

Mind the (labour cost) gap – the analysis of the European labour market integration

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Abstract

This article examines the wage dispersion in the European Union in the last ten years (1996-2006). The research is motivated by the fact that New Members States (NMS) expected that wage convergence would occurred after their accession to the EU. Still the dispersion of wages between NMS and the core EU countries is significant. Our calculations comprise of sigma and beta convergence adopted from the real growth literature. To check the stability of the results different econometric specifications are employed such as: OLS, Random and Fixed Model, and the dynamic approach with system GMM estimator.

Key words: international wage dispersion, labour cost, convergence

Jel classification: J31, E24, F15

1. Introduction

The labour market integration can be measured according to several alternative indicators. Most often it is related to the migration flows. However, the analyses of migration flows can be misleading because markets could be perfectly integrated with little migration or they could be poorly integrated and exhibit high migration flows (Boyer and Hatton 1997). As an alternative we want to propose the analysis of the magnitude of wage dispersion as a measure of degree of labour integration.¹ Taking into account that completely equalised wages among member states are hard to be achieved., wage convergence is not a sufficient indicator of labour integration and cannot be treated as *sine qua non* condition of a single labour market. Nevertheless, our hypothesis is that successful integration should bring lower wage differentials.

In his paper we want to answer two questions:

1. What is the theoretical background of wage convergence?

¹Of course we are aware that the issue is more complicated see for example the discussion regarding market efficiency versus market integration. (Barett and Li 2002) and due to the

2. Has the wage convergence been observed between New Member States and the core EU countries, if yes what is the speed of wage convergence?

In an empirical part of this paper we want to conduct the analysis of wage convergence employing the concept of sigma and beta convergence. Sigma convergence occurs when the dispersion of the levels of given variable between different economies tend to decrease over time. The concept is derived from the literature of real convergence (Barro, Sala-i-Martin 1992) and originally concerns cross-sectional dispersion of GDP. In our context, sigma convergence occurs if the dispersion of labour costs measured by standard deviation declines over time. Beta convergence is divided in an absolute and relative version. Absolute (unconditional) beta convergence is the process when economies with different levels of a given variable approach to the identical point while conditional (weak) beta convergence is the process when economies with different levels of a given variable approach to each other but the identical point will not be reached. We follow the classical approach to measuring beta convergence; we estimate so called Barro's regression. We want to check the relation between the initial level of labour costs with its growth rate. If the relation is negative it means that economies with initial lower level of labour costs grow faster than economies with initially higher level and the beta convergence takes place. The paper is organised in the following way:

- section 2 is dedicated to theoretical background of the wage convergence hypothesis
- section 3 examines the sigma and beta wage convergence

Finally, the conclusion is drawn together with suggestions for future studies.

3. Theoretical background of wage convergence

The concept of wage convergence can be considered as part of real convergence process or/and as part of nominal convergence process – convergence of price levels and costs. Because of that from the theoretical background three elements have to be considered simultaneously namely: trade theory, growth theories and new economic geography. First of all wage convergence can be interpreted in the framework of the well-known theory of factor price equalisation (Samuelson 1948) which is based on Heckscher-Ohlin trade theory postulating that free trade in commodities eliminates price differentials effecting an equalizing of factor prices. In this case the equalisation can be derived without labour movement. The theorem holds in strict circumstances (perfect competition, two countries share the same production technology etc.) which are all violated in the real world.

Alternatively, wage convergence can be interpreted in the framework of the growth theory, as a phenomenon accompanying real convergence. (Gaes 2001). The neoclassical growth model is based on the convergence hypothesis. Assuming the same saving rates, the same growth of saving rates and identical technologies, due to the diminishing marginal returns countries with lower per capita capital stock should grow faster than economies with higher per capita capital stock. The growth is negatively correlated with the initial level of income. Consequently poor countries should grow faster, catching up to the rich ones. The criticism of the neoclassical growth model is based on the fact that it does not explain the origin of growth as the long-run rate of growth is exogenously determined. It gives rise to many endogenous growth models. The basic elements of endogenous models are: accumulation of material and human capital (Lucas 1988), private externalities (Romer 1986), public externalities (Barro 1990), endogenous rate of technological progress (Aghion and Howitt 1992, Grossman and Helpman 1992) and transfer of knowledge (Grossman Helpman 1991, Rivier-Bartiz i Romer 1991).

Myrdal (1957) in his theory of circular and cumulative causation criticises the trade theory of comparative advantage, arguing that neither market forces nor trade allocate production and income equally. The free movement of production factors, goods can lead better developed region to attain all advantage while the lagging regions are “robbed” of the possibility of future progress. The mechanism is quite simple, the higher competition pressure causes that the firms are closing down on the lagging regions and labour and capital migrates towards wealthier areas with better infrastructure and hence reducing human capital and depressing demand for goods, services and factors of production in lagging areas. The initial inequalities explain further accumulation of disparities and lagging areas are said to be caught in a vicious circle of poverty while rich in a virtuous circle of growth.

The similar effect is presented by new economic geography and Krugman's (1991) core-periphery model. The final structure of the market – whether core-periphery or dispersed depends on the effect of two forces: centripetal and centrifugal. The first one also called agglomeration force promotes spatial concentration of economic activity and the former – dispersion force opposes such concentration. The strength of agglomeration and dispersion forces diminishes as trade gets freer (as trade costs decrease). But the dispersion force is stronger than the agglomeration forces when trade costs are very high.

An extensive overview of the literature on the effects of integration gives inconclusive results relating to the convergence/divergence scenario. Grossman and Helpman (1991) Rodrigues and Rodrik (2001) show that the relation between reducing the trade barrier and the growth is not ambiguous. Krugman and Venables (1993) confirm this general conclusion and add that this relation can change over time. Riviera-Batiz and Romer (1990) underline that the integration can increase the long-run rate of growth only if it encourages the exploitation of increasing returns to scale in the research and development sector. Baldwin and Forsild (1999) show that integration should be considered as a source of reduction of the cost of information and not as it was traditionally considered the trade costs.

It is worth to cite the Williamson's hypothesis - on the inverted-U curve of regional inequality. According to Williamson the regional inequality increases during the early stages of development, and declines during the later stages.

On the theoretical base it is not easy to answer whether the integration is the factor of convergence or divergence and the final conclusion can be drawn only on the base of the empirical analysis

4. Wage dispersion in the EU 1996-2006

Our main goal of the empirical studies is to analyse the behaviour of wage levels in the new member states and to check whether the wage convergence has been observed between NMS and the core EU countries. We follow the suggestion that the beginning of 90s was very volatile in terms of macroeconomic variables for the vast majority of transition economies, which may distort the obtained results. Moreover labour relations have been affected by the change of the economic system resulted in the suppression of state paternalism and the gradual privatization of the majority of the state-run firm (Delteil et al. 2004) in Central and Eastern Europe. We therefore propose the period of analysis starting in mid 90s and because of data availability the cover period is 1996-2006. Since the analysis is based on a panel data analysis this approach will not be detrimental to the quality of econometric evaluation. On the other hand it is detrimental to the choice of the econometric techniques. Namely panel time series techniques which would be

otherwise used, in our case are unreasonable (too short period of time). Because of that we want to use panel data analysis.

The term “*wage*” has two aspects – income constituting the standard of living and cost. When we want to compare earnings across countries we have to decide which exact wage measure to use. The data relating to wages or earnings can be difficult to compare internationally mainly because of different definition of wage, different treatment of social security contribution or different industrial structure.² Because of data availability and possibility to make international comparison we restrict our analysis only to labour costs. As it is suggested in Van Mourik (1994) analysis utilising labour costs is largely identical to the analysis employing real wages. The data used in this part of our studies comes from the Economist Intelligence Unit (EIU) and expressed labour cost per hour (pay and non pay costs) in USD at purchasing power parity exchange rate (PPP). The data are not available for Luxembourg, Malta and Cyprus. We choose PPP exchange rate rather than current exchange rate in order to correct for the different national price levels.

Purchasing power parity of a given country means how many national currency units equals the standard unit. This standard unit buys the same amount of goods and services in all countries, whereas different numbers of national currency units are needed to buy this volume of goods and services depending on the national price level.

4.1 Sigma convergence

The figure 1 shows the overall view on wage differences in 2006. We see that differences are very high between Latvia with lowest labour costs of 4.18 USD and Denmark with highest of 36.29 USD per hour. Figure 2 plots the movement of labour costs of NMS in relation to the EU average which for all years is settled as 100. We see that all analyzed NMS have moved closer to the EU average – this means for them rise in their labour costs. This historical trend is in favor of convergence phenomenon.

To assess the extent to which there has been sigma convergence across EU countries we calculated the unweighted standard deviation for log labour cost from 1996 to 2006 (Figure 3). Over the whole period of time wage convergence resulting in the fall of the deviation by 25% from 0.94 in 1996 to 0.71 in 2006 is observed. The separate line plots the labour costs dispersion across EU14 (without Luxembourg) and we can see that these countries present considerably lower level of wage dispersion but only with slight process of convergence.

It is worth checking whether the decline in the standard deviation was statistically significant. We performed the test of Carree and Klomp (1997)³ to check the difference between variance in 1996 and 2006. The sigma convergence is statistically significant for EU22 but not for EU14.

4.2 Beta convergence

To measure beta convergence we want to check the relation between the initial level of labour costs with its growth rate. If the relation is negative it means that the beta convergence takes place.

² For example countries with high proportion of low-wage industries might bias the general wage rate downwards and vice versa. Van Mourik (1994)

³ Carree and Klomp statistic for equality of variance is preferred to the traditional F test which is said to have low power.

As it can be seen from the Figure 4 we have noticed the negative correlation in the investigated period. It means that the beta convergence process for EU22 was observed between 1996 and 2006. The Barro's growth model received some critiques, both as far as methodology and theoretical concept is concerned. To avoid the methodological shortcomings we employ the panel data analysis to the following regression:

$$\ln\left(\frac{lc_{i,t}}{lc_{i,t-1}}\right) = \alpha + \beta \ln(lc_{i,t-1}) + \eta_i + v_t + u_{i,t} \quad (1)$$

where:

lc_{it} - labour costs of country i in time t

η_i - individual effect for countries i ($i = 1, \dots, 22$)

v_t - time effect ($t=1996, \dots, 2006$)

$u_{i,t}$ - error term, $u_{i,t} \sim IID(0, \delta_\xi^2)$

Clearly the above model can be written equivalently as:

$$lc_{i,t} = \alpha + (1 - \beta)lc_{i,t-1} + \eta_{ij} + v_t + u_{ij,t} \quad (2)$$

The estimated coefficient on the lagged income is the indicator of convergence process. The speed of convergence is calculated as: $\lambda = -\ln(1 - \beta)$ and the half-life according to the formula:

$t^* = -\frac{\ln 0,5}{\lambda}$. Half life indicates the period needed for half of the dispersion to disappear.

In our model, the explanatory variable is the lagged value so it is a dynamic model. Therefore the standard panel data estimators - OLS levels (pooled), Within Groups (Fixed Effects) - cannot be used. Nevertheless, it may still be useful to compare those results to those obtained by GMM. Our results for the model (2) are reported in Table 1.

The first two columns report OLS and Within Groups estimates. It is well known that OLS levels give an estimates of autoregressive parameter that is biased upwards and Within Groups give an estimate that is biased downwards (Blundell, Bond 1998, Bond 2002). In our case it means that speed of convergence of OLS is biased downwards and of Within Groups biased upwards. The third column reports a two-stage first-differenced GMM estimator using full set of instruments. The DIF-GMM appears to give downwards-biased estimate of the coefficient on the lagged dependent variable that is consistent with the finite sample biases expected in the case of highly persistent series (Bond 2002). The final column reports the system GMM estimator which use lagged levels and lagged first-differences as instruments. The estimated autoregressive parameter of 0.9576 implies an average speed of convergence is 4,3% per year and consequently a half-life of 16 years.

5. Conclusion

In this paper we investigated the wage dispersion in the EU between 1996 and 2006. The analysis attempts to evaluate the effect of last ten years of European integration on wage dispersion.

The dispersion of labour cost levels for whole group of EU countries was shown to be still very significant. In our analysis the sigma convergence concerning cross-sectional dispersion of labour costs was confirmed for EU 22 and rejected for EU14.

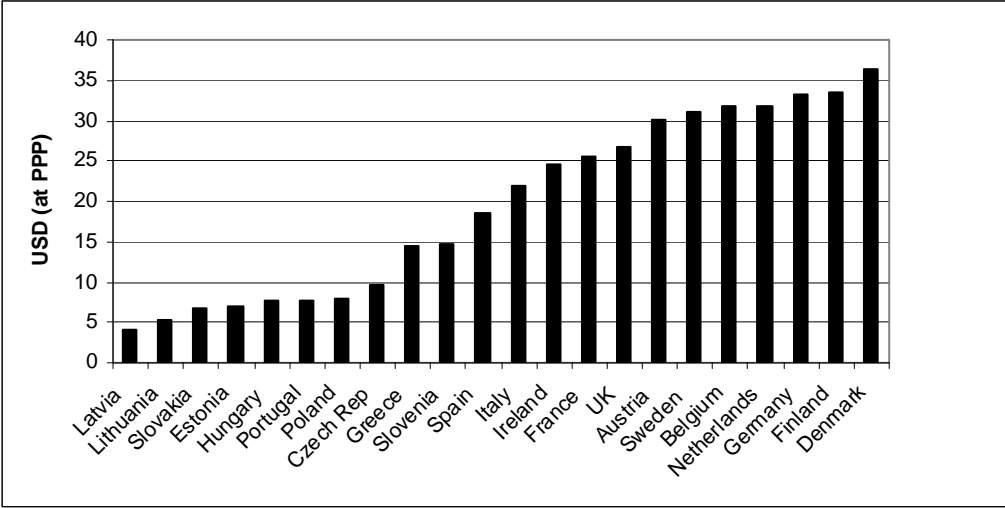
Beta convergence for EU22 was proven to occur, but the speed of convergence was extremely low and the half life of over 16 years. Although our results relate to the conditional beta convergence through employing individual effects for different countries in further research we want to enrich the analysis by including independent variables that can affect the wage convergence scenario. The potential sources of the wage differentials would be: capital labour ratio, human capital endowments, different rate of technological progress between countries but also one can utilize gravitational variables such as: common language, common border, distance between markets etc.

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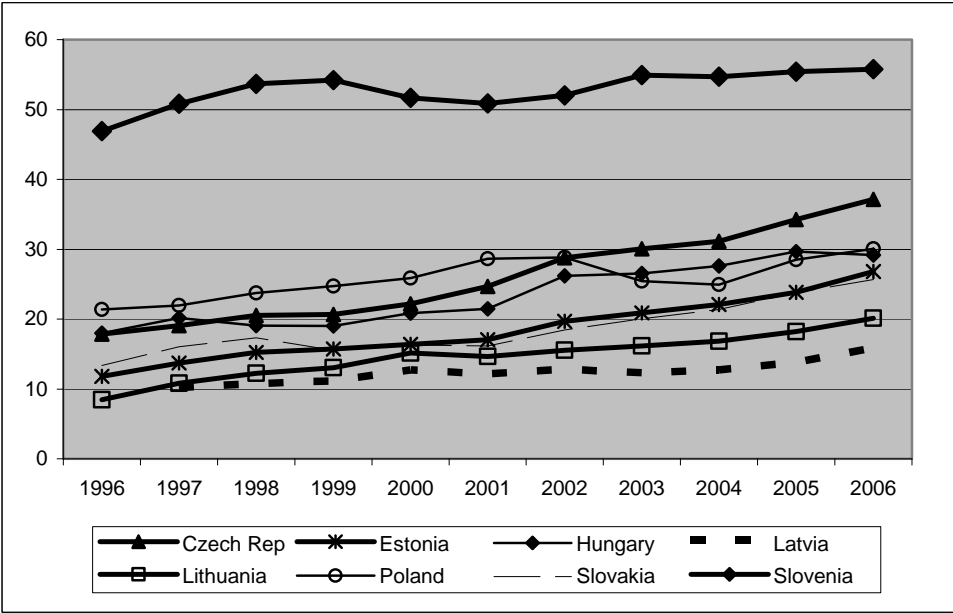
Figures and Tables

Figure 1
Labour costs in the European Union (2006)



Source: data from the EIU

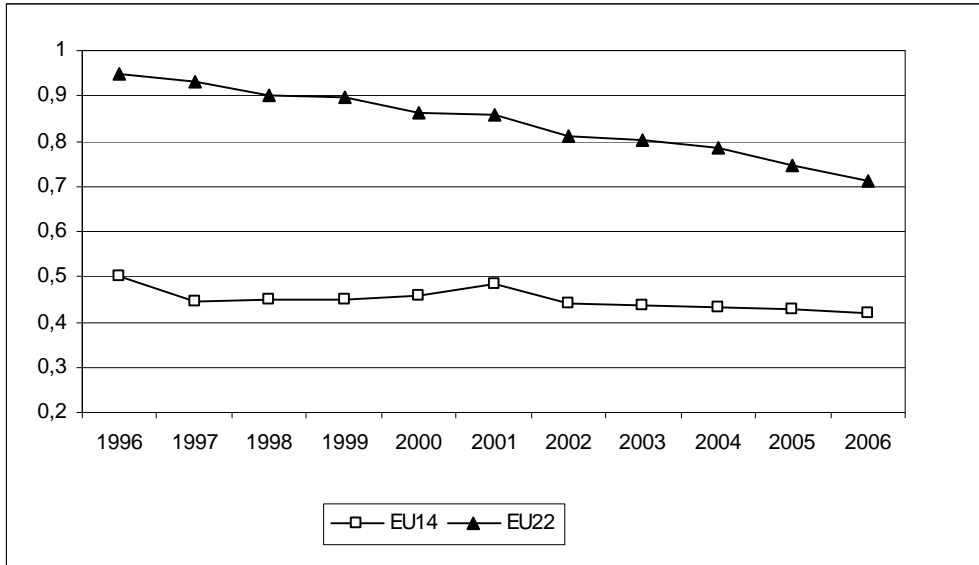
Figure 2
Labour cost in NMS between 1996 and 2006 in relation to the EU average=100



Source: own calculations

Figure 3

Sigma convergence of labour costs between 1996 ad 2006



Source: own calculation

Table 1

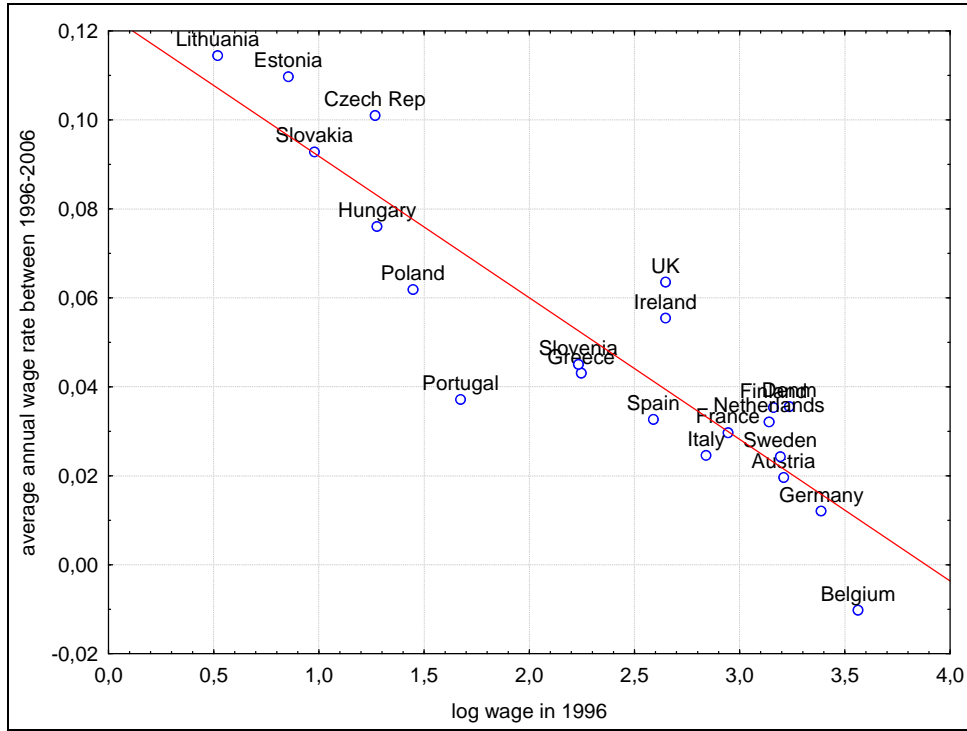
The estimations of beta convergence for log labour costs

	OLS LEVELS	WITHIN GROUPS	2SLS	DIF-GMM	SYS-GMM
	0.9639736 (0.0062163)	0.7418902 (0.0834188)	0.8277143 0.2397952	0.8390006 0.0723881	0.9576454 0.0047091
Speed of convergence (λ)	-0.03669	-0.29855	-0.18909	-0.17554	-0.04328
half-life (t*)	18.89129	2.321681	3.665753	3.94857	16.01626

Notes: All computation done using XTABOND2 for StataSE 9.0, Year dummies included in all models
Robust standard errors in parentheses, 2SLS – Two Stage Least Squares, DIF-GMM first-differenced estimator,
SYS-GMM system estimator,

Figure 4

Relation between labour costs in 1996 and the average growth rate of labour costs between 1996 and 2006.



Source: own calculation