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Measuring the Comprehensive Wage Effect of Changes in Unit Labour Cost

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Abstract

Unit labour cost (ULC) is defined as labour compensation per value added. It captures the cost competitiveness of industries and countries. As labour compensation is wage multiplied by hours worked or number of people employed, it is easy to show that ULC is wage divided by labour productivity. Thus, changes in ULC are often discussed in the context of wage increases and labour productivity. However, a higher wage induces firms to substitute labour with capital, which affects labour productivity. However, the conventional decomposition of changes in ULC dismisses this indirect impact of wage on ULC through labour productivity. We propose an alternative decomposition of the change in ULC with a measure of a comprehensive wage effect, which fully captures its direct as well as indirect impact. It allows us to understand more accurately the role of wage changes in enhancing cost competitiveness. Furthermore, we compare measures of the wage effect under two decompositions, using data from 18 OECD countries over the 1995–2005 period. We find the wage effect to be significantly overestimated under the conventional decomposition. This study looks at ULC for the whole country as well as for two sectors—manufacturing sector and electricity, gas and water supply sector.

Key Words: Unit Labour Cost, Malmquist index, Index number, Manufacturing sector, Energy sector

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1. Introduction

Unit labour cost (ULC) is defined as labour compensation per unit of value added.[1] As it captures labour cost required to produce one unit of value-added, it is widely accepted as an appropriate measure of cost competitiveness for a producer.[2] ULC is often computed for industries and countries. Monitoring it over a period or across units helps one to track their cost competitiveness.

While labour compensation is units of labour multiplied by labour compensation per unit of labour (simply wage), the value added divided by units of labour defines labour productivity.[3] Thus, ULC can be considered the ratio of wage to labour productivity. A change in the ULC is often attributed to a change in the wage (wage effect) and in labour productivity (labour productivity effect). This suggests that there are two ways of enhancing cost competitiveness: retaining wage or raising labour productivity. This conventional decomposition of the change or difference in ULC into two effects has been applied to investigate the sources of cost competitiveness for industries or countries.[4] Van Ark et al. (2005) compare the ULC of the manufacturing sector for OECD member countries. They indicated that even among advanced economies, there are significant differences between countries in terms of the relative contributions of the wage and labour productivity effects.[5][6]

However, the current decomposition of the changes in ULC has shortcomings. These arise from the fact that wage and labour productivity are not independently determined. Faced with input prices such as user cost of capital and wage, a firm's demand for capital and labour is such that production cost is minimised. Thus, a rise in wage induces a firm to employ more capital and hire less labour. As Mizobuchi (2014) emphasises, this is likely to raise labour productivity, holding other factors constant. Thus, the labour productivity effect in a conventional decomposition is partly attributable to wage changes. In other words, this indirect impact of a wage change through labour productivity is not captured by the current measure of the wage effect.

This study proposes an alternative decomposition of changes in the ULC into three components; these are two input-price effects (user cost of capital and wage) and a technical change effect. First, we define each component theoretically using a ULC function. Second, we derive index number formulae that approximate each component. The wage effect in this decomposition captures fully the impact of a change in wages on the ULC. Its direct impact on labour compensation as well as its indirect impact through a change in labour productivity are captured. We show that the bias in the

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[1] Strictly speaking, we are talking about value added at constant prices or the quantity of value added.

[2] Turner and Van't dack (1993) and Turner and Golub (1997) recommend the use of unit labour cost in manufacturing as a measure of competitiveness..

[3] Formally, $ULC = \frac{labour\ compensation}{value\ added} = \frac{wage \times units\ of\ labour}{value\ added} = \frac{wage}{value\ added/units\ of\ labour} = \frac{wage}{labour\ productivity}$.

[4] As the changes in ULC over time is decomposed into changes in wage and labour productivity, the differences in ULC across units is decomposed into differences in wage and labour productivity.

[5] Although the rapidly growing share of China's manufacturing export is often ascribed to its low wages, Ceglowski and Golub (2007) and Ceglowski and Golub (2012) document that labour productivity growth played a significant role in lowering ULC, although this slowed down after 2003.

[6] ULC is also a key variable for estimating the New Keynesian price equation (Galí and Gertler 1999; Sbordone 2002). In these studies, real ULC, which is ULC deflated by output price, is considered a measure of marginal cost.

conventional measure of wage effect depends on production technology, especially output elasticity or factor shares.

We apply our decomposition to data from 18 OECD countries by employing EU KLEMS. We focus on the period 1995–2006, for which data is available for the largest number of countries. For each country, we decompose the ULC of the whole country, manufacturing sector, and electricity, gas and water supply sector. This allows us to quantify empirically by how much the conventional measure of wage effect overestimates or underestimates the comprehensive impact on ULC of wage changes. Since the underlying technology varies across sectors, the magnitude of bias in the conventional wage effect is also likely to vary.

The paper is organised as follows. Section 2 decomposes the change in ULC into three components. Section 3 applies this decomposition to data from OECD countries. Section 4 concludes the paper.

2. Methods

We introduce a simple model of production to incorporate substitution between capital and labour. A firm utilises capital K and labour L to produce a single output, Y. We assume the firm's cost-minimising behaviour. Thus, given output Y, a firm chooses K and L to minimise cost based on factor prices r (user cost of capital) and w (wage). Technology at period t is represented by the production function $Y = F^t(K, L)$, which exhibits constant returns to scale. Given factor prices and output, the period t cost function of a firm is as follows:

$$C^t(r, w, Y) = \max\{rK + wL: Y = F^t(K, L)\} \qquad (1)$$

Since we assume constant-returns-to-scale technology, the cost function is a multiplication of the unit cost function and output, such as $C^t(r, w, Y) = C^t(r, w, 1) \cdot Y$. Applying Shephard's lemma ((Shephard 1970)), we derive the following unit labour cost function as the function of factor input prices and time:

$$ULC^t(r, w) = \frac{r \cdot \partial C^t(r, w, Y)/\partial r}{Y} = r \cdot \partial C^t(r, w, 1)/\partial r \qquad (2)$$

This is the key equation for determining changes in ULC. Let us compare ULC for two periods, 0 and 1. First, we look at the comprehensive impact of the change in wage on the ULC. The wage effect is measured by the ratio $ULC^t(r, w^1)/ULC^t(r, w^0)$. This captures the changes in ULC induced by the change in wage going from period 0 to 1, using the technology that is available during the reference period t and facing the reference user cost of capital, r. Since each choice of the reference vector (t, r) might generate a different measure, we calculate two measures using different reference vectors $(0, r^0)$ and $(1, r^1)$ which, in fact, are chosen in each period and thus are equally reasonable. Then, following Fisher 1922 and Diewert 1976 we use the geometric mean of these measures as a theoretical measure of the wage effect, $Wage$, as follows:

$$Wage = \sqrt{\frac{ULC^0(r^0, w^1)}{ULC^0(r^0, w^0)} \cdot \frac{ULC^1(r^1, w^1)}{ULC^1(r^1, w^0)}} \quad (3)$$

Second, we consider the comprehensive impact of the change in user cost of capital on ULC. The user cost effect is measured by the ratio $ULC^t(r^1, w)/ULC^t(r^0, w)$. It indicates changes in ULC induced by the change in user cost going from period 0 to 1, using the technology that is available during the reference period t and facing the reference wage, w. As each choice of the reference vector (s, w) might generate a different measure, we calculate two measures using different reference vectors $(0, w^0)$ and $(1, w^1)$ which, in fact, are chosen in each period and thus, are equally reasonable. Then, we use the geometric mean of these measures as a theoretical measure of user cost effect, $Usercost$, as follows:

$$Usercost = \sqrt{\frac{ULC^0(r^1, w^0)}{ULC^0(r^0, w^0)} \cdot \frac{ULC^1(r^1, w^1)}{ULC^1(r^0, w^1)}} \quad (4)$$

Lastly, we consider the impact of a technical change on the ULC. Technical change is measured by the ratio $ULC^1(r, w)/ULC^0(r, w)$. It indicates changes in ULC induced by technical change going from period 0 to 1, facing the reference factor prices r and w. Since each choice of the reference vector (r, w) might generate a different measure, we calculate two measures using different reference vectors (r^0, w^0) and (r^1, w^1) which, in fact, are chosen in each period and thus, are equally reasonable. Then, we use the geometric mean of these measures as a theoretical measure of technical change effect, $Technology$, as follows:

$$Technology = \sqrt{\frac{ULC^1(r^0, w^0)}{ULC^0(r^0, w^0)} \cdot \frac{ULC^1(r^1, w^1)}{ULC^0(r^1, w^1)}} \quad (5)$$

These three measures are theoretical ones. Thus, even though we know the factor prices prevailing at each period, we cannot compute these measures, which are defined by the unknown ULC functions. There are multiple ways of implementing these measures. Here, we adopt the index number approach and derive the index number formula that approximates the theoretical measures proposed above. Our purpose is to propose a tractable way of investigating the sources of the change in ULC, replacing the conventional decomposition.[7]

We implement them by assuming the following production functions for $t = 0, 1$:

[7] Estimating the cost function is one way of implementing theoretical measures (See Coelli et al., 2005). However, there are multiple concerns about adopting this approach, such as the number of observations as well as specification of the stochastic term. It is far more demanding than computing the rate of wage change and labour productivity growth. Our approach is as tractable as the current decomposition.

$$F^t(K, L) = A^t K^{\alpha^t} L^{(1-\alpha^t)} \quad (6)$$

It is a variant of the Cobb–Douglas production function allowing factor output elasticity of capital α, which is known to be equal to capital share, to vary in each period. Technology of a firm in period t is represented by a combination of A^t and α^t. Under this specification, the three theoretical measures coincide with a formula for factor input prices and quantities observed at two periods 0 and 1 as follows:[8]

$$Wage = \left(\frac{w^1}{w^0}\right)^{\frac{1}{2}(s_L^0 + s_L^1)} \quad (7)$$

$$Usercost = \left(\frac{r^1}{r^0}\right)^{\frac{1}{2}(s_K^0 + s_K^1)} \quad (8)$$

$$Technology = \left(\left(\frac{w^1 L^1}{Y^1}\right) \Big/ \left(\frac{w^0 L^0}{Y^0}\right)\right) \Big/ \left(\left(\frac{w^1}{w^0}\right)^{\frac{1}{2}(s_L^0 + s_L^1)} \times \left(\frac{r^1}{r^0}\right)^{\frac{1}{2}(s_K^0 + s_K^1)}\right) \quad (9)$$

where $s_K^t = \frac{r^t K^t}{(r^t K^t + w^t L^t)}$ and $s_L^t = \frac{w^t L^t}{(r^t K^t + w^t L^t)}$ is the capital and labour compensation share defined for $t = 0, 1$.

Our measure of the wage effect is smaller than the conventional measure of wage effect w^1/w^0. A higher wage directly increases the ULC by raising the labour compensation. However, it induces a firm to substitute labour by hiring more capital. Less labour raises labour productivity, lowering the ULC. Thus, the direct impact of a wage increase on labour compensation is somewhat mitigated. That is what the measure of wage effect proposed by this study captures. Three measures are independently proposed to capture the distinct effect on the ULC. Under the assumption of equation (6), the change in ULC is completely decomposed into these factors, as follows:

$$\begin{aligned} \frac{ULC^1(r^1, w^1)}{ULC^0(r^0, w^0)} &= \left(\frac{w^1 L^1}{Y^1}\right) \Big/ \left(\frac{w^0 L^0}{Y^0}\right) \\ &= Wage \times Usercost \times Technology \end{aligned} \quad (10)$$

3. Results and discussion

The data source of this study is the EU KLEMS database based on ISIC Rev. 3, which was updated in March 2011. It comprehensively covers inputs and outputs for the detailed 72 industries. We use data series of value added, capital services and labour services for our simple case of two inputs and one output. Nominal values and volume measures of value added, capital services and labour are available. Volume measures of these series correspond to quantities Y, K and L, whereas input prices r and w are implicitly derived from nominal values and volume measures. We deal with the whole economy and two sectors—manufacturing sector and electricity, gas and water supply

[8] Under the specification of equation (6), it can be shown that $ULC = \left(\frac{r^{\alpha^t} w^{1-\alpha^t}}{A^t}\right)\left(\frac{1-\alpha^t}{\alpha^t}\right)^{1-\alpha^t}$. Equations (7)–(9) flow from this equation.

sector among the detailed 72 industries. We intend to show empirically the bias in the current measure of wage effect and the biases varying across sectors characterised by different production technologies. We focus on the period 1995–2006, for which data necessary for computing index number formulae is available for the largest number of countries (18).

[Place Table 1 here]

Table 1 summarises input–output data for the whole economy and two sectors in 18 countries for 1995–2006. GDP, which is the value added for the whole economy, grew at the average annual rate of 2.91 percent in the sample countries.[9] Labour for the whole economy also increased but its growth rate was not as much as that of GDP. In contrast, manufacturing showed a higher growth rate with a value added of 3.16 percent, even with declining quantity of labour. While the value added of the electricity, gas and water supply sector grew at a relatively low rate of 1.56 percent per year, labour in this sector also declined. Thus, it indicates that labour productivity grew in the whole economy as well as the two sectors, and that the growth rate was especially higher in manufacturing. Similarly, large increases in wages were also documented in the whole economy and the two sectors, where wages grew at around 4 percent on average per year. It is worth noting the differences in production structures reflected by factor shares for the two sectors. While manufacturing showed the capital share of approximately 40 percent, which is close to the whole economy, the electricity, gas and water supply sector showed especially large capital share of 66.38 percent, reflecting its dependence on large infrastructure.

[Place Table 2 here]

Decomposition of the changes in ULC based on equations (7)–(10) are summarised in Table 2. It also presents the conventional decomposition into changes in wage and labour productivity, for comparison.[10] ULC for the whole economy significantly increased at the average rate of 2.33 percent per year. On the other hand, while ULC for electricity, gas and water supply increased at a smaller rate of 1.42 percent on average per year, ULC for manufacturing was nearly constant over this period. Thus, it shows that only the manufacturing sector could hold its cost competitiveness over this period, along with other factors deteriorating their competitiveness.

Now we investigate the sources of changes in ULC. We begin by revisiting the conventional decomposition; the large wage effect of around 4 percent dominates the increase in ULC but it is partly mitigated by labour productivity growth. Since the rate of wage increases is comparable among sectors, the difference in ULC growth can be attributed to the difference in labour productivity growth. However, once we use the alternative decomposition proposed in this study, we find that the wage effect has shrunk in the whole economy and in the two sectors, reflecting the firm's substitution of labour by capital under higher wages. As equation (7) suggests, the smaller the labour share or the larger the capital share, the more the wage effect has shrunk, under the alternative measure of wage effect. Reflecting its large capital share, electricity, gas and water supply sector shows the largest gap in the two wage effects, falling from 4.03 percent under the conventional measure to 1.42 percent in the alternative decomposition.

[9] See Tables A.1-A.3 for underlying country-specific data.
[10] See Tables A.4-A.6 for underlying country-specific result.

The wage effect under the alternative decomposition proposed by this study turns out to be very close to the growth rate of ULC for the whole economy and electricity, gas and water supply sector on average over time. Effects of user cost and technical change offset each other in these two sectors.[11] Thus, we can conclude that the long-run impact of labour productivity growth, which is induced by factors other than wage, is negligible in these sectors.

[Place Figure 1 here]

Figure 1 compares the time series of two wage effects and ULC. Evidently, there is a one-to-one relationship between the movement of ULC and the wage effect in the alternative decomposition for the whole economy. As Figure 1 suggests, this relationship does not necessarily hold, especially in sectors where there is much technical progress. However, it is clear that the wage effect in the decomposition proposed here becomes much closer to the growth rate of ULC compared with the conventional measure of wage effect, by reducing the role of labour productivity growth, which is characterised by the joint effects of user cost change and technical change.

4. Conclusions

We propose the decomposition of the change in ULC into two factor-price effects and a technical change effect. All these effects are defined by the underlying ULC function, which reflects a firm's cost-minimising behaviour. Thus, the wage effect in our decomposition captures not only its direct impact on labour compensation but also incorporates the indirect impact on ULC through the change in labour productivity, which is attributed to wage changes. We theoretically show that the bias in the conventional measure of wage effect depends on factor shares.

The empirical examination of 18 OECD member countries indicates that the impact of the wage effect on the change in ULC is overestimated by more than one percentage point under the conventional measure of wage effect. The bias in the conventional measure is especially large for industries with large capital shares such as in the electricity, gas and water supply sector. We find that once the comprehensive impact of wage change is appropriately measured based on the decomposition proposed in this study, the wage effect becomes smaller and much closer to the growth rate of ULC. For the whole economy, the change in ULC is almost completely explained by the wage effect.

This study is a first step towards measuring the comprehensive impact of a wage change on ULC. One limitation is clearly our selection of the functional form. Our theoretical result indicates that some index number formulae are exact to the theoretical measures based on the ULC function under the assumption of the Cobb–Douglas production function. However, even though output elasticities are allowed to vary over time, it is constant within a period. This leads to a unitary elasticity of substitution between capital and input. Thus, the assumption of Cobb–Douglas severely restricts substitution between two inputs a priori. Ideally, the exactness should hold under flexible functional forms such as the translog functional form, which imposes the minimum on the underlying production technology.[12] However, we leave the search for such superlative

[11] Technical change and underlying production technology of energy sectors are discussed in detail by Managi et al. (2004) and Kerstens and Managi (2012).

[12] See Diewert (1976) and Caves et al. (1982).

index number formulae of the comprehensive wage effect for ULC change to future researchers.

Competing interests

The author declares that they have no competing interests.

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References

Caves DW, Christensen LR, Diewert WE (1982) The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity. Econometrica 50:1393–1414.

Ceglowski J, Golub S (2007) Just How Low are China's Labour Costs? World Econ 30:597–617. doi: 10.1111/j.1467-9701.2007.01006.x

Ceglowski J, Golub SS (2012) Does China Still Have a Labor Cost Advantage? Glob Econ J. doi: 10.1515/1524-5861.1874

Coelli TJ, Rao. DSP, O'Donnel CJ, Batesse GE (2005) An Introduction to Efficiency and Productivity Analysis, Second. Springer, New York, NY

Diewert WE (1976) Exact and Superlative Index Numbers. J econo 4:115–145.

Fisher I (1922) The Making of Index Numbers: A Study of Their Varieties, Tests, and Reliability. Houghton Mifflin, Boston, MA

Galí J, Gertler M (1999) Inflation Dynamics: A Structural Econometric Analysis. J Monet Econ 44:195–222. doi: 10.1016/S0304-3932(99)00023-9

Kerstens K, Managi S (2012) Total Factor Productivity Growth and Convergence in the petroleum industry: Empirical Analysis Testing for Convexity. Int J Prod Econ 139:196–206. doi: 10.1016/j.ijpe.2012.04.008

Managi S, Opaluch JJ, Jin D, Grigalunas T a. (2004) Technological Change and Depletion in Offshore Oil and Gas. J Environ Econ Manage 47:388–409. doi: 10.1016/S0095-0696(03)00093-7

Mizobuchi H (2014) Returns to Scale Effect in Labour Productivity Growth. J Product Anal 42:293–304. doi: 10.1007/s11123-014-0408-9

Sbordone AM (2002) Prices and Unit Labor Costs: A New Test of Price Stickiness. J Monet Econ 49:265–292. doi: 10.1016/S0304-3932(01)00111-8

Shephard RW (1970) Theory of Cost and Production Function. Princeton University Press, Princeton, NJ

Turner AG, Golub SS (1997) Towards a System of Unit Labor Cost-Based Competitiveness Indicators for Advanced, Developing and Transition Countries. Washington, DC

Turner P, Van't dack J (1993) Measuring International Price and Cost Competitiveness. Basle

Van Ark B, Stuivenwold E, Ypma G (2005) Unit Labour Costs, Productivity and International Competitiveness.

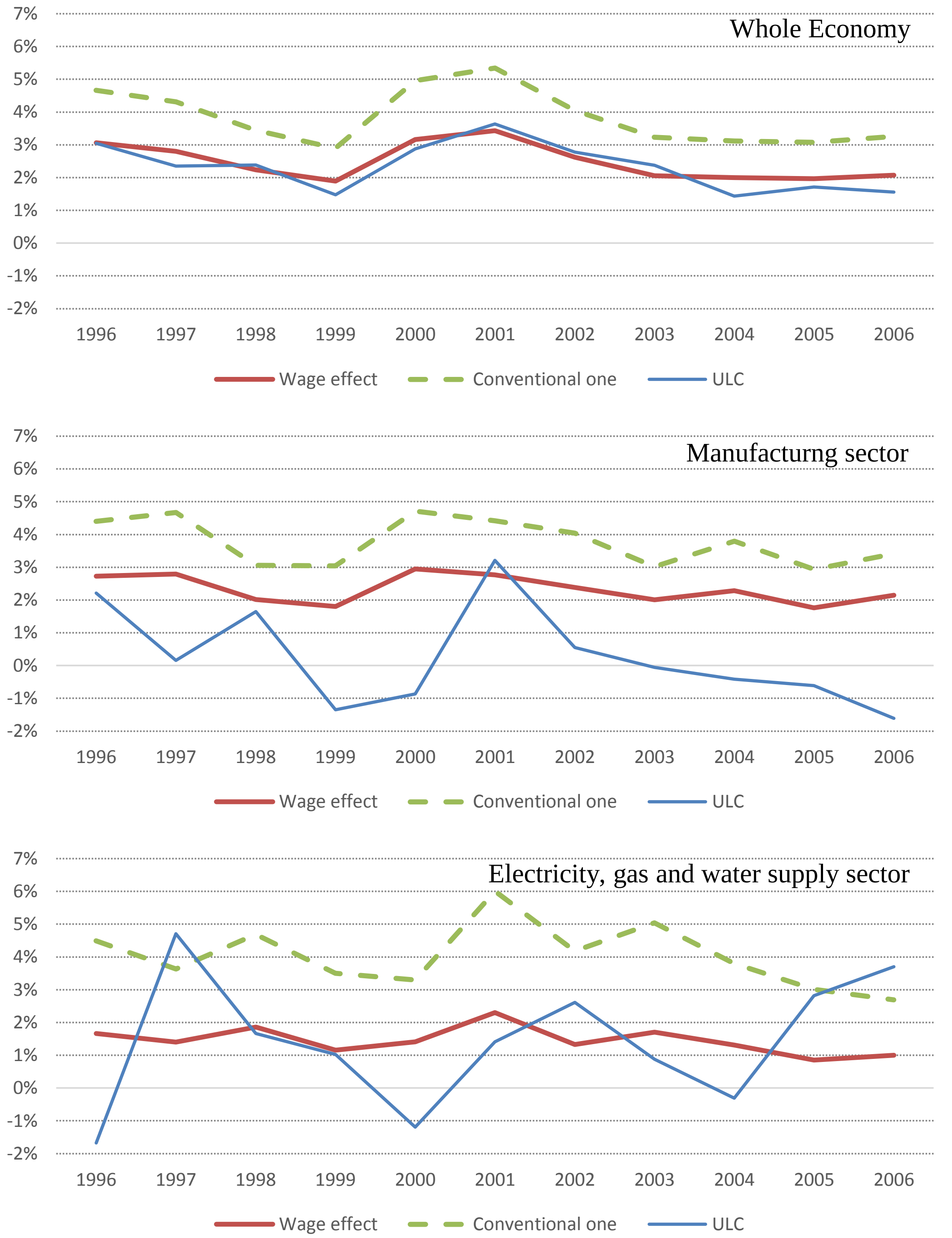

Figure 1: Average growth rate of GDP, labour and factor prices and average share of factor input, 1995–2006 (%)

Table 1: Average growth rate of GDP, labour and factor prices and average share of factor input, 1995–2006 (%)

	Growth rate				Factor income share	
	Value added	Labour	Wage	User cost	Capital	Labour
			Whole economy			
Mean	2.91	1.39	3.85	2.19	35.59	64.41
Std. Dev.	1.34	1.17	2.63	2.99	4.77	4.77
Max	6.97	4.45	11.09	11.72	43.91	75.69
Min	1.25	-0.31	-0.33	-1.42	24.31	56.09
			Manufacturing sector			
Mean	3.16	-0.36	3.77	1.91	38.13	61.87
Std. Dev.	2.21	1.10	2.45	4.16	11.99	11.99
Max	7.64	2.36	10.31	12.25	68.18	76.29
Min	0.21	-1.83	-0.38	-3.80	23.71	31.82
			Electricity, gas and water supply sector			
Mean	1.56	-1.05	4.03	3.67	66.38	33.62
Std. Dev.	1.89	1.68	2.69	4.63	11.23	11.23
Max	4.30	2.72	10.33	16.36	80.18	54.81
Min	-3.15	-3.15	1.05	-3.97	45.19	19.82

Table 2: Decomposition of changes in unit labour cost, 1995–2006 (%)

	ULC				(conventional decomposition)	
		Wage	User cost	Technology	Wage	Labour
			Whole economy			
Mean	2.33	2.48	0.76	-0.92	3.85	-1.52
Std. Dev.	2.15	1.67	1.12	0.97	2.63	0.89
Max	8.42	6.67	4.68	0.55	11.09	0.30
Min	-1.62	-0.19	-0.60	-2.93	-0.33	-3.18
			Manufacturing sector			
Mean	0.26	2.33	0.67	-2.75	3.77	-3.51
Std. Dev.	2.28	1.56	1.44	2.12	2.45	1.91
Max	5.25	6.04	4.95	0.88	10.31	0.23
Min	-3.08	-0.21	-1.26	-5.73	-0.38	-6.37
			Electricity, gas and water supply sector			
Mean	1.42	1.45	2.14	-2.17	4.03	-2.61
Std. Dev.	4.00	1.29	2.49	2.93	2.69	2.15
Max	11.11	5.12	7.63	3.75	10.33	1.64
Min	-3.46	0.21	-3.17	-6.57	1.05	-5.18

Appendix: Underlying Data and Result by

Table A1: Average growth rate of GDP, labour and factor prices and average share of factor input from 1995 to 2006 (%), whole economy

	Growth rate				Factor income share	
	GDP	Labour	Wage	User cost	Capital	Labour
Australia	3.47	2.04	3.95	1.93	38.73	61.27
Austria	2.33	1.09	1.80	2.21	35.27	64.73
Belgium	2.08	1.18	2.35	0.48	37.27	62.73
Czech Republic	2.54	0.11	7.48	1.67	41.30	58.70
Denmark	1.89	1.33	3.05	-0.37	32.58	67.42
Finland	3.52	1.59	3.04	3.00	35.29	64.71
France	2.12	0.88	2.73	1.53	34.46	65.54
Germany	1.50	-0.31	1.74	0.20	33.07	66.93
Hungary	4.22	1.55	11.09	11.72	39.63	60.37
Ireland	6.97	4.45	5.03	3.50	43.91	56.09
Italy	1.39	1.17	2.53	1.78	35.22	64.78
Japan	1.25	-0.04	-0.33	-1.42	42.43	57.57
Netherlands	2.63	1.55	3.17	2.45	33.38	66.62
Slovenia	4.07	0.89	7.81	6.81	24.31	75.69
Spain	3.48	3.78	2.63	2.38	36.89	63.11
Sweden	2.99	0.80	3.63	-0.35	33.05	66.95
United Kingdom	2.72	1.47	3.85	0.75	28.42	71.58
United States	3.16	1.44	3.74	1.13	35.44	64.56

Source: EUKLEMS based on ISIC Rev. 3.

Table A2: Average growth rate of GDP, labour and factor prices and average share of factor input from 1995 to 2006 (%), manufacturing sector

	Growth rate				Factor income share	
	GDP	Labour	Wage	User cost	Capital	Labour
Australia	1.56	-0.57	4.02	0.69	36.81	63.19
Austria	3.47	-0.72	2.68	5.86	36.80	63.20
Belgium	2.48	-1.74	3.02	0.94	65.46	34.54
Czech Republic	5.43	0.30	7.42	2.39	41.75	58.25
Denmark	0.59	-1.03	3.36	-0.81	28.38	71.62
Finland	6.24	0.84	3.11	2.13	42.57	57.43
France	1.92	-0.89	2.34	-0.97	30.29	69.71
Germany	1.69	-1.23	2.22	5.10	23.71	76.29
Hungary	5.64	0.59	10.31	12.25	42.24	57.76
Ireland	7.64	1.27	3.97	0.79	68.18	31.82
Italy	0.21	0.00	2.60	-0.53	30.39	69.61
Japan	1.64	-1.06	-0.38	-2.92	43.75	56.25
Netherlands	2.07	-0.44	2.76	2.45	35.67	64.33
Slovenia	4.98	-0.57	7.84	9.92	28.96	71.04
Spain	2.12	2.36	2.17	0.31	35.28	64.72
Sweden	5.58	-0.23	3.41	-1.74	35.83	64.17
United Kingdom	0.59	-1.83	3.68	-3.80	24.89	75.11
United States	2.96	-1.50	3.41	2.29	35.39	64.61

Source: EUKLEMS based on ISIC Rev. 3.

Table A3: Average growth rate of GDP, labour and factor prices and average share of factor input from 1995 to 2006 (%), electricity, gas and water supply sector

	Growth rate				Factor income share	
	GDP	Labour	Wage	User cost	Capital	Labour
Australia	1.09	1.42	2.52	1.22	72.20	27.80
Austria	3.41	-1.77	2.38	3.63	57.01	42.99
Belgium	1.89	2.72	2.91	2.89	45.19	54.81
Czech Republic	-1.23	-2.97	8.52	4.11	73.94	26.06
Denmark	-0.16	-3.15	3.90	1.16	80.04	19.96
Finland	2.87	-1.90	3.52	2.71	71.94	28.06
France	2.92	-1.34	3.76	2.78	58.61	41.39
Germany	2.11	-2.72	3.28	3.07	58.97	41.03
Hungary	-3.15	-2.37	10.33	16.36	50.57	49.43
Ireland	3.48	1.20	5.21	2.22	48.22	51.78
Italy	0.69	-2.07	1.05	3.91	71.07	28.93
Japan	2.91	-1.66	1.10	-3.97	80.18	19.82
Netherlands	2.15	-1.67	2.77	6.47	71.84	28.16
Slovenia	2.53	-0.52	9.05	13.62	57.63	42.37
Spain	4.30	0.34	1.62	0.70	74.63	25.37
Sweden	-0.70	0.94	3.92	1.22	77.20	22.80
United Kingdom	1.85	-1.81	1.95	1.77	69.90	30.10
United States	1.13	-1.57	4.78	2.14	75.68	24.32

Source: EUKLEMS based on ISIC Rev. 3.

Table A4: Decomposition of changes in unit labour cost from 1995 to 2006 (%), whole economy

	ULC				(conventional decomposition)	
		Wage	User cost	TFP	Wage	ALP
Australia	2.52	2.42	0.75	-0.64	3.95	-1.43
Austria	0.56	1.16	0.80	-1.40	1.80	-1.24
Belgium	1.44	1.48	0.18	-0.22	2.35	-0.91
Czech Republic	5.06	4.38	0.68	0.01	7.48	-2.42
Denmark	2.49	2.06	-0.12	0.55	3.05	-0.56
Finland	1.12	1.96	1.05	-1.89	3.04	-1.92
France	1.49	1.79	0.53	-0.82	2.73	-1.24
Germany	-0.07	1.17	0.09	-1.32	1.74	-1.81
Hungary	8.42	6.67	4.68	-2.93	11.09	-2.67
Ireland	2.51	2.79	1.45	-1.73	5.03	-2.52
Italy	2.31	1.63	0.62	0.05	2.53	-0.22
Japan	-1.62	-0.19	-0.60	-0.83	-0.33	-1.29
Netherlands	2.09	2.12	0.82	-0.85	3.17	-1.08
Slovenia	4.63	5.96	1.47	-2.80	7.81	-3.18
Spain	2.93	1.66	0.89	0.38	2.63	0.30
Sweden	1.44	2.44	-0.12	-0.87	3.63	-2.19
United Kingdom	2.60	2.75	0.21	-0.36	3.85	-1.25
United States	2.01	2.42	0.40	-0.81	3.74	-1.72

Table A5: Decomposition of changes in unit labour cost from 1995 to 2006 (%), manufacturing sector

	ULC				(conventional decomposition)	
		Wage	User cost	TFP	Wage	ALP
Australia	1.89	2.52	0.24	-0.87	4.02	-2.13
Austria	-1.51	1.68	2.13	-5.32	2.68	-4.19
Belgium	-1.19	1.03	0.63	-2.86	3.02	-4.22
Czech Republic	2.30	4.32	1.01	-3.03	7.42	-5.12
Denmark	1.74	2.41	-0.22	-0.45	3.36	-1.62
Finland	-2.30	1.78	0.92	-4.99	3.11	-5.40
France	-0.47	1.62	-0.28	-1.81	2.34	-2.81
Germany	-0.70	1.70	1.30	-3.70	2.22	-2.92
Hungary	5.25	6.04	4.95	-5.73	10.31	-5.06
Ireland	-2.41	1.23	0.29	-3.92	3.97	-6.37
Italy	2.39	1.81	-0.17	0.75	2.60	-0.21
Japan	-3.08	-0.21	-1.26	-1.60	-0.38	-2.70
Netherlands	0.26	1.79	0.90	-2.42	2.76	-2.50
Slovenia	2.30	5.61	2.33	-5.65	7.84	-5.55
Spain	2.40	1.41	0.11	0.88	2.17	0.23
Sweden	-2.40	2.20	-0.62	-3.97	3.41	-5.81
United Kingdom	1.26	2.82	-0.99	-0.57	3.68	-2.42
United States	-1.05	2.22	0.89	-4.16	3.41	-4.46

Table A6: Decomposition of changes in unit labour cost from 1995 to 2006 (%), electricity, gas and water supply sector

	ULC				(conventional decomposition)	
		Wage	User cost	TFP	Wage	ALP
Australia	2.85	0.71	0.87	1.27	2.52	0.33
Austria	-2.80	1.03	2.12	-5.96	2.38	-5.18
Belgium	3.74	1.59	1.26	0.88	2.91	0.83
Czech Republic	6.79	2.26	3.03	1.50	8.52	-1.73
Denmark	0.92	0.77	0.94	-0.80	3.90	-2.99
Finland	-1.25	0.99	2.03	-4.27	3.52	-4.77
France	-0.50	1.56	1.57	-3.64	3.76	-4.26
Germany	-1.55	1.34	1.86	-4.76	3.28	-4.83
Hungary	11.11	5.12	7.43	-1.44	10.33	0.78
Ireland	2.93	2.65	1.04	-0.76	5.21	-2.28
Italy	-1.71	0.25	2.76	-4.71	1.05	-2.76
Japan	-3.46	0.21	-3.17	-0.50	1.10	-4.56
Netherlands	-1.05	0.73	4.79	-6.57	2.77	-3.82
Slovenia	6.00	3.85	7.63	-5.48	9.05	-3.05
Spain	-2.33	0.41	0.52	-3.26	1.62	-3.95
Sweden	5.56	0.88	0.93	3.75	3.92	1.64
United Kingdom	-1.71	0.61	1.25	-3.57	1.95	-3.66
United States	2.08	1.19	1.61	-0.73	4.78	-2.71