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Global and European Labor Costs.

by

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DISCUSSION
PAPER

GLOBAL AND EUROPEAN LABOR COSTS

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Filip Abraham*

Abstract: Multinational companies and national governments pay considerable attention to labor cost and labor productivity differentials across countries. This paper analyzes total and unit labor differentials for a group of European and non-European countries in the 1960-1998 period. It deals with (i) the magnitude of total labor cost differences (ii) the developments in unit labor cost and labor productivity (iii) the convergence process between countries with higher and lower labor costs.

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INTRODUCTION

Labor costs figure prominently in the literature on international business and international trade. The traditional Ricardian model of comparative advantage is built on international labor costs and productivity differentials. In Porter's (1990) framework, labor costs feature as one of the factor supply conditions that shape the competitive advantage of nations. Dunning's OLI paradigm of multinational activity identifies labor costs as a key locational determinant for efficiency-seeking multinational companies (see Dunning, 1993 and 1998, Caves, 1996). Buckley and Casson (1998) emphasize the role of labor costs and labor flexibility in decision-making of multinationals. Recent empirical work investigates the role of international labor costs differentials in host and home country employment decisions of multinationals (Konings and Murphy, 2001 and Blomström et al., 1997). Starting with the pioneering work of Vernon (1966), a long list of authors view labor costs as an essential element of the product cycle and of the internationalisation of the value chain (see Grossman and Helpman, 1995 for a survey). Finally, in recent agglomeration models (Krugman, 1991 and Fujita, Krugman and Venables, 1999) labor cost differentials influence firm decisions to locate in or to move out of a regional cluster of economic activity.

In many countries the evolution of labor costs is monitored closely because multinational companies carefully compare labor costs across countries in deciding on their worldwide investments. National and regional policy-makers around the globe are confronted with the need to keep labor costs under control. This is particularly true in Europe where, due to decades of market integration and the recent introduction of the euro, labor costs are widely perceived as a key determinant of international competitiveness.

Three labor costs issues are of main concern to global companies. Firstly, firms are interested in the magnitude of the *total* labor cost differentials between countries. All other things equal, countries with higher labor costs are less attractive investment locations. All other things are usually not equal and that is why, as a second factor, *unit* labor costs matter. Unit labor cost indicators take into account productivity differentials in comparing labor costs. An increase implies that labor costs rise by more than productivity gains such that the competitive position of the company deteriorates. Hence, unit labor costs reflect the competitive (dis)advantage due to (higher) lower labor costs. Authors like Trefler (1993) find that labor costs differences between countries to a large extent reflect productivity differentials. This would imply that the competitive impact of international labor cost deviations are small. Labor cost comparisons by Hooper and Vrankovich (1997) and by Turner and Van 't Dack (1993) dispute this view.

The third important issue concerns *convergence* in labor costs. Convergence relates to the growth of labor costs over time. Firms that take advantage of lower labor costs want to know how long the labor cost advantage will last. If unit and total labor cost quickly converge to the levels in other countries, companies are less likely to base their investment decisions on labor cost conditions. Compared to the extensive literature of income convergence across countries and regions (e.g. Barro, 1997, Sala-I-Martin, 1996), the convergence of labor costs has received scant attention.

This paper deals with these three aspects of labor cost performance. In doing so, we combine the data sets for the manufacturing sector from the OECD and the US Bureau of Labor Statistics. Admittedly, manufacturing accounts for only part of the economy of most countries but it by far the most open sector and subject to intense global competition. Moreover, the focus on manufacturing allows us to study close to thirty countries primarily consisting of industrialized countries but also including several emerging economies at different stages of economic development. EU countries are

included so that we can pay detailed attention to the European situation. The data set covers the period 1975-1998 for all countries and goes back to 1960 for a small group of OECD countries. This variation across both countries and time offers an appropriate setting to address convergence in labor costs.

The paper is structured as follows. In Section 1, we provide the information about the magnitude of labor cost differentials across countries. Section 2 deals with the relation between labor costs and labor productivity. In Section 3, we focus on convergence. The conclusion to the paper summarises the main lessons for global and European business.

1. A COMPARISON OF TOTAL LABOR COSTS

In this paper labor costs are approached from the perspective of a company that compares the total cost of an average manufacturing worker in a common currency (US $). Total labor costs are the sum of gross wages and non-wage labor costs which mainly consist of social security contributions by the employer and other payments for the social protection of workers.

As any measure of labor costs, this definition has its merits and drawbacks[1]. Conceptually, it represents the best indicator for a multinational company that compares various locations at a given moment in time and sells most of its products in the world market. On the negative side, the measure is influenced by short run exchange rate fluctuations between domestic currencies and the US dollar. Nor does it correct for differences in purchasing power parity. Our approach therefore does not analyze the real income position of manufacturing workers and does not focus on sales strategies that exploit price differentials for homogeneous products in low and high income countries.

We draw on two data sets. The US Bureau of Labor Statistics publishes data for the period 1975-1998 on hourly labor costs, hourly wage costs and hourly non-wage costs for the 28 countries listed in Table 1. For twelve industrialized countries[2], the data set goes back to 1960. The OECD Stan data set is limited to 22 countries[3]. It includes fewer emerging economies and covers the period 1970-1996[4]. Data refer to labor compensation per worker in manufacturing. The evolution of labor costs per hour and per worker will deviate when hours worked are reduced over time.

Insert Table 1

Table 1 presents the most recent data on labor costs. One important message is that labor costs differ sharply across countries. The picture for Europe is particularly striking. The (unweighted) average of hourly labor costs for the EU15 countries is roughly comparable to the US and the Japanese level. But the differences inside Europe are substantial. The most expensive countries in our sample of countries are located in Europe. Hourly labor costs in the Scandinavian and the Benelux countries, in Germany and Switzerland are substantially higher than in the US[5]. Not all EU countries though are characterized by high labor costs. Hourly compensation in France and Italy are close to the US figures while Ireland, Spain, Portugal and the UK stay well below US labor compensation. This implies of course that hourly labor costs vary considerably between individual European countries. For instance, German hourly compensation in 1998 amounted to nearly five times the level of Portugal and exceeded the UK and French labor costs by respectively 65.6% and 48.8%.

It is well known that part of Europe's labor cost problem is explained by the labor-tied financing of the social security system. The gap between European countries and the rest of the world is much wider for the non-wage component of labor costs, which mostly consists of social security

contributions on labor. Wage costs are in many cases close to the US level. Exceptions to this pattern are Norway, Switzerland, Denmark -where social security charges are not tied to employment- as well as the UK where the social security system is less developed than in continental Europe.

A comparison between labor compensation per hour and per employee in 1995-1996 provides another explanation for the higher European labor costs[6]. European workers cost more because they work less. On a yearly basis, firms in most European countries pay a comparable or lower amount in labor compensation to employ one manufacturing production worker as their US counterparts. However, the shorter yearly working time of a typical European worker drives up the labor cost per hour. A notable exception is the UK where people work longer hours than in other European countries.

Differences in labor costs are also found between the United States and several Asian countries. Remarkable is the wide labor cost gap between the US and advanced Asian countries such as Singapore, Hong Kong, Taiwan in Korea. By contrast, Japanese labor hourly labor costs are quite similar to the US situation. In Asia and the Pacific rim, substantial labor cost disparities prevail as well. Labor is most expensive in Japan and Australia, followed at quite some distance by New Zealand and the Asian tigers (Hong Kong, Singapore, Taiwan and Korea). Low income countries as Sri Lanka (and presumably many other Asian economies not represented in our sample) are at the bottom of the labor cost league.

Finally, there is NAFTA with the well-known labor cost gap between the US and Canada on the one hand and Mexico on the other hand. Note that the labor cost inequality within NAFTA is far more pronounced than in the EU. Labor costs in the US are approximately tenfold the Mexican level and hence exceed the maximum labor cost differential in the EU between Germany and Portugal.

Insert Figure 1

Labor cost differentials are not a new phenomenon. In Figure 1, we compute the coefficient of variation of hourly labor costs, hourly wage costs and hourly non-wage costs. The coefficient of variation is an indicator of the average percentage dispersion in the various labor cost concepts. Since the mid-seventies, the average dispersion of hourly labor costs in our sample of 28 countries ranged from 49% to 63%. Interestingly, the coefficient of variation for non-wage costs lies well above the dispersion in wages. Apparently, wage costs across countries are more similar than social security contributions on labor: different social security systems are an important source of international labor cost differentials.

2. LABOR COSTS AND PRODUCTIVITY DIFFERENTIALS

In this part of the paper we focus on the relation between differentials in labor costs and productivity. In Table 2 we combine data from the OECD STAN data set on labor costs per worker and labor productivity (value added per worker) to compute the share of labor costs in value added. This indicator is defined as W^cL/PY where W^c = nominal labor cost per worker in $, L= total number of workers, P=manufacturing price index in $ and Y= real manufacturing value added. The share of labor costs in value added is the indicator of nominal unit labor cost used in this paper because it compares the total labor cost of producing 1 US $ of value added in the various countries of our sample. As long as nominal labor costs and the price index in the manufacturing sector of our sample countries are affected similarly by exchange rates changes with respect to the dollar, this unit labor cost concept is not influenced by currency realignments.

Interestingly, this same variable also compares real labor costs per worker (W/P) to real labor productivity (Y/L). This is seen by rewriting WL/PY as (W/P)/(Y/L). An increase in the share of labor costs in value added indicates that real labor costs are rising more rapidly than real labor productivity. This pushes up unit labor costs and makes the country less attractive to foreign investors. In short, this indicator provides a reasonable way to study whether (higher) lower total labor costs are compensated by (higher) lower labour productivity and hence lead to a competitive (dis)advantage.

2.1. A Look at the Data

Do labor cost differentials reflect productivity differentials? To a significant degree they do. This is seen in Table 2. The labor cost of 1$ worth of value added of the individual countries is much closer to the US level than the corresponding labor compensation per hour or labor cost per employee. In 1995-1996 all countries of our sample except Mexico, Portugal and Korea are within a 75-120% range of the US labor cost share. Several countries are actually very close to the US figures.

Insert Table 2

The same message emerges from a comparison of variation coefficients in Figure 2. We compute the unweighted variation coefficient in total labor cost per worker and unit labor cost (as measured by the share of labor costs in value added) for the 21 countries of the OECD data set in the 1970-1996 period. For the broader BLS sample of countries, we present the variation coefficient for hourly labor costs from 1975-1998. The picture is clear: differentials in unit labor costs of 17-25% typically amount up to half the variation in total labor cost per worker or per hour. All of this means

that labor is more productive in countries with higher labor costs while lower labor cost countries are typically characterized by lower productivity levels.

Insert Figure 2

Having said this, the remaining labor cost differentials that are not compensated by labor cost differentials should not be underestimated. The numbers for the variation coefficient indicate that, even taking into account labor productivity, the average dispersion in unit labor costs in our sample amount to 20% and more. This constitutes a substantial competitive advantage or disadvantage for specific countries. In 1995-1996 Mexico, Portugal, Korea and to a lesser extent Spain and New Zealand benefited from a labor cost advantage that is not fully eroded by lower labor productivity. Except for New Zealand, those countries belong to a group with significantly lower GDP per capita levels than the advanced industrialized countries. By contrast, Austria, Germany, Sweden, Norway and – surprisingly – the UK rank among the countries with an unfavorable trade-off between labor costs and productivity.

Insert Figure 3

It is worthwhile to take a closer a look at the situation in the EU. In Figure 3, we compare the dispersion in unit labor costs for the 21 OECD countries to the unweighted variation coefficient for (i) the EU15 countries and (ii) the six core countries that founded the European Community in 1958 (Benelux, Italy, France and Germany). As can be expected for a group of neighboring European countries at a comparable stage of economic development, there is a closer link between labor costs and productivity in the EU15 than in the sample of 21 OECD countries. The dispersion in unit labor cost ranges in the 10-20% interval, indicating that - even in the integrated EU area – productivity does not perfectly offset labor cost differentials. The closest relationship between costs and

productivity is found among the six EU countries that have been integrating for the longest time period. The variation coefficient of the EU6 group is 10% and less.

2.2. Estimating the Link Between Labor Costs and Productivity

We further explore the relation between real labor costs and real labor productivity by estimating the following *level equation* for labor costs:

$$\ln (W^j_{it}/P_{it}) = \alpha + \beta \ln (Y_{it}/L_{it}) + \gamma D^{EU} \ln (Y_{it}/L_{it}) + \varepsilon_{it} \quad (1)$$

Where j = h,c are superscripts for respectively labor costs per hour (W^h) or per worker (W^c). We thus estimate equation (1) for both hourly labor costs and labor compensation per worker. The subscripts i and t refer to countries and time. ε_{it} is an iid error term. D^{EU} is a dummy variable that takes on the value one if the country belongs to the EU.

As reliable productivity and price data are only available in the STAN data set we estimated all regressions for the 21 OECD countries for 1975-1995. Tables 3 and 4 present the regression results for respectively hourly labor costs and labor costs per worker. We report both OLS and fixed effects estimators with yearly observations[7]. In addition, we redid our OLS regressions taking five-year averages for the labor cost and productivity variables. The inclusion of EU dummies in some of our regressions allows for a different impact of productivity changes on labor costs in the EU. We separately consider the current EU member states (EU15) and the founding EU6 countries.

To correct for autocorrelation, we use a Cochrane-Orcutt iterative procedure. We subsequently repeated our regressions with a first difference estimator to correct for potential unit root problems[8]. As results were very similar to the level estimates, we do not report them here but they are available

on request. We also experimented with time dummies for 1975-1980, 1981-1985 and 1986-1990. Those did not alter our results and are not reported here.

In estimating equation (1), we implicitly assume that productivity is exogenously determined by such factors as technology, capital investment, input supplies and so on. This assumption can be criticised as labor costs may also influence labor productivity. If so, regression estimates will suffer from simultaneity bias. We considered three alternative solutions for the simultaneity problem. First, we estimated equation (1) with lagged instead of current labor productivity. Secondly, we performed a two-stage approach where we instrumented labor productivity by one and two lags of the productivity variable. Thirdly, we instrumented real labor productivity by real manufacturing exports, capital stock per worker[9] and real import penetration (see Abraham and Brock, 2000 for more details)[10]. The various alternatives produce similar results. We decided to report the estimates for the lagged productivity variable and are prepared to supply the interested reader with all other regression results.

The results in Tables 3 and 4 are statistically significant and robust to changes in estimation methods, sample choice and definition of the labor cost variable. They lead to several insights on the relation between labor costs and productivity that supplement and strengthen our earlier findings:

1. Labor costs and productivity levels are closely linked. The β coefficient, which is the elasticity of total labor costs with respect to labor productivity, is positive and highly significant in all regressions. Labor is more expensive in countries with higher productivity. Labor productivity differentials are an important factor in explaining labor cost inequality between countries.
2. Unit labor costs are not the same in all countries. In nearly all regressions we can statistically reject the hypothesis that β is equal to one[11]. A unitary elasticity would imply that labor costs differentials are fully reflected in productivity such that unit labor costs across countries are

similar. We find this not to be the case which is consistent with the substantial variation in labor cost per value added found in Table 1. In other words, countries can have a competitive labor cost advantage or disadvantage.

3. Most of the regression estimates for β are larger than one[12], indicating that productivity levels between countries are more similar than total labor costs. If so, more productive countries face higher unit labor costs than countries at an earlier stage of the productivity chain. This may explain why the variation coefficient for value added per worker (productivity) in Figure 2 is smaller than the coefficient of variation for labor costs per worker. And why lower income countries such as Korea, Portugal, Mexico and Spain are found to benefit from a unit labor cost advantage.
4. There is some evidence that unit labor costs between EU countries are more similar than is the case for the whole sample of countries. In our regression model γ captures the cross-effect between labor productivity and membership of the EU6 or EU15 country group so that $\gamma+\beta$ measures the impact of higher productivity on labor costs in the EU. The EU regression coefficient γ is only statistically different from zero and significant in magnitude for the fixed effect estimates. But in all regressions, we observe that γ is negative when $\beta > 1$ and positive when $\beta < 1$. For this reason $\gamma+\beta$ tends to be closer to one than β. The EU is closer to a one-to-one relation between labor costs and productivity – and hence to identical unit labor costs - than in the sample that also includes non-EU countries. This lends some credibility to the hypothesis that EU market integration – more that global competition- puts pressure on labor costs of the member states to be in line with their productivity performance. This result supports our earlier finding that the variation coefficient of unit labor cost for the EU6 and EU15 is smaller than the same coefficient for the broader sample of 21 OECD countries. It also consistent with the price

comparisons by Knetter and Slaughter (1999). Looking at various price measures, their study finds a smaller coefficient of price variation among EU member states and, most of all, among EU6 countries compared to a broader sample including either other industrialized countries or both industrialized and developing economies.

3. CONVERGENCE

In this section of the paper we focus on the growth path of total and unit labor costs. We analyze whether low-cost countries close the gap with high-cost countries over time. We first present some descriptive statistics before proceeding to econometric estimation.

3.1. A Look at the Data

A substantial amount of information on convergence is hidden in Table 2 and Figures 2 and 3. In Table 5 and Figure 4 we present more data on the evolution of total labor costs. Table 5 traces the evolution of labor costs from 1960 to 1998 with respect to the US level[13]. Figure 4 provides the same information for selected countries and country groups[14] but expresses the labor cost variable in absolute dollar values.

Insert Table 5

For the entire time period considered and the full sample of countries, the trend is towards modest convergence in total and unit labor costs. Looking at total labor costs first, we observe in Table 5 and Figure 4 that most countries close (part of) the labor cost gap with the US. Convergence with US labor costs is full-fledged for Japan, for the average of the EU6 and EU15 country groups as well as for selected European economies. Convergence is partial for most other countries. The variation coefficients of total labor costs in Figure 2 decline by approximately ten percentage points. To be more precise, the average dispersion in hourly labor costs declines from 60.7% to 51. 4% between 1975 and 1998 while the variation coefficient of labor cost per worker

falls from 52.3% to 42.2% in the 1970-1995 period. Turning to unit labor costs, there is a slight decline in the variation coefficient from 23% in 1970 to 19.1% in 1995.

Insert Figure 4

Having said this, the road to convergence is bumpy and uneven. The speed of the convergence process varies markedly over time. Roughly speaking, we distinguish three phases in the convergence process for both total and unit labor costs. The first phase goes from the 1960's up to the beginning of the eighties and is characterized by clear-cut convergence. During this period hourly labor costs of the EU6 catch up with US levels and Japan closes about half of its labor cost gap with the US (see Figure 4 and Table 5). The cross-country variation in total and unit labor costs declines unambiguously as seen in Figure 2. During the second phase, which stretches from 1981-1982 up to 1986-1987, the convergence process is halted and even reversed. Afterwards the trend towards convergence is hesitantly resumed. During this third phase, hourly labor costs in Japan and the EU15 catch up with American labor costs. Likewise, the Asian NIC experience a sharp upward movement of their labor costs when related to US levels. Variation coefficients of total and unit labor costs decline modestly during this time period.

The convergence process varies from country to country. Some countries experience very little or no convergence at all. Among the lower income countries we observe no closing of the labor cost gap with respect to the US during the past 25 years for Mexico and Sri-Lanka. And the current labor cost position of richer countries such as Canada and New-Zealand is pretty much the same as in 1960 or 1975.

In spite of these country-specific trends, two general principles appear to drive convergence. First, convergence is more pronounced when the gap in labor costs between countries is larger. This principle fits the convergence pattern of Japan and the Asian NIC with respect to the US. It applies

equally well to the experience of the EU6 countries in the sixties and early seventies. Inside the EU, strong relative gains in total and unit labor costs are observed in lower income countries such as Spain, Greece, Ireland and to a lesser extent Portugal. For this reason, the variation coefficient of unit labor costs in Figure 3 declines over time in the EU15 but does not fall in the higher income EU6 countries.

As a second principle, we argue that convergence in productivity and total labor costs are closely linked. This is most easily seen in Figure 2 by comparing the time path of the variation coefficients for total labor cost per worker and value added per worker. When productivity differentials between countries narrow, total labor costs come closer together. Labor cost differentials widen when productivity levels of countries diverge.

3.2. A Growth Equation for Labor Costs

To assess the impact of those two convergence principles, we estimate a growth equation for total labor costs inspired by the recent empirical literature on growth and income convergence (see Barro, 1997, Vanhoudt et al., 2000). In this literature, growth rates of variables are typically defined over five year periods. We computed the average yearly growth rates for 1975-1980, 1981-1985, 1986-1990 and 1991-1995. The regression equation is specified as follows:

$$d\ln(W^j_{it}/P_{it}) = \eta + \delta\, d\ln(Y_{it}/L_{it}) + \lambda \ln(W^j_{i,t-1}/P_{i,t-1}) + \varepsilon_{it} \qquad (2)$$

In this equation the real growth rate of total labor costs in period t ($d\ln(W^j_{it}/P_{it})$) is explained by the growth of real productivity in t and the log-level of real labor costs at the end of the previous five year period t-1. We expect δ to be positive because of the role of productivity in convergence of

total labor costs. According to this productivity hypothesis, countries with stronger growth in labor productivity experience faster labor cost growth.

The lagged labor cost variable is included to capture the idea that, keeping labor productivity constant, stronger convergence is observed in cost countries with lower labor costs. If this is the case, countries with low levels of labor costs at the end of the previous period are characterized by higher growth in total labor costs in the current period. In our regression model, λ would then be negative. This λ can be called the conditional convergence parameter because it measures the catching-up process of low labor cost countries that is not caused by productivity gains.

As for equation (1) we performed a battery of robustness checks. We experimented with EU dummies for labor productivity growth and lagged labor costs. The EU effects were not significant and are not reported. Neither do we show the estimates for regressions with time dummies as they did not alter the results of the base specification.

Insert Table 6

The regression results are shown in Table 6. They confirm the important role of productivity growth in explaining labor cost growth. The estimates for δ are highly significant and close to one, implying that productivity gains are fully reflected in labor cost increases. Countries with strong productivity growth will therefore close the gap in total labor costs with countries that experience a slower expansion of manufacturing productivity.

When productivity growth does not take place, the process of convergence of countries with lower labor costs goes much slower. As expected, the parameter of conditional convergence, λ is negative and significantly different from zero in three of the four specifications. Independently of their

productivity performance, countries with lower labor costs experience higher labor cost growth. Looking at the magnitude of the regression coefficients however, one sees that this additional growth effect is small. The implied yearly conditional convergence rate ranges from 0.08% to 0.9%, well below the 1%-2% that is typically found in the literature on international and interregional convergence in income levels. Apparently, it is sustained productivity growth in the first place that closes the gap between countries with lower and higher labor costs.

CONCLUSION

This paper focuses on labor costs in a group of European and non-European economies. At the end of this paper, we return to the three main issues for global companies that we identified in the introduction. What did we learn?

One major theme of this paper concerns the magnitude of total labor cost differentials between countries. In the past decades, multinational companies faced substantial labor cost differentials between countries and over time. Average dispersion in labor costs in our sample of 28 countries typically amounted to 50% and more. Labor costs are markedly lower in emerging economies. Among industrialized countries, labor costs in the US, Japan and the average of the EU15 countries were roughly comparable at the end of our sample period 1996-1998. But labor costs vary considerably between EU countries. The higher labor costs in selected European countries are caused by expensive social security contributions on labor and shorter working time.

As a second issue, we focused on unit labor costs. We found that labor costs partially reflect different productivity levels. Our regression model identifies labor productivity as a major explanatory variable for explaining cross-country differences in total labor costs per hour and per worker. Unit labor cost comparisons suggest that about half of the international variation in total labor costs is compensated by productivity differentials. The other half of the labor cost gap, of course, cannot be attributed to labor productivity leading to an average dispersion in unit labor costs of 20% and more. In our sample of countries, there is therefore no one-to-one relationship between total labor costs and productivity. This conclusion is confirmed by the regression coefficients for the productivity elasticity of labor costs which are consistently found to deviate from one.

The implications of unit labor cost differentials for multinational companies and their potential host countries are far-reaching. Our findings strongly suggest that some countries offer a more attractive trade-off between labor costs and productivity than others. Companies, which locate in those countries with favorable unit labor costs, benefit from a competitive advantage. Our data and regression analysis point to such advantages in the group of countries with lower levels of GDP per capita and lower productivity.

In the EU the scope for unit labor cost advantages are on the whole more limited. Labor costs and productivity differentials among EU15 and particularly among EU6 countries are better matched. This lends some credibility to the hypothesis that EU integration – more than global competition- puts pressure on labor costs of the member states to be in line with their productivity performance. In spite of this, we still observe an average deviation in unit labor costs of 10-20% in the EU15,

providing a clear incentive for multinational companies to carefully compare labor and productivity conditions in EU member states.

Are labor cost advantages being eroded over time? They are up to a point. The analysis of the convergence process in labor costs constitutes the third theme of this paper. Our reading of the past decades is one of overall convergence between countries with higher and lower labor cost. But the convergence process is slow and often partial. Convergence does not apply to all countries nor to all time periods. Hence, cost-based advantages may in specific cases survive the short and sometimes even the medium run.

Productivity growth is the key to labor cost convergence. Without productivity gains the gap between low and high labor cost countries is closed at a rate of less than 1% a year. By contrast, companies that invest in countries with low labor costs and strong productivity growth benefit from these productivity gains but should realize that the labor cost advantage will be declining accordingly.

This paper leaves open several tracks for future research. One could look at more detailed sectoral and company data inside and outside manufacturing to get a better picture of labor cost differentials. Likewise, one could delve deeper into the sources of productivity differentials that play such an essential role in explaining cross-country differences in labor costs. We intend to address those issues in future work.

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Table 1: A comparison of manufacturing labor costs in 1996 and 1998 (US = 100)

	Labor costs per hour in 1998	Wage costs per hour in 1998	Non-Wage costs per hour in 1998	Labor costs per hour in 1996*	Labor costs per employee in 1996*
Nafta					
United States	100	100	100	100	100
Canada	84.5	89.0	67.4	85.0	75.3
Mexico	9.9	11.1	5.2	10.0	11.3
*EU15***	96.6	94.0	106.6	81.7	93.0
Austria	119.4	109.0	159.1	147.0	116.6
Belgium	124.5	112.8	169.2	146.0	106.3
Denmark	122.3	146.5	29.8	136.0	90.6
Finland	116.2	113.1	128.0	133.0	84.2
France	98.5	85.2	149.2	113.0	97.5
Germany	146.6	138.6	176.9	171.0	111.6
Greece	48.0	47.1	51.3	54.0	46.5
Ireland	71.8	77.6	49.7		
Italy	92.2	82.2	130.3	100.0	64.5
Netherlands	110.8	108.4	120.2	130.0	102.0
Portugal	29.5	28.6	33.2	31.0	24.7
Spain	65.4	61.5	80.3	76.0	51.1
Sweden	118.7	108.0	159.6	138.0	100.0
United Kingdom	88.5	97.3	54.9	80.0	62.6
Other Europe					
Norway	127.7	133.3	106.2	142.0	104.0
Switzerland	131.4	137.3	108.5	160.0	
Asia					
Hong Kong	29.5	36.0	4.7	29.0	
Japan	97.3	104.7	68.9	118.0	99.7
Korea	27.1	28.2	22.8	46.0	38.4
Singapore	41.9	43.9	33.9	47.0	
Sri Lanka	2.5	2.7	1.8	3.0	
Taiwan	28.2	32.4	12.4	34.0	
Other					
Australia	80.4	82.3	73.1	95.0	61.7
Israel	64.8	67.5	54.4	64.0	
New Zealand	49.5	58.8	14.2	62.0	50.1

Source: US Bureau of Labor Statistics and OECD Stan data set
* Data for Austria, Portugal and New-Zealand are for 1995

** Unweighted Average

Table 2: Labor cost of producing 1 US$ of value added (share of labor costs in value added, US = 100)

	1970	1975	1980	1990	1996*
Nafta					
United States	100	100	100	100	100
Canada	99.05	96.74	91.41	98.14	90.95
Mexico	77.24	80.01	66.15	49.05	40.64
EU					
Austria	80.86	98.44	98.34	101.09	108.87
Belgium	88.47	106.03	96.20	90.32	99.69
Denmark	101.94	104.57	99.29	105.74	98.47
Finland	83.33	95.72	82.99	91.58	88.69
France	82.85	94.71	91.64	87.73	94.13
Germany	82.64	90.31	93.00	100.78	109.95
Greece	39.69	49.37	57.93	77.78	89.24
Italy	76.99	91.57	76.59	82.96	82.72
Netherlands	86.37	100.36	96.89	86.86	90.39
Portugal	56.27	103.20	69.67	73.34	67.54
Spain	82.49	96.92	71.60	76.49	80.55
Sweden	103.39	103.85	107.79	107.98	110.43
United Kingdom	105.23	118.20	109.47	108.57	110.92
Other					
Norway	92.76	100.98	100.32	103.45	116.78
Japan	55.55	75.49	67.86	76.11	93.50
Korea	44.18	44.23	53.77	69.18	63.92
Australia	82.76	95.72	85.60	85.88	88.04
New Zealand	72.24	88.65	89.06	79.61	78.98

* Data for Austria, Portugal and New Zealand are for 1995

Table 3: Regression Results for the Level Estimation of Hourly Labor Costs

Estimation Method	Sample	Real Labor Productivity (β)	Additional EU15 Productivity Effect (γ)	Additional EU6 Productivity Effect (γ)
OLS	Yearly data	1.07** (0.01)		
OLS	Five year averages	1.12** (0.02)		
OLS with correction for simultaneity	Yearly data	0.65** (0.04)		
OLS	Yearly data	1.08** (0.01)	-0.009 (0.01)	
OLS	Yearly data	1.08** (0.01)		-0.02 (0.02)
Fixed effects	Yearly data	1.06** (0.01)		
Fixed effects with correction for simultaneity	Yearly data	0.95** (0.03)		
Fixed effects	Yearly data	1.14** (0.02)	-0.17** (0.03)	
Fixed effects	Yearly data	1.09** (0.01)		-0.16** (0.04)

Standard erros are between brackets. Two stars imply significance at the 99% level.

Table 4: Regression Results for the Level Estimation of Labor Costs per Worker

Estimation Method	Sample	Real Labor Productivity (β)	Additional EU15 Productivity Effect (γ)	Additional EU6 Productivity Effect (γ)
OLS	Yearly data	1.07** (0.01)		
OLS	Five year averages	1.09** (0.01)		
OLS with correction for simultaneity	Yearly data	0.64** (0.05)		
OLS	Yearly data	1.08** (0.01)	-0.008 (0.01)	
OLS	Yearly data	1.08** (0.01)		-0.01 (0.01)
Fixed effects	Yearly data	1.05** (0.01)		
Fixed effects with correction for simultaneity	Yearly data	0.96** (0.02)		
Fixed effects	Yearly data	1.10** (0.01)	-0.12** (0.02)	
Fixed effects	Yearly data	1.07** (0.01)		-0.11** (0.03)

Standard erros are between brackets. Two stars imply significance from zero at the 99% level.

Table 5: The Evolution of Hourly Labor Costs in Manufacturing from 1960-1998 (US = 100)

	1960	1970	1975	1980	1990	1998
Nafta						
United States	100	100	100	100	100	100
Canada	84.4	83.7	93.7	88.0	107.0	84.5
Mexico			23.1	25.9	10.6	9.9
EU						
Austria			70.9	71.6	119.0	119.4
Belgium	29.1	46.4	100.8	104.0	128.6	124.5
Denmark	30.4	51.0	98.7	86.6	121.0	122.3
Finland			72.5	74.0	141.0	116.2
France	29.8	40.1	71.1	73.8	103.9	98.5
Germany	30.9	57.3	99.2	96.1	146.7	146.6
Greece			26.6	33.7	45.3	48.0
Ireland			47.6	51.4	78.2	71.8
Italy	24.7	45.9	73.4	69.6	117.0	92.2
Netherlands	24.7	50.5	103.5	91.2	121.1	110.8
Portugal			24.8	18.8	25.3	29.5
Spain			39.8	51.1	76.3	65.4
Sweden	41.3	66.5	112.9	108.6	140.4	118.7
United Kingdom	32.7	36.0	53.0	67.2	85.2	88.5
Other Europe						
Norway	36.8	57.9	106.4	101.3	144.0	127.7
Switzerland			95.8	93.3	139.9	131.4
Asia						
Hong Kong			11.9	14.3	21.5	29.5
Japan	9.7	23.5	47.2	55.9	85.8	27.1
Korea			5.0	9.4	24.9	41.9
Singapore			13.2	16.6	25.4	41.9
Sri Lanka			4.4	1.9	2.3	2.5
Taiwan			6.3	11.1	26.4	28.2
Other						
Australia			88.4	90.2	87.7	80.4
Israel			35.4	38.5	57.3	64.8
New Zealand			50.5	52.3	55.9	49.5

Table 6: Regression Results for the Growth Equation

Estimation Method	Dependent Variable	Growth in Real Labor Productivity (δ)	Level of Real Labor Costs at the end of previous period (δ)
OLS	real hourly labor costs	1.03**	-0.009**
		(0.02)	(0.004)
OLS	real labor costs per worker	1.01**	-0.006**
		(0.01)	(0.002)
Fixed effects	real houly labor costs	1.03**	-0.0008
		(0.02)	(0.003)
Fixed effects	real labor costs per worker	1.02**	-0.005*
		(0.02)	(0.002)

Standard errors are between brackets. Two stars significance at the 99% level.

Figure 1: Coefficient of variation in hourly labor, wage and non-wage costs

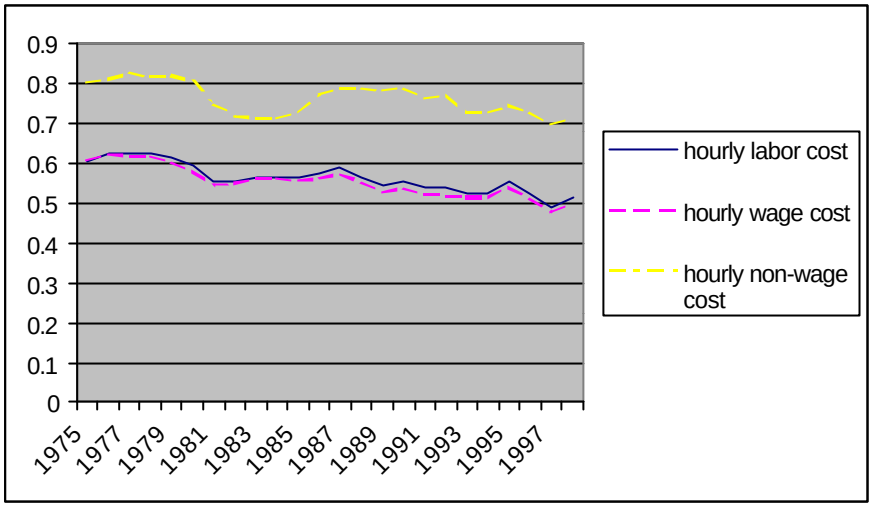


Figure 2: variation coefficient in unit and total labor costs and in value added per worker

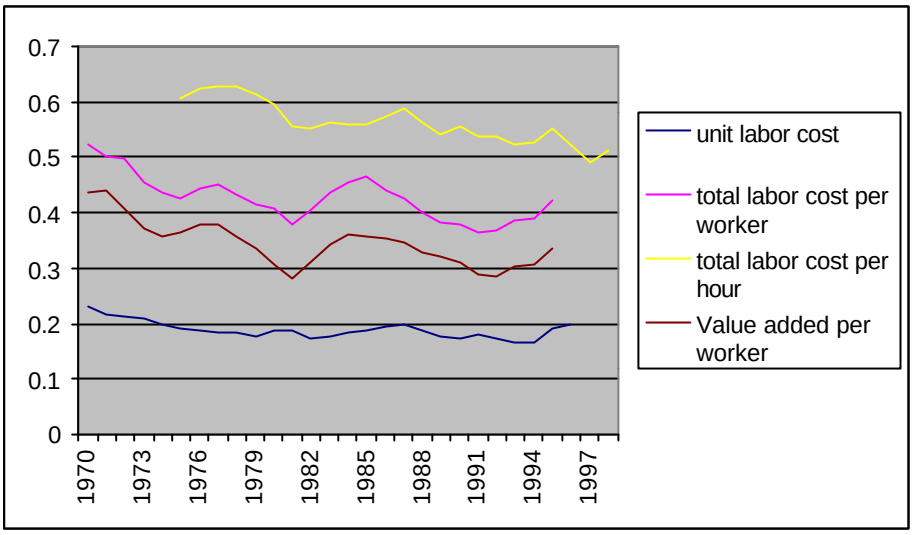


Figure 3: Variation coefficients of unit labor costs in the OECD and the EU

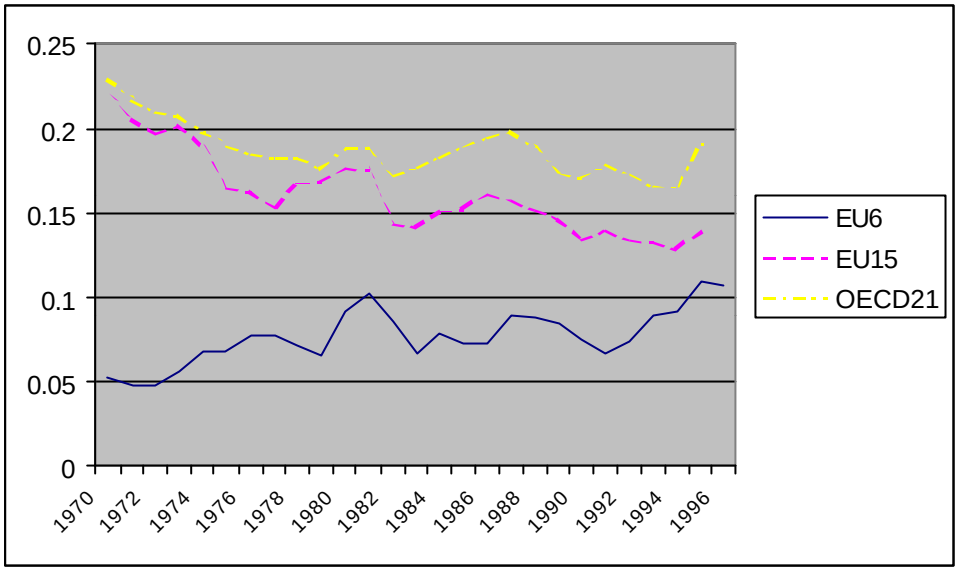
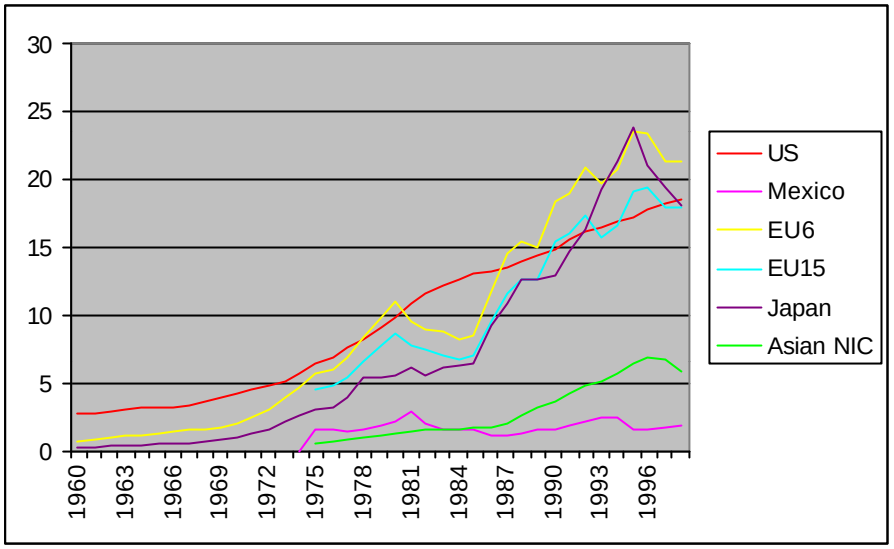


Figure 4: The evolution of hourly labor compensation in $ from 1960-1998



[1] For a detailed discussion of labor cost comparisons see Turner and Van 't Dack (1993).

[2] US, Canada, Belgium, Denmark, France, Germany, Italy, Netherlands, Sweden, UK, Japan and Norway.

[3] The 28 countries of Table 1 minus Ireland, Switzerland, Hong Kong, Singapore, Sri Lanka, Taiwan, Israel.

[4] For Austria, Portugal and New Zealand 1995 is the latest year available.

[5] Although the size of the labor cost gap between the US and Europe is influenced by exchange rate movements, as the comparison between hourly labor compensation in 1998 and 1996 indicates. The dollar appreciated by 16.9% in the 1996-1998 period making Europe a cheaper place to do business.

[6] As mentioned earlier, one should be cautious in comparing data from two different data sources.

[7] Regression coefficients of panel estimation measure both "within" variation over time and "between" variation across countries. The OLS estimates capture more of the between variation and hence reflect better how productivity differentials across countries are reflected in labor costs. In our regressions, fixed effects and OLS estimation yields very similar results (see Verbeek, 2000).

[8] Unit root tests for panel data are not fully developed yet. (Augmented) Dickey Fully tests have low power and their use for panel estimation is still being debated. They were inconclusive in our case.

[9] Capital stock data are derived from STAN investment data using a Perpetual Inventory Method.

[10] Defined as the ratio of imports to production minus net exports.

[11] We do not report the t-statistics for the hypothesis that $\beta = 1$ but can supply them on request.

[12] But this may be due to simultaneity bias. The correction for simultaneity drives down the estimate of β.

[13] We use the BLS data set on hourly labor cost because it covers the broadest group of countries. The growth pattern of labor costs per worker is very similar.

[14] For the Asian NIC the unweighted average of four Asian Tigers, i.e Korea, Singapore, Taiwan and Hong Kong is taken.