerstens et al. (2010) demonstrates as well that the MPI is not always the TFP index. The technology assumption for the return to scale – constant (CRS) or variable (VRS) is also discussed in literature a lot for MPI with different results, see for example work of Coelli and Rao (2005) or Ray and Desli (1997). For these reasons, this paper employs the Hicks-Moorteen TFP index to analyze banks's performance in the V4 countries for both assumptions – CRS and VRS. Results of both cases are then analyzed and compared.

The remainder of the paper is structures as followed. Next section discuss the review of the literature for the topic. In Section 3 it is exposed the methodology of Hicks-Moorsteen TFP index approach. Section 4 introduces the used data while Section 5 presents empirical results of the paper. Section 6 finally provides final considerations and conclusions.

2 LITERATURE OVERVIEW

The empirical analysis of banking efficiency and its decompositions are very frequently discussed topics in literature. In particular, great attention is now focused on the European banking industry. The banking sector is experiencing a difficult situation due to the crisis and all conflicts of the recent years and the pressure of globalization.

In work of Fang et al. (2014) are identified three reasons for the interest. The first talks about many structural changes of banking regulation, financial market structure and competition environment in transition economies. The second discusses the development of security markets and the fact that more banks are treated publicly in stock market nowadays. The third focuses on the idea that there have been established the Basel Capital Accord. Under this the greater supervisory efforts have been focused on risk management and enhancing the capital ratio.

These and probably some other reasons let many authors to study the problematic banking industry all around the world, in Europe, in the V4 or even just in one exact country. For example the work of Lyroudi and Angelidis (2006) and Svitálková (2014) for the Europe may be mentioned as the inspiration. The countries which are part of the V4 were discuss in work of Řepková (2014) or Stavárek and Řepková (2012) for example.

In the literature, there are known two main approaches for evaluation of the bank efficiency as production unit. These approaches are based on the traditional microeconomic theory of the firm. The primary source of difference between them is the treatment of deposits. The approaches are as following:

Production approach. This approach views deposits as output. Banks are seen as producers of deposits, loans and other services. The inputs are define as physical variables – labour, material, space, information systems etc. This approach was found by Benston (1965). Benston also found out two main disadvantages of this approach – a detailed database is required (the number of deposit and loan accounts or the operational cost) and it does not take into consideration the interest cost.

Intermediation approach. It was found by Sealy and Lindley (1977). In this concept the bank produce intermediation services. Banks are as financial intermediaries channelling funds between depositors and creditors. They collect deposits and other liabilities to apply it as interest-earning assets, such as loans, securities and other investments. The deposits are considered as input in this approach. The advantage of this approach is that operating cost and interest cost are considered.

Nowadays, the second approach – the intermediation approach – is the most common for researchers. This paper is devoted to examining the bank efficiency based on the intermediation approach as well.

This paper is attempt to use the Hicks-Moorsteen TFP index to decompose TFP for banking sector in the V4. Generally for this type of study is used the popular MPI. This index was initially introduced by Caves et al. (1982) as theoretical index. Based on work of Farrell (1957), Färe et al. (1992) have developed a new MPI to measure the changes. They also showed that the new MPI could be decomposed into two change components: technical and efficiency. Later, Färe et al. (1992) made decomposition even further – pure technical efficiency change and change in scale efficiency. However, O'Donnell (2012) presented that the MPI as the TFP index cannot be used to reliably measure TFP changes except some cases. He and later other researches have pointed out that the distance functions constituting the MPI TFP index may well be undefined when estimated by general technologies. On the other hand the Hicks-Moorsteen productivity index is well-defined under weak conditions on technology (weak assumptions of strong disposability) and thus more reliable than the MPI TFP index. For these reasons some new studies employs the Hicks-Moorsteen TFP index, for example Arjomandi et al. (2014), Islam et al. (2014) and so on.

There are some discussions about the assumption of the return to scale. O'Donnell (2012) described that the Hicks-Moorsteen TFP index is better to use for the VRS. Generally, there are mixed results, see Coelli and Rao (2005) or Ray and Desli (1997). In this paper it is supposed that the VRS assumption should be better. The CRS assumption has in banking industry more troubles. The banking industry faces usually imperfect competition, government regulation, un-distinction of size or some other situations. These factors may with the CRS assumption lead to worst results then it would be with the VRS result.

This paper uses the intermediation approach to determine different efficiency changes for banks in the V4 through the Hicks-Moorsteen TFP index with two assumptions of return to scale – CRS and VRS. These analyses are made to better understand the past in this region to be able predicted the future and improve this industry in these countries. There have been some empirical researches on this topic, but the research for the V4 in this period is first.

3 METHODOLOGY

3.1 The Hicks-Moorsteen TFP index

The standard used definition of the TFP is following

$$\mathrm{TFP}_{nt} = \frac{Y_{nt}}{X_{nt}}, \tag{1}$$

where TFP_{nt} is the TFP of the n-th decision making unit (DMU) in the period t, X_{nt} and Y_{nt} represents the vector of input and output variables, respectively.

The equation 1 expresses the index number that measures changes in TFP as the ration of an output quantity index to an input quantity index. This index number is referred to as multiplicatively-complete index.

O'Donnell (2010, 2012) proved that the Hicks-Moorsteen TFP index is a consistent with the above equation 1 of TFP, so it may as well be define as multiplicatively-complete indexes. The additional value of this index is that it can be computed without required price data. The Hicks-Moorsteen TFP index is define as following:

$$\mathrm{TFP}_{\mathrm{HM}}^{t,t+1} = \left(\frac{D_o^{t+1}(x^{t+1}, y^{t+1})\, D_o^t(x^t, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^t)\, D_o^t(x^t, y^t)} \times \right.$$

$$\left. \times \frac{D_i^{t+1}(x^t, y^{t+1})\, D_i^t(x^t, y^t)}{D_i^{t+1}(x^{t+1}, y^{t+1})\, D_i^t(x^{t+1}, y^t)} \right)^{\frac{1}{2}}, \tag{2}$$

where $D_o^T(x, y) = \min \left\{ \delta > 0 : (x, y/\delta) \in P^T \right\}$ and $D_i^T(x, y) = \max \left\{ \rho > 0 : (x/\rho, y) \in P^T \right\}$ are output and input distance functions, respectively. P^T denotes the period-T production possibilities set in these functions.

This paper is using the nonparametric DEA method to compute the distance functions. This method was also used by O'Donell (2010, 2012). The advantage of the DEA is that it does not require any restrictive assumptions regarding the functional form and efficiency distribution. On the other hand, the DEA has its own limitations and makes no allowance for stochastic noise. These disadvantages have to be taken in mind in interpreting the results. Due to this statistical shortcoming, any possible measurement errors in the data could make the estimated efficiency and TFP indexes to some extent biased.

3.2 The decomposition of the Hicks-Moorsteen TFP index

Advantage of the Hicks-Moorsteen TFP index is also its decomposability. The decomposition is good for better understanding of the situation which is measured.

All detail may be seen in the work of O'Donell (2010, 2012). The general idea is that with some regards to the efficiency measures defined above, the following input-oriented decomposition can be defined as following:

$$\text{TFP efficiency} = \mathrm{TFPE}_t = \frac{\mathrm{TFP}_t}{\mathrm{TFP}_t^*} =$$

$$= \frac{Y_t/X_t}{Y_t^*/X_t^*} = \mathrm{ITE}_t \times \mathrm{IME}_t \times \mathrm{RISE}_t, \tag{3}$$

where ITE_t is input-oriented technical efficiency, IME_t is input-oriented mix efficiency, RISE_t is residual input-oriented scale efficiency and TFP_t^* is defined as the maximum TFP possible using any technically feasible inputs and outputs.

The equation 3 may be rewritten as following:

$$\mathrm{TFP} = \mathrm{TFP}_t^* \left(\mathrm{ITE}_t \times \mathrm{IME}_t \times \mathrm{RISE}_t\right). \tag{4}$$

A similar equation can be formulated for any other DMU like m in period s. So the index number which compares the TFP of DMU n in period t with the TFP of DMU m in period s is defined as following:

$$\mathrm{TFP}_{ms,nt} = \frac{\mathrm{TFP}_{nt}}{\mathrm{TFP}_{ms}} = \frac{\mathrm{TFP}_t^*}{\mathrm{TFP}_s^*} \times$$

$$\times \left(\frac{\mathrm{ITE}_{nt}}{\mathrm{ITE}_{ms}} \times \frac{\mathrm{IME}_{nt}}{\mathrm{IME}_{ms}} \times \frac{\mathrm{RISE}_{nt}}{\mathrm{RISE}_{ms}} \right), \tag{5}$$

technical change $\times$ overall efficiency change.

The first component in the brackets on the right-hand side of equation 5 measures technical change from time period s to t, quantifying the ratio of the maximum TFP possible, using the technology feasible in period's t and s respectively. Depending on whether $\mathrm{TFP}_t^*/\mathrm{TFP}_s^*$ is greater or less than 1, it can quantify the extent

of technical improvement or technical decline, respectively. If it is equal to 1 the situation does not change. Note, equation 5 measures TFP efficiency change or overall efficiency change. This includes technical efficiency change, mix efficiency change and (residual) scale efficiency change.

4 DATA AND MEASUREMENT OF INPUTS AND OUTPUTS

This paper uses the intermediation approach, as it was chosen as the most improved in this area, see in Section 2. This concept sees banks as producers of intermediation services. Banks should collect deposits and other liabilities to apply it. According to the approach, the basic inputs are physical capital, labour and loanable funds. The basic output are advances and investments.

In previous studies by Hančlová and Chytilová (2015) have been shown that inclusion of the non-interest income into output vector is improving the results. The non-interest income represents in the model the non-traditional activities of banks. If banks are active in the non-traditional activities, it helps them with problematic situation of fee-generating activities. According to this previous analysis, the variable – non-interest income has been include into this model.

Tab. 1 provides the details about input and output variables. The finall model includes three variables in the input vector – physical capital, labour and loanable funds; and it has also three variables in the output vector – advances, investments and non-interest income. The required data have been collected from the BankScope (2015).

This paper is based on period between 2008 to 2013. The V4 countries had many banks during this period. Not all banks have been in this period for all time (bankruptcies, mergers etc.) or some data were missing. These banks were excluded from the analysis. It is due to the fact that a homogeneous set is required for Data Envelopment Analysis. Just banks from the V4 countries which were in the banking industry for whole period (2008–2013) and banks with all needed data from the BankScope were defined as DMUs of this paper. Finally, there have been 27 banks – eight banks from the Czech Republic and Poland, six from Slovakia and five from Hungary. The list of banks is in Tab. 4 in Annex. The fact that all banks have not been used may affect the results. This has to be kept in mind in the final analysis.

5 EMPIRICAL ANALYSIS RESULTS

This paper have examined the decomposition of TFP by the Hicks-Moorsteen TFP index for the V4 banks using constant and variable return to scale assumption. In this section are analyzed and presented the main results. There have been provide various efficiency measurements for each individual bank of the V4. To be clearer with the results, this paper presents two kinds of results: (1) results by each country (geometrical average of all banks in the country), and (2) results by over all banking industry in the V4 (geometrical average of all banks in the V4).

Tab. 2 and Tab. 3 report indexes measuring changes in total factor productivity (dTFP), the technology (dTech) and various other types of efficiency for the banking industry in each country of the V4 for each period. Tab. 2 is for index with CRS assumption and Tab. 3 shows results for the VRS assumption.

Tab. 2 with the CRS assumption is showing the following:

- Czech Republic – big improvement in TFP growth (dTFP) of above 31% (1.311) in period 2011–2012. However, there are there

Tab. 1: Description of inputs and outputs

Variables	Description in the balance sheet	Unit
Input variables		
Physical capital (x_1 – FA)	Fixed assets	th Euro
Labour (x_2 – LAB)	Number of employees	Number
Loanable funds (x_3 – LF)	Deposits + Short term funding	th Euro
Output variables		
Advances (y_1 – ADL)	Loans + Advances to Banks	th Euro
Investments (y_2 – INV)	Other Securities	th Euro
Non-interest income (y_3 – NII)	Non-earning Assets	th Euro

are two periods when the banking industry experienced a significant deterioration of dTFP of below 100%: the period 2008–2009 (91.7%) when it reached its lowest and the following period 2009–2010 (92.5%) during very slow recovery. This reflect the world-wide financial crisis and policy change in 2010 towards the risk management system of domestic and foreign banks.

- Hungary – improvement in TFP growth (dTFP) of above 20% and 26% was period 2008–2009 and 2010–2012, respectively. There have been not be declare significant deterioration of dTFP. This is little bit surprising, but it may due to the fact that lot of many in Hungary was fixed in Swiss franc which was not effected by the the world-wide financial crisis so much. Also the government influence the banking sector a lot by some restrictions which may with CRS assumption cost some errors as it was mentioned earlier.
- Poland – it is not really seen improvement in TFP growth in first three periods. In fourth period, 2011–2012 there is big improvement in dTFP of 30%, but next year there is a significant deterioration of dTFP of below 100%.
- Slovakia – seems have very turbulent environment. Periods 2008–2009, 2010–2011 and 2012–2013 hows that the FP growth almost did not change. On the other hand, the significant deterioration of dTFP of below 100% are seen in period 2009–2010 (79.1%) and 2011–2012 (95.6%). The reason for the first and largest one is probably the change of currency.

The technological change (dTech) estimates for all countries similar results – in period from 2008 to 2010 the technological change declines. Specially in period 2008–2009 are the values lowest. From 2010 there is change and dTech is improving for all countries. So it again seen that the recovery from the world-wide financial crisis is seen everywhere. Also all countries of the V4 made big changes in the policy of banking risk management which helped also improved the dTech.

Tab. 3 with the VRS assumption is showing similar results as Tab. 2. The trends in TFP change for the Czech Republic and Hungary are same. In case of the Czech Republic it is seen that the values of TFP are more closer to 100%, except of the crisis period. The TFP change of banking in the Czech Republic has no improvement or deterioration since 2008–2009. It may be called stable by the model with VRS assumption. In case of Hungary, the values of TFP are lower – more skeptical about the improvement and more considered about the deterioration. This is more likely in this case, as this industry in Hungary is very restricted by government, so VRS assumption should be more useful. More skeptical situation by dTFP is also presented for Slovakia. Generally, the banking there industry experienced a significant deterioration of dTFP of below 100% or are close to 100% – 2010–2011 and 2012–2013. The low dTFP in first period is cost by he world-wide financial crisis and in the second period is cost by the changing to euro currency and transfer to the third stage of the European Monetary Union. On the other hand, the development of dTFP in Poland is

Tab. 2: Changes in productivity and efficiency by country – CRS assumption

Country	Year	dTFP	dTech	dEff	dITE	dRISE	dIME
Czech Republic	2008–2009	0.917	0.590	1.554	1.094	1.373	1.034
	2009–2010	0.925	0.668	1.385	1.128	1.234	0.995
	2010–2011	1.041	1.177	0.884	0.966	0.891	1.027
	2011–2012	1.311	1.311	1.000	1.124	0.909	0.979
	2012–2013	1.014	1.062	0.955	0.966	0.976	1.013
Hungary	2008–2009	1.206	0.572	2,110	1.363	1.443	1.074
	2009–2010	0.970	0.679	1.429	1.407	1.036	0.980
	2010–2011	1.260	1.139	1.106	0.972	1.073	1.061
	2011–2012	1.134	1.304	0.870	1.000	0.924	0.941
	2012–2013	0.997	1.024	0.974	0.983	0.992	0.999
Poland	2008–2009	1.024	0.579	1.770	1.160	1.378	1.107
	2009–2010	1.044	0.613	1.703	1.376	1.285	0.963
	2010–2011	1.012	1.072	0.943	0.922	1.053	0.972
	2011–2012	1.304	1.145	1.140	1.139	1.001	0.999
	2012–2013	0.953	1.071	0.889	0.907	0.980	1.000
Slovakia	2008–2009	1.040	0.748	1.390	1.183	1.173	1.002
	2009–2010	0.791	0.788	1.004	0.968	1.089	0.952
	2010–2011	1.061	1.069	0.992	1.008	0.992	0.993
	2011–2012	0.956	1.087	0.880	0.871	0.998	1.013
	2012–2013	1.002	1.031	0.972	0.993	0.979	1.000

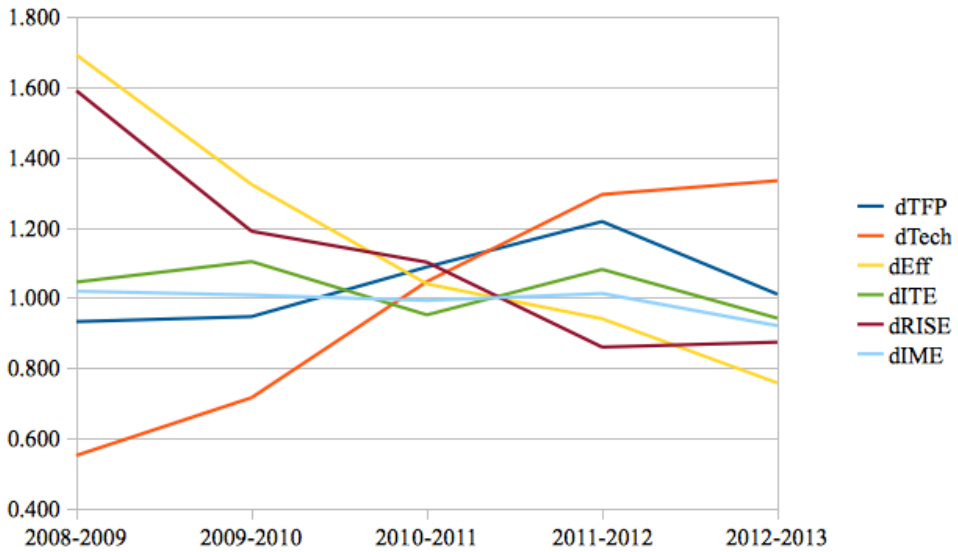

Fig. 1: Changes in productivity and efficiency for the V4 – CRS assumption

Tab. 3: Changes in productivity and efficiency by country – VRS assumption

Country	Year	dTFP	dTech	dEff	dITE	dRISE	dIME
Czech Republic	2008–2009	0.848	0.475	1.785	1.079	1.633	1.013
	2009–2010	0.986	0.702	1.405	1.039	1.332	1.015
	2010–2011	1.075	0.991	1.085	1.011	1.074	0.998
	2011–2012	1.014	0.702	1.445	1.070	1.318	1.025
	2012–2013	1.025	1.408	0.728	0.972	0.919	0.816
Hungary	2008–2009	1.140	0.562	2,031	1.191	1.661	1.027
	2009–2010	0.963	0.782	1.232	1.015	1.146	1.059
	2010–2011	1.225	0.987	1.241	0.950	1.294	1.010
	2011–2012	1.093	1.383	0.790	1.088	0.705	1.030
	2012–2013	0.979	1.164	0.842	0.961	0.894	0.979
Poland	2008–2009	0.975	0.449	2,169	0.952	2,191	1.040
	2009–2010	1.048	0.697	1.504	1.339	1.118	1.004
	2010–2011	1.018	1.016	1.002	0.858	1.200	0.973
	2011–2012	1.101	1.061	1.038	1.018	1.019	1.001
	2012–2013	0.992	1.567	0.633	0.840	0.802	0.939
Slovakia	2008–2009	0.841	0.864	0.973	1.016	0.966	0.992
	2009–2010	0.770	0.705	1.093	0.990	1.146	0.964
	2010–2011	1.093	1.227	0.891	1.007	0.888	0.996
	2011–2012	0.938	1.189	0.788	0.874	0.915	0.987
	2012–2013	1.042	1.122	0.929	1.035	0.898	1.000

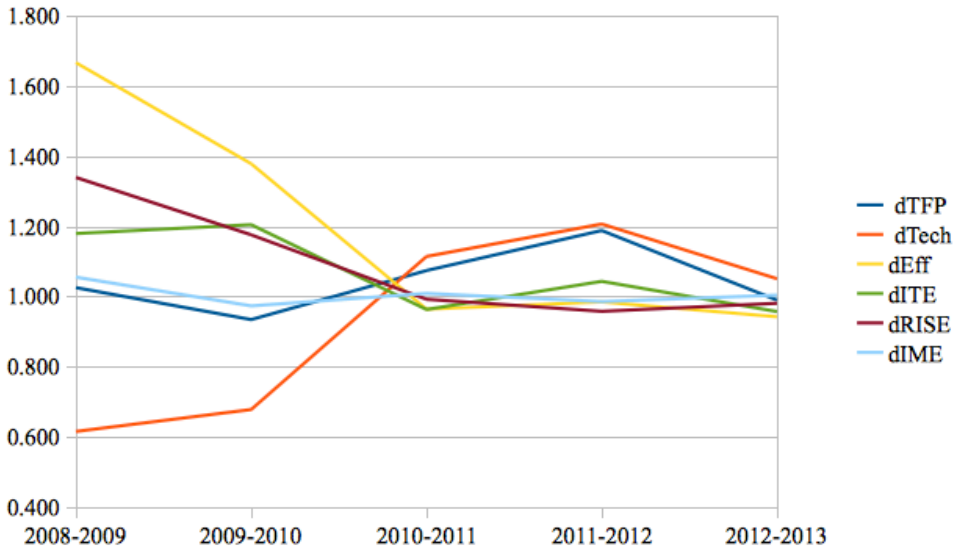

Fig. 2: Changes in productivity and efficiency for the V4 – VRS assumption

seen more positive by the model with VRS assumption.

The technological change (dTech) for model with VRS assumption has same trend for Poland and Slovakia. In case of the Czech Republic it is seen that with this model the dTech is the main trouble which was fixed just in last two periods. Hungarian banking industry struggles with deterioration of dTech mainly in first part of the analyzed period. Over all, for the dTech, the important year was mainly in 2010 – when the risk management was change.

Fig. 1 and 2 give overall total factor productivity change and its components for the V4 countries all together in time period 2008–2013 with the CRS assumption and the VRS assumption, respectively.

Fig. 1 shows that under the CRS assumption the main contributor of dTFP in the banking industry is mainly the technical change (dTech). This is mostly seen in period from 2010 to 2013. In the beginning of the period (2008–2010) it is also seen the influence of pure technical efficiency (dITE). Note, that efficiency changes (dEff) are in the period decreasing really fast until 2010 and then they have oscillate around the value one – so the efficiency changes in the V4 seems to be stable after the recovery from the global crisis. This is mainly cost by the change in residual scale efficiency (dRISE) and also pure technical efficiency (dITE). The change of mix efficiency (dIME) have oscillate all the time around constant one.

Fig. 2 shows overall total factor productivity changes and its components for the period 2008–2013 with the VRS assumption. From the first look it may be said that Fig. 2 is very similar to Fig. 1. There are some small differences. Firstly, dTFP in first time period (2008–2009) does not decrease. This is cost by higher increase of the dTech and pure technical efficiency (dITE). Secondly, the influence of the pure technical efficiency (dITE) is much more seen in this case during all period. The rest of the changes seem to have very similar character.

From Fig. 1 and 2 it is very clearly seen that the use of the VRS assumption is more convenient for this case. It is due to the fact that dTFP is mainly depending on dTech – technological changes. The technological part for the banking industry is most important. The technological changes (dTech) captures the effect of technological changes as well as the effects of government regulation, central bank policy or competition. And due to the theoretical knowledge these are factors which are not handled in the CRS assumption. Also the different size of analyzed bank is the factors which is better handled by the VRS assumption. Over all, the result from the model with the VRS assumption seems to fit better to the situation in the past as well.

6 CONCLUSION

This paper is focusing on measurement of the development of efficiency and productivity of banking industry in the Visegrad Group based on the application of the Hicks-Moorsteen Total Factor Productivity index. The decomposition of Hicks-Moorsteen Total Factor Productivity index is used to see the situation in time from 2008 to 2013. In this paper the Hicks-Moorsteen Total Factor Productivity index uses the DEA for measuring the distance function so this fact let to try which assumption of return to scale is more convenient for this case. There have been estimated many efficiency measurements and components of productivity changes of the banking industry to better understand the situation in this industry.

Firstly, there have been made calculations for each bank. This brought too many information so the analysis for both models have been made just by the country. The analysis showed that both models give similar results. In the model with CRS assumption the main contributor of dTFP in the industry were just technical changes (dTech). Under the VRS assumption the main contributor of dTFP in the industry were dITE as well as technical changes (dTech) for all countries in the V4. These findings further support that scale inefficiency is a

significant reason behind TFP shortfalls in the industry.

The results from the previous analysis also have been confirmed by the analysis of the overall total factor productivity change and its components. So over all it would be better to use for the future studies the model with VRS assumption as the results seem to be more correct according to reality and the requirements for the technology more fit.

For future work the database should be extended – more banks or different variables as input or output should be tried, for example variable equity is sometimes used as quasi input variable. Also the results should be discuss and compare with some alternative Total Factor Productivity indices like the Färe-Primont or other indices (Fisher, Törnqvist and so on).

7 ACKNOWLEDGEMENT

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9 ANNEX

Tab. 4: List of banks

	Name of bank	Origin of bank
1	Bank Ochrony Środowiska S.A. – BOŚ Bank Ochrony Środowiska Capital Group	PL
2	Bank Zachodni WBK S.A.	PL
3	Bank BGŻ BNP Paribas S.A.	PL
4	Československá obchodní banka, a. s. – ČSOB	CZ
5	ČSOB stavebná sporiteľňa, a. s.	SK
6	Erste Bank Hungary Zrt.	HU
7	Euro Bank S.A.	PL
8	GE Money Bank, a. s. (MONETA)	CZ
9	ING Bank Śląski S.A. Capital Group	PL
10	J & T Banka, a. s.	CZ
11	mBank Hipoteczny S.A.	PL
12	mBank S.A.	PL
13	MKB Bank Zrt.	HU
14	Modra pyramida stavební spořitelna, a. s.	CZ
15	Nordea Bank Polska S.A.	PL
16	OTP Bank PLC	HU
17	OTP Banka Slovensko, a. s.	SK
18	Poštová banka, a. s.	SK
19	PPF banka, a. s.	CZ
20	Raiffeisen Bank Zrt.	HU
21	Raiffeisen stavební spořitelna, a. s.	CZ
22	Sberbank Slovensko, a. s.	SK
23	Stavební spořitelna České spořitelny, a. s.	CZ
24	Tatra banka, a. s.	SK
25	UniCredit Bank Czech Republic and Slovakia, a. s.	CZ
26	UniCredit Bank Hungary Zrt.	HU
27	Všeobecná úverová banka, a. s.	SK

AUTHOR'S ADDRESS

Lucie Chytilová, Department of System Engineering, Faculty of Economics, Technical University of Ostrava, Sokolská třída 33, 701 21 Ostrava, Czech Republic, e-mail: lucie.chytilova@vsb.cz

BETA CONVERGENCE IN THE EXPORT VOLUMES IN EU COUNTRIES

Miroslav Radiměřský[1], Vladimír Hajko[1]

[1] *Mendel University in Brno*

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ABSTRACT

This paper investigates the β-convergence in the trade volumes of EU countries. We focus on a different approach to convergence analysis, namely trade's contribution to convergence. Neoclassical growth theory assumes there will be a convergence process among the economies, even in absence of trade. Trade relations might, however, speed up this process. We use panel data for trade volumes of 26 EU countries and test the presence and the speed of β-convergence pattern on SITC sectors 6 and 7 trade categories. The implied speeds of unconditional convergence of the export volume per capita are about 0.05–0.06 (implying half-lives around 12–13 years). When accounting for the country- or time-period specific effects, we can observe relatively high convergence rates (with half-lives somewhere around 2–4 years).

KEY WORDS

trade, convergence, export

JEL CODES

O47, F14

1 INTRODUCTION

The theory of income convergence has gained solid grounds in the economic literature in the past two decades.

Despite the applicability of the formalized logic, i.e. the countries will show differentiated rates of growth, depending on the initial level, it is only rarely applied to other economic variables.

The basic concept of convergence was introduced by Barro and Sala-i-Martin (1992) and Mankiw et al. (1992) in the context of the macroeconomic growth theory. Islam (2003) offers a detailed survey of convergence methods, and the prevailing conclusion seems to be that there is an evidence for the convergence of economic growth and income. Interested

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reader can find further details regarding income convergence e.g. in the recent contribution by Cuaresma et al. (2013).

This paper focuses on a different approach to convergence analysis, namely trade's contribution to convergence. Neoclassical growth theory assumes there will be a convergence process among the economies, even in absence of trade. Trade relations might, however, speed up this process. Among the first papers dealing with this topic are contributions by Ben-David (1993, 1994, 1996).

The traditional view might indicate that primary role in the convergence process will be played by trade openness, rather than trade volumes. Nevertheless, it is an empirical rule that increased trade openness leads to higher specialization, and hence increased trade volumes.

In the seminal paper by Frankel and Rose (1998) the convergence of economic performance is closely linked to the development of international trade. Rivera-Batiz and Romer (1991) and Frankel and Romer (1999) argued about the problems caused by the presence of endogeneity and proposed a model of endogenous growth featuring a measure of economic integration. As argued above, trade and growth relationship is closely linked to trade openness and it is expected that economic growth spillovers increase with higher degrees of economic integration. Establishing a robust causal relationship, however, has been difficult.

Ben-David (1993) and Sachs et al. (1995) among others empirical papers showed open economies experience unconditional convergence. Sarkar (2008) examined cross-country panel data of 51 countries during 1981–2002. He showed that highly trade-dependent countries report positive relationship between the openness and growth. Billmeier and Nannicini (2009) confirmed a positive and significant effect of openness on growth, while controlling for endogeneity. Bernhofen (1999) showed that convergence of economies has significant impact on trade structure and its development. Hakro and Fida (2009) showed that trade liberalization helps in achieving convergence respectively leads to acceleration of convergence. Bértola and Porcile (2006) identified main factors of convergence in selected states of Latin America. The factors are technological diffusion, openness, specialization and institutional arrangements at domestic and international levels. Three of these are subjects of international trade.

The aim of this paper is to test trade data for the presence of convergence using well established method from growth economics in the trade study. Based on approach of Bernhofen (1999) and the results of empirical studies mentioned above, there should be convergence in international trade data as well as in the growth data.

We test for the presence and the speed of the beta convergence in the trade volumes in EU countries. Essentially, we investigate whether the rates of change in trade depended on initial volumes.

With respect to the recent trade volumes development, we expect at least some evidence of beta convergence to be present, even in the stronger, unconditional version. Given the arguments in Frankel and Romer (1999), this relationship should be reciprocal due to the endogeneity. Given the apparent consensus of growth convergence, it is reasonable to expect it should be accompanied by trade convergence as well – as shown in Radiměřský and Hajko (2015), there was a rather significant spillover trade effect in case of EU countries during the sample period 1999–2011. The occurrence of convergence is dependent on existence of spillover effect between trade partners. Trade-divergence relationship should turn up otherwise.

2 METHODOLOGY AND DATA

Unconditional convergence assumes the variable of interest converges towards a unique steady state for the countries included in the dataset:

$$\Delta \log(T_{i,t}) = \mu + \beta \log(T_{i,t-p}) + \epsilon_{i,t} \qquad (1)$$

The conditional convergence assumes multiple steady states that are conditional on country-specific characteristics μ_i:

$$\Delta \log(T_{i,t}) = \mu_i + \beta \log(T_{i,t-p}) + \epsilon_{i,t} \qquad (2)$$

The so-called implied speed of convergence (typically denoted λ) and the half-life of convergence (H) are the measures of the convergence speed typically reported to make for easier comparisons of the β estimates. Their usefulness shows especially if we account for the recommendation in Islam (2003), and focus on longer time windows. Apart from one year estimation window ($T = 1$), we carry out the estimations also for the 5 year periods ($T = 5$). The estimates carried out on longer time windows should help the error term to be less influenced by the business-cycle fluctuations and serial correlations.

The implied speed of convergence is derived from the approximation around the steady state (T^*):

$$\frac{\partial \log(T_{i,t})}{\partial t} = \lambda\big[\log T^* - \log T(t)\big], \qquad (3)$$

which implies

$$\begin{aligned} \log T(t) \quad = \quad & \big(1 - \mathrm{e}^{-\lambda t}\big) \log T^* + \\ & + \mathrm{e}^{-\lambda t} \log T(0), \end{aligned} \qquad (4)$$

where $T(0)$ is the trade volume at the initial time.

This can be rewritten and manipulated to:

$$\begin{aligned} & \log T(t) - \log T(0) = \\ & = \big(1 - \mathrm{e}^{-\lambda t}\big)\big(\log T^* + \log T(0)\big) \end{aligned} \qquad (5)$$

The difference between the unconditional and conditional convergence lies in the ability to differentiate for country-specific growth paths. In order to do so, the dummy variables (the panel fixed effects) are entered into the equation (1). Further elaboration therefore leads to two additional specifications with the additional country-specific dummies (i.e. establishing a fixed-effect model) and country and time-period specific dummies.

Note that the λ can be determined from the expression $\beta = -(1 - \mathrm{e}^{-\lambda t})$, calculating with estimates from equation (1). The half-life (H) can be derived from the expression $\mathrm{e}^{-\lambda H} = 0.5$, or $\mathrm{e}^{-\lambda H} = \log(2)\lambda^{-1}$. This is the approximate number of years it would take for half of the current disparities to be eliminated.

The data on trade volume exports are available from Eurostat database code DS-018995 trade by SITC classification (2016). In order to calculate the trade share, we take into the account all world trade partners. The selected sample covers years 2002–2014 in yearly frequency. The trade volumes are measured in euro value of trade. To factor for differentiated economy sizes, we have adjusted the export volume data by the total population of a given country (World Bank indicator SP.POP.TOTL). The estimates are thus carried out on the export trade volume per capita.

Equation (5) is estimated using panel regression. The actual estimation is done for the full panel of 26 countries (EU-28 countries without Malta and Cyprus), in both unconditional and conditional convergence specifications.

To account for possible heterogeneity of the estimation groups, we have repeated the estimation on the subsamples of countries, namely Eurozone countries, PIIGS, and the new EU countries.

3 RESULTS

The results of the estimations are summarized in Tab. 1–6. The results are not significantly different if we compare the SITC sectors 6 or 7. As might be expected the inclusion of the country-specific fixed effects improved the explanatory power, which apparently provides better description of the convergence. But it also shows there is a disparity between the steady state growth paths of the individual countries in all groups.

Tab. 1: Estimated coefficients (t-statistics in parentheses) of the unconditional and conditional convergence, SITC 6, 1 year period

	Unconditional	Country-specific fixed effects	Country- and time-period specific fixed effects
All	−0.053	−0.293	−0.132
	(−4.856)	(−9.119)	(−7.16)
Eurozone	−0.027	−0.384	−0.147
	(−1.89)	(−7.508)	(−5.289)
PIIGS	−0.098	−0.453	−0.177
	(−1.847)	(−4.386)	(−2.765)
New EU 04	−0.084	−0.244	−0.180
	(−3.814)	(−5.901)	(−4.373)

Tab. 2: Estimated coefficients (t-statistics in parentheses) of the unconditional and conditional convergence, SITC 7, 1 year period

	Unconditional	Country-specific fixed effects	Country- and time-period specific fixed effects
All	−0.055	−0.214	−0.149
	(−5.883)	(−8.263)	(−6.849)
Eurozone	−0.022	−0.230	−0.160
	(−1.619)	(−5.878)	(−4.792)
PIIGS	−0.055	−0.201	−0.230
	(−2.092)	(−2.76)	(−3.096)
New EU 04	−0.064	−0.202	−0.170
	(−3.694)	(−5.76)	(−3.856)

This especially holds for the Eurozone area with unconditional non-convergence. Considering the remaining groups, we can see the half-lives of convergence lie in the vicinity of 6–8 years for SITC 6 and 10–12 years for SITC 7 export volumes.

The 5-year estimation windows with country-specific fixed effects do not seem to be well-suited specification for the data in question, given the non-correspondence of 5-year window specifications for PIIGS groups, both for SITC 6 and 7, and Eurozone group in SITC 6 to expected values of beta coefficients, which disallows the calculation of half-lives (implicating explosive behavior). The inclusion of the period-specific fixed effects, apparently with some degree of explanatory power (but it is important to account for the fact the estimation sample includes the period of crisis), helps eliminate this issue, but at the same time leads to lightly slower convergence rates.

Tab. 3: Estimated coefficients (t-statistics in parentheses) of the unconditional and conditional convergence, SITC 6, 5 year period

	Unconditional	Country-specific fixed effects	Country- and time-period specific fixed effects
All	−0.187	−0.872	−0.552
	(−7.833)	(−19.024)	(−11.782)
Eurozone	−0.069	−1.007	−0.649
	(−2.108)	(−14.689)	(−8.262)
PIIGS	−0.303	−1.271	−1.090
	(−2.357)	(−9.233)	(−6.135)
New EU 04	−0.262	−0.786	−0.700
	(−6.127)	(−13.122)	(−7.162)

Tab. 4: Estimated coefficients (t-statistics in parentheses) of the unconditional and conditional convergence, SITC 7, 5 year period

	Unconditional	Country-specific fixed effects	Country- and time-period specific fixed effects
All	−0.238	−0.836	−0.638
	(−9.219)	(−18.243)	(−12.353)
Eurozone	−0.096	−0.934	−0.637
	(−2.141)	(−10.916)	(−6.451)
PIIGS	−0.226	−1.207	−0.841
	(−2.885)	(−5.364)	(−4.026)
New EU 04	−0.240	−0.776	−0.769
	(−5.693)	(−14.144)	(−8.118)

The implied convergence half-lives are strongly differentiated. The strong version of unconditional convergence among all observed 26 countries is not overly convincing, with implied speeds of 0.05–0.06 for both SITC sectors (implying half-lives around 12–13 years). Although this is still bit faster than the usual "2–3 percent" typically reported in income-related studies, Abreu et al. (2005) argue such lower rates are typically caused by not correcting for the unobserved heterogeneity in

Tab. 5: Implied speeds and half-lives of convergence (half-lives in italics, in years), SITC 6

	1-year windows			5-year windows		
	Unconditional	**Country-specific fixed effects**	**Country- and time-period specific fixed effects**	**Unconditional**	**Country-specific fixed effects**	**Country- and time-period specific fixed effects**
All	0.05	0.35	0.14	0.04	0.41	0.16
	12.7	2.0	4.9	16.7	1.7	4.3
Eurozone	0.03	0.48	0.16	0.01	N/A	0.21
	25.6	1.4	4.4	48.6	N/A	3.3
PIIGS	0.10	0.60	0.19	0.07	N/A	N/A
	6.7	1.1	3.6	9.6	N/A	N/A
New EU 04	0.09	0.28	0.20	0.06	0.31	0.24
	7.9	2.5	3.5	11.4	2.2	2.9

Tab. 6: Implied speeds and half-lives of convergence (half-lives in italics, in years), SITC 7

	1-year windows			5-year windows		
	Unconditional	**Country-specific fixed effects**	**Country- and time-period specific fixed effects**	**Unconditional**	**Country-specific fixed effects**	**Country- and time-period specific fixed effects**
All	0.06	0.24	0.16	0.05	0.36	0.20
	12.2	2.9	4.3	12.7	1.9	3.4
Eurozone	0.02	0.26	0.17	0.02	0.54	0.20
	30.9	2.7	4.0	34.4	1.3	3.4
PIIGS	0.06	0.22	0.26	0.05	N/A	0.37
	12.2	3.1	2.7	13.5	N/A	1.9
New EU 04	0.07	0.23	0.19	0.05	0.30	0.29
	10.4	3.1	3.7	12.6	2.3	2.4

technology levels in the income studies. On the other hand, Nerlove (1998) argues the more diverse country samples typically lead to slower convergence rate estimates.

The half-lives for the unconditional convergence in the sub-groups of countries do not show very similar results. Both 1 and 5 years estimation windows indicate non-convergence for Eurozone. The beta coefficients for PIIGS countries are either not significant (1-year) or with test-statistic rather close to the critical values of the test (5-year).

Allowing for country-specific steady states, we can observe relatively high convergence rates (with half-lives somewhere around 2–4 years). The necessity of the inclusion of the conditional convergence however makes the attribution of the growth rate and its development purely to the initial level difficult and dubious.

4 CONCLUSIONS

While the initial assumption of the unconditional convergence of the export volume per capita shows some evidence to support it, with implied speeds of 0.05–0.06 for both SITC sectors 6 (manufactured goods) and 7 (machinery and transport equipment) implying half-lives around 12–13 years, there is a clear message in the data that the convergence process is far from universally applicable to the individual countries. The Eurozone countries are showing non-convergence. All remaining groups clearly show that the conditional convergence rates are significantly different, implying the presence of multiple steady state paths. Nevertheless, when accounting for the country- or time-period specific effects, we can observe relatively high convergence rates (with half-lives somewhere around 2–4 years).

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AUTHOR'S ADDRESS

Miroslav Radiměřský, Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: miroslav.radimersky@mendelu.cz

Vladimír Hajko, Department of Economics, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: vladimir.hajko@mendelu.cz

EXAMINING THE ROLES OF HUMAN RESOURCE MANAGEMENT IN FOREIGN-OWNED FIRMS: FOCUS ON THREE CEE COUNTRIES AND AUSTRIA

Barbara Covarrubias Venegas[1], Katharina Thill[1], Martina Rašticová[2], József Poór[3,4], Zdeňka Konečná[5]

[1] *FH Wien University of Applied Sciences*
[2] *Mendel University in Brno*
[3] *Szent István University, Gödöllő*
[4] *Selye János University, Komárno*
[5] *Brno University of Technology*

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ABSTRACT

Foreign-owned firms enter foreign markets for traditional reasons (market acquisition, securing resources, and diversification), but lately they have also been seeking better economies of scale and a more rational allocation of expenditures, via shifting processes and activities to lower-cost countries. The aim of this paper is to analyse the major foreign direct investments (FDI) and impacts on Human Resource Management through seven case studies in Austria, Czech Republic, Hungary and Slovakia. Multinational Corporations are considered the driving force behind the internationalization of business. The shift from a domestic to a global business perspective also has a profound impact on corporate human resources management activities. The analysis confirms the general viewpoint in literature that HR work in subsidiaries of MNCs has shifted from an administrative role to a strategic contributor role. The strategic impact is especially big when it comes to fields which need to be "culturally translated": recruitment, compensation and benefits, and talent management. However, that influence is still limited to national HR work on a national level.

KEY WORDS

international HRM, CEE-region, foreign subsidiary, MNC, HR roles

JEL CODES

J24, M12, O15

1 INTRODUCTION

Multinational Corporations are considered the driving force behind the internationalization of business. Anyhow, there is an ongoing debate about the potential adverse side effects of globalisation. The differences in HR management and increase in employment volatility are some of the side effects usually depicted in a negative light, since they decrease job security (Scheve

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and Slaughter, 2004; Geishecker et al., 2012). Globalisation could influence the volatility and unpredictability of employment for three main reasons. First, internationalization of production may strengthen the volatility of shocks that firms face. Second, multinational companies may react to shocks on economic changes more strongly, i.e. their elasticity of labour demand could be larger in absolute terms. Third, the differences in HR management in multinational companies in comparison to domestic companies may influence employment volatility.

The literature on comparative capitalism has highlighted clear differences in institutions and associated practices. Four key institutional archetypes are often presented. A key distinction in the literature is between Liberal Market Economies (LMEs or shareholder capitalism), Coordinated Market Economies (CMEs or stakeholder capitalism) – see Hall and Soskice (2001) or Whitley (1999) – and the Mediterranean or Mixed Market Economies (MMEs) and the Emerging Market Economies of Central and Eastern Europe (EMEs) – see Hancké et al. (2007) or Amable (2003). "In the former, employment is more likely to be contingent, employee voice weaker, and skills formation bifurcated between those with generic tertiary skills and a large grouping of those with poor skills and occupational insecurity. In the latter, tenure is more secure, employee voice stronger, with a stronger emphasis on vocational skills and continuous lifelong skills development" (Wood et al., 2015, p. 6).

Estimation of conditional volatility based on propensity score matching yield the result that employment tends to be more unsecure in the subsidiaries of foreign-owned enterprises than in domestically owned firms. However, higher flexibility in foreign-owned enterprises is not unanimously caused by their more elastic labour demand. Meriküll and Rõõm (2014) refer that labour demand can be either more or less elastic in subsidiaries of foreign-owned multinationals, depending on the institutional environments of their home and host countries. When FDI (foreign direct investment) originates from a region of Liberal Market Economy (LME) with a more flexible institutional environment (e.g. from the USA to Western European countries), then the elasticity of labour demand is smaller in absolute terms in FOEs (Foreign-Owned enterprises) than in DOEs (domestic enterprises). Hofstede (1991), Rosenzweig and Nohria (1994), Jackson and Artola (1997) and Yan (2003) found that national cultures, as external contextual components, have a significant impact on the HRM structures and practices of companies. In the opposite case (e.g. when FDI originates from Germany a Coordinated Market Economy-CME to Central and Eastern European countries), the elasticity of labour demand is higher. A potential explanation for this finding is that in countries with rigid labour market regulations, multinational companies avoid changing domestic employment in response to economic crisis and instead use other margins of adjustment (Bartlett and Beamish, 2011). They are more likely to do this than domestic firms are since it is easier for multinational companies to substitute between factor inputs. In addition to adjusting through alternative margins, they may also shift the adjustment of labour in response to economic shocks to subsidiaries which are located in countries with less regulated labour markets. Alternatively, multinational firms may choose the host countries where they establish subsidiaries by looking at the labour market institutions: if they operate in sectors that have highly volatile demand then they are more likely to move to countries with a flexible institutional environment (Meriküll and Rõõm, 2014; Dowling et al., 2013).

1.1 Specifics of foreign investment

Multinational companies are a major driving force when it comes to foreign direct investment (Carstensen and Toubal, 2004; Lankes and Venables, 1996; Holtbrügge and Puck, 2009; Spee, 2013). A recent study published by UNCTAD (2012) showed that FDI in CEE amounted to approximately $650 billion. Therefore, a brief outline of specifics of foreign direct investment shows the impact and importance of MNCs for national economies. Section 1.3 is dedicated to the importance of MNCs for the development of HRM in emerging markets.

There are two main categories of foreign investments:

Foreign direct investment (FDI) means "gaining ownership and control over a company in another country" (Krugman and Obstfeld, 2003, p. 190). Deresky (2014) assumes that foreign direct investment (FDI) occurs when a firm invests directly in new facilities to produce and/or market in a foreign country. In exchange for ownership, the investor company delivers financial, production and management know-how and other resources to the target country, and the management's direct involvement in the foreign firm should also be highlighted in connection with FDI (Peng, 2009). The investor can choose between several alternative forms of investment. For example, he can purchase a company which had been operating for a long time, or he might opt for a completely new, so-called "green-field" investment. Most cross-border investment is in the form of mergers and acquisitions rather than green-field investments (Deresky, 2014). As previously stated, the essence of foreign direct investment is to acquire and secure control over the assets and operation of a company in another country, but, when we talk of FDI, we should not fail to mention that the characteristics of the product and the size, nature and culture of the local market or other conditions might demand the adaptation of corporate strategy and management practice to local circumstances (Hill, 2014). In car manufacture, for example, there is no such thing as a world car. Toyota is a good illustration of this, since, although it is the number one brand in the United States, it was unable to get into the top three in Japan. The story of Coca-Cola is very similar. Although it is advertised as a global world drink, country-specific advertisements proved to be more successful than would have been the case with the same polar-bear campaign running in every country (Warkentin, 2014).

In contrast to the above, *portfolio investment* means that investors purchase different financial assets and shares (Krugman and Obstfeld, 2003), and follow an investment approach which produces indirect influence over the company involved. A relatively strong correlation can be detected between the economic development of a given country or region and foreign direct investment, and it can also be noted that large investor countries are themselves among the recipients of significant inward FDI flows (Hill, 2014).

Foreign direct investment was very important for economic development, employment and economic growth of Central European countries on their way to the market economy. This is especially true for Slovakia, which in the past years showed rapid economic growth thanks to its economic reforms and relatively high level of FDI inflows. This growth had a positive impact on the rate of unemployment, but in Slovakia the unemployment rate for certain socially weak groups of the population is still high. However, FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy (Borensztein et al., 1998, p. 115).

1.2 Influences on Human Resource Management

Global competition leads to globalized business and thus begs the question of how HR can best support business in the face of global integration and coordination, while maintaining local flexibility. This implies that the role of HR in global business ventures is crucial when it comes to implementing organizational strategies with sensitivity to cultural influences (Pucik, 1996). A number of researchers have identified that among the challenges and contradictions MNCs face, there is the need to be simultaneously local and global in scope, to be centralized and decentralized (Bures and Vloeberghs, 2001; Caldas et al., 2011; Doz and Prahalad, 1986; Evans et al., 2002; Hill, 2014), and to maintain a dynamic balance between implementing global standard practices and localization if they are to become transnational (Bartlett and Ghoshal, 1998). Along with being performed differently, HRM is also conceptualized differently in different countries (Lazarova et al., 2008). Furthermore, a paradigm shift from HR as an administrative or support function to one having strategic importance seems to be in

process (Karoliny et al., 2009). Deresky (2014) assumes that successful firms, besides a good salary, provide potential candidates with a good brand, purposeful jobs, opportunities and a reliable organizational culture.

It can also be hypothesized that, due to globalisation, HR practices from more developed countries have been transferred to developing countries, forcing the latter to adopt HR practices that put an emphasis on people. However, Pucik (1996) draws our attention to the fact that although there are multiple value-adding opportunities for HR in the process of business globalisation, the positioning or recognition within companies does not reflect this assumption yet, as the HR function now is still not seen as a full partner in the globalisation process. As HRM continues to be developed in Central Eastern Europe (CEE), there is a growing need to examine each country individually and take into account its cultural and institutional contexts.

The traditional notion of HRM has been highly influenced by scholars from the USA (Gooderham et al., 2004; Michailova et al., 2009; Clark and Pugh, 2000). The ongoing debate on convergence or divergence of HRM practices seems to be endless and rather too complex to be able to draw a conclusion (Clark and Pugh, 2000). Signs of homogeneity of preferred HR practices and techniques do exist when comparing the CEE region and global practices (Karoliny et al., 2009), as well among European countries (Clark and Pugh, 2000; Mayrhofer and Brewster, 2005), which might lead to the conclusion that there is an increasing convergence in HRM (Karoliny et al., 2009). Many authors state that national culture, as well as external factors such as socio-political and economic elements, the role of the state, education, and religion all affect the competitive advantage of nations and influence the development and establishment of the HR base (and furthermore the development of HR competencies) in countries. In particular, this means that the host country with its cultural value system has a significant influence on HRM (Rosenzweig and Nohria, 1994).

1.3 Human Resource Management in Multinational Corporations

Already since the late 20th century, researchers have been observing that international strategies and organizational designs are in rapid transition (Egelhoff, 1998; Miles and Snow, 1984; Bartlett and Ghoshal, 1993; Hedlund, 1994; Roberts, 2004). These contributions show new opportunities for multinational corporations to gain competitive advantages: global specialization and scale advantages could be increased and combined with adaptation to local markets; specific skills could be developed in dispersed subsidiaries and then exchanged among units; new innovations could be created by joint development projects. However, MNCs must often address greater challenges than domestic firms – particularly in terms of geographic dispersion of operations, cross-cultural differences, global competition, and greater reliance on overseas divisions (Milliman et al., 1991). Therefore an effective (International) Human Resource Management is crucial for the successful implementation of international strategies in MNCs (Bartlett and Ghoshal, 1989). The competitiveness of companies has increasingly been recognized as dependent on people management strategies (Pieper, 1990; Porter, 1990; Pucik, 1992). One could therefore argue that the globalization of business has resulted in the increasing recognition of the value of a well-managed workforce and the evolution of the human resource function. It has shifted from being viewed as a support function to that of a strategic partner (Pucik, 1992; Teagarden and von Glinow, 1997; Scullion and Starkey, 2000; Wright and Snell, 1991; Huselid, 1995). The key strategic tasks facing the HRM function in many MNCs are, according to literature, facilitating the development of firm-specific competencies, producing complex social relationships, and generating organizational knowledge (Pucik, 1988; Lado and Wilson, 1994).

However, HRM is not only carried out in the headquarters but also, to a big extent, in the subsidiaries. Truss (2000) claim to be able to distinguish between the corporate HR

department and the subsidiary HR department in this respect. The role of the corporate HR department and the subsidiary HR department are different in that they deal with HR on two different levels. Corporate HR is active on an international/global level, while subsidiary HR has an impact on a local/regional level. Scullion and Starkey (2000) posit that the key roles of the corporate HR department in MNCs often include management development, managing the mobility of expatriate managers, career planning, succession planning, strategic staffing, and top management rewards. Furthermore, it is common that MNC corporate HR is responsible for managing key personnel in worldwide operations while the rest of the staff is managed by subsidiary HR departments (Scullion and Starkey, 2000). This means a strategic role does not necessarily require the same processes at the level of the corporate HR department and at the level of the subsidiary HR department. Despite this the roles of the two departments are likely to be influenced by each other, depending at least partly on the design of the MNCs overall international HRM system (Farndale and Paauwe, 2005). Accordingly, a literature review about the transformation of headquarters-subsidiary relations by Ferlie and Pettigrew (1996, p. 496) emphasizes that "the ever-swinging pendulum thus seems currently to be moving from centralisation to decentralisation".

Little research has been conducted on how HR departments in MNCs organize and structure themselves in order to balance their strategic and technical HRM activities and meet the demands for local responsiveness and global standardization (Stiles and Trevor, 2006). In recent research designs the main emphasis is put on cooperation with Asian enterprises (Ferner, 1997; Gamble, 2003; Sumelius et al., 2009; Chang et al., 2007) while European and/or North-American headquarter-subsidiaries-relations are rarely taken into consideration (for exceptions see Mayrhofer et al., 2011). Furthermore, the research that has been conducted on the role of the HR department in MNCs was concentrated almost exclusively on the role of the corporate HR department (Novicevic and Harvey, 2001; Scullion and Starkey, 2000; Minbaeva, 2005), whereas the subsidiary HR function has received less research attention. Although the role of corporate HR is undoubtedly important, the role of the subsidiary HR department should be considered nonetheless as it plays an important part in helping the MNC balance its activities between local and global needs (Truss et al., 2002; Farndale and Paauwe, 2005). Accordingly, this paper seeks to explore that particular perspective of HR work in (Central-Eastern) European subsidiaries.

1.4 Human Resource Management in CEE

In the case of Central Eastern Europe in particular, a thorough overview is given in the book publication edited by Morley et al. (2009). They argue that all these countries have been undergoing a transition process from socialist to market oriented economies (contextual factor), the unique political, socio-cultural and economic features of each country had a strong influence on how HRM developed (Michailova et al., 2009).

During the socialist era the strategical positions in organizations were kept under review by the Socialist Worker's Party (e.g. in the case of Hungary) and the state bureaucracy (Wolfe and Poór, 1992). The personnel function, which performed mostly administrative, ideological and social roles (Brewster et al., 2010), was divided into two hierarchical fields: The "Personnel Department" managed the selection, employment and promotion of managers and cadres, while the "Labour Department" took care of employment, wages and allowances of blue-collar workers (Poór and Karoliny, 2015). According to Garavan et al. (1998) these roles in the socialist system were not encouraging more sophisticated and value adding activities. After the fall of the iron curtain and the collapse of the socialist regimes the current view of HRM started to develop in the CEE region and is more and more consolidated in management thinking (Brewster et al., 2010). Morley et al. (2009) described the CEE region as heterogenic

concerning the rising economy and a rapidly changing socio-cultural context, which is influenced by restructuring, privatization, increasing foreign direct investment, and an emerging individualism. From 2001 to 2007 economies in CEE grew rapidly due to foreign capital inflows. Nevertheless, since the 2008 financial crisis the economic growth in CEE struggles and therefore presents HRM with new challenges (Hoffmann, 2010).

The Czech Republic, Hungary and Slovakia are among the CEE countries which are included in the CRANET project (as well as Poland, Estonia, Latvia, Lithuania, Slovenia and Croatia) and Austria (among the western countries). The 2005 and 2010 findings show that HR departments in CEE are already on their way to design strategic processes. Written HRM strategies and the involvement of HR managers in the managing board can be noticed in the majority of organizations (Poór, 2009; Cranet, 2011).

2 METHODOLOGY AND DATA

A thorough literature review on HR roles, in particular differences between national companies and subsidiaries of international organisations, led to an exploratory qualitative study. Qualitative expert interviews have been conducted in Austria, Czech Republic, Hungary and Slovakia in the period of January to June 2015. In this study, we posed the following main research question: what are the characteristics of HR work in subsidiaries of multinationals in Austria, Czech Republic, Hungary and Slovakia and how does HR work differ compared to national companies?

The Tab. 1 provides general data regarding the analysed country cases. A detailed description of each case follows below. Every country case gives insights into the specifics of HR's work in subsidiaries of MNCs with respect to the target country.

Data were collected through face-to-face interviews keeping the same structure through a common guideline. Except the facts regarding company's description and organizational structure, the areas of local HR department, current process of HR development and challenges were questioned. Another section dealt with the HR role in international organizations. The interviews were partly conducted in English, partly in the national language with English translation. The approximate duration was one hour per interview.

We placed special importance on our method of analysis as well as the process of analysis in a team of researchers. Thematic analysis was the method of choice to evaluate our data. As described by Braun and Clarke (2006), thematic analysis provides a flexible and useful research tool, which can potentially deliver a rich and detailed account of data. Thematic analysis can thus be a method that works both to reflect reality and to unravel the surface of 'reality'. In this context, a theme captures something important reflected in the data, is related to the research question, and represents some level of structured response or meaning within the data set (Braun and Clarke, 2006). In line with the approach as proposed by Braun and Clarke (2006), we familiarised ourselves with the data by starting with the verbatim transcription and thorough reading of all the transcripts. Then we began the coding process using the software Atlas ti, with coding activities based on a rough coding scheme developed from literature. We also followed Yin's (2003) suggestion to ensure and enhance reliability by using a research framework explicitly derived from literature. We also followed Yin's (2003) suggestion to ensure and enhance reliability by using a research framework explicitly derived from literature. As a result, we define a code in our qualitative inquiry as 'most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute' (Saldaña, 2009, p. 3). In terms of reliability, the key principles are transparency and replication (Gibbert and Ruigrok, 2008). According to

Tab. 1: Sample cases

Case countries	Branch/Sector	Origin	Headcount in target countries	HR department
CZ1	Multinational technology and consulting firm	USA	4,000 employees	20 employees
CZ2	Multinational firm	USA	600 employees	7 employees
HU1	Multinational firm	Germany	800 employees	5 employees
HU2	International banking organization	Hungary/Germany	2,100 employees	15 employees
SK1	International manufacturing firm	Germany	1,100 employees	n. a.
SK2	Oil and gas	Hungary	3,000 employees	36 employees
AT1	International banking organization	Italy	6,000 employees	120 full time equivalents

Krippendorff (2004), analysts can verify reliability by checking similarities and differences in readings, interpretations, and responses to given texts or data. This may be achieved by several researchers or by relying on distinct yet functionally equal measuring devices. In this sense, reliability is indicated by substantial agreement of results among these duplications. Therefore, the process of defining the specifics of each theme was based on the continuous exploration of each pattern accompanied by weekly meetings of the three primary coders. As recommended by Yin (2011) and Müller-Benedict (1997), these weekly meetings ensured inter-coder reliability throughout the research process.

Limitation of this study: The research team is completely aware that the sample in each country is rather small, hence we do not claim generalisation through the analysis. It has to be mentioned that this qualitative analysis is embedded in a bigger research project, therefore just showing a small part of our activities. Anyhow, we can draw some preliminary conclusions from this qualitative research. In total we have been conducting 40 interviews, whilst this paper, as mentioned before, is especially focusing on the MNC sample.

3 RESULTS

Considering our expert panel's many different backgrounds and experiences, the respondents were remarkably consistent in the views they expressed. This section describes the eight cases we have been analysing for the purpose of this paper.

CZECH REPUBLIC: Case 1

Company CZ1 is part of a US-American multinational technology and consulting corporation. In the Czech Republic the company has about 4,000 employees. Regarding the organisational life cycle the organisation is in a stability phase.

The local HR department is part of the global HR organisation and consists of about twenty employees. One HR manager leads the centres in the Czech Republic and in Hungary. Besides two HR business partners there is also one HR administrative manager, who heads the HR specialist team and reports to the HR manager. The HR specialist team consists of different sections. For example, there are four recruiters, who report to a different manager outside the country, as well as an HR employee responsible for newcomers and the onboarding program. Although payroll is outsourced, an internal payroll expert is part of the HR department.

The main areas of the local HR department can be described as recruitment and compensation & benefits. There are also two specific teams which are not in the local HR department: one for education and one for resource deployment, supporting people on internal movements from department to department.

The subsidiaries of the multinational have to implement the global HR strategy autonomously, with directives from the US-

American headquarters. Due to local specifics, the implementation processes can be described as very challenging.

In general, HR roles in the Czech Republic changed from rather operational services and agendas to some kind of strategic and partnership-oriented support functions. Therefore, HR roles cannot be reduced to administrative functions anymore.

Czech labour law is not perceived as very restrictive, although strict limits regarding work time and employing foreign country citizens are being described as challenging. Since those limitations affect HR work, improvements in the labour law are described as desirable.

CZECH REPUBLIC: Case 2

Company CZ2 supports microscopy technology and is in a phase of growth. The headquarter is located in the United States. The company currently has over 2,800 employees in more than 20 countries worldwide. The 600 local employees are engaged in research & development, manufacturing and business support functions.

The HR department of the subsidiary consists of seven Full time equivalents (FTEs). It is structured in a classical HR back office which is called "HR research centre" where two HR employees work. In addition to that there is the recruitment team which also consist of two people. The remaining three people work in the HR front office. Two of them hold a similar position as HR managers. They have the same role but serve different divisions of the company. Their primarily goal is to strengthen the role of the managers in the company by consulting them. They do not seek to interfere in their communication with the staff. The head of the HR department is the so called HR side lead. She is a senior manager who represents HR towards the company and the headquarters.

The challenges of HR are mostly described in recruitment and selection – the local market has a specific lack of software engineers. The competition for suitable candidates became tough. Moreover, this is the fact because candidates need to have good English skills.

The company is globally oriented but contained in size. The size is therefore projected in the way of communication and cooperation as well. It is described as strict by implementing global procedures but still sensitive to the local environment and willing to reflect that also in the global guidelines.

The organisational culture is described as particularly open, informal and friendly. There is no strict hierarchy in the sense who can be approached, either for help, advice or any other kind of contact. Company events that embrace also families take place once a quarter. This is to include the employees' relatives in the company life because they feel depended on their understanding concerning the high worktime flexibility they ask of their staff.

The labour law in the Czech Republic is seen as not particular restrictive. Trade unions or another legal formation do not exist in this sector.

HUNGARY: Case 1

Company HU1 is a subsidiary of a German multinational with a leading global market position in three business areas. The MNC has subsidiaries in 75 different countries and more than 47,000 employees worldwide. In addition to the national headquarters in Budapest, two other subsidiaries in Hungary with more than 800 employees in total exist.

The Hungarian subsidiary has three internal employees in the HR department and five employees for payroll and administrative functions.

Subsidiaries of this MNC display the same structure of HR departments in all subsidiaries. There are experts developing strategic HR programs and activities based on business needs, and HR business partners contributing actively to the business strategy by adapting it to the organisational people capabilities. HR operational functions have the main objective to deliver HR services and to coordinate change processes. Other HR colleagues have to support the implementation of the global HR strategy and to drive innovation through local HR business partnership.

The HR strategy itself is provided by the German headquarters and has a special focus on talent and performance issues. Besides talent management, the responsibilities mainly

include employer branding and recruitment by attracting ambitious people. The HR departments in the different subsidiaries are strategic business partners in operative areas.

Multinationals are described as the drives of a more strategic HR work in Hungary. Regarding the current state of the economy, the companies must be able to adapt themselves to upcoming changes in a competitive and effective way. The success of the HR function depends on its ability to create value through the business activity and to lead the business strategy and different processes. Hungarian labour law is perceived as very restrictive and furthermore having strong influences on the implementation of HR strategies and processes.

As part of a global corporation an SAP system is implemented, which is perceived as having a positive influence on efficient processes and furthermore fostering business results.

HUNGARY: Case 2

Company HU2 is an international banking organization with subsidiaries in Bulgaria and Romania, controlled by a German bank. Before the financial crisis there was hardly any intervention in the management what changed for a short time. Since the financial crisis the bank is again in a phase of growth and in strategic control.

HR in Hungary has developed in recent years from an operational function to managing tasks. Current HR managers are extensively educated. This process is described as initiated by foreign-owners.

The HR department of HU2 is structured in three divisions. First, there is strategy and controlling which currently is working on the implementation of a new analyzing tool. The HR director is integrated and is the one who reports to the management. They are also responsible of the management of remuneration policy. Here they are aligned to the five HR business partners. One business partner has assigned to one division and is responsible for strategic development – in close coordination with the management. Recruitment is also allocated there but not an active part as most positions are filled by recommendations. The third division works on training and development.

The company culture is described as conservative; rather reactive than innovative. There is a health program but no special leisure time events.

The labor market is not being considered as challenging as no shortage of workforce can be seen. Trade unions and labor law are not providing any obstacles.

SLOVAKIA: Case 1

Company SK1 is a German manufacturing company with subsidiaries worldwide. The Slovakian subsidiary is organised in two separate organisations: the manufacturing with more than one thousand employees, and the shared service centre with more than 100 employees. Currently the company can be described as being in a growth phase, planning a new business centre.

Facing those problems, HR is becoming more important in Slovakia. Especially employer branding, recruitment and compensation & benefits are becoming very popular. Even if international companies are already perceived as very attractive employers, HR departments of multinationals have to develop different strategies to attract young, educated people.

The HR department of the company is divided into the manufacturing business unit and the shared service centre: there are two business partners for each of them, covering HR activities from recruiting, training & development and retention. Additionally, the shared service centre has a talent acquisition specialist, described as a critical function due to employee shortages despite the high rates of unemployment in Slovakia. Employee shortages are partly due to the location of the company (not Bratislava) as well as skills shortages.

The professionalization of HR management is mainly enforced by the headquarters in Germany. Like in other international companies, the headquarters provides HR strategy directives and leaves the leadership in the change process to the local subsidiaries. Every country has its local HR and can be described as working with a high level of autonomy.

HRM has partially developed from being a purely administrative support to being a strategic business partner. HR managers already "have their seat at the big table", attending top management meetings and being part of strategy development.

SLOVAKIA: Case 2

Company SK2 is a so called "flagship" of a MNC with headquarters in Hungary. A flagship here is understood as a bigger organisational entity. The MNC consist of four; one in Slovakia, the others in Italy, Croatia and Hungary. Concerning the organisational life cycle the company is in a stability phase.

HR contains of 36 employees taking care of, locally, more than 3,000 employees. The HR director is reporting to the CEO. She has three direct report managers: one is talking care of the HR development part, one for HR business partnering and one for the HR compensation and administration part. This structure is described as a classic model in business partnering; front office, back office and centre of excellence. HR partner is part of the front office, as a contact for line managers. He is the one with the closest contact to the business and therefore has to know the business very well. An internal customer services takes care of employees and their requests. As to reduce administrative tasks, payroll is outsourced.

The company culture is described as very conservative and "technical" due to high safety requirements. Stability therefore is a common goal.

Cooperation with the headquarters is described as "two-way-communication". Still the main HR strategy is established in the headquarters. Local adjustments concerning legal requirements are made in the subsidiary.

The labour law is perceived as very restrictive. The company sometimes feels forced to choose organisational changes to manage the workforce because otherwise dismissals are hardly possible. Trade unions also have a big influence in this sector – over 50 percent of employees are members of a trade union.

AUSTRIA: Case 1

Company D is part of an Italian global banking and financial services company, which is one of the largest European banking groups with more than 147,000 employees in 17 different countries. The Austrian headquarters is based in Vienna and serves as a sub-holding company of the banking group – responsible for overseeing the group´s banking activities in the CEE region. In Austria, this company has 6,000 employees, and together with the CEE-subsidiaries more than 60,000 employees. The influence of the Italian headquarters can be described as very strong. The Austrian subsidiary is in a mixed phase regarding the organisational life cycle of stability and decline.

The local HR department is organised in two big areas: the business partners on one hand and one big expertise centre on the other hand. The business partners work closely together with the management (business strategy). The expertise centre conducts mainly HR functions in labour law, HR planning and development & learning. The expertise centre is not in "client contact". In addition to the 120 employees in the Austrian HR department, they also have a shared service centre in Poland - responsible for administration, e.g. travel management, payroll.

HRM has developed from being a rather administrative support to a strategic business partner and change communicator. This is mainly due to the increasing importance of the HR department for developing and implementing business strategies, which is being acknowledged. Another major topic of the HR strategy is to introduce a more trustful culture for the employees, e.g. with flexible working hours. Besides the outsourcing of the administrative part to the employees and managers (employee and management self-service systems), the HR department introduced and fostered the concept of an internal job market.

For the specific business and particularly for fulfilling customer needs, labour law as well as strong work councils are perceived as restrictive with a high influence on HR work.

Tab. 2: Main areas, processes and challenges of HR departments of local subsidiaries

Country of the local subsidiary	Areas of the local HR department	Current process of HR development	Challenges
Czech Rep.	Recruitment Compensation & benefits	Changed from rather operational services and agendas to some kind of strategic and partnership-oriented support functions	Czech labour law
Hungary	Experts developing strategic HR programs and activities based on business needs HR business partners contributing actively to the business strategy Business partners supporting the implementation of the global HR strategy	Employer branding and recruitment by attracting ambitious people The HR departments in the different subsidiaries are strategic business partners in operative areas	The ability to create value through the business activity and to lead the business strategy and different processes Hungarian labour law
Slovakia	Manufacturing business unit The shared service centre: there are two business partners for each of them, covering HR activities from recruiting, training & development and retention	HRM has partially developed from being a purely administrative support to being a strategic business partner	Developing of different strategies to attract young, educated people
Austria	HR business partners (business strategy) One big expertise centre (which conducts mainly HR functions in labour law, HR planning and development & learning)	Besides the outsourcing of the administrative part to the employees and managers (employee and management self-service systems), the HR department introduced and fostered the concept of an internal job market	To introduce a more trustful culture for the employees, e.g. with flexible working hours

4 DISCUSSION AND CONCLUSIONS

The analyses based on the qualitative approach gives indication that there is a range of differences in HR management in MNC companies. In the MNCs surveyed in the Czech Republic, the HR department focuses mostly on recruitment, compensation, and benefits. Roles of HR management in the Czech Republic changed from rather operational services to strategic and partnership oriented support functions. In Hungary, multinationals are supposed to be the drivers of a more strategic HR work in Hungary. The company studied pays attention especially to talent management and performance issues, focusing also on employer branding and recruitment by attracting ambitious people. Czech labour law is perceived as less restrictive in comparison to Hungarian labour law. The MNC analysed in Slovakia is influenced by the current growth phase, which challenges employer branding, recruitment, compensation and benefits. Although the headquarters provides HR strategy directives, every country has its local HR and works with a high level of autonomy. In Austria, HR management is perceived as a strategic business partner and change communicator and is highly influenced by restrictive labour law.

The influence of local culture, local policies and HR practices is obvious. From an HR point of view, it seems crucial to broaden competencies of HR managers and especially involve sensitivity to diversity and openness to ambiguity, flexibility, and communication skills.

These findings together with the analyses of the literature result in a newly designed competency model for HR work. Three technical HR competencies (HR Knowledge, Business Knowledge, Strategic Approach) and six behavioural HR competencies (Leadership Competence, Relationship Management Competence, Consultation Competence, Ethical Competence, Cultural/Global/Diversity Competence, Change Competence) outline the relevant skills, abilities and knowledge important for HR work in MNCs. This model will be published in following papers.

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AUTHOR'S ADDRESS

Barbara Covarrubias Venegas, Institute for Human Recources and Organisation, Faculty of Management and Communication, Währinger Gürtel 97, 1180 Vienna, Austria, e-mail: barbara.covarrubias@fh-wien.ac.at

Katharina Thill, Institute for Human Recources and Organisation, Faculty of Management and Communication, Währinger Gürtel 97, 1180 Vienna, Austria, e-mail: katharina.thill@fh-wien.ac.at

Martina Rašticová, Department of Law and Social Sciences, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic, e-mail: martina.rasticova@mendelu.cz

József Poór, Department of Human Resource Management, Faculty of Economics and Social Sciences, Szent István University, Páter Károly Street 1, 2100 Gödöllő, Hungary, e-mail: poorjf@t-online.hu

Zdeňka Konečná, Department of Management, Faculty of Business and Management, Brno University of Technology, Antonínská 548/1, 601 90 Brno, Czech Republic, e-mail: konecna@fbm.vutbr.cz

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