A new unit labour cost changes decomposition Four pillars of cost competitiveness recovery

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Abstract

This article presents a new decomposition of unit labour costs into compensation per worker and labour productivity, which, in turn, is decomposed into efficiency gains, technical progress and capital deepening. Data for Western European countries and the US show that the evolution of labour productivity components counteracts the deterioration in countries' cost competitiveness caused by increases in nominal wages. The policy implication is that efforts aimed at reducing nominal labour costs should be accompanied by policies fostering capital deepening. Further improvements in countries' cost competitiveness can be achieved by enhancing efficiency gains and technical progress, which has been mostly negative during the period under study.

KEYWORDS: unit labour cost; internal devaluation; labour productivity; technical change; capital deepening.

The recent crisis highlighted structural weaknesses of developed economies, generating a heated debate on the causes of economic deterioration in Europe and the consequent growth of unemployment. A striking characteristic of this crisis so far is how European countries were generally incapable of responding effectively to it in order to put the economies back on track. This is due to many reasons. One the one hand, budgetary tightening limited the resources available to foster growth. On the other hand, due to the monetary union, indebted countries could no longer use competitive devaluation to expand demand. The internal devaluation proposal advocates a reduction in wages as essential to exit the crisis. In this view, unit labour costs are crucial to increase competitiveness.

This article aims to clarify the link between labour costs and countries' competitiveness. In particular, it examines the link between cost competitiveness (intended as a reduction in unit labour cost) and labour productivity and its determinants, and stresses that the latter are important sources of competitiveness.

Unit labour costs (ULC hereafter) are defined as the ratio of total nominal cost per employee to real labour productivity. If in a given country total nominal costs per employee increase faster than labour productivity, then inflationary demand pressures may emerge and the country could lose competitiveness. Thus, ULC changes reflect the comparative evolution of total nominal costs per employee to labour productivity (e.g. Ark et al., 2005). In turn,

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following Kumar and Russell (2002), labour productivity changes can be decomposed into three elements: efficiency changes, technical changes and capital deepening. This allows us to highlight four components of ULC, which broadens policy perspective and enriches the analysis of ULC changes. Innovation, investment in tangible and intangible capital, labour quality and business environment come into play through efficiency change, technological change and capital deepening.

This article is organised as follows. The first section presents the decomposition of ULC, and gives an economic interpretation of each component. The following section presents the evolution of the ULC components for 15 European countries and the United States from 1995 to 2009. The last section concludes.

1   The decomposition of Unit Labour Costs

ULC is defined as total labour compensation (TLC) per unit of output (GDP).Dividing each term by labour (L), ULC can be written as the ratio of compensation per employee to labour productivity. Changes in ULC are:

$$\frac{ULC_{t+1}}{ULC_t} = \frac{\frac{TLC_{t+1}/L_{t+1}}{GDP_{t+1}/L_{t+1}}}{\frac{TLC_t/L_t}{GDP_t/L_t}} \tag{1}$$

Taking logs and rearranging terms:

$$d\ln(ULC_{t+1}) = d\ln\frac{TLC_{t+1}}{L_{t+1}} - d\ln\frac{GDP_{t+1}}{L_{t+1}} \tag{2}$$

(d denotes the change in logarithm.) The equation above shows that, in order to recover cost competitiveness, a country could decrease labour cost and/or increase labour productivity. Kumar and Russell (2002), in a framework that allows for inefficiency in production, and assuming constant returns to scales technology, show that labour productivity changes can be decomposed into efficiency changes (EFF), technical changes (TECH) and capital deepening (CAP). Then ULC changes are:

$$d\ln(ULC_{t+1}) = d\ln\frac{TLC_{t+1}}{L_{t+1}} - \ln(EFF_{t+1}) - \ln(TECH_{t+1}) - \ln(CAP_{t+1}) \tag{3}$$

An increase in 1% in efficiency (or any other components of labour productivity) lowers ULC by about the same amount. Conversely, any increase in compensation per worker will increase ULC by the same amount. Changes in efficiency have the same effect as changes in technical progress and capital deepening.

Positive efficiency changes mean that countries moves towards best practices, or maximum feasible production given inputs use. This could be achieved through improvements in managerial practices, firms' decision structure and learning by doing. Such elements, under the control of the management, are among the determinants of productivity identified by Syverson (2011).

Technical change measures expansions in feasible production. It results from successful R&D, reflecting the ability of countries to innovate, and evolves with investments in intangible capital. (Intangibles, which measure the amount of knowledge and organisational capital and firm-specific skills, are also a determinant of the evolution of efficiency Corrado et al., 2009).

Efficiency and technical progress determine total factor productivity (TFP), which represents productivity gains resulting from the efficient combination of inputs. Thus, TFP changes reflect a complex mix of elements such as increase in knowledge from innovation, investment in intangibles, organisational and managerial practises.

Capital deepening has received various interpretations. (Pilat, 2004) explains that the use of new capital introduces new technologies in the production process. The most interesting explanation of capital deepening is given by Frankel (1962). This author argues that firms accumulate capital in response to market conditions and economic opportunities. This means that capital deepening reflects factors external to the firm, such as changes in regulatory frameworks or flexible inputs markets.

The ULC decomposition of this section shows that increases in average compensation of workers lead to competitiveness losses. Conversely, countries cost competitiveness improves following improvements in efficiency, the occurrence of technical change and increases in capital intensity.

The following section analyses the evolution of components of cost competitiveness from 1995 to 2009. ULC is defined as total labour compensation (TLC) divided by labour. It is compiled by the OECD in PPPs. Output is measured by GDP, and labour by number of persons employed (Eurostat). The components of labour productivity are computed using data envelopment analysis assuming constant returns to scale.

2   Results

Table 1 shows that countries have experienced competitiveness losses from 1996 to 2009. Notably, in the aftermath of the 2007-2009 recession ULC decreased in all countries, exception made of the United Kingdom. Greece, United Kingdom and Portugal have experience the largest increase in ULC moving from a value of 100 in 1995 to, respectively, 161, 148 and 143 in 2010. (Spain's ULC growth is also high, but data is missing for 2009.) Countries with the lowest ULC are Germany (104 in 2010, assuming a value of 100 in 1995), Austria (111) and Sweden (120). The case of Germany is interesting as, according to a study of Soskice and Iversen (2001), large companies in Netherlands, Belgium, Austria and France increasingly relate their wage increases to ULC developments in Germany. The correlation of countries ULC evolution to the one of Germany ranges from 0.55 for France to 0.69 for Austria.

Among the countries which experienced the largest growth in ULC, thus the largest deterioration in cost competitiveness, are those that are currently experiencing the debt crisis (Spain, Greece and Portugal), which seems to support the "internal devaluation" view. (Katsimi and Moutos, 2010, relate the Greek's ULC rise in to the inherent inability of the country's trade unions to accept real wage increases for private-sector workers in line with productivity developments.)

Table 1: Growth rates of ULC

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	mean
AT	-0.5%	-0.2%	0.0%	-0.1%	0.8%	0.2%	1.3%	-0.7%	0.6%	1.0%	0.7%	3.3%	4.6%	-0.6%	0.7%
BE	0.2%	1.1%	1.4%	0.4%	4.2%	2.3%	1.0%	-0.6%	1.4%	1.8%	2.1%	4.3%	4.3%	-0.5%	1.7%
DE	-1.0%	0.3%	0.7%	0.5%	0.3%	0.5%	0.9%	-0.4%	-0.9%	-2.4%	-1.0%	2.2%	5.8%	-1.5%	0.3%
DK	1.0%	3.4%	1.9%	1.0%	4.1%	3.5%	2.1%	0.3%	1.9%	2.1%	4.4%	6.2%	4.7%	-1.1%	2.5%
ES	1.8%	1.8%	1.7%	2.7%	3.1%	2.8%	2.8%	2.3%	3.1%	3.1%	4.0%	4.7%	1.0%		2.7%
FI	-1.1%	1.3%	0.7%	0.6%	3.6%	0.8%	0.8%	-0.1%	2.2%	0.3%	0.5%	5.8%	7.3%	-1.5%	1.5%
FR	0.2%	-0.2%	0.8%	1.6%	2.2%	2.9%	2.0%	1.0%	1.8%	1.8%	1.5%	3.0%	3.1%		1.7%
GR	9.2%	4.7%	2.9%	1.4%	-0.7%	9.4%	1.7%	1.9%	3.5%	1.6%	3.4%	5.8%	5.4%	-1.6%	3.5%
IE	-0.1%	5.4%	1.1%	2.7%	5.9%	0.8%	3.7%	3.9%	5.2%	3.8%	3.9%	5.0%	-1.3%	-5.6%	2.5%
IT	2.7%	-2.1%	1.5%	0.3%	3.2%	3.4%	4.0%	1.7%	3.1%	1.7%	2.2%	3.9%	3.8%	0.0%	2.1%
NL	1.0%	2.5%	1.8%	3.2%	4.5%	4.5%	2.4%	0.4%	-0.3%	0.7%	1.6%	2.6%	5.1%	-0.8%	2.1%
PT	3.9%	3.3%	2.3%	4.3%	3.8%	3.2%	3.8%	1.0%	3.5%	0.9%	1.2%	3.4%	3.2%	-1.4%	2.6%
SE	0.8%	0.1%	-1.2%	4.9%	5.0%	0.5%	0.5%	-1.0%	0.4%	-0.7%	4.1%	2.7%	4.6%	-1.9%	1.3%
UK	2.4%	3.9%	2.4%	2.7%	3.3%	2.1%	2.9%	1.7%	2.5%	2.5%	2.9%	2.3%	6.0%	2.2%	2.9%
US	1.5%	2.8%	1.4%	3.6%	2.1%	0.3%	2.0%	1.4%	2.3%	3.0%	2.8%	2.8%	0.3%	-1.0%	1.8%

Note: data are yearly changes. Data is missing for Spain and France in 2009.
(Source: Eurostat, Statec.)

Table 2 shows that the largest contributor to the deterioration of cost competitiveness is the increase in labour compensation. This is the case for all countries. One can also see that, exception made of Spain, Greece and Italy, the growth rate of labour compensation is higher than ULC changes. This implies that the evolution of labour productivity has compensated the effects of increases in labour compensation and lowered its impact on ULC. Tables 3–5 show the evolution of the components of labour productivity, respectively efficiency changes, technical progress, and capital deepening. (Positive figures for the logarithm of efficiency change indicate that efficiency gains have occurred.)

Table 2: Growth rates of labour compensation

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	mean
AT	2.3%	3.1%	2.9%	4.2%	-2.4%	4.0%	2.1%	2.2%	-0.6%	3.5%	0.9%	0.1%	-0.3%	2.0%	1.7%
BE	3.8%	-0.2%	4.9%	5.5%	2.7%	5.7%	-0.5%	-0.5%	0.3%	2.2%	2.5%	0.7%	0.0%	3.1%	2.2%
DE	1.7%	1.2%	3.5%	2.8%	1.2%	2.2%	3.3%	2.6%	2.2%	1.3%	1.0%	-0.1%	-1.3%	2.8%	1.7%
DK	3.5%	4.4%	3.8%	4.8%	1.8%	5.5%	0.1%	4.6%	0.0%	3.5%	3.9%	1.4%	0.6%	4.8%	3.1%
ES	2.5%	1.7%	1.1%	2.6%	1.3%	3.6%	-0.6%	1.0%	0.8%	4.3%	5.1%	2.8%	2.5%		2.2%
FI	2.9%	3.7%	3.2%	4.7%	1.3%	2.2%	1.2%	7.0%	2.4%	2.8%	4.2%	2.1%	0.6%	4.8%	3.1%
FR	3.7%	2.1%	3.6%	4.9%	3.2%	4.4%	-1.5%	3.0%	3.6%	2.5%	3.0%	-1.3%	-0.1%		2.4%
GR	9.9%	0.1%	4.2%	5.8%	2.9%	11.9%	1.3%	2.7%	1.3%	2.6%	2.7%	4.7%	0.0%	-3.5%	3.3%
IE	2.4%	1.4%	0.1%	3.9%	2.8%	3.5%	4.2%	5.6%	4.1%	4.5%	7.6%	-0.5%	2.4%	4.8%	3.3%
IT	3.9%	-0.8%	1.7%	1.7%	2.7%	-2.7%	0.8%	0.4%	2.8%	2.8%	4.0%	1.6%	-1.4%	0.0%	1.3%
NL	2.6%	4.1%	4.9%	6.5%	1.4%	4.2%	-0.2%	5.3%	1.6%	2.6%	3.8%	-0.1%	-0.7%	4.5%	2.9%
PT	4.4%	2.3%	5.5%	5.8%	1.6%	2.6%	3.0%	1.0%	8.0%	2.3%	3.4%	0.3%	3.1%	3.4%	3.3%
SE	4.8%	1.7%	3.2%	8.7%	0.3%	2.5%	2.8%	6.2%	-0.8%	2.2%	6.8%	-2.3%	-2.9%	3.4%	2.6%
UK	5.5%	4.7%	4.4%	8.1%	4.9%	2.9%	1.9%	4.7%	1.9%	3.0%	1.5%	-2.0%	-0.5%	4.0%	3.2%
US	4.3%	5.6%	5.7%	5.4%	1.6%	2.0%	2.9%	3.5%	2.5%	0.9%	3.1%	-1.4%	-2.1%	4.7%	2.8%

(Source: Eurostat, Statec.)

On average, most countries have realised efficiency gains. Efficiency has decreased only in Belgium, Spain, Italy and Portugal. In contrast, the lack of technical progress or even technical regress, have worsened the cost competitiveness performance of nearly all countries, by not reducing ULC. Only exceptions were Austria and Belgium. While technical regress can be find in many studies, only few authors have attempted to provide a plausible explanation of this result. For Lee and Johnson (2012), technical regress is often attributed to production issues when in fact it may result from lack of demand. Bontemps et al. (2012) emphasizes the negative effect of new regulations that generate negative technical progress. For Sena (2006) it is a consequence of sharp recessions. Based on Caballero and Hammour (1994, 1996), this author argues that during recessions old techniques are substituted by new techniques. If the process of destruction of old techniques is faster than the creation of new techniques, then countries are experiencing technical regress.

Capital deepening, has improved on average for all countries and has contributed to in-

creases the cost competitiveness (decreases in ULC).

Table 3: Logs of efficiency

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	mean
AT	-0.001	0.038	-0.015	0.019	-0.018	0.017	0.001	0.004	-0.010	0.036	0.002	0.014	-0.015	-0.039	0.002
BE	0.010	-0.005	-0.007	0.026	0.000	0.015	-0.016	-0.017	-0.010	0.018	0.002	0.008	-0.010	-0.030	-0.001
DE	0.000	0.025	-0.008	0.006	0.020	-0.002	0.001	0.003	0.025	0.051	0.017	0.019	-0.041	-0.014	0.007
DK	-0.014	0.033	0.007	0.016	0.005	-0.005	-0.012	0.020	0.004	0.010	-0.005	-0.010	-0.015	-0.005	0.002
ES	-0.018	0.011	-0.045	-0.016	0.000	-0.011	-0.028	-0.024	-0.012	0.003	-0.003	0.010	0.034	-0.036	-0.008
FI	0.016	0.037	-0.014	0.024	0.005	0.002	0.000	0.027	0.010	0.033	0.033	0.007	-0.052	0.005	0.010
FR	0.009	0.034	-0.013	0.015	0.016	-0.002	-0.036	-0.003	0.011	0.024	0.010	-0.001	-0.004	-0.031	0.005
GR	-0.010	0.016	-0.004	-0.001	0.046	-0.003	0.014	0.010	-0.007	0.012	0.005	0.011	0.005	-0.062	0.002
IE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.008	-0.005	0.009	-0.039	0.012	0.030	0.000
IT	-0.014	0.023	-0.036	-0.003	0.007	-0.048	-0.028	-0.013	-0.006	0.007	0.005	-0.001	-0.021	-0.023	-0.011
NL	-0.008	0.027	-0.011	0.014	-0.019	-0.014	-0.022	0.012	0.011	0.036	0.019	0.016	-0.025	-0.012	0.002
PT	-0.065	-0.030	-0.048	-0.040	-0.017	-0.041	-0.044	-0.020	-0.010	-0.001	0.013	0.009	0.028	0.011	-0.018
SE	0.014	0.045	0.030	0.025	0.000	0.008	0.028	0.052	0.013	0.022	0.014	-0.014	-0.024	0.019	0.017
UK	-0.009	0.018	-0.001	0.009	0.028	0.002	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
US	0.002	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003

(Source: Eurostat, Statec.)

Table 4: Logs of technical progress

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	mean
AT	0.022	-0.011	0.037	0.015	-0.015	0.011	0.002	0.020	-0.002	-0.014	0.001	-0.042	-0.035	0.062	0.004
BE	0.022	-0.008	0.037	0.016	-0.016	0.011	0.002	0.020	-0.001	-0.015	0.000	-0.042	-0.034	0.061	0.004
DE	0.022	-0.022	0.019	0.001	-0.026	-0.003	-0.002	0.012	-0.004	-0.018	0.000	-0.041	-0.030	0.049	-0.003
DK	0.007	-0.033	-0.001	0.001	-0.032	0.000	-0.012	-0.008	-0.017	-0.014	-0.014	-0.035	-0.048	0.019	-0.013
ES	0.022	-0.014	0.036	0.010	-0.022	0.000	-0.004	0.002	-0.013	-0.017	-0.011	-0.037	-0.031	0.059	-0.006
FI	0.022	-0.014	0.035	0.009	-0.023	-0.004	-0.006	0.005	-0.011	-0.017	-0.010	-0.034	-0.035	0.040	-0.003
FR	0.022	-0.014	0.035	0.011	-0.012	0.008	0.004	0.011	-0.005	-0.019	0.000	-0.041	-0.030	0.055	-0.002
GR	-0.001	-0.031	-0.016	-0.008	-0.041	-0.001	-0.018	-0.018	-0.019	-0.012	-0.015	-0.036	-0.054	0.011	-0.018
IE	0.011	-0.035	-0.014	-0.008	-0.042	-0.010	-0.024	-0.015	-0.019	-0.014	-0.014	-0.035	-0.038	0.058	-0.014
IT	0.022	-0.019	0.027	0.005	-0.022	-0.003	-0.008	-0.004	-0.016	-0.015	-0.013	-0.034	-0.043	0.022	-0.007
NL	0.022	-0.014	0.036	0.013	-0.011	0.001	-0.004	0.008	-0.006	-0.019	-0.001	-0.041	-0.033	0.038	-0.001
PT	-0.001	-0.031	-0.016	-0.016	-0.046	-0.022	-0.019	-0.007	-0.017	-0.014	-0.019	-0.035	-0.065	-0.003	-0.022
SE	0.022	-0.030	0.003	0.001	-0.033	0.002	-0.020	-0.015	-0.020	-0.013	-0.015	-0.035	-0.050	0.015	-0.013
UK	-0.001	-0.031	-0.016	-0.016	-0.046	-0.022	-0.019	-0.005	-0.016	-0.011	-0.018	-0.036	-0.065	-0.001	-0.022
US	0.022	-0.019	0.027	0.007	-0.018	0.003	0.002	0.012	-0.005	-0.019	-0.007	-0.037	-0.035	0.038	-0.002

(Source: Eurostat, Statec.)

Table 5: Logs of capital deepening

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	mean
AT	0.007	0.007	0.007	0.009	0.001	0.009	0.005	0.005	-0.001	0.003	-0.001	-0.004	0.001	0.003	0.004
BE	0.004	0.001	0.006	0.009	0.002	0.008	0.000	-0.002	0.000	0.001	0.002	-0.003	0.001	0.005	0.002
DE	0.005	0.006	0.017	0.015	0.015	0.022	0.025	0.016	0.010	0.004	0.002	-0.002	-0.001	0.007	0.010
DK	0.032	0.010	0.013	0.022	0.003	0.025	0.004	0.030	-0.006	0.019	0.015	-0.003	0.022	0.045	0.017
ES	0.003	0.002	0.002	0.005	0.004	0.019	-0.002	0.009	0.002	0.025	0.024	0.008	0.012	0.009	0.009
FI	0.001	0.001	0.004	0.007	-0.004	0.015	0.010	0.038	0.004	0.008	0.013	-0.010	0.021	0.019	0.009
FR	0.005	0.003	0.007	0.007	0.007	0.009	-0.003	0.012	0.013	0.003	0.005	-0.001	0.003	0.006	0.005
GR	0.017	-0.031	0.034	0.053	0.030	0.029	0.000	0.015	0.003	0.010	0.004	0.014	-0.005	0.031	0.014
IE	0.014	-0.005	0.004	0.020	0.011	0.036	0.029	0.032	0.016	0.025	0.042	0.018	0.062	0.016	0.023
IT	0.005	0.008	0.011	0.012	0.010	-0.011	0.004	0.004	0.019	0.019	0.027	0.012	0.011	0.001	0.009
NL	0.002	0.003	0.005	0.007	-0.002	0.010	-0.001	0.028	0.013	0.003	0.003	-0.002	-0.001	0.026	0.007
PT	0.072	0.051	0.096	0.071	0.041	0.057	0.055	0.028	0.072	0.029	0.028	-0.006	0.036	0.041	0.048
SE	0.004	0.001	0.011	0.012	-0.014	0.010	0.016	0.035	-0.005	0.019	0.029	-0.001	-0.001	0.019	0.010
UK	0.041	0.022	0.036	0.061	0.035	0.028	0.000	0.035	0.010	0.016	0.004	-0.006	0.000	0.019	0.021
US	0.004	0.007	0.016	0.011	0.013	0.014	0.007	0.009	0.008	-0.002	0.009	-0.005	0.010	0.018	0.009

(Source: Eurostat, Statec.))

3   Conclusions

Results presented in this study support the idea that policy efforts should be targeted to restrain labour costs. However, this approach has several drawbacks; lower nominal wage growth is obviously less attractive than higher productivity growth (Blanchard, 2007) and has adverse social consequences. Such drawbacks make the compression of nominal wages
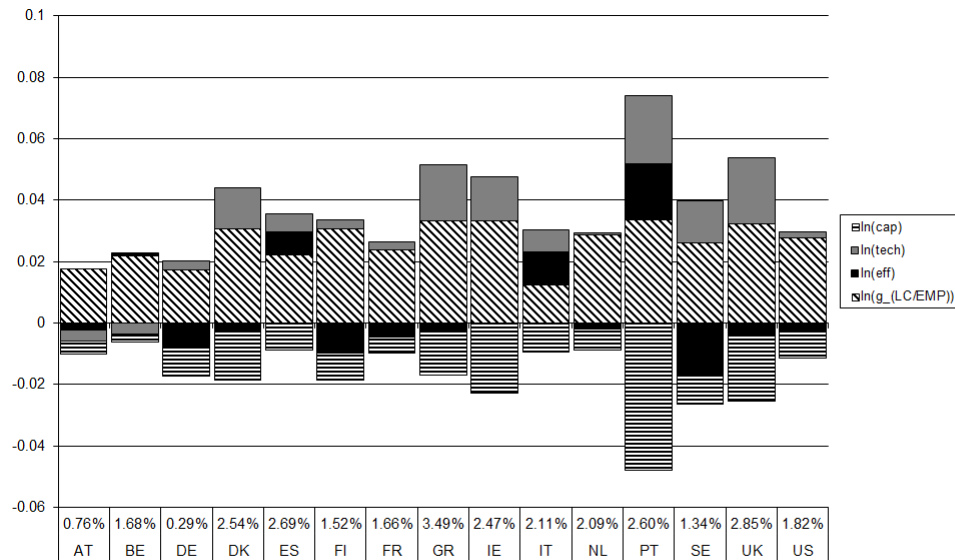
Figure 1: Decomposition of average ULC changes.

an unlikely and possibly unsustainable long term strategy to foster economic growth. This strategy also assumes the absence of nominal wage rigidities, which is not supported by the data (Arpia and Pichelmann, 2007, founded significant wage rigidity in the Euro Area). However, the decomposition of unit labour costs presented in this document suggests that other options, such as structural reforms to foster capital deepening, new industrial organization to improve efficiency and research and development policies, could be successful in fostering countries cost competitiveness. The burden of improving unit labour cost should not only fall on labour market adjustment but also on structural reforms and the design of new production systems. The decomposition proposed in this article emphasizes the important role of intangible, supporting the finding of Corrado et al. (2009).

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