

Is There a Relationship between Company Profitability and Salary Level? A Pan-European Empirical Study

Raul Ruubel¹ and Aaro Hazak¹⁺

¹ Department of Economics, Tallinn University of Technology

Abstract. We seek to look into the relationship between company profitability and salary level in 17 European Union (EU) member states in the comparative perspective of Central and Eastern Europe (CEE) and Western Europe (WE). Our study is based on the 2001 to 2009 data of 93,500 companies from the Amadeus database. We do not identify any economically significant relationship between companies' salary level and EBITDA margin, but we find that on average WE companies in nearly all industries have been able to achieve similar profitability margins as in CEE despite the significantly higher salary level in WE. This may relate to a considerably higher efficiency in WE companies in comparison to their CEE counterparts.

Keywords: profitability, salaries, European Union

1. Introduction

One of the first studies documenting inter-industry wage differences is the Slichter (1950) paper. Several later studies have investigated the drivers of salary differences on samples from different countries (incl. in Europe), industries and time periods, including papers on the linkages between company profitability and its salary level, e.g. Benito (2000) on a UK sample, Kouwenberg and van Opstal (1999) on Dutch data, Plasman et al. (2006) and Du Caju et al. (2011) on Belgian samples, and Genre et al. (2005), Gannon et al. (2007), Du Caju et al. (2010) and Magda et al. (2011) on cross-country samples from Europe. Except for Genre et al. (2005), all these papers document a positive correlation between wage differentials and industry or company profitability. In this short pilot paper, we look into the relationship between company profitability and salary level in 17 European Union (EU) member states in the comparative perspective of Central and Eastern European (CEE) and Western European (WE) countries under different phases of the economic cycle.

2. Data and Methodology

We use data from the Amadeus and Eurostat databases. The dataset derived from the Amadeus database includes data of 93,500 companies over a nine year period from 2001 to 2009. We have used annual data on each company's profitability (EBITDA margin), salary level (total annual personnel cost divided by average number of employees; i.e. salaries in nominal terms), country (country where the company has been registered) and industry (8 main industries based on the NACE Rev.1.1 classification) for our study. Our dataset covers 17 countries for which the necessary data was available. We have divided those into two groups based on the overall characteristics of their economic conditions: CEE (including Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland and Slovenia) and WE (including Belgium, Germany, Finland, France, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom).

In parallel, we have used industry and country level data on average salaries and average profitability from the Eurostat database, which covers the entire population of companies operating in 24 EU countries (all EU member states, except for Cyprus, Malta and Ireland for which the necessary data was not available). Data from the Eurostat database was available for a slightly different time period, namely 1996-2007.

⁺ Corresponding author. Tel.: +372 6204 057; fax: +372 6203 946;
e-mail address: aaro.hazak@tseba.ttu.ee.

As regards the methodology of our pilot study, we have used analysis of variance (ANOVA) and descriptive statistics to study the relationships between salary level and profitability in different regions, industries and different phases of the economic cycle. In order to apply ANOVA, we have divided our dataset into groups based on the profitability level (three rough groups of identical size – high, medium and low EBITDA margin), phase of the economic cycle (years 2001-2003, 2004-2007 and 2008-2009) and economic region (CEE or WE). In order to identify whether the relationships between salary level and profitability in these groups are different, we have applied the Fisher Least Significant Difference (LSD) test. The results obtained based on this exploratory pilot study should provide a better basis for further research employing more sophisticated econometric models on the same dataset.

3. Empirical Findings

As expected, there appear to be vast differences in the salary levels between CEE and WE (see Figure 1). A significant gap in average salary between CEE and WE can be noted in all industries and in all years over the period 1996-2007. This may be explained by the overall catching-up nature of the CEE economies, characterised by relatively high inflation and high nominal salary increases.

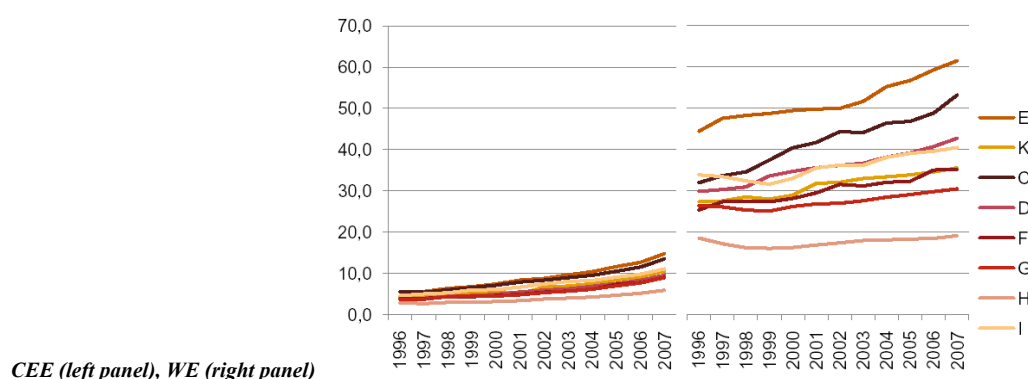


Fig. 1: Average annual nominal salary level in CEE and WE by industries (EUR in thousands; Eurostat data)¹.

In CEE, the developments in average salary appear to be driven primarily by the convergence process with WE economies, and the impacts of economic cycles do not become evident, at least not from this preliminary analysis. In CEE, there has been a monotonous increase in the average salary level in all industries over 1996-2007. Moreover, there have been no changes in the ranking on industries based on their average salary level over the mentioned 12-year period. Average annual increase in average salary (in nominal terms) ranges from 8.8% (in the hotels and restaurants sector) to 13.4% (in the utilities sector) in the CEE region. Given the CEE (as per our sample) average inflation rate of 6.1% (Eurostat data on Harmonized Indices of Consumer Prices, HICP) over the period, the real increase in salaries remains approximately in the range between 2.7% and 7.3%, depending on industry. This may be attributable, among other factors, to improved possibilities for cross-EU mobility of labour having caused a pressure on salaries in CEE.

Despite the constant increase, by the end of the period under review, the average salary level in all industries remains still far behind the industry average salary levels in WE. Inter-industry salary differentials have increased in CEE over 1996 to 2007, however, from a 2.0 times difference between the industries with highest and lowest average salary level to 2.5 times by 2007. Given the overall monotonous increase in the average salary level in all industries and no changes in the position of industries in the ranking based on their average salary level, the increase in the inter-industry wage differential appears to be attributable to the economic convergence or a broader evolutionary process rather than cyclical effects.

As regards the WE countries, the dynamics in nominal salaries appear to be much more versatile than in the case of the CEE countries. The mining sector (C) as well as the utilities (E), manufacturing (D) and construction (F) sectors have exhibited a monotonous increase in annual average salaries. Common features

¹ Industries: C – Mining and quarrying; D – Manufacturing; E – Electricity, gas and water supply; F – Construction; G – Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; H – Hotels and restaurants; I – Transport, storage and communications; K – Real estate, renting and business activities.

of these industries are expected difficulties in businesses to be relocated, their overall high investment intensity and thereby higher entry and exit barriers. It may be argued that these barriers may reduce the companies' negotiating power over salaries. In parallel, the hotels and restaurants sector (H) in WE has evidenced an overall 3% increase in nominal salaries over the 12 year period, meaning a close to zero change in average real salaries in consideration of the WE (as per our sample) average inflation rate of 2.1% (Eurostat data on HICP) over the same period. Also, the transport, storage and communications (I), wholesale and retail trade (G), and real estate, renting and business activities (K) sectors have exhibited modest overall growth rates in nominal salaries. Moreover, there appear to be years in which nominal average salaries have decreased in these industries. This may relate to stronger cyclical patterns in the salary dynamics in these industries, potentially explained by tougher competition, lower entry and exit barriers, relatively low qualification of labour and larger demand fluctuations.

Similarly to CEE, there has been an increasing trend in the inter-industry salary differentials. It can be noted, however, that the inter-industry salary differentials in absolute terms are much smaller in CEE in comparison to WE. This observation appears to be contradictory to the Magda et al. (2011) finding, on a slightly different sample though. In 1996, there was a 2.4 times difference in the average nominal salary in the industries with highest and lowest salary level, and this difference had grown to 2.8 times by 2007. This increase may be attributable to an evolutionary process stemming from the fundamental differences in the business environment (relocatability, entry and exit barriers, etc) for different industries. The ranking of industries based on their average salary level appears to be quite similar in WE and CEE with investment intensive non-relocatable industries on top positions and cyclical businesses in the lower positions.

Looking into EBITDA margins by industries in the CEE and WE regions over 2000 to 2007 (see Figure 2), we can note that the East-West differences are much smaller than in the case of salaries. Moreover, average EBITDA margins in different industries appear to be quite similar in CEE and WE with mining sector (C) being the only considerable exception. As mentioned above, the mining sector tends to be characterised by non-relocatability, which may be a reason for limited convergence in the profitability rates in this sector between CEE and WE. Furthermore, we can note that the mining sector along with the utilities sector (E) – another non-relocatable investment intensive industry – are the ones with highest fluctuations in average EBITDA margins over 2000-2007, both in CEE and WE. Although Berman and Pflieger (1997), among other authors, have drawn attention on the low cyclicality in these industries, companies operating in both of these industries are expectedly characterised by relatively high fixed costs as well as by an exposure to dynamics in fuel prices, which may be among the reasons for fluctuating EBITDA margins. Another reason for the changes in average EBITDA margins over the years may be that both utilities and mining (more broadly energy) tend to be strongly regulated industries.

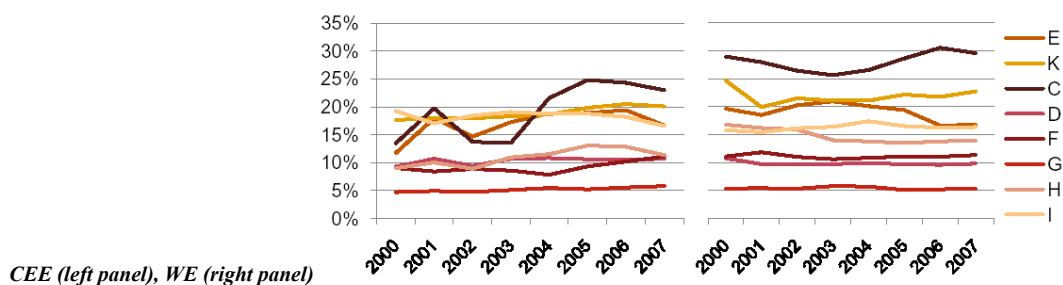


Fig. 2: Average annual EBITDA margins in CEE and WE by industries (Eurostat data).

Overall, it is an expected finding that EBITDA margins in CEE and WE are not substantially different, at least in the case of relocatable businesses, given the (relatively) free movement of capital. However the question, what explains the vast differences in salary levels in CEE and WE while profitability margins in the two regions are similar, remains an interesting topic for further study. It may be that companies in WE are able to operate much more efficiently and earn profit margins similar to their CEE counterparts despite the significantly higher salary levels, or there might be large differences in the price level of other costs and revenues similarly to the salary differences, leading in aggregate to comparable profitability margins.

Moving on to the analysis of company level data based on the Amadeus database, we observe considerable dispersion of average salary and EBITDA margins, and we therefore test the statistical significance of the differences in these variables between the CEE and WE regions by employing the analysis of variance (ANOVA). Overall, we find the CEE versus WE differences to be statistically significant on a 99% level (see Table 1) with the exception of EBITDA margins in the utilities sector (E) as well as a lower confidence level (95%) in the hotels and restaurants sector (H). Based on the above analysis (see Figure 2) the result regarding the utilities sector may be explained by the fluctuations in annual EBITDA margins both in CEE and WE, potentially explained by fuel price dynamics as well as regulatory matters.

Table1. Differences in Average Salary Cost and EBITDA Margin in CEE and WE (Amadeus Data)

Industry:	All	C	D	E	F	G	H	I	K
CEE average salary level (EUR in thousands)	11.8	9.8	10.4	10.9	10.6	12.9	6.2	13.4	14.3
WE average salary level (EUR in thousands)	41.8	44.6	38.0	44.4	41.4	41.1	31.0	47.3	51.1
Statistical significance of CEE/WE difference	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CEE average EBITDA margin	10.9%	22.7%	11.1%	17.5%	10.3%	7.5%	13.2%	14.7%	14.6%
WE average EBITDA margin	9.4%	17.1%	9.6%	17.9%	9.1%	6.2%	14.0%	11.1%	13.6%
Statistical significance of CEE/WE difference	0.000	0.000	0.000	0.287	0.000	0.000	0.040	0.000	0.000

It can be noted, similarly to what is depicted on Figures 1 and 2, that there are vast differences in the salary level between CEE and WE in all industries, while the differences in EBITDA margins remain statistically significant but have little economic significance, except for the mining sector (C). The latter may be explained by the non-relocatability of mining businesses.

As a next step, we tested the statistical significance of differences in the salary level of companies with different EBITDA margins (Table 2). In the case of WE, we find there to be statistically significant differences in salary levels of companies depending on their EBITDA margin. However, as seen from Table 2, the economic significance of these differences remains small, not exceeding 8% in any case, except for the mining sector (C) which appears to be exceptional anyway. Thus we did not identify any economically significant differences in the salary levels of companies with different EBITDA margins in WE.

Table2. Relationship between Average Salary Cost and EBITDA Margin in CEE and WE (Amadeus Data)

	Industry:	All	C	D	E	F	G	H	I	K
CEE	Average salary at companies with low EBITDA margin	11.7	9.92	9.85	10.3	10.7	12.5	5.69	13.3	14.2
		8			5	0	4		4	8
	Average salary at companies with medium EBITDA margin	11.7	10.4	10.5	12.5	10.9	13.0	6.67	13.1	13.9
		5	1	2	1	0	4		5	8
	Average salary at companies with high EBITDA margin	11.8	10.4	10.9	9.81	10.2	13.0	6.17	13.7	14.5
	1	1	0		3	2		6	3	
	Statistical significance of difference	0.91	0.80	0.00	0.00	0.22	0.08	0.08	0.52	0.70
		3	3	0	0	4	3	4	5	5
WE	Average salary at companies with low EBITDA margin	41.5	45.5	38.0	42.9	41.6	40.8	30.3	46.7	49.7
		2	9	8	1	6	4	3	0	2
	Average salary at companies with medium EBITDA margin	40.4	40.8	37.1	44.2	40.0	39.7	30.5	46.5	50.1
		0	0	9	4	1	5	9	8	6
	Average salary at companies with high EBITDA margin	43.5	47.5	38.6	45.9	42.6	42.6	31.9	48.6	53.4
	3	2	1	9	2	8	3	1	8	
	Statistical significance of difference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0	0	0	0	0	0	0	0	0

As regards CEE, there are four sectors (C, F, I and K) in the case of which there is no statistically significant difference between salary levels in companies with different EBITDA margins. In the remaining four sectors the differences appear to be statistically significant – at 99% confidence level in sectors D and E and at 90% confidence level in sectors G and H. In the manufacturing sector (D) companies with high EBITDA margin appear to have on average an 11% higher salary level than in companies with a low EBITDA margin. In the utilities sector, surprisingly, companies with medium EBITDA margins appear to have on average a 21% higher salary level than these with a low EBITDA margin, and an average 22% higher salary level than companies with a high EBITDA margin. Despite our efforts to eliminate outliers, such a result may still be the effect of some unidentified outlying observations. As regards the wholesale and retail trade sector (G), the differences in salary levels of companies with different profitability are not

economically significant. In the hotels and restaurants sector (H), companies with medium EBITDA margins appear to pay average 17% higher salaries than companies with low EBITDA margins.

Finally, we tested whether there are any considerable differences in the salary level of companies with different profitability levels under different phases of the economic cycle. Our ANOVA exercise did not reveal more than an increase in both average salary level and average EBITDA margin over the period under review. The differences in these variables appear to be statistically significant in different time periods (2001-2003, 2004-2007 and 2008-2009), but we cannot identify any economically significant differences in the salary level of companies depending on their EBITDA margin. What is interesting, however, is that on average companies' salary costs per employee increased in both CEE and WE in 2008 and 2009, despite the economic crisis.

4. Conclusions

A significant gap in average salary between CEE and WE companies can be noted in all industries and in all years over the period 1996-2007. This may be explained by the overall catching-up nature of the CEE economies, characterised by relatively high inflation and high nominal salary increases. Despite a constant increase, by the end of the period under review, the average salary level in CEE in all industries remains still far behind the industry average salary levels in WE. Inter-industry salary differentials have increased in both CEE and WE over 1996 to 2007. This increase may be attributable to an evolutionary process stemming from the fundamental differences in the business environment (relocatability, entry and exit barriers etc) for different industries. The ranking of industries based on average salary level appears to be quite similar in WE and CEE, however, with investment intensive non-relocatable industries on top positions and cyclical businesses in the lower positions.

Overall, it is an expected finding that EBITDA margins in CEE and WE are not substantially different, given the (relatively) free movement of capital. However the question, what explains the vast differences in salary levels in CEE and WE while profitability margins in the two regions are similar, remains an interesting topic for further study.

Seeking to identify whether there are any notable differences in the salary level of companies depending on the company's profitability, we performed ANOVA analysis in respect of CEE and WE companies, different industries and different phases of the economic cycle during the period 2001 to 2009. Notwithstanding the findings in previous literature, we did not find an economically significant relationship between companies' salary level and profitability although in many cases the relationships were statistically significant. The results obtained based on this exploratory pilot study should provide a better basis for further research employing more sophisticated econometric models on the same dataset. It remains an interesting area for future studies whether companies with low profitability have to pay a compensation for higher risk of default, and whether the fixedness of salaries is among the determinants of company failures.

5. Acknowledgment

We are grateful to the Estonian Science Foundation (grant no ETF8796) for financial support.

6. References

- [1] Benito, A. (2000). Inter-Industry Wage Differentials in Great Britain. *Oxford Bulletin of Economics and Statistics*, Vol. 62, pp. 727-746.
- [2] Berman, J., and J. Pflieger (1997). Which industries are sensitive to business cycles? *Monthly Labor Review*, February, pp. 19-25.
- [3] Du Caju, P., G. Kátay, A. Lamo, D. Nicolitsas and S. Poelhekke (2010). Inter-Industry Wage Differentials In EU Countries: What Do Cross-Country Time Varying Data Add to the Picture? *Journal of the European Economic Association*, April/May 2010, Vol. 8, No. 2-3, pp. 478-486.
- [4] Du Caju, P., F. Rycx and I. Tojerow (2011). Inter-Industry Wage Differentials: How Much Does Rent Sharing Matter? *The Manchester School*, Vol. 79, pp. 691-717.
- [5] Gannon, B., R. Plasman, F. Rycx and I. Tojerow (2007). Inter-Industry Wage Differentials and the Gender Wage

Gap: Evidence from European Countries. *Economic and Social Review*, Vol. 38, No. 1, pp. 135-155.

- [6] Genre, V., D. Momferatou, and G. Mourre (2005). Wage Diversity in the Euro Area, an Overview of Labour Costs Differentials across Industries. ECB Occasional Paper, No. 24.
- [7] Kouwenberg, J. and R. van Opstal (1999). Inter-industry Wage Differentials: Evidence from Micro Data. Quarterly Review of CPB Netherlands Bureau for Economic Policy Analysis, No. 1999/3.
- [8] Magda, I., F. Rycx, I. Tojerow and D. Valsamis, (2011). Wage Differentials across Sectors in Europe: An East-West Comparison. *Economics of Transition*, Vol. 19, Online, doi: 10.1111/j.1468-0351.2011.00417.x
- [9] Plasman, R., F. Rycx and I. Tojerow, (2006). Industry wage differentials, unobserved ability, and rent-sharing: evidence from matched worker-firm data, 1995–2002. IZA Discussion Paper, No. 2387.
- [10] Slichter, S.H. (1950). Notes on the Structure of Wages. *Review of Economics and Statistics*, Vol. 32, pp. 80-91.