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Unit Labor Costs in the Eurozone: The Competitiveness Debate Again*

by

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ABSTRACT

Current discussions about the need to reduce unit labor costs (especially through a significant reduction in nominal wages) in some countries of the eurozone (in particular, Greece, Ireland, Italy, Portugal, and Spain) to exit the crisis may not be a panacea. First, historically, there is no relationship between the growth of unit labor costs and the growth of output. This is a well-established empirical result, known in the literature as *Kaldor's paradox*. Second, construction of unit labor costs using aggregate data (standard practice) is potentially misleading. Unit labor costs calculated with aggregate data are not just a weighted average of the firms' unit labor costs. Third, aggregate unit labor costs reflect the distribution of income between wages and profits. This has implications for aggregate demand that have been neglected. Of the 12 countries studied, the labor share increased in one (Greece), declined in nine, and remained constant in two. We speculate that this is the result of the nontradable sectors gaining share in the overall economy. Also, we construct a measure of competitiveness called *unit capital costs* as the ratio of the nominal profit rate to capital productivity. This has increased in all 12 countries. We conclude that a large reduction in nominal wages will not solve the problem that some countries of the eurozone face. If this is done, firms should also acknowledge that unit capital costs have increased significantly and thus also share the adjustment cost. Barring solutions such as an exit from the euro, the solution is to allow fiscal policy to play a larger role in the eurozone, and to make efforts to upgrade the export basket to improve competitiveness with more advanced countries. This is a long-term solution that will not be painless, but one that does not require a reduction in nominal wages.

Keywords: Competitiveness; Eurozone; Income Distribution; Unit Labor Costs

JEL Classifications: D31, D33, E25, J30

1. INTRODUCTION

Discussions about the need to regain competitiveness in the euro area have taken center place in policy forums in the context of the current crisis. The issue is particularly important for Greece, Ireland, Italy, Portugal, and Spain. No matter how the crisis started, analysts have concluded that these countries suffer from a competitiveness problem (i.e., workers are too expensive, especially given their labor productivity). Given that devaluation is not possible because they all use the euro, and that the monetary union has imposed fiscal rigidity and removed monetary independence, it appears that adjustment has to come through the labor market. Therefore, policy discussions have focused on analyses of unit labor costs. A number of economists have concluded that to close the “competitiveness gap,” in particular with Germany, requires downward adjustments in relative wages in these five countries (Black 2010), i.e., the so-called *internal devaluation*.¹

Unit labor costs are defined as the ratio of a worker’s total compensation, or money-wage (i.e., the nominal wage rate plus all other labor-related costs to the firm such as payments in-kind related to labor services, social security, severance and termination pay, and employers’ contributions to pension schemes, casualty, and life insurance, and workers compensation, and, in some cases, payroll taxes as well as fringe benefits taxes, etc.), to labor productivity. Assuming the numerator is measured in euros per worker and the denominator is measured in numbers of pencils per worker, the unit labor cost is measured in euros per pencil (i.e., total labor cost per unit of output, or the cost in terms of labor for the products we get). Algebraically:

$$ulc^q = w_n / (q / L) \tag{1}$$

where w_n denotes total labor compensation, q is physical output, and L is employment (e.g., number of workers).

¹ Paul Krugman, for example, has written extensively on his blog advocating this view of the problem. For example, <http://krugman.blogs.nytimes.com/2010/05/17/et-tu-wolfgang/>

Firms, obviously, do care about unit labor costs because they track the relationship between their total labor costs and how productive workers are. If a firm's unit labor cost increases, and even more so vis-à-vis those of its competitors, most likely it will lose market share and its growth expectations will be negatively affected. The solution to this problem is a combination of wage restraint and labor productivity increase, the latter usually achieved by introducing labor-saving techniques that are profitable.

Increasing productivity is not easy and does not happen overnight. Besides, the determinants of productivity are not well known. In a recent survey, Syverson (2010) summarizes a wealth of literature and classifies its determinants into two groups: (i) factors that operate primarily within firms and under the control of the management;² and (ii) factors external to the firm. The latter operate indirectly through the environment by affecting producers' willingness and ability to harness factors that affect firms.³ Syverson admits that it is not clear which one of the determinants is more important quantitatively and further research is needed. In discussions, often the policy recommendation to increase productivity is to reform, especially the labor market.⁴

A decrease in the nominal wage rate faces all sorts of psychological and legal problems (Blanchard 2007). The question is whether this is the solution to the current crisis. Would workers in countries like Spain, where unemployment affects over a fifth of the labor force, accept a reduction in nominal wages to maintain their firms' competitiveness and this way keep their jobs?

A key issue that seems to have been forgotten by the participants in this debate is the well-documented lack of empirical relationship between the growth in unit labor costs and output growth. This is referred to in the literature as *Kaldor's paradox* (Kaldor 1978; see chapter 4 of McCombie and Thirlwall [1994] for a discussion). Kaldor found, for the postwar period, that those countries that had experienced the greatest decline in their price competitiveness (i.e., highest increase in unit labor costs) also had the greatest

² Syverson mentions the following: (a) managerial practice/talent; (b) higher-quality general labor and capital inputs; (c) information technology and research and development; (d) learning-by-doing; (e) product innovation; and (f) firm structure decisions.

³ Syverson mentions the following: (a) productivity spillovers; (b) competition; (c) deregulation or proper regulation; (d) flexible input markets.

⁴ See, for example, Allard and Everaert (2010).

increase in their market share. Hence, the belief that low nominal wage growth vis-à-vis that of productivity will restore competitiveness and eventually lead back to growth is at best too simplistic and does not have strong empirical evidence. Indeed, if the argument about the importance of unit labor costs as a measure of competitiveness were so simple and straightforward, researchers would have long ago found an unambiguous relationship between them and growth rates. In the context of the analysis of Harrod's multiplier and the balance of payments constraint, Kaldor (1970, 1971) argued that the growth rate of an economy depends on the growth rate of exports, which itself depends on world demand and the international competitiveness of exports. According to Kaldor, *export competitiveness* depends on the dynamic evolution of money wage and of productivity. The evidence on the inverse relationship between output growth and the growth rate of unit labor costs is, paradoxically, inconclusive, because at times researchers have found that the fastest growing countries in terms of exports and GDP in the postwar period have at the same time experienced faster growth in their unit labor costs than other countries, and vice versa.^{5, 6} In the words of Fagerber (1988): "This... indicates that the popular view of growth in unit labor costs determining international competitiveness is at best too simplified. But why?" Fagerberg (1996) revisited this enduring puzzle by analyzing the period 1978–1994 and concluded that the paradox also holds for this period.⁷

In the remainder of the paper, we discuss a number of problems with the recent work on unit labor costs in the eurozone and the policy recommendations derived from it,

⁵ Kaldor's argument was, in fact, a bit more sophisticated. His conclusion of an inverse relationship between output growth and the growth in relative unit labor costs (i.e., the differential between the growth rates of the unit labor costs in two countries) depended on two more equations, one expressing money wages as a function of labor productivity, and Verdoorn's law.

⁶ Kaldor (1978) compared growth in unit labor costs and growth in value in market shares for exports for 12 countries for 1963–1975. He found that for some of these countries, the relation between the two variables was positive. Kaldor concluded that no analysis of international competitiveness could be carried out by merely considering cost factors, and that the inclusion of other circumstance, such as the role of technology, was necessary. See De Benedictis (1998).

⁷ From standard specifications of export and import equations, assuming long-term balanced trade, and that firms set prices by applying a mark-up on *ulcs*, Fagerberg (1988) showed that the growth of output (\hat{y}) can be modeled as $\hat{y} = \gamma [\hat{ulc} - \hat{ulc}^*] + \delta \hat{y}^*$, where the superscript * refers to the rest of the world, $\hat{}$ denotes growth rate, and the parameters γ , δ are functions of the price and income elasticities of exports and imports. In this formulation, economic growth is written as a function of the growth in relative unit labor costs and world demand. The variable γ is a function of the export-price and import-price elasticities, and will be negative provided the Marshall-Lerner condition is satisfied (i.e., that the sum of these two elasticities is greater than one).

in particular the need for a large internal devaluation. We argue that the way unit labor costs are calculated, using aggregate data, has influenced the discourse, yet it is potentially misleading. We acknowledge that the crisis has many aspects that we do not discuss (e.g., the debt situation). The analysis in the paper concentrates exclusively on the use of unit labor costs in the discussion.

A first problem is that the calculation of unit labor costs for the whole economy cannot use equation (1) because the measure of aggregate output is not a physical quantity, but the economy's value-added. This has two important implications. The first one is that unit labor costs calculated with aggregate data are no more than the economy's labor share in total output multiplied by a price effect. While this is true also at the firm (product) level, the difference is that at the aggregate level, one cannot calculate unit labor costs without using an aggregate price deflator. This is not true at the product level with physical data (see equation (1)). The second implication is that this brings about a discussion of the functional distribution of income between labor (wages) and capital (profits). Parallel to the notion of unit labor cost, we define the concept of unit capital cost—the ratio of the nominal profit rate to the productivity of capital. The idea of a growing unit labor cost puts the burden of adjustment on the workers. It may well be that profit rates grow (fall) faster (more slowly) than capital productivity with a consequent increase in unit capital costs, hence also reducing competitiveness. Moreover, if all unit labor costs reflect is, essentially, the distribution of income between labor (wage share) and capital (profit share), this can explain Kaldor's paradox. And certainly, this argument has important macroeconomic implications (effects on aggregate demand) that seem to have been forgotten in current discussions.

Second, we show that unit labor costs calculated with aggregate data are certainly related to the firm-level unit labor costs. But the former is not a simple weighted average of the latter. It is possible that firm-level unit labor costs decline while the aggregate unit labor cost increases. Moreover, aggregate analyses hide what happens at the product level (i.e., not all firms can be uncompetitive in a country).

As a consequence of these observations, our arguments cast doubt on straightforward interpretations of “increasing unit labor costs” as a problem for some countries. The internal devaluation proposal (i.e., that to restore competitiveness, unit

labor costs, or their growth, should decrease) must not forget the consequences for the functional distribution of income.⁸ In the final section of the paper we discuss alternative policy options.

2. UNIT LABOR COSTS IN THE EUROZONE

Although many firms surely do have data to calculate their unit labor costs as in equation (1), at the aggregate level (e.g., economy-wide, or just a sector) there is a problem. This is that although the numerator can be an average of the total money-wage compensation, and thus also be measured in euros per worker, the denominator, labor productivity, cannot be measured in pencils per worker. To calculate it, researchers use the economy's (or sector's) value-added in real terms (i.e., nominal value-added divided by the GDP deflator, euros of a base year) divided by the number of workers, that is:

$$ULC = w_n / ALP = w_n / (VA_r / L) = \frac{w_n}{(VA_n / P) / L} \quad (2)$$

where, ULC is the unit labor cost, w_n is the average money wage rate or labor compensation, ALP is labor productivity, VA_r is real value-added (in euros of a base year), L is the number of workers, and P is the value-added deflator. This means that the aggregate unit labor cost, unlike that of a firm, is a unitless magnitude. Equation (2), however, is not the same as equation (1).

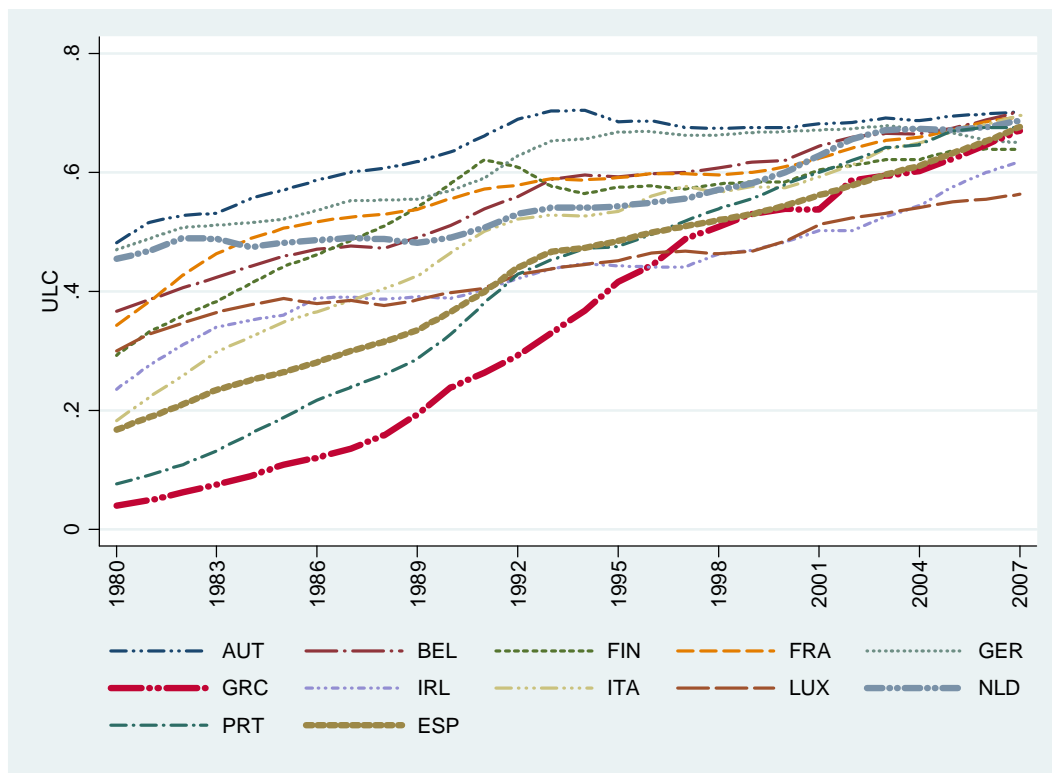
Figure 1 shows the unit labor costs of 12 countries of the eurozone during 1980–2007, calculated using equation (2). Data used throughout the paper is for the total economy. The source of all variables is the OECD (<http://stats.oecd.org>). Unit labor costs reported by the OECD are calculated as the ratio of total labor costs to real output. Real output is the constant price value-added, where the base year for real output is 2005. The share of labor income reported by the OECD database is calculated as the ratio of total labor costs to nominal output. The total labor cost measure is the compensation of

⁸ The internal devaluation proposal has another implication that we do not discuss. This is that a reduction in wages and costs in general, leads to higher debt. As the latter increases, public spending must be cut and taxes increased to service government's debt.

employees adjusted for self-employment. The two are used to back out the price deflator used in the calculation of unit labor costs.

The figure shows that unit labor costs have increased in all countries without exception, in some cases by a factor of 15 (e.g., Greece). The ratio of the 2007 value to the one for 1980 for Portugal is 9.5 (corresponding to an average annual growth rate of 8.45%); for Spain and Italy, 4.7 and 4.5 (or an average annual growth rate of 5.31% and 5.07%, respectively); and for Ireland 3.5 (corresponding to an average annual growth rate of 3.64%). The lowest increases were registered by Germany and the Netherlands, where the ratios are 1.6 and 1.7, respectively (average annual growth rate of 1.21% and 1.55%, respectively).

Figure 1: Unit Labor Costs in the Eurozone



Source: OECD and authors' estimates

Note: AUT-Austria, BEL-Belgium, FIN-Finland, FRA-France, GER-Germany, GRC-Greece, IRL-Ireland, ITA-Italy, LUX-Luxembourg, NLD-Netherlands, PRT-Portugal, ESP-Spain

Under the standard interpretation of unit labor costs, the reason behind their increase is the fact that workers' nominal compensation grew faster than labor productivity. Unfortunately, there is no data on nominal labor compensation for 1980–1995 for Greece, Ireland, Luxemburg, and Portugal. For the other countries, the highest ratios of the 2007 value with respect to that of 1980 are for Finland (4.3 times, corresponding to an average annual growth rate of 5.57%), Italy (5.2 times or an average annual growth rate of 6.33%), and Spain (5.4 times, or an average annual growth rate of 6.43%); the lowest is for Germany (2 times, which translates into an average annual growth rate of 2.66%). Since 1995 (data available for all countries), the highest increases took place in Greece (ratio of the 2007 to the 1995 value is 2.2 and the average annual growth rate over the same period is 6.7%), Ireland (ratio is 1.91, or an average annual growth rate is 5.54%), and Portugal (ratio is 1.66 or the average annual growth rate is 4.31%). Labor productivity, on the other hand, grew significantly less in all countries. We discuss this later in more detail, but it is important to remark now that labor productivity grew very fast in countries like Ireland or Portugal, in both cases significantly faster than in Germany.

Often, however, comparisons are made relative to a country. To do this, since all data is in euros, we simply divide the unit labor costs (ULC), as calculated as in equation (2), for one country by that of the base country, which in our case we take to be Germany.

Figures 2a and 2b show the 11 countries' unit labor costs relative to that of Germany. The figures show that the relative unit labor costs of Greece, Ireland, Italy, Portugal, and Spain have increased systematically since 1980. Post-1995, all ULCs increase vis-à-vis that of Germany. The largest increases are those of Greece, Portugal, Ireland, Spain, and Italy (in this order).

Figure 2a: Unit Labor Costs relative to Germany

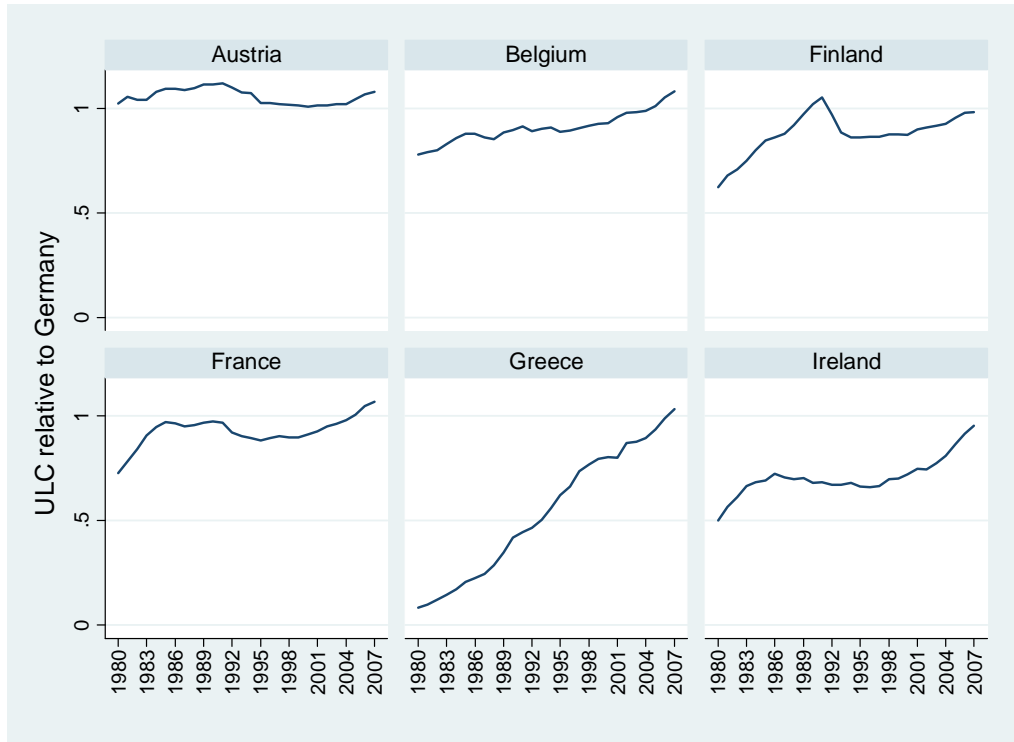
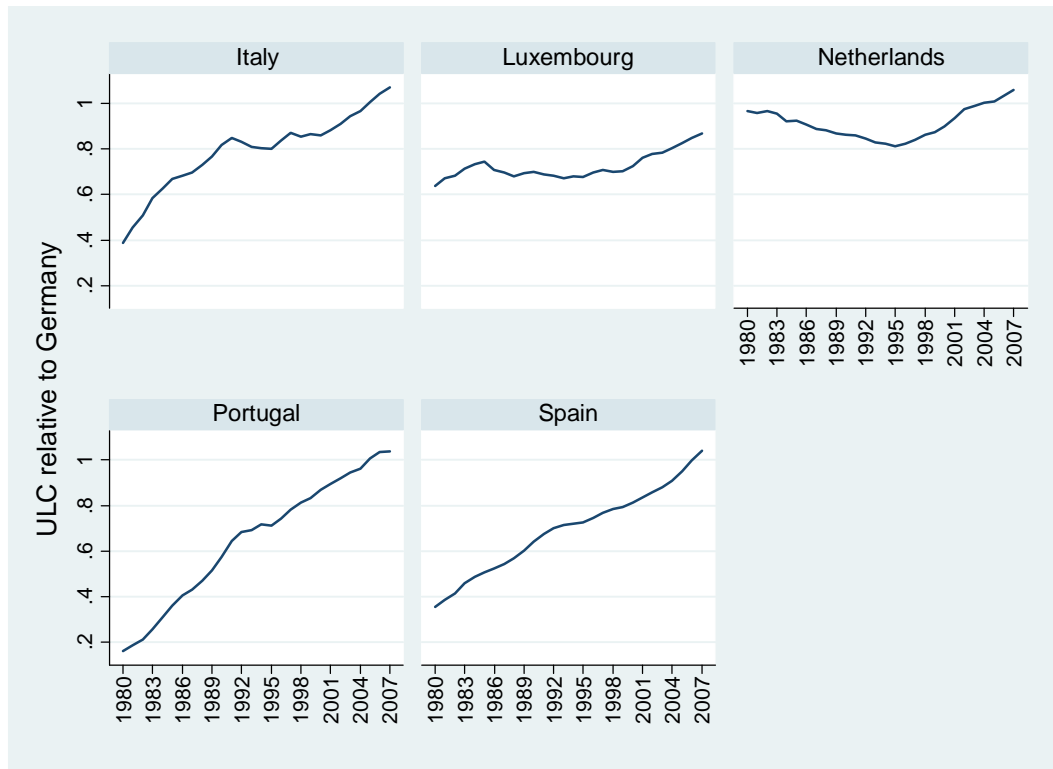


Figure 2b: Unit Labor Costs relative to Germany



Source: OECD and authors' estimates

We close this section by asking whether Germany should be the comparator. Often the southern European countries and Ireland are compared to Germany in terms of unit labor costs. However, this comparison is problematic, as their export baskets are significantly different. Using a data set covering 5,107 HS-6 digit products and 125 countries, Abdon et al. (2010) document complexity (a combination of diversification and ubiquity of the export basket) at the country and product levels. Germany is the second-most complex economy in the world, after Japan. And it is the second most diversified country after Italy: Germany exports 2,113 of the 5,107 products with revealed comparative advantage (Italy exports with 2,241 products revealed comparative advantage).⁹ Moreover, Germany exports significant shares of total world exports of the top ten most complex products (e.g., cumene (6.2%), methacrylic acid (31.6%), carbide tool tips (14.7%), photo, cine laboratories equipment (16%), hexamethylenediamine (2.9%), electronic measuring and controlling apparatus (17.4%), laser, light, and photon beam process machine tools (17%), sheet, plates, rolled of thickness 4.75mm plus, of iron or steel or other alloy steel (26.8%)). This means that, even though these products are tradable, their exports are concentrated in a very small group of countries, to which Germany belongs (together with Japan, Sweden, Switzerland, the United States, Finland, and the United Kingdom). Probably these countries exert significant market power. This also means that Ireland, Spain, Portugal, and Greece do not compete directly with Germany in many products that they export and hence comparing their aggregate unit labor costs and drawing conclusions is probably misleading. Ireland, 12th in the complexity ranking (it exports only 421 products with revealed comparative advantage), is closer to the Netherlands (ranked 13th) and to the Czech Republic (14th); Spain is ranked 28th (it exports 1,747 products with revealed comparative advantage), at the level of countries such as Korea (22nd), Italy (24th), Mexico (29th) or Brazil (31st); Greece is ranked 52nd (it exports 1,060 products with revealed comparative advantage) and Portugal 53rd (it exports 1,188 products with revealed comparative advantage), close to China (51st).

⁹ The number of products exported with revealed comparative advantage reported here is the average number of products that the country exported with revealed comparative advantage during 2001–2007.

If we increase the number of products exported with revealed comparative advantage to the top 100 most complex, Germany's exports of these products represent 18% of world exports, against Ireland's 0.81%, Spain's 0.89%, Greece's 0.02%, and Portugal's 0.04% (see appendix table 1). Finally, while German exports are concentrated in the most-complex products of the complexity scale (the top 100 most complex products represent 7.93% of the country's total exports), and as the complexity level declines, the shares become smaller (the least-complex export group represents 3.5% of Germany's exports); in the case of Greece and Portugal, their exports are concentrated in the least-complex groups (33.1% and 21.7%, respectively, of their total exports belong to the least-complex group), and their export shares (by complexity groups) are similar to those of China (see appendix table 2). If China were the correct comparator, then perhaps the situation of the European countries would be significantly worse.

We believe that this is where the real problem of the peripheral countries lies. Their lack of competitiveness vis-à-vis Germany is not due to the fact that they are expensive (their wage rates are substantially lower), or that labor productivity has not increased. The problem is that they are stuck at middle levels of technology and they are caught in a trap. Reducing wages would not solve the problem.

3. UNIT LABOR COSTS AND INCOME DISTRIBUTION

Equation (2) can be written as:

$$ULC = \frac{w_n}{(VA_n / P) / L} = \left(\frac{w_n L}{VA_n} \right) P = \left(\frac{\text{Total labor Compensation}}{VA_n} \right) P = s_i^n * P \quad (3)$$

This shows that the aggregate unit labor cost is nothing but the economy's labor share (a unitless magnitude), s_i^n , times the price deflator (also unitless). This is because:

$$\begin{aligned}
VA_n &\equiv W_n + \Pi_n \equiv w_n L + r_n K \\
1 &\equiv \left(\frac{w_n L}{VA_n} \right) + \left(\frac{r_n K}{VA_n} \right) \equiv s_l^n + s_k^n
\end{aligned} \tag{4}$$

where, VA_n is the nominal value-added and it equals (consistent with the National Accounts' data) the total nominal wage bill/labor compensation (W_n) plus total profits (Π_n). W_n can be expressed as the product of the average nominal wage rate (w_n) and number of workers (L), and total profits can be expressed as the product of the ex post nominal profit rate (r_n) times the capital stock (K). $s_l^n \equiv (w_n L / VA_n)$ is the share of labor in total output (both in nominal terms) and $s_k^n \equiv (r_n K / VA_n)$ is the share of capital in total output (both in nominal terms). By definition, they add up to 1. This implies that a discussion of aggregate unit labor costs automatically entails a discussion of the functional distribution of income.¹⁰

Figures 3a and 3b show the two components of the aggregate unit labor cost, namely, the labor share and the price deflator for the 12 countries. The figure shows that between 1980 and 2007, the labor share has declined in Austria, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, and Spain. This implies that in these nine countries, the share of capital in total value-added increased. In Belgium and Portugal, it has remained almost constant; only Greece's labor share does display an upward trend (the ratio of the 2007 to the 1980 values is 1.15. Greece started with the lowest labor share of all 12 countries in 1980, below 0.6). On the other hand, the 12 price deflators display a marked upward trend that compensates the constancy or decline of the labor share. This indicates that, except in Greece, the overall upward trend of the unit labor cost shown in figure 1 is, exclusively, the result of the increase in the price deflator.

¹⁰ The OECD database notes that, "the division of total labor costs by nominal output is sometimes also referred to as a real unit labor cost—as it is equivalent to a deflated unit labor cost where the deflator used is the GDP implicit price deflator for the economic activity (i.e., sector) concerned." Available at <http://stats.oecd.org/mei/default.asp?lang=e&subject=19>. We find this reference somewhat misleading because it confuses the reader with the possibility that unit labor costs can be calculated and analyzed in "real" terms, and because it ignores the implications for the functional distribution of income.

Figure 3a: Unit Labor Costs Decomposed

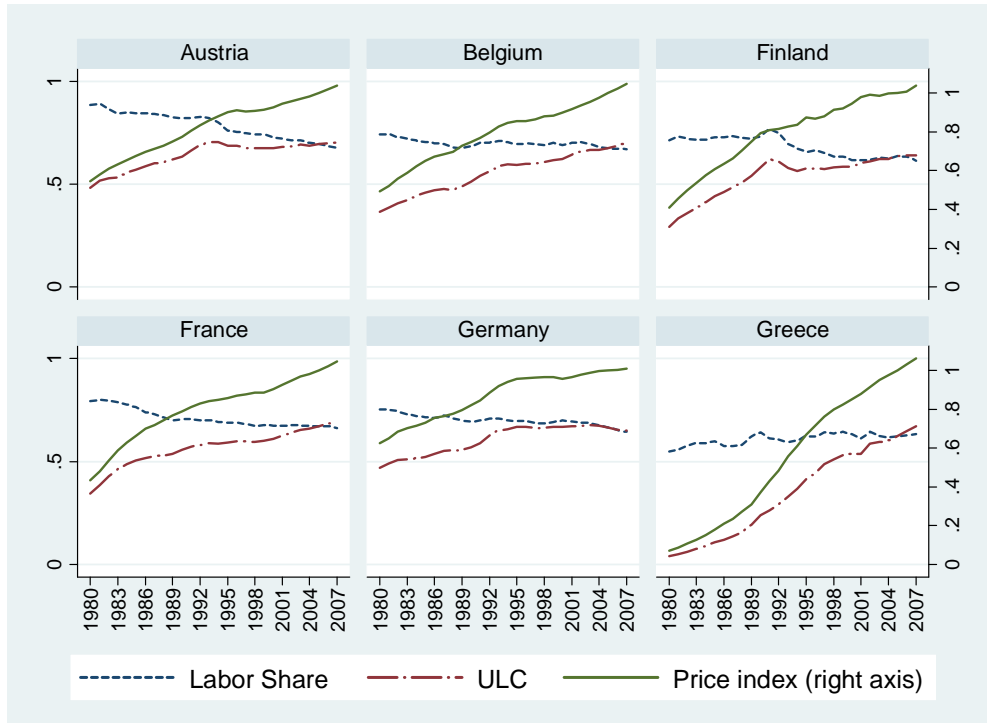
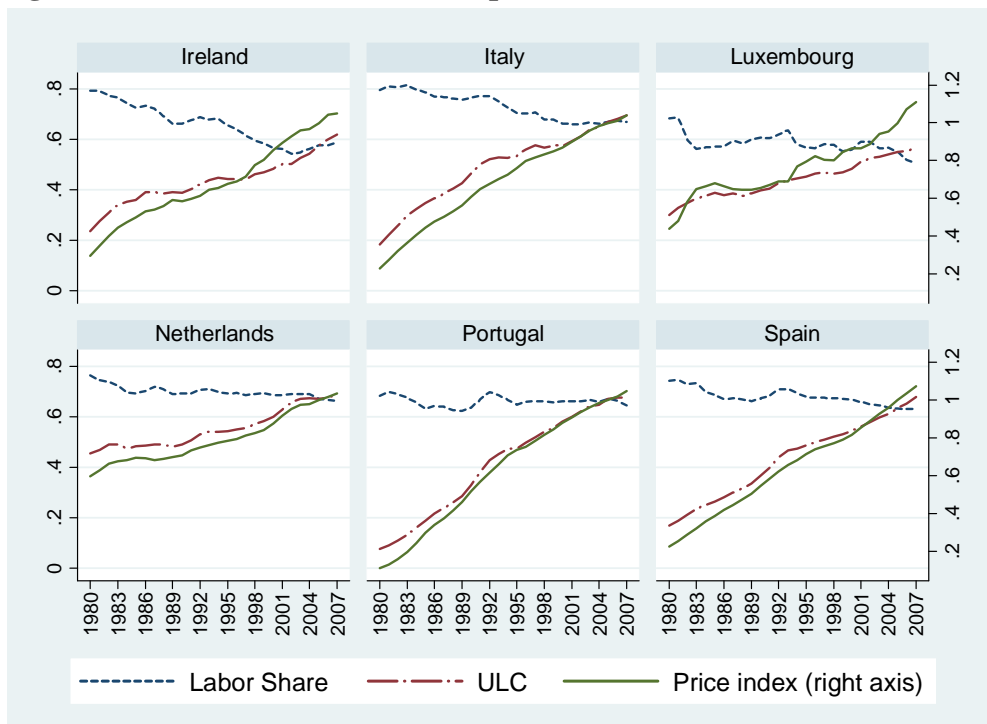


Figure 3b: Unit Labor Costs Decomposed

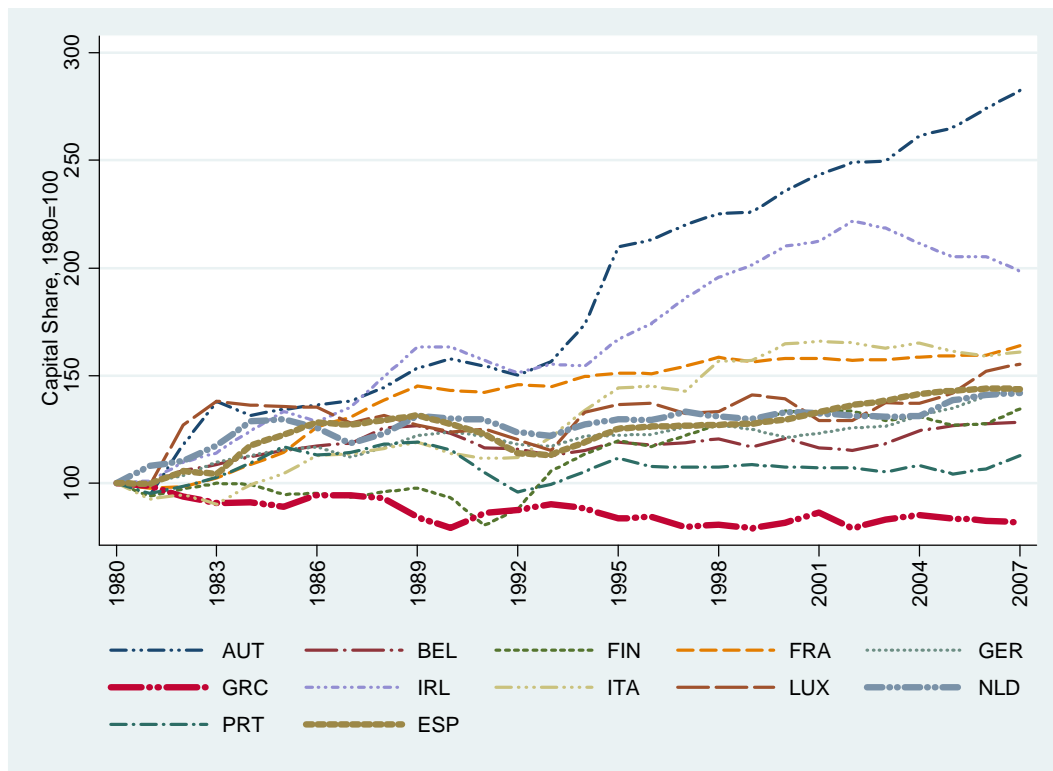


Source: OECD and authors' estimates

Note: The labor share and ULC are shown on the left-hand side axis. The price index is shown on the right-hand axis.

Why does this discussion matter? First of all, there is a question of interpretation. While at the firm level it is patently obvious what the unit labor cost measures, at the aggregate level it is less clear. Since it captures the economy’s labor share, normative statements about the need to contain increases in unit labor costs to maintain competitiveness inevitably imply an increase in the share of capital. Except in Greece, where capital’s share has declined, figure 4 shows a generalized increase in this share. In the case of Austria, it almost tripled during the period analyzed. This has important macroeconomic implications, analyzed in section 5.¹¹

Figure 4: Capital Shares in the Eurozone, 1980=100



Source: OECD and authors’ estimates

This point has one implication. This is that if unit labor costs provide a measure of competitiveness from the “workers’ side,” there is no reason why one could not calculate a parallel measure of competitiveness from the “capital side.” We can call it unit capital cost, and calculate it as the ratio of the nominal profit rate to capital productivity. This

¹¹ This holds at any level of aggregation—national, sector, industry, or firm. It does not involve any assumption about the production structure or the nature of markets.

has to be equal to the product of the capital share in total value-added times the price deflator, that is:

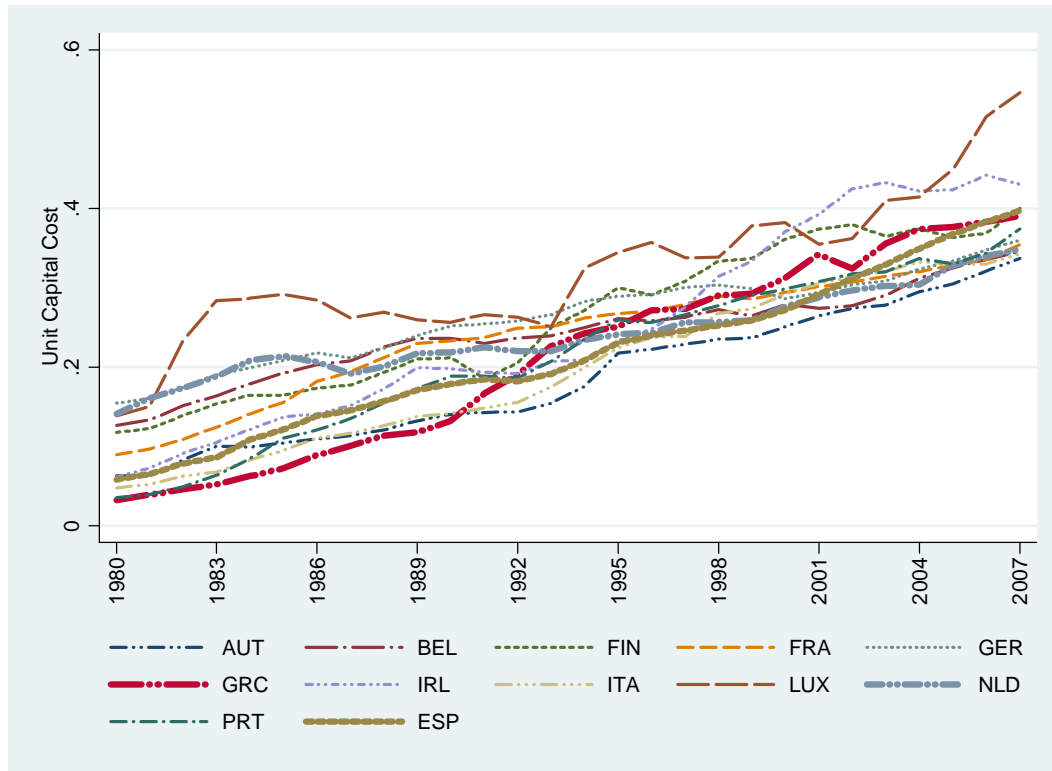
$$UKC = \frac{r_n}{(VA_n / P) / K} = \left(\frac{r_n K}{VA_n} \right) P = \left(\frac{\text{Total capital compensation}}{VA_n} \right) P = s_k^n * P \quad (5)$$

where, UKC is the unit capital cost, r_n is the ex post nominal profit rate, VA_n is nominal value-added, and K is the capital stock.

Figure 5 shows that unit capital costs have increased in all eurozone countries. Marquetii (2003) documented that, over the long run, capital productivity displays a declining trend. Moreover, Glyn (1997) showed that profit rates also display a long-term tendency to decline. This means increasing unit capital costs are the result of a faster decline in capital productivity than in the profit rate.

Given that both unit labor and capital costs are measures of the cost structure, the key question is: which one of the two has increased faster? Unit labor costs put the burden of adjustment on workers. Table 1 shows that increase in unit labor and capital labor costs for all 12 countries, for the whole period 1980–2007 and for the subperiod 1995–2007. The results are very clear: in all countries, except in Greece, unit capital costs increased faster than unit labor costs. While the difference between the two variables varies across countries, the results indicate that the “loss of competitiveness” by some countries in the eurozone is not just a question of nominal wages increasing faster than labor productivity: in all countries, nominal profit rates decreased at a slower pace than in capital productivity.

Figure 5: Unit Capital Costs in the Eurozone



Source: OECD and authors' estimates

Table 1: Unit Labor Costs and Unit Capital Costs in the Eurozone in 2007 relative to the Respective Levels in 1980 and 1995

Country	<i>2007 relative to 1980</i>		<i>2007 relative to 1995</i>	
	ULC	UKC	ULC	UKC
Austria	1.46	5.39	1.02	1.55
Belgium	1.92	2.73	1.18	1.32
Finland	2.18	3.41	1.11	1.33
France	2.02	3.98	1.17	1.32
Germany	1.38	2.33	0.97	1.24
Greece	17.06	12.10	1.61	1.55
Ireland	2.63	7.02	1.40	1.85
Italy	3.80	7.26	1.30	1.53
Luxembourg	1.88	3.93	1.25	1.58
Netherlands	1.51	2.47	1.27	1.44
Portugal	8.94	10.71	1.42	1.44
Spain	4.04	6.85	1.40	1.72

Source: OECD and authors' estimates

Second, the problem with the use of unit labor costs as a policy variable is that they consider the question of competitiveness from the firm's angle. Workers do care about unit labor costs because the viability of the firm is at stake, but they also care about their *real* wage rate—that is, the buying power of their money wage rate across time—and not about the firm's unit labor costs. This poses the problem that, at times, analyses of unit labor costs and real wages may send different signals, interpreted differently by firms and workers.

It is possible that both variables move in such a way that firms and workers see themselves as losing their positions (e.g., unit labor costs increasing and real wage rates being stagnant or even decreasing), or that one variable moves favorably for the corresponding group while the other variable moves unfavorably. When this happens, a conflict between labor and capital is unavoidable. This is probably happening in many countries today.

How have real wage rates evolved in the eurozone since 1980? Since we do not have data for real wages before 1995, we use real average labor compensation (ALC) and assume that real wages follow the same pattern as the real ALC because wages are a major component of the latter. Labor productivity is calculated as real output (gross value-added) divided by the total number of employed persons. Real average labor compensation (real ALC) is obtained by dividing the nominal average labor compensation by the consumer price index (CPI). Data on nominal average labor compensation and labor productivity are for the total economy and are taken from the OECD.

Table 2 provides a comparison between real ALC and ULC. In all countries for which data is available, we see that during 1980–2007, ULCs increased faster than real ALC. This is also true for the subperiod 1995–2007, except for Austria and Finland.

Table 2: Real ALC and ULC

<i>Relative to 1980=100</i>			<i>Relative to 1995=100</i>		
Country	Real ALC	ULC	country	Real ALC	ULC
Austria	1.257	1.457	Austria	1.025	1.025
Belgium	1.293	1.915	Belgium	1.089	1.185
Finland	1.715	2.184	Finland	1.219	1.110
France	1.263	2.024	France	1.129	1.174
Germany	1.102	1.382	Germany	0.951	0.972
Greece		17.056	Greece	1.370	1.612
Ireland		2.627	Ireland	1.299	1.397
Italy	1.232	3.802	Italy	1.021	1.302
Luxembourg		1.880	Luxembourg	1.128	1.247
Netherlands	1.076	1.513	Netherlands	1.127	1.265
Portugal		8.936	Portugal	1.178	1.419
Spain	1.212	4.038	Spain	1.005	1.395

Figures 6a and 6b show both real wage rates and labor productivity for the 12 countries. The evidence shows that in all of them, except in Greece and Portugal, labor productivity grew faster.¹² In some cases, like Germany and the Netherlands, the difference is very high. It is worth noting that these two countries registered the smallest increase in real wages during 1980–2007: the ratio between the 2007 and the 1980 values of real ALC are 1.10 and 1.07, respectively (which translates into very small average annual increases of 0.36% and 0.27%, respectively).¹³ For the whole period, the highest increases in labor productivity took place in Ireland. Finally, we note that in the cases of Greece and Portugal, while it is true that both real and nominal average labor compensation grew faster than labor productivity during 1995–2007, the latter variable grew significantly, especially in Greece, which registered the second highest increase (after Ireland’s), with a ratio between the 2007 and 1995 values of 1.33, higher than those registered by the Netherlands (1.16) and Germany (1.17) for the same period.¹⁴

¹² For Greece, Ireland, Luxemburg, and Portugal the comparison is for a shorter period due to lack of data on both variables for the complete period.

¹³ It is important to note that Germany has registered small increases in both real wages and in productivity. Cheap labor from Eastern Europe helped hold down costs.

¹⁴ We must add that the confusion between equations (1) and (2) noted at the start of section 2 affects policy discussions of inflation. For example, Posner (2010) regresses UK inflation on the four-quarter lead of annual growth in unit labor costs and argues that an empirical regularity of the UK economy is that unit labor costs are a significant predictor of inflation. This is hardly a surprise since equation (3) above shows that, by construction, the economy’s deflator (the consumer price index and the economy’s overall deflator

Figure 6a: Real Average Labor Compensation and Labor Productivity

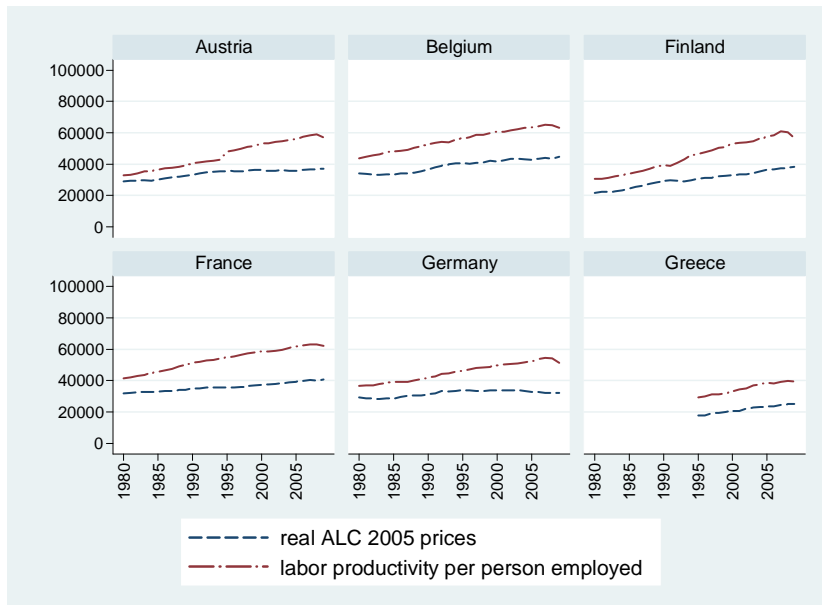
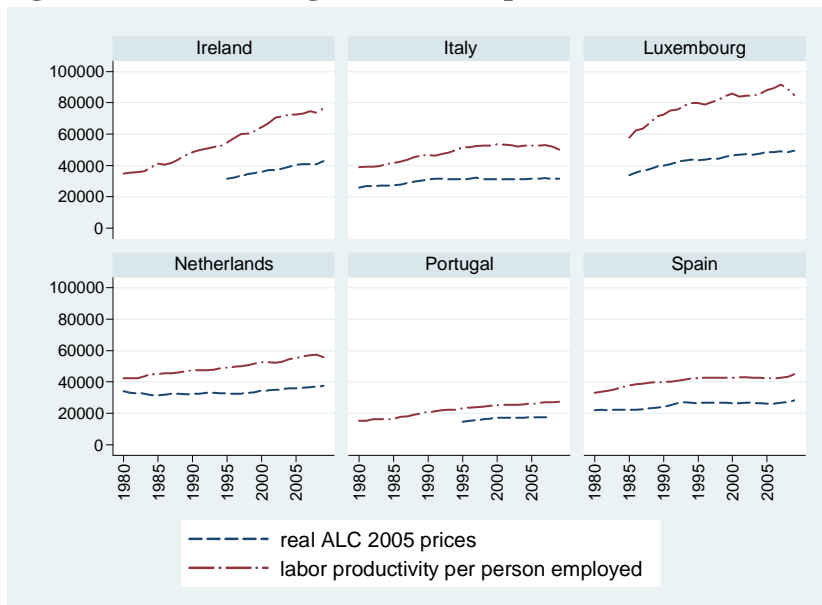


Figure 6b: Real Average Labor Compensation and Labor Productivity



Source: OECD and authors' estimates

are highly correlated) is a component of the aggregate unit labor cost, in the sense that the aggregate unit labor cost cannot be calculated independently of the deflator. Equation (3) in growth rates is

$$\hat{ULC} = \hat{s}_l^n + \hat{P}$$
 To the extent that labor shares do not vary much from one period to the next (i.e., their growth rate is close to zero), a regression of inflation on the growth rate of unit labor costs must show a good fit, with a coefficient close to unity. The divergence from unity will be due to the omission of the labor share from the regression. It is obvious from equation (1) that this problem would not occur with physical data, as prices do not appear in the construction of the unit labor cost.

4. THE RELATIONSHIP BETWEEN FIRM-LEVEL UNIT LABOR COSTS AND AGGREGATE UNIT LABOR COSTS

While it is obvious that firms compete by trying to lower their unit labor costs (euros per pencil), countries do not compete by trying to lower their labor shares, at least consciously, although this is what calls for reductions in unit labor costs may effectively end up achieving. Nevertheless, one could ask if the aggregate unit labor cost is a good approximation to the average of the individual firms' unit labor costs. If the answer is yes, then it could be used to discuss competitiveness. If the answer is no, how misleading is it?

We can rewrite the aggregate labor share as a weighted average of the firms' labor shares as follows:

$$s_l^n = \sum_{i=1}^k \left[\left(\frac{p^i q^i}{\sum_{i=1}^k p^i q^i} \right) * s_l^i \right] = \sum_{i=1}^k \phi^i * s_l^i \quad (6)$$

where, ϕ^i is the share of firm i 's value-added in total value-added, and s_l^i is the share of labor in firm i 's value-added. Furthermore, recall that s_l^i is the ratio of labor compensation in firm i to value-added of firm i , that is,

$$s_l^i = \frac{w_i l_i}{p_i q_i} = \frac{ulc_i}{p_i} \quad (7)$$

where, w_i is the average labor compensation in firm i , l_i is the number of employees in firm i , p_i is the price charged by firm i , q_i is the quantity produced by firm i , and ulc_i is the unit labor cost of firm i . Equation (7) shows that the firm's labor share equals its unit labor cost divided by the selling price.

Combining equations (3), (6), and (7), the aggregate unit labor cost (ULC) can be written as follows:

$$\begin{aligned}
ULC = s_l^n * P &= \left[\sum_{i=1}^k \left\{ \left(\frac{p_i q_i}{\sum_{i=1}^k p_i q_i} \right) * s_l^i \right\} \right] * P = \left(\sum_{i=1}^k \phi^i * s_l^i \right) * P = \\
&\left(\sum_{i=1}^k \phi^i * \left(\frac{w_i l_i}{p_i q_i} \right) \right) * P = \left(\sum_{i=1}^k \phi^i * \left(\frac{ulc_i}{p_i} \right) \right) * P
\end{aligned} \tag{8}$$

that is, as the product of the sum of the firms' labor shares (each weighted by its share in aggregate value-added) times the economy-wide price deflator. The firm's labor share can be written as the ratio of its unit labor cost divided by the unit price charged.

Equation (8) shows that, indeed, the aggregate unit labor cost captures the firms' unit labor costs. However, the former is not just a weighted average of the latter i.e.,

$$ULC \neq \left(\sum_{i=1}^k \phi^i * ulc_i \right), \text{ as there are two other variables to be taken into account:}$$

(i) aggregate price deflator (P); and (ii) price charged by each firm (p_i).

Suppose that the entire economy could be divided into two sectors—tradables (T) and nontradables (NT). We can write equation (8) as follows:

$$ULC = s_l^n * P = (\phi_T * s_l^T + \phi_{NT} * s_l^{NT}) * P \tag{9}$$

where ϕ_T and ϕ_{NT} are the shares in value-added of the two sectors. Equation (8) then becomes:

$$ULC = s_l^n * P = \left[\phi_T * \left(\frac{ulc_T}{p_T} \right) + \phi_{NT} * \left(\frac{ulc_{NT}}{p_{NT}} \right) \right] * P \tag{10}$$

As we saw earlier, aggregate unit labor costs increased in all 12 countries, and this was due to the increase in the aggregate price deflator (P), while the aggregate labor shares declined or were stable in 11 of the countries. The change in the aggregate labor share in this two-sector case is:

$$\Delta s_i^n = \Delta \phi_T * s_i^T + \Delta \phi_{NT} * s_i^{NT} + \phi_T * \Delta s_i^T + \phi_{NT} * \Delta s_i^{NT} \quad (11)$$

where Δ represents the change in the variable. What are some plausible explanations for the decline in the aggregate labor share? Equation (11) indicates that this decline had to be the result of either or a combination of the following:

(i) The sectors' labor shares (s_i^T, s_i^{NT}) remain constant (so that (ulc / p) remains constant and does not affect Δs_i^n). Returning to equation (11), with $\Delta s_i^T = \Delta s_i^{NT} = 0$, $\phi_T + \phi_{NT} = 1$, and $\Delta \phi_T + \Delta \phi_{NT} = 0$, we can write the change in the aggregate labor share as:

$\Delta s_i^n = \Delta \phi_T * s_i^T + \Delta \phi_{NT} * s_i^{NT} = \Delta \phi_T * (s_i^T - s_i^{NT})$. A decline in the aggregate labor share requires that $\Delta \phi_T * (s_i^T - s_i^{NT}) < 0$. There are two possible cases for this to happen: (a) $\Delta \phi_T < 0$ with $(s_i^T > s_i^{NT})$; or (b) $\Delta \phi_T > 0$ with $(s_i^T < s_i^{NT})$. Assuming firms set prices as a markup (μ_i) over unit labor cost, that is,

$$p_i = (1 + \mu_i)ulc_i \quad (12)$$

combining equations (7) and (12), the share of labor is the inverse of the mark-up:

$$s_i^l = \frac{ulc_i}{p_i} = \frac{1}{(1 + \mu_i)} \quad (13)$$

Under the (plausible) assumption that the nontradable sector has a higher markup because it is the more protected of the two, equation (13) implies that the labor share of the nontradable sector is lower than that of the tradable sector, i.e., $s_i^T > s_i^{NT}$, i.e., case (a) above. This would mean that the share of the nontradable sector in the economy's total value-added increased ($\Delta \phi_{NT} > 0$), and, consequently, the share in total value-added of the sector with a lower markup (or with a higher labor share, i.e., the tradable sector) declined ($\Delta \phi_T < 0$). In other words, what we should observe across the eurozone is a decline in the size of the tradable sector and an increase in that of the nontradable sector.

(ii) On the other hand, if the sectors' shares in total value-added (ϕ_T, ϕ_{NT}) remain constant, the change in the aggregate labor share is $\Delta s_i^n = \phi_T * \Delta s_i^T + \phi_{NT} * \Delta s_i^{NT}$. The aggregate labor share will decline (i.e., $\Delta s_i^n < 0$) if $\left(\frac{\phi_{NT}}{\phi_T}\right) < -\left(\frac{\Delta s_i^T}{\Delta s_i^{NT}}\right)$, that is, if: (a) the absolute value of the ratio of the change in the labor share of the tradable sector to the change in the labor share of the nontradable sector is greater than the ratio of the share in total value-added of the nontradable sector to that of the tradable sector; and (b) the share of labor in the tradable and nontradable sectors change in opposite directions. If the nontradable sector is the more protected of the two, and the one with a higher and an increasing markup, then the labor share of the nontradable sector will experience a decline ($\Delta s_i^{NT} < 0$) and the labor share of the tradable sector will increase ($\Delta s_i^T > 0$) so that the ratio $\left(\frac{\Delta s_i^T}{\Delta s_i^{NT}}\right)$ increases. In other words, given that there is an inverse relationship between the labor share and the markup, what we should observe is an increasing mark up in the nontradable sector together with a declining markup in the tradable sector.

5. KALDOR'S PARADOX, INCOME DISTRIBUTION, AND THE EFFECTS OF CHANGES IN FACTOR SHARES ON AGGREGATE DEMAND

Thinking of unit labor costs through the lens of the distribution dimension should make one reflect upon the concept of competitiveness in a different way from the traditional one. This is because, in standard analyses, an economy is deemed more competitive the lower its unit labor cost is. While, as we have noted, this may make sense at the firm level, the implications at the economy-wide level are potentially very different. The reason is that the flip side of this line of reasoning is that an economy is more competitive the lower its labor share is, *ceteris paribus*. Hence, a great deal of policies to lower unit labor costs are, effectively, policies to lower the share of labor in total income. However, are the economies deemed as the most competitive (i.e., the economies that grow fast and/or gain market share) those whose labor shares grow the least or even decline? The answer is that this need not be the case. Would it be sensible from a policy perspective to

conclude that the lower the labor share, the better off the economy? Surely there is something wrong here. The important aspect of this argument is that it may provide a reasonable explanation of *Kaldor's paradox* and what may make sense at the firm-level, may not make it at the aggregate level.

Indeed, at the theoretical level, a higher labor share need not necessarily lead to a less competitive economy. Kalecki (Osiatynski 1991) showed in a very simple income-multiplier model that the level of national income is inversely related to the profit share (Blecker 1999). Likewise, Goodwin's (1972) growth-cycles model locates the source of business cycles in the labor market, in particular in the effect of changes in the wage share on accumulation, where real wages and the labor share fluctuate in a cyclical fashion as a result of the impact of capital investment on employment. During an economic boom, the demand for labor rises and unemployment falls. This causes wages to rise faster than the economy as a whole, and hence leads to a fall in profits. As a result, investment in new capital is cut back and the economy moves to a downturn. In the slump, unemployment rises and wages are driven down, thus restoring profitability and leading to a revival of investment. Fluctuations are self-generating. In this model factor shares oscillate between some boundaries in a self-reproducing orbit. All this indicates that the relationship between labor shares (or unit labor costs) and growth is much more complex, probably nonlinear (implying that the sign of the relationship between the two variables varies over time, and that the value of the elasticity is not constant), than the simple view that lower unit labor costs imply higher growth.¹⁵

Suppose, as discussed earlier, that firms set prices as a markup on unit labor costs. What occurs if the distribution of income shifts toward capital, as has happened in most of the eurozone during the period considered? This will probably lead to an increase in investment in the initial stages. However, a prolonged shift in the distribution of income toward capital will induce a decline in consumption. Sooner or later there will be a mismatch between supply and demand as the increase in capacity due to the increase in investment will not be accompanied by an increase in consumption demand. This is a

¹⁵ For example, in an analysis of the manufacturing labor share for Korea, Mexico, and Turkey, Onaran (2007) finds that the labor share is procyclical during a crisis in the three countries. On the other hand, during a normal year, the labor share has no cyclical pattern in Korea and Mexico, whereas in Turkey it is countercyclical, i.e., the labor share decreases in this country in both good years and in years when the economy contracts.

problem of lack of demand or what is known as *underconsumption crisis*. Capacity utilization will have to decline, then investment will be reduced; this will be followed by a decline in income, and then in production and in employment.

Let us now assume a situation where workers win large wage increases and suppose firms respond by cutting their markups while still raising prices to some extent. Under these circumstances, the profit share s_k'' will fall. As income is redistributed to workers, that is, s_l'' increases, and since these have a higher marginal propensity to consume than capitalists, Kalecki's model indicates that output will increase (consumer demand will increase, possibly stimulating investment too through the accelerator). In other words, a higher labor share leads to a higher level of income. In this case (i.e., redistribution of income towards workers) aggregate demand will be affected through a decline in investment and an increase in consumption, and aggregate supply will decline or grow at a slower pace.

If, however, the increase in consumption is small or takes place slowly, then, as the profit share declines, a *profitability crisis* may emerge and unemployment will most likely develop. It is possible that the changes in consumption and investment cancel out, but this would be a fluke. In general, however, investment responds more quickly and sharply to these events than consumption, although it is possible that delayed changes in the distribution of income may result in (positive) changes in consumption that dominate the decrease in investment, thus avoiding the problem.

In a so-called *wage-led economy*, a higher real wage rate or a higher labor share stimulates demand. Wage-led growth occurs when the impact of profits on investment is negligible—then an increase in the wage share leads to an increase in the equilibrium capacity utilization rate, which leads to an increase in the growth rate of the capital stock and growth. Wage-led growth occurs because the increase in consumption demand derived from the increase in the labor share has a positive feedback effect on investment through an increase in the capacity utilization rate. Because in this regime investment is not sensitive to profits, there is no dampening effect through changes in profitability from the labor share increase (Foley and Michl 1999: chapter 10). The result is overcontraction of domestic demand in a wage-led regime as a consequence of the implementation of policies that lead to a reduction in unit labor. Wage restraints depress consumption while

labor productivity growth brought about by, for example, downsizing of the labor force, reinforces the depressive effect (and outweighs the possible stimulating effect on investment and exports). This danger of a sharp decline in domestic demand tends to be overlooked in today's policy discussions.

This discussion has two implications. The first is that the relationship between the growth of aggregate unit labor costs (assuming there is a meaningful one) and that of output may well be positive, at least for some ranges of the data. And second, that it is not possible to talk about an economy's competitiveness without addressing the relationship between growth and its distributional implications.

6. CONCLUSIONS

Unit labor costs are one of the most widely used variables in the analysis of competitiveness. They are defined as the ratio of a worker's total compensation or money-wage rate compensation to labor productivity in physical terms. Therefore, at the firm level, they are measured in the country's currency (e.g., euros) per unit of output (e.g., per pencil). At the aggregate level, however, there is no physical equivalent of output, and value-added has to be used. This has very important implications for analyses and policy. The reason is that although the aggregate unit labor cost is related to the firms' unit labor costs, the former is not a weighted average of the latter. This has several implications that question many analyses and policy recommendations:

(i) Construction of unit labor costs using aggregate data (standard practice) is potentially misleading. Unit labor costs calculated with aggregate data are not just a weighted average of the firms' unit labor costs.

(ii) Aggregate unit labor costs reflect the distribution of income between labor and capital (i.e., the factor shares), and need not move one-to-one with firm-level unit labor costs. This means that one has to consider the economic implications of a reduction in the labor share (and the consequent increase in the capital share) if countries follow policies that lead to a reduction in unit labor costs.

(iii) Aggregate unit labor costs either may have little to do with overall growth (which provides one answer to *Kaldor's paradox*), or the relationship between the two variables is not well captured by simple regressions.

We have calculated and analyzed aggregate unit labor costs for 12 countries of the eurozone during 1980–2007, before the onset of the crisis. The analysis indicates that aggregate unit labor costs in all the eurozone increased. Greece and Portugal saw the fastest increases during this period (much faster than in the other countries) as a result of nominal wage rates that increased faster than labor productivity. Under our proposed view that aggregate unit labor costs are the economy's labor share times the price deflator, the increase in unit labor costs (in all countries) was due to the increase in the price deflator used to calculate labor productivity. Except in Greece, aggregate labor shares declined or remained constant in the other 11 countries. We have discussed two possible reasons for this trend. One is that the nontradable sector of the economy, which probably applies a higher markup on unit labor costs, is gaining weight in the economy. A second reason is an increasing markup in the nontradable sector together with a declining markup in the tradable sector.

Parallel to the notion of unit labor cost, we have defined the concept of unit capital cost, the ratio of the nominal profit rate to capital productivity, and shown that it has increased faster than unit labor costs in all countries analyzed, except in Greece.

What are the policy options for the eurozone countries as they struggle to come out of the crisis? The first is the implementation of an across-the-board austerity program (internal devaluation) amounting to a reduction in the wage bill and workers' benefits. This *may* achieve stabilization, but at the expense of a painful recession. Moreover, this measure will be accompanied by huge losses by workers. If this option is pursued, firms should also share the burden by acknowledging that unit capital costs have increased significantly. We have argued that the comparison with Germany is, at least for some countries, misplaced. Using disaggregated data we showed that Germany is not the correct comparator as its export basket is very different from that of the southern European countries and of Ireland. What would an across-the-board reduction in nominal wages of 20%–30% achieve? The most obvious effect would be a very significant

compression of demand. But would this measure restore competitiveness? We argue that it would not allow many firms to compete with German firms, which have a different export basket, and in all likelihood it will not be enough to be able to compete with China's wages.

A second option, probably politically unfeasible, is to exit the euro and return to a national-currency system. This would probably lead to a devaluation and would have to be accompanied by measures such as industrial policy programs, including strategies to improve productivity.

A third option is to reform the eurozone so as to allow a greater role for a much more active fiscal policy. This requires an analysis of the implications that this could have for the euro, but, in our view, is the most sensible option. This strategy should be combined with significant efforts to upgrade. Greece, Ireland, Italy, Portugal, and Spain should look upward and try to move in the direction of Germany, and not in that of China. The real problem is one of lack of nonprice competitiveness vis-à-vis Germany. Spain and Italy are ahead of the other three countries, and closer to Germany. Though Ireland has a very sophisticated export package, its level of diversification is low. Greece and Portugal are well below the other three and face a more precarious situation. Certainly this is not easy and it is only a long-term solution.

Appendix Table 1: Share in World Exports by Complexity Groups*

Countries	Share in world exports							
	Top 10	Top 100	1	2	3	4	5	6
Austria	1.73	1.62	1.58	1.49	1.10	1.23	0.85	0.23
Belgium	3.76	2.26	3.21	2.89	2.01	2.05	2.60	1.85
China	1.22	1.28	2.72	8.08	10.78	13.97	12.96	13.35
Finland	0.50	1.09	1.05	1.38	0.59	0.72	0.29	0.22
France	5.11	3.57	5.78	6.08	5.43	5.58	3.08	1.59
Germany	12.24	17.99	17.73	13.50	8.01	7.64	4.65	1.89
Greece	0.01	0.02	0.03	0.16	0.13	0.24	0.31	0.37
Ireland	1.25	0.80	2.71	2.26	1.21	1.50	0.51	0.11
Italy	1.40	3.07	4.04	4.30	3.15	3.87	4.69	2.56
Luxembourg	0.81	0.15	0.14	0.30	0.15	0.20	0.11	0.03
Netherlands	5.11	3.50	2.93	3.51	3.17	2.76	3.50	2.73
Portugal	0.05	0.04	0.30	0.23	0.48	0.48	0.56	0.52
Spain	0.23	0.88	2.23	2.36	1.70	1.85	2.46	1.28

*Figures are based on the averages of export values for 2001–2007

**Countries with population of less than 2 million (except Luxembourg) were excluded from the calculation of total world export. Top 10 and Top 100 correspond to the most complex products; products are divided into six groups, 1 is the most complex product group and 6 the least.

Appendix Table 2: Share in a Country's Total Exports by Complexity Groups*

Countries	No. of products (RCA \geq 1)	Complexity Rank	Share in country's exports							
			Top 10	Top 100	1	2	3	4	5	6
Austria	1,369	8	0.23	6.17	30.38	23.29	19.00	14.99	8.83	3.52
Belgium	1,470	10	0.23	3.84	27.81	20.30	15.55	11.26	12.12	12.96
China	1,962	51	0.02	0.53	5.71	13.90	20.75	19.52	15.59	24.53
Finland	765	5	0.10	6.11	30.09	31.99	15.19	13.14	4.52	5.08
France	1,788	11	0.16	3.20	26.18	22.33	22.00	16.09	7.54	5.86
Germany	2,113	2	0.19	7.90	39.62	24.50	16.01	10.85	5.61	3.40
Greece	1,060	52	0.01	0.39	3.82	14.78	12.50	17.21	18.60	33.09
Ireland	421	12	0.13	2.28	39.06	26.27	15.60	13.79	3.97	1.32
Italy	2,239	24	0.06	3.47	23.16	20.06	16.16	14.12	14.54	11.96
Luxembourg	588	9	0.78	3.88	19.22	33.53	18.10	17.60	8.27	3.28
Netherlands	1,312	13	0.25	4.75	20.23	19.72	19.60	12.12	13.08	15.26
Portugal	1,188	53	0.02	0.42	15.32	9.84	22.09	15.57	15.53	21.66
Spain	1,745	28	0.02	1.89	24.18	20.80	16.53	12.77	14.46	11.25

*Figures are based on the averages of export values for 2001–2007

** Top 10 and Top 100 correspond to the most complex products; products are divided into six groups, 1 is the most complex product group and 6 the least.

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