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How bad is Divergence in the Euro-Zone? Lessons from the United States of America and Germany

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Abstract: This paper compares relative unit labour cost developments in the countries of the euro-area since the beginning of the European Monetary Union (EMU) both with historical developments and with intra-regional unit labour cost developments in the United States of America and Germany. To this end, unit labour cost indices for the US states and census regions from 1977 to 1997 as well as for the German Länder from 1970 to 2004 have been constructed. Against this benchmark, it is found that unit labour cost increases since 1999 in Portugal and to a lesser extent in Spain and Greece can be judged as excessive, pointing at labour market rigidities which might impair smooth working of EMU in the future.

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1 Introduction

Lately, a lively debate has developed whether the euro-zone's national economies are drifting apart. While it has been observed for quite a while that there has been very little further convergence of inflation rates since the beginning of EMU (ECB 2003), the discussion on economic divergence in the euro-zone has reached a new quality in the past couple or years or so. With Italy having experienced two recessions since the end of the New-Economy boom in 2000 and German unemployment having reached levels unknown since the late days of the Weimar Republic in the 1930s and the Spanish economy growing rapidly on the back of an increasing dangerously looking real estate and construction boom, some commentators have even asked whether the European Monetary Union (EMU) can survive the decade (Gros 2005) and whether single countries such as Italy (Roubini 2006) or Spain (Munchau 2006) might leave EMU.

In this debate, it has increasingly been argued that divergence in inflation and divergence in economic performance are connected (Lane 2006) and might lead to dangerous imbalances in EMU and possibly a political backlash against European integration altogether (Dullien/Schwarzer 2005). Empirically, the German slump has been going hand in hand with very low rates of inflation and even the talk about Germany falling into deflation. The Spanish boom, on the other hand, has coincided with annual consumer price increases almost twice as high as the average of the euro-area. The divergence of inflation has thus been perceived as amplifying regional booms and busts (Enderlein 2004): While high inflation in high-growth-countries has made investments in fixed assets and housing more attractive and has thus boosted property markets and construction, low inflation in countries such as Germany has made financing-conditions more burdensome, depressed domestic demand and construction and has contributed to the travails of regional banking systems. Given both inflation and growth trends, the common interest rate of the European Central Bank has been perceived to be inappropriate both for fast-growing as well as slow-growing countries. The overall impression of economic divergence has been underlined by a deterioration of public finances in the slow growth countries, notably Italy and Germany.

However, divergences in growth and inflation do not necessarily mean trouble for a monetary union. As the ECB (2003) states correctly, diverging inflation rates might just be a sign of

regional economies adjusting toward equilibrium: If countries have entered the monetary union at an over- or undervalued exchange rate, below- or above-average inflation rates over a number of years might be required just to bring a region's real exchange rate to an equilibrium. In addition, divergences can just be a sign of a different position in the business cycle.

The interesting question thus is not whether inflation differs, but whether the differences are just a sign of the normal business cycle and a smoothly working adjustment mechanism between regions or whether they result from structural rigidities which might have serious economic consequences in the medium and long run. If, for example, differences in inflation stem from labour market institutions which do not allow for a fall of regional wage increases below that of the rest of the currency union, a real overvaluation once reached will not be corrected anymore. In this case, a region can experience a continuing deterioration of its economic structure and might be caught in a permanent low growth trap as it has been witnessed in the case of East Germany. [3]

This paper tries to shed some light on this question. It does so by looking at the underlying changes of unit labour costs in the euro-area. It examines current levels reached as well as the dynamics, both in historical perspective and in comparison with two well-functioning currency unions, the United States of America and the Federal Republic of Germany. Unit labour costs have been chosen for this comparison because they are arguably the best measure available for a region's real appreciations and depreciations in a currency union (remember that lasting changes in the real exchange rates between regions in a monetary union can only result from different paces in labour cost changes, as the nominal exchange rate has been fixed and capital markets are widely integrated). Consumer price indices, in contrast, tend to be distorted by changes in indirect taxes or administered prices. Moreover, they might diverge just because consumption habits differ between countries: An oil shock will increase inflation more in a country in which people spend a larger part of their income on energy (i.e. because they have a larger distance to cover commuting to work), while this does not mean in any way a danger to the stability of EMU.

The implicit argument behind the comparison of unit labour cost trends to historical precedents in the US and Germany is as follows: If regional unit labour cost developments are part

[3] For an excellent exposition how an real overvaluation due to excessive wage increases after the German currency union and labour market institutions which keep wages from falling again interacted in producing the persistent East German slump, see Snower/Merkl (2006).

of a normal adjustment mechanism in a well-functioning currency union, they should not deviate more from their long term average than it has been experienced by regions within the US or within Germany over the past decades. Moreover, as a higher speed of unit labour cost dynamics means that the short-run amplifying effect of the real interest rate on economic activity is stronger, regional booms and busts tend to be more pronounced the more dynamic unit labour costs change. Thus, if unit labour cost dynamics in EMU countries turn out to be faster than in the United States or Germany, this might provide an indication of a higher probability of disturbing cyclical developments and excesses in parts of EMU.

This paper is structured as follows: Section 2 provides some theoretical background for determining whether divergences in the euro-area are harmful or not and how to best spot harmful divergences. In section 3, relative nominal unit labour cost indices for the euro-countries are constructed. Section 3.3 then looks at the development of these indices in historical perspective. It compares the most recent developments with those before the start of European Monetary Union (EMU) and tries to draw a conclusion whether recent divergences are excessive by historical standards. Section 3.4 takes a look at the developments of unit labour costs between the States ("Länder") of the Federal Republic of Germany. It presents formerly unpublished estimates for relative unit labour costs of the German Länder from 1970 to 2004 and compares the trends and adjustments to those in the euro member states. Section 3.5 does the same for the 50 US states and the 8 US census regions. It presents newly calculated unit labour cost indices for these regions from 1977 to 1997 and compares the trends and stylised facts with those in the euro-zone. In both section 3.4 and 3.5, the comparisons are made with an emphasis on two features of the time series. First, it is evaluated whether the dynamics of relative nominal unit labour costs in single EMU countries since 1998 have any precedents in the German Länder or in the US regions. To this end, it is investigated if there have been any eight-year-periods during which unit labour costs in part of Germany or of the USA have changed as much as in the EMU countries since its beginning. Second, it is checked whether the current level of unit labour costs, measured as the deviation from the long-run average, has any precedents in Germany or the USA. Section 4 concludes.

2 How to spot harmful divergences in a monetary union?

Before measuring divergences in EMU, it is useful to distinguish which types of divergences actually pose economic problems, which types are benign and which types might actually be a useful and a wanted adjustment mechanism. This section tries to give answers to these questions. Subsection 2.1 examines in which cases divergences might actually be useful for the working of a monetary union. Subsection 2.2 then moves to the question in which cases divergences can cause serious economic problems. Subsection 2.3 explains how harmful divergences can arise in EMU. Figure 1 proposes a graphical classification of divergences, summarising subsections 2.1 to 2.3.

2.1 Labour cost divergences as part of necessary adjustment

Divergences in inflation do not necessarily cause harm. Starting from disequilibrium, unit labour cost growth rates in single countries must diverge from the rest of a currency union in order to reach equilibrium again (i.e. ECB 2003), in a monetary union, inflation and wage divergences in fact might be a beneficial phenomenon and might therefore not be a reason for concern: If a single country has entered EMU with an exchange rate which is below the long-run equilibrium exchange rate, it might need an inflation rate above the rest of EMU to reach equilibrium. Similarly, if a country has entered EMU at an overvalued exchange rate, it might need a below-average rate of inflation to regain competitiveness and again reach its equilibrium exchange rate.

A similar argument can be made if a country is hit by an asymmetric demand shock: If suddenly a shift in global preference away from one country's production occurs, prices for that country's output need to fall in order to prevent a prolonged shortfall of demand over supply and thus an increase in unemployment in the country in question. If, on the other hand, global demand for a country's products suddenly and structurally increases, an above-average rate of inflation might be warranted in order to bring demand again back into line with supply. In both cases one would expect also wages to move in line with inflation.

In both cases, the adjustment process might run over several years. As prices and wage trends tend to be sticky, such an adjustment process can be expected to last for several years rather than happen at once. However, neither these divergences nor their persistence need to be

reason for concern. Quite the contrary: It should be a reason for concern should these divergences not appear as they are the only way to get a regional economy back to equilibrium after an initial misalignment of its exchange rate or after an asymmetric shock.

Moreover, a divergence of inflation rates might just be a sign of a different position in the economic cycle, which by itself does not need to be a problem. After all, regional boom and bust cycles have been experienced in the United States of America and been analysed well before the beginning of EMU (Krugman 1993). Given decently working labour and product markets, inflation differentials should correct themselves in due time: As Arnold/Kool (2003) as well as Lane (2006) explain, there are two counterbalancing effects at work in a monetary union. The first effect amplifies growth in high inflation areas via a lower real interest rate, while the second effect dampens growth in those regions via a real appreciation. Given a common nominal interest rate, the real interest rate in regions with high inflation is lower than in regions with low inflation. Consequently, demand, credit growth and housing markets in these regions are stimulated, again pushing up inflation. At the same time, high inflation regions slowly lose competitiveness vis-à-vis the rest of the currency area, which in due time will dampen extra-regional demand and thus economic growth in the high inflation region. While the first effect seems to be the one working much quicker than the second one, the second one finally leads to the end of a regional boom or bust cycle (Arnold/Kool 2003).

2.2 Why and under which circumstances divergences can become a problem

Even for divergences which are not part of the adjustment mechanism and do not fall under those examined above, one might argue that they do not pose serious economic problems, as long as prices converge back to equilibrium in the long run. Prices in one country would then be a little higher than in the rest of the union for a number of years and below the average for another number of years. As long as individuals can borrow in financial markets, welfare effects should be expected to be small. The phenomenon, one could argue, is a purely nominal one, without any real effects. [4] However, there are a number of theoretical arguments to cast doubt on this view. Instead, if divergences persist for a prolonged periods, they might cause misallocations and even long-term detrimental effects to growth.

[4] This might be true even though Lucas (2003) argues that direct welfare effects from economic fluctuations are rather small. See Yellen/Akerlof (2006).

First, as an above-average rate of domestic inflation makes finance cheaper while investment in the tradable sector becomes less attractive with the loss of competitiveness, it might lead to excessive investment in the housing sector. Not only might an excessive amount of capital be allocated to this sector which contributes relatively little to long-term productivity growth. In addition, there is the danger that workers are lured into construction jobs who might later be very hard to retrain once a building boom ends, thus shifting the Beveridge curve outwards and increasing structural unemployment.

Second, persistent deviations in the price trend might lead to a strong overvaluation of one country in monetary union. Whereas undervaluation leads to increasing exports and income, import prices raise and via a deterioration in the trade balance, adjustment occurs in the long run. Adjustment processes might however be asymmetric with regard to speed and intensity, due to hysteresis phenonenom: Once trapped in a situation of overvaluation, profits might suffer and investment contract, leading to a longer period of sub-trend economic growth until the real appreciation is corrected again. These boom-and-bust-periods might not only bring about negative welfare effects , but might also lower the potential output of a single country: As we know from labour market economics, there are good arguments for hysteresis in the labour market, meaning that unemployment is at least to a certain extent path dependent. This does not necessarily imply an insider/outsider set-up as it has been assumed by Blanchard/Summers (1986), but can also be constructed by new-growth-theory considerations of human capital accumulation. Saint-Paul (1987) describes the detrimental effects of longer stints of unemployment on potential output with the words “unlearning by not doing”: If a person is unemployed for an extended period, she would miss out learning new technologies and might even lose some basic skills necessary for productive employment.

In addition, recent research has pointed to the fact that periods of below-trend-growth might even lower the rate of technological progress, thus depressing the long-run growth rate of an economy. Aghion/Howitt (2005) argue that especially in countries with underdeveloped financial markets, firms might not be able to get capital for research and development activitites in a cyclical downturn. Excessive (or long) downward deviations from the trend thus lower the economies’ expenditure on R&D which in turn depresses technological progress. As Aghion and Howitt point out, this effect can be expected to be larger in EMU countries than in the U.S. given the relative underdevelopment of financial markets in Europe.

Finally, political economy arguments hint that prolonged boom-and-bust cycles as a result from divergences might actually endanger the political stability of the euro-area: A country which finds itself at the beginning of the bust leg of a business cycle amplified by the structure of EMU might find the idea of leaving monetary union increasingly attractive. Leaving the union would allow the country to depreciate sharply and forego the adjustment costs of relative wage deflation. If the country's politicians have a sufficiently high personal discount rate, the short-term benefits of leaving EMU might actually be perceived larger than the long-run costs of the forgone membership in the monetary union such as lower long-term interest rates. This might in the end lead to single countries pulling out of EMU.

All of these negative effects of divergences can be expected to start kicking in as soon as a region's real exchange rate and inflation trend is away from equilibrium. However, they will only be sizable if a single country's real exchange rate has deviated significantly from its equilibrium value.

2.3 Possible reasons for excessive divergences in EMU

There are a number of arguments why there might be strong divergences in EMU which are not part of a normal adjustment mechanism. First, the absence of national monetary policy can amplify the national business cycle (Lane 2006, Enderlein 2004), thus leading to a further real appreciation when a country already has an overvalued real exchange rate or to a further depreciation event though a country's exchanger rate is already undervalued. As the ECB sets its interest rate with reference to the whole EMU, for some EMU countries, the interest rate by definition will below what would be optimal for the current position in the business cycle, while it will be above the optimum level for other countries.[5] Consequently, if a single country is finding itself in a stronger cyclical growth position than the rest of EMU, economic growth in this country is further amplified as the ECB interest rate is accommodating. The opposite is true for a country finding itself with a larger output gap and lower inflation than the rest of EMU: In these cases, the common monetary policy might be too restrictive from the point of view of the single country, dampening regional growth further.

Due to this mechanism, relative prices and wages can be depressed or boosted even for countries which had a real exchange rate in equilibrium to begin with. In principle, this kind of

divergence should reverse in due course: With the real appreciation of the booming country, external demand should slow after some time while the real depreciation of a country with sub-par growth should boost exports. However, empirics seem to point at the fact that the real exchange rate effects works much slower than the interest rate channel, leading to long periods of appreciation even if a country already has an overvalued real exchange rate or long periods of depreciation even if a country already is highly competitive.

While a certain divergence from the equilibrium real exchange rate also happens in a pre-EMU regime, two facts might thereby cause the real exchange rate to diverge further from its equilibrium in a monetary union than in a floating regime: First, in a pre-EMU-regime, the national central bank would fight national inflation earlier and harder, breaking wage trends before they lead to large changes in the real exchange rate. Second, in a pre-EMU-environment, financial markets probably would not put up with very large current account deficits, putting a downward pressure on the nominal exchange rate.

Thus, these cyclical divergences are both a consequence and a cause of amplified business cycle in EMU: They stem from the fact that a common monetary policy amplifies booms and busts in a monetary union. At the same time, they set the stage for prolonged periods of boom and bust as they might force the real exchange rate of a booming country far away from its equilibrium, making a longer period of sub-potential growth necessary to correct for the excessive price and wage increases.

A second possibility for malign divergences arises, if inflation or wage trends in a single country have a high persistence and do not react quickly to a change in aggregate or labour demand, it is possible that the regional price level diverges away from equilibrium even if the country in question does not show any significant divergence in the position in the business cycle. If, for example, wage bargainers in a single country hardly react to an increase in unemployment due to specific labour market structures, this country might experience a permanent real appreciation, even if it already is in a situation of real overvaluation to begin with. Abstracting from cyclical fluctuations, this would lead to a continuing increase in the unemployment rate until labour market structures are changed or the wage bargaining regime breaks apart due to endogenous tensions from rising unemployment. Contrary to the cyclical

[5] See Hayo (2006) for an estimate of the deviation of the ECB interest rate from the optimum for a number of EMU countries.

divergences described above, these structural divergences can be expected to have much more serious consequences as the normal course of the business cycle does not provide for a mechanism by which they could be corrected.

The interesting question is thus how long divergences can still be seen as benign. This paper uses historical precedents of other monetary unions which have proved to be stable over several decades. Against this background, divergences in EMU should be seen as a reason for concern if they fulfil the two criteria of moving the real exchange rate away from its equilibrium and are larger than before the beginning of EMU. Moreover, if divergences persist beyond the regional business cycle, they can be assumed to be structural.

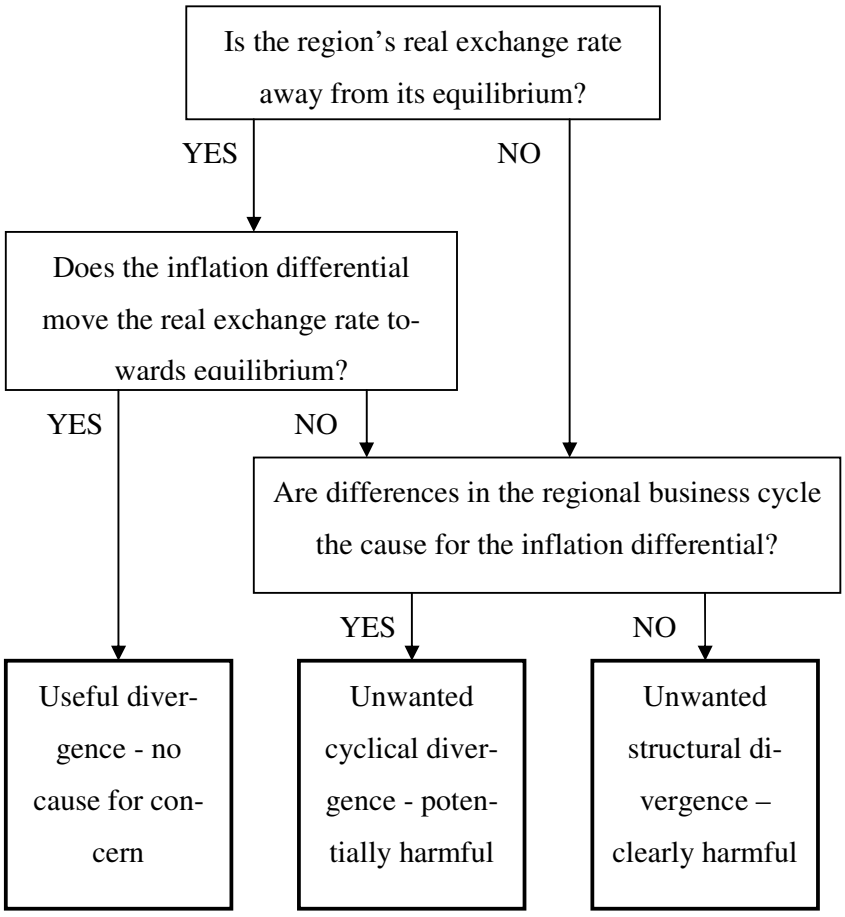

Figure 1: Classifying divergences in a monetary union

3 Empirical Measurement of Divergences

In order to spot harmful divergences, an indicator to measure these deviations is needed. At first sight, one could think that differences in the national rates consumer price inflation give a good indication of divergences in a monetary union. However, there are a number of factors which might influence consumer prices but do not have any influence on medium or long term competitiveness and are therefore are of little importance to the working of a monetary union. First, changes in indirect taxation can push inflation up or down, without actually influencing national competitiveness as indirect taxes are charged both to imported as well as domestically produced goods. The same is true in the case of some social security reforms: I.e. when the share of individual co-payments to public health services is increased, measured CPI inflation usually rises. [6] However, the increased co-payments again have no significance for the competitiveness of a single country in a monetary union.

Second, CPI inflation is usually strongly influenced by swings in energy prices. As the share of energy consumption in the consumer's basket differs between the countries, changes in energy prices might again distort the indices.

Third, especially in some of the smaller countries with goods markets which are well integrated into the world market (or the neighbouring countries' markets), underlying changes in labour costs and competitiveness might not necessarily show up in headline CPI inflation: If consumer prices are to a large extent determined by the neighbouring countries' price level, inflation might not diverge much even if underlying trends deviate from the rest of the union. In this case, excessive wage increases and a loss in competitiveness would rather show up in falling profits and finally rising unemployment while CPI inflation might remain close the trend of the neighbouring countries.

Thus, a better indicator than CPI inflation seems to be unit labour costs which closely describe the underlying change of a single countries' competitiveness. For this reason, this paper concentrates on analysing unit labour cost trends.

[6] This was the case when Germany introduced a 10 € fee for visits to a doctor's office in 20004.

3.1 Indices for relative unit labour cost performance

The analysis of this paper is consequently done using an index of relative nominal unit labour costs (RNULC hereafter). For computing the RNULC index for the euro area, the EU commission's AMECO database's (fall 2005) time series on nominal unit labour costs for the whole economy measured in ECU/Euro has been used (see table Table 2).The RNULC index can be interpreted as a real exchange rate index relative to the euro-zone, measured in unit labour costs. This index has the value 100 for all countries in the base year 1998. Moreover, it has the value 100 for the euro-zone as a whole for the entire time range of the sample. Consequently, the reading for a specific country in a specific year shows how much price competitiveness has improved or deteriorated relative to the base year. For example, a value of 105.5 for Spain in 2003 shows that Spain's price competitiveness has deteriorated by 5.5 percent since 1998. Germany's reading for the same year of 95.5 shows that the country's competitiveness has improved by 4.5 percent. From these values, one can also compute the change in the competitiveness position between two given years in a straightforward way by dividing the years' two values: For example, if one wants to find out by how Spanish competitiveness has changed from 1993 to 2003, one has to divide the 2003 value of 105.5 by the 1993 value of 102.7. Thus, we see that Spain has lost 2.7 percent in price competitiveness between 1993 and 2003.

1998 has been chosen as a base year. 1998 turns out to be the first year in which the nominal exchange rates of all of the 11 original EMU members have been in the range of plus or minus less than one percent of their final euro conversion rate. Taking the commission's standard base year (1995), on the other hand, might have led to wrong conclusions: From 1995 until 1998, there have been some cases of quite strong nominal exchange rate movements which cannot be attributed to a loss of competitiveness due to a malfunctioning of regional labour markets within the monetary union. [7]

Just as the EU commission's figures on nominal unit labour costs include estimates for 2005 and forecasts for 2006, the RNULC index also extends to 2006. Even though it is possible that developments turn out different from the EU's commission's forecast, this paper analysis the developments up to 2006. The basic conclusions of this paper would not change much should there be a small deviation from the commission's forecast.

To judge the developments within the euro-zone against the experiences of the Federal Republic of Germany with its single currency (the Mark), a similar RNULC index has been computed for the German Länder. The data for this exercise was taken from the web-site of the Länder's network for economic statistics ("Arbeitskreis VGR der Länder")[8]. Unit labour costs have been computed by dividing the (nominal) compensation for employees by the real gross regional product for each of the 11 Länder. In a second step, these numbers were indexed against a pan-German unit labour cost index. As the data for the old federal republic is only available until 1990, and from 1991 only data for all of Germany is provided, the reference shifts from the old Länder until 1990 to pan-Germany from 1991 onwards. Thus, until 1990, the index shows the relative development of unit labour costs vis-à-vis the old federal republic while from 1991 onwards, the index shows the development relative to all of Germany. Just as the index for the EMU countries show that countries' performance against the rest of that currency union (even after it expanded with the joining of Greece in 2001), the index for the German Länder shows the relative performance against all of the other Länder. 1970 is chosen as the base year as it is the first available year in the statistics. The results of these computations can be found in Table 3.

Finally, to draw from the experience of the United States of America, a RNULC index has also been constructed for the 50 states of the US States as well as for the 8 census regions. The necessary data on gross state products and total compensation of employees has been taken from the Bureau of Economic Analysis' database on regional and state GSP. [9] The change from the SIC industrial classification to the NAICS classification in 1997 has created a slight problem: As data on employees' compensations has not been published for the first years after the statistical change and have only been resumed in 2001, a RNULC time series can only be constructed from 1977 to 1997. However, that still gives us 13 eight-year-periods and an overall time-span of about three times that of EMU to compare recent developments in the euro-zone to.

[7] For example, the Italian lira has gained back much of the value lost after the 1992 crisis of the European Monetary System in the years 1993 to 1998.

[8] http://www.vgrdl.de

[9] http://www.bea.gov/bea/regional/gsp.htm

3.2 Standard Measures of the RNULC time series

Having constructed the RNULC indices, the next step is to find a sensible measure for divergence. Traditional indicators such as the standard deviation or the range do not help much in determining whether divergence is reaching dangerous levels: If countries have entered EMU at a misaligned exchange rate, their unit labour costs can be expected to diverge over the years since, thus leading to a higher standard deviation over time. So would also a divergence away from equilibrium. Consequently, both wanted and unwanted divergences could be expected to produce the same pattern of standard deviations. Moreover, as the standard deviation describes the average deviation, it would not react much should only one country diverge in a problematic manner.

A similar argument holds for the range between the highest and lowest relative unit labour cost position: If exchange rates prior to EMU have been misaligned badly, one would expect a rather large increase in the range in the years since, without this hinting at dangerous developments. Moreover, a higher range would only point at one single country diverging, not showing whether additional countries experience pathological developments.

Attempts to conduct a more in-depth analysis econometric of the behaviour of RNULC since the beginning of EMU such as a cointegration analysis and an error-correction model which might hint at the speed with which unit labour costs return to equilibrium and how far they have deviated from their fundamental level are doomed to fail as the time series available is much to short and will remain so for a number of years.

This paper thus follows a different approach: First, the levels of RNULC are judged against their long term average, both in comparison with historical precedents of pre-EMU times when a nominal exchange rate still existed which might have caused adjustment and in comparison with the United States and Germany. In addition, the euro-zone data is examined whether it shows dynamics after 1998 which are unusual in comparison with other currency unions such as Germany and the United States. There is the implicit assumption behind this approach that in the very long run, real exchange rates have on average not deviated much from their equilibrium value. [10]

[10] This does not exclude that real exchange rates have deviated for longer periods from their equilibrium values. It only assumes that periods of persistent over- and undervaluation are roughly equally distributed.

3.3 Euro-Zone developments in historical perspective

Taking a closer look at the RNULC index for the euro-zone, we see that a small number of countries have lost a significant part (more than 7.5 percent) of their original price competitiveness between 1998 and 2006: By this measure, Portugal has appreciated by 16.8 percent, Spain by 11.3 percent, Ireland by 10 percent, Luxembourg by 9.3 percent and Italy by 9.4 percent. Greece has also strongly lost competitiveness. Since the country only joined EMU in 2001 after repeated nominal depreciations in prior years, the index figure for 2005 even understates the loss of competitiveness induced by nominal wage increases. From 2001 to 2006, the country has lost 12.4 percent of its price competitiveness, more than any other countries in this five-year period.

It is interesting to note that all but two (the exceptions being tiny Luxembourg and Ireland) of the countries which have significantly lost competitiveness until 2006, lost competitiveness in almost every single year since 1998. This is even more remarkable as Portugal and Italy have been underperformers with respect of economic growth in the past years. Had they well-functioning labour markets, one would have expected that their widening output gaps in 2003 to 2005 had put downward pressure on labour cost growth. Instead, unit labour costs in these two countries continued to rise quicker than in the rest of the euro-zone even though their economies were performing markedly worse. This development contrasts with that in the Netherlands: The Dutch economy had lost competitiveness from 1998 to 2003 to almost the same extent as Spain has from 1998 to 2006. However, as the economy slowed, the trend in RNULC turned and the competitive position improved again. In 2006, the Netherlands had regained a third of the competitiveness lost in prior years.

When comparing the current levels of competitiveness to historical relative unit labour cost performance, we see that Portugal has the worst competitive position since the beginning of the time series. The same is true for Spain, though that country's competitive position is close to that experienced in 1992 just prior to the speculative attacks which pushed its currency out of the European Monetary System (EMS). Greece's competitive position is the worst since that country's end of military dictatorship in 1974 (and long before her joining of European Union in 1981). The situation does not look quite as bleak for Italy which is still slightly more competitive than it was just prior the EMS crisis in 1992. Ireland's real exchange rate relative to the rest of EMU is still significantly below that of the early 1980s.

Moreover, the loss of competitiveness of these countries is unusual even in cross-country perspective. Compared to 1998, there have only been a few occasions on which single countries have been as uncompetitive as Portugal or Spain are now. The Netherlands had lost competitiveness to a similar degree in the 1970s which culminated in a deep economic crisis in the early 1980s. Ireland had a similarly unfavourable relative unit labour cost position in the early 1980s when the country was widely seen to be in deep crisis and unemployment stood at double digit rates. Only a strategy of deliberate undervaluation by very low wage increases brought this country back into a favourable competitive position. France had a unit labour cost position only a little shy of that of Portugal today in the early 80s before major alignments in EMS took place in 1982 and 1983.[11]

According to the data, there is one single country that has significantly improved price competitiveness since 1998: Germany's relative unit labour costs have fallen by 8.9 percent from 1998 to 2006, significantly faster even than in Austria, the country with the second highest decrease over the period (6.0 percent). A fall in nominal relative unit labour costs as experienced in Germany has not been at all unusual for EU countries prior to EMU when nominal depreciations of single currencies regularly led to large fluctuation in single countries' competitive positions. For example, Italy gained about 13 percent in price competitiveness in the two years after the EMS crisis in 1992 when the lira had dropped out of the exchange rate mechanism. However, compared to its long-term relative unit labour cost position, Germany appears to be highly competitive in 2006: One has to go back to the late 1960s to find a year in which the relative unit labour cost index has been as low as now.

3.4 Lessons from Germany

However, a certain divergence in the development might just reflect slightly different regional cycles or a correction of asymmetric shocks to one or more regions in a currency union. Thus, the interesting question is whether the divergence observed in the euro-zone can be considered as something which is normal in currency unions or whether it is beyond those divergences in other monetary union.

Taking a closer look at the RNULC developments of the German Länder, we find that a deterioration of the competitive position close to what we have seen in Italy, Ireland and Luxem-

[11] Finland's uncompetitive position before the early 1990s cannot be compared as that country only joined EU in

bourg in the eight years up to 2006 has only happened once in one of the German Länder excluding Berlin (see Table 5): In Schleswig-Holstein, relative unit labour costs deteriorated by 8.8 percent from 1975 to 1983. However, this increase came after a period of gains and competitiveness and was followed by a swift correction 1983 onwards. However, the increase both in Italy, Ireland and Luxembourg since 1998 has been above this value, thus putting them beyond the experience of the larger German Länder.

A deterioration of the RNULC position even close to that experienced by Spain (11.3 percent) or Portugal (16.8 percent) cannot be found in any eight-year-period in any of the German Länder excluding Berlin. Only Berlin has experienced a similar deterioration after Reunification: As the western part of the city was united in 1990 with its eastern half, relative unit labour costs jumped by almost four percent. One of the reasons was that Eastern German wages rose rapidly while productivity was lagging behind. From 1990 to 1998, Berlin's relative unit labour cost position deteriorated by 10.3 percent. However, these data have to be interpreted with the historical background in mind: Transport from and to Berlin was very difficult prior to the fall of the Berlin wall in 1990. Economic activity therefore needed to be heavily subsidised. The increase in labour costs after 1990 thus might only be a compensation for the fall in the company's non-labour costs. Moreover, economic activity in Berlin today is very strongly tilted towards public and government services (with the larger part of the federal government and a number of lobbyists working in Berlin). For these activities, competitiveness is not an issue since these services cannot be substituted by similar services in other Länder. The argument would not hold for EMU countries such as Portugal, Spain or Ireland, but maybe for Luxembourg: For this country, providing services to the rest of the EU such as hosting the European Court of Justice might explain a similar unit labour cost development as in Berlin.

Germany's performance within the EMU with a decrease in the relative unit labour cost position of 8.9 percent from 1998 to 2004 also is extraordinary by the standards set by the German Länder: A decrease of unit labour costs close to this magnitude in any given eight-year-period has only been observed in the small city state of Hamburg, in the periods starting in 1988 and 1989. However, even there, relative unit labour costs never fell by more than 8.0 percent over any eight-year-period. The maximum decrease for any larger German states (excluding the

1995 and had a very protected economy before that.

city states) has been the fall in relative unit labour costs in Hesse by 6.9 percent, in the period from 1988 to 1996.

However, in order to judge whether the divergence of relative unit labour costs in EMU since 1998 can be considered as normal fluctuation or even a wanted adjustment compared with other currency unions, not only the speed of adjustment is important, but also the question whether adjustment has moved beyond a level of relative unit labour costs which is sustainable. To this end, the long run average of the relative unit labour cost position has been computed both for each EMU country as well as for the German Länder. For the EMU countries, the 2006 value has been set into relation with the long-term average since 1980, assuming that prior to that date, nationally sheltered markets might make comparison difficult. For the German Länder, the maximum deviation above and below the long-term trend have been computed (see bottom part of Table 3). Against this background, the development of unit labour costs in Greece, Spain and Portugal looks highly unusual: While for the German Länder, only Berlin experienced any deviation of more than 9.3 percent above the long-term average, Spains's relative unit labour costs in 2006 stood 11.7 percent, Greek unit labour costs 18.1 percent and Portugal's relative unit labour costs 28.1 percent above its long-term average. Italy's competitive position, on the other hand, looks rather benign: With only 4.6 percent above the long-run-average, this is clearly in the bounds of German Länder precedents. The same is true for Ireland, the NULC index standing only 4.1 percent above its average value. Germany's relative unit labour cost position in EMU also does not look extraordinary. With 6.1 percent below the long-term average, similar developments have been experienced by one large German Länder, Hesse and by the city state of Bremen.

Thus, compared to Germany, unit labour costs in some EMU countries have diverged already further than had been the case in any of the German states except Berlin. While the deterioration of the unit labour cost position of Spain and Portugal are clearly beyond anything experienced in Germany, both Italy's and Ireland's real appreciation as well as Germany's real depreciation in unit labour cost terms can be considered to be still close to the Länder precedents.

3.5 Lessons from the United States

Another instructive way to gauge the developments of unit labour costs in the Euro-area is a comparison with the development in the USA. When looking at the changes in relative unit

labour costs over any given eight-year-periods in the United States, at first sight, the variation seems to be much larger than in the European Monetary Union, with increases of up to 21 percent and decreases of up to 35 percent (see Table 6). Closer examination of the data, however, reveals that much of this variation is due to very distinct developments in one state and one territory, namely Alaska and Washington, D.C. While the relative unit labour cost position of Alaska is extremely volatile, Washington, D.C. has experienced a continuing increase of relative unit labour costs since 1979. Two factors probably explain these developments. For Alaska, one reason might be the heavy reliance of the State's economy on natural resources such as oil or mining which already leads to a very volatile gross state product (with several measured GSP increases and decreases in the range of the sample by more than 10 percent compared to the year before) . The unit labour cost series thus seems to capture more of a change in the oil drillers' rents than in the state's competitiveness. Moreover, for the profitability of oil production, the crude price probably is more important than the variation in labour costs.

For Washington, D.C., a similar argument might hold as for Berlin or Luxembourg: Due to its role as national capital, Washington, D.C., provides services to the rest of the country which cannot be easily substituted by some other state's products and which are paid for by transfers from the rest of the currency area. Thus, the permanent real appreciation might be consequence of that territory's special role and of little economic consequence for D.C.

If we look at the United States excluding Alaska and D.C., the changes in relative unit labour costs of some EMU countries again seem quite pronounced. None of the single States in the US (except Alaska) has experienced any eight-year-period in which it has experienced an increase of unit labour costs even close to Portugal's 16.8 percent. Spain's, Ireland's and Italy's loss of competitiveness is still in the range of US states. The largest increase of unit labour costs over any eight-year-period in any US state except Alaska has been experienced in Louisiana from 1988 to 1996. Here, relative unit labour costs rose by 12.9[12] percent , compared to 10 percent in Ireland, 11,3 percent in Spain, or 9.4 percent in Italy.

Germany's performance, on the other hand, does not look extraordinary when compared to the single US states: The maximum decrease in unit labour costs over an eight-year-period in

[12] See **Table 4** for an overview of maximum increases and decreases of relative unit labour costs in the USA. The complete RNULC time series for all of the 50 US states and Washington, D.C., will be made available on the author's website at the date of the paper's publication.

the US has been 21 percent, experienced in Wyoming from 1982 to 1990, way above Germany's decrease of 8.9 percent.

However, one must ask whether one can really compare Germany's adjustment to that of Wyoming. After all, Germany's share of EMU GDP is roughly 26 percent while Wyoming's share of total US GDP is roughly 0.2 percent, even less than Luxembourg's share in the EMU. Louisiana is tiny not only compared to Spain: Louisiana's share in US GDP amounts to 1.6 percent compared to Spain's 12.2 percent share in EMU.

In order to gauge how much change in relative labour costs might be reasonable for a larger region within a currency area, unit labour costs for the US census regions have been computed using the same regional data set from the Bureau of Economic Analysis as for the state data (see Table 8). With a 1997 weight of US GDP of between 3.0 percent (Rocky Mountains) to 21.9 percent (Southeast), these regions roughly compare in relative size in the currency union to the somewhat larger Euro countries Austria (2.9 percent of EMU GDP), Belgium (3.6 percent), the Netherlands (5.9 percent), Spain (12.2 percent), Italy (17.6 percent), France (19.9 percent) and Germany (26.3 percent).

Compared to the census regions, unit labour cost developments in Spain and Portugal again look slightly excessive: Only on one occasion has a single census region experienced a deterioration in its competitive position by more than ten percent over an eight-year-period (see Tabelle 9): From 1977 to 1985, unit labour costs in the Southwest rose by 10.9 percent, still about 7 percentage points shy of Portugal's RNULC increase and half a percentage point shy of Spain's RNULC increase 1998. Italy's and Ireland's performance looks rather on the border of the US regional precedents: There has been one eight-year-period when relative unit labour costs in the Southwest rose as strongly as in Italy from 1998 to 2006.

Germany's performance, on the other hand, looks quite out of bound when compared to the US census regions: The maximum decrease in any US census region was 4.5 percent, almost three percentage points shy of Germany's decrease since 1998, following (similarly to the German experience) a strong increase in relative unit labour costs in the years before.

When taking the deviation from the relative long-term competitive position as a reference (see bottom of Table 8), developments in Portugal, Spain and Greece again look to have run beyond the precedents set by US-states: Excluding Alaska and Washington, D.C., no US state has ever experienced a deviation from its long-run competitive position compared to Portu-

gal's or Greece's. The closest development is that of Wyoming which in 1982 reached a relative unit labour cost position 15.1 percent above the long-term average, compared to 28.1 percent in Portugal and to 18.1 percent in Greece in 2006. Spain's deviation in 2006 with 11.7 percent above the long-term average still looks close to Wyoming's precedent. However, one has to note that Wyoming rather looks like an outliner in the US. Without tiny Wyoming, the largest upside deviation from one single state's long-term relative unit labour cost position has been 9.4 percent, experienced in West Virginia.

From the US census regions, no single entity has ever experienced the relative unit labour cost position deviating more than 3.7 percent above its long-term average. Italy, Spain, Portugal and Spain look unusual from this point of view. Germany's experience, in contrast, looks in line with that of US census regions: With relative unit labour costs roughly six percent below the long-run average, this is well in line with developments experienced in the Southwest of the US.

4 Conclusion

This paper has looked at the unit labour cost developments of single EMU countries relative to the currency area as a whole in order to evaluate whether the divergence since the beginning of EMU can be considered as "normal" when compared to regional developments in other currency unions such as the Federal Republic of Germany and the USA. It has found that, while unit labour cost developments seem to be well in line for most EMU countries, a handful of countries actually have experienced unusual developments, namely Portugal, Spain, and to a lesser extent Greece, Italy and Germany. Table 1 summarises the results.

The developments since 1998 have been especially unusual for two countries, Portugal and Spain. For these countries, not only relative unit labour costs have increased much faster than for any of the German Länder (except Berlin), faster than for any continental US state and significantly faster than for any US census region. Relative unit labour costs for these countries have also deviated more from their long-term average than it has been the case for any German Länder or any US census region. In the case of Portugal, moreover, no instance could be found in which a single US continental state had ever deviated more from its long-term average relative unit labour cost position. This hints that the divergence of these two countries is unwanted and might pose problems in the future. For Portugal, the divergence might even

be structural given that even the harsh recession after 2001 did little to correct the divergence. For Spain, it is yet to early to make any conclusions whether the divergence is cyclical or structural, given that the country has continuously experienced robust growth up to the present.

Also worrying in international comparison has been the development of relative unit labour costs in Greece. While cost dynamics in this country over the past eight years have been still in line with dynamics experienced inside Germany or inside the USA, the deviation from the long run average now is above that experienced by any German Länder, any US state and any US census region. More worrying, the dynamics of relative unit labour costs in Greece since 1998 has been understated by the country's late entry to EMU and the nominal depreciation in the years prior to EMU membership. This hints that Greece's divergence is also unwanted. As for Spain, however, it seems to early to tell whether this divergence is structural or purely cyclical.

Italy and Ireland seem to be borderline cases: Italy's unit labour cost position has deteriorated faster than that of any German Länder in the sample. Moreover, its level is now further away from its long-term average than that of any US census region. However, compared to the dynamics in the US census regions and the deviations from the long-term average in Germany, its cost position still looks within the precedents. Ireland is a special case, with the dynamics having been very strong in recent years (especially from 2003 to 2006). However, Ireland is still comfortably close to its long-term average competitive position, which might hint that unit labour cost increases in Ireland have rather been a sign of an adjustment of an undervalued euro conversion rate than of pathological developments.

The development in Germany, the country with the strongest fall in unit labour costs relative to the rest of the currency union, on the other hand, cannot yet clearly be judged to be unusual. While the dynamics of German unit labour costs has been stronger than in any US census region and any larger German Länder in the sample, it still looks reasonably normal when compared to the US states. Moreover, compared to the long-run average, the level of German competitiveness still seems to be within the range experienced in other currency unions. Thus, for Germany, we cannot rule out that the divergence is still a correction of a misaligned euro conversion rate.

Table 1: Unusual Relative Labour Cost Developments in selected EMU countries compared to Germany and the USA

	German Länder		US States		US Census regions	
	eight-year-dynamics	**level relative to long-term average**	**eight-year-dynamics**	**level relative to long-term average**	**eight-year dynamics**	**level relative to long-term average**
Germany	X				X	
Italy	X					X
Ireland	X					
Spain	X	X		X	X	X
Portugal	X	X	X	X	X	X
Greece		X		X		X
X – no comparable precedent found						

Thus, one can conclude that, seven years after the creation of European Monetary Union, unit labour cost increases in some countries have been much more pronounced than it has been observed in the last decades between regions in Germany or the US. While it is possible that factors such a misaligned exchange rate at the beginning of EMU and catch-up growth of the countries in question play a role, divergences in single countries already seem to be too large to be explained solely by these factors.

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6 Appendix

Table 2: Relative Unit Labour Costs in the Euro-Zone, 1998=100

	Euro area[1]	Bel-gium	Ger-many[2]	Gree ce	Spain	Franc e	Ire-land	Italy	Lux-em-bour g	Neth er-lands	Aus-tria	Por-tugal	Finla nd
1980	100,0	106,6	96,9	75,5	96,3	114,0	109,1	90,9	117,5	113,4	90,4	73,4	100,8
1981	100,0	101,8	93,8	87,1	97,4	113,9	111,6	96,0	116,4	106,9	90,8	82,6	113,3
1982	100,0	91,9	95,8	97,2	96,0	110,2	115,8	98,5	105,2	110,0	91,5	78,6	115,0
1983	100,0	90,6	96,7	96,2	86,4	107,9	118,6	106,4	102,6	108,3	92,1	71,8	112,6
1984	100,0	91,3	95,1	96,5	88,7	107,6	117,0	109,0	100,1	102,0	94,3	71,6	121,9
1985	100,0	92,5	93,9	94,5	88,8	109,4	118,4	108,6	100,2	99,8	94,5	73,4	126,8
1986	100,0	93,1	96,9	78,0	86,9	107,3	116,8	108,9	96,4	101,2	97,9	70,7	119,9
1987	100,0	92,3	99,2	75,7	86,6	104,1	108,7	108,9	97,8	102,6	99,7	68,3	118,9
1988	100,0	89,9	98,3	81,7	93,7	102,3	110,2	110,1	94,3	101,0	98,6	69,5	126,5
1989	100,0	90,1	95,6	88,0	101,2	100,8	106,4	114,6	93,1	95,7	97,4	72,5	135,8
1990	100,0	91,3	93,4	88,6	106,5	100,2	102,9	117,8	93,6	93,3	95,5	76,8	136,9
1991	100,0	92,8	92,6	82,7	111,2	97,4	100,6	120,8	90,6	92,5	95,2	86,7	136,0
1992	100,0	93,1	95,6	80,9	111,8	96,0	101,4	115,6	94,3	93,8	95,8	95,8	110,2
1993	100,0	98,4	101,2	82,1	102,7	99,5	98,5	100,4	98,2	98,5	101,5	92,2	89,6
1994	100,0	101,4	102,4	85,1	97,4	100,1	99,3	96,7	103,3	99,6	103,8	91,7	95,4
1995	100,0	103,3	105,7	89,0	96,2	100,2	92,9	86,7	107,3	101,4	106,4	92,5	104,3
1996	100,0	100,2	102,0	91,8	98,7	100,2	93,6	97,5	104,7	98,5	101,2	94,8	100,6
1997	100,0	99,1	99,8	100,5	98,2	99,8	100,2	102,9	100,7	98,2	99,7	98,1	100,0
1998	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1999	100,0	100,6	99,5	102,7	100,9	99,7	98,3	100,0	99,9	101,0	99,1	110,2	100,2
2000	100,0	99,6	98,9	99,5	102,4	99,6	100,6	100,6	100,2	102,9	97,7	112,9	99,9
2001	100,0	101,4	97,8	96,8	103,6	99,5	102,6	101,6	106,1	106,1	96,7	108,6	102,9
2002	100,0	101,4	96,4	100,5	104,4	99,9	101,1	102,7	108,1	108,8	95,4	110,6	101,2
2003	100,0	100,3	95,5	99,9	105,5	99,7	102,3	104,8	107,2	110,3	94,3	112,3	99,5
2004	100,0	99,7	94,0	103,6	107,6	99,6	105,8	106,5	107,1	109,4	93,7	113,5	99,6
2005	100,0	100,3	92,5	106,2	109,1	99,8	109,0	108,7	108,2	108,3	93,5	115,2	100,7
2006	100,0	100,6	91,1	108,8	111,3	100,1	110,0	109,4	109,3	106,8	94,0	116,8	99,8
Min	100,0	89,9	91,1	75,5	86,4	96,0	92,9	86,7	90,6	92,5	90,4	68,3	89,6
Max	100,0	106,6	105,7	108,8	111,8	114,0	118,6	120,8	117,5	113,4	106,4	116,8	136,9
Ave.	100,0	97,2	97,1	92,2	99,6	102,5	105,6	104,6	102,3	102,6	96,7	91,1	109,9
2006 in % of average	100,0	103,5	93,9	118,1	111,7	97,6	104,1	104,6	106,8	104,1	97,3	128,1	90,8

[1] including linked German series; [2] linked series

Table 1: Relative Nominal Unit Labour Costs in the German Länder, 1970=100

	Ba-den-Wuert tem-berg	Bava-ria	Berlin	Bre-men	Ham-burg	Hesse	Lower Saxon y	North Rhine - West-phalia	Rhine land-Pa-latinat e	Saar-land	Schle swig-Hol-stein	FRG[1]
1970	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	99.0	98.8	101.2	102.5	99.9	100.1	99.8	100.9	100.6	99.1	99.9	100.0
1972	97.3	99.4	101.6	103.0	100.6	99.8	100.2	101.4	99.9	100.2	99.2	100.0
1973	97.8	100.5	100.7	102.6	99.6	99.4	99.5	100.9	100.8	100.6	99.2	100.0
1974	99.1	101.4	100.5	103.5	97.9	98.6	100.4	100.3	100.1	97.7	98.3	100.0
1975	98.3	100.3	98.3	103.5	98.6	98.4	99.2	101.9	101.7	97.8	97.1	100.0
1976	98.3	100.3	97.8	103.3	98.9	97.4	98.0	102.6	101.5	98.4	98.0	100.0
1977	97.5	99.4	97.0	102.6	98.6	96.5	98.4	103.7	101.7	101.5	97.7	100.0
1978	98.3	99.0	98.6	102.9	98.2	95.7	97.9	103.6	102.4	99.6	99.0	100.0
1979	98.9	98.7	99.1	102.9	95.8	95.6	98.5	103.2	102.8	99.3	100.8	100.0
1980	99.3	98.7	97.4	99.5	97.1	94.2	98.1	103.8	102.5	98.9	101.5	100.0
1981	98.7	97.9	97.6	98.6	96.9	95.5	98.5	104.0	101.7	97.1	104.9	100.0
1982	99.4	97.2	96.5	100.4	98.6	94.6	98.1	104.6	100.0	97.8	104.9	100.0
1983	99.3	97.2	96.7	102.4	98.0	93.4	98.1	105.0	100.2	97.9	105.6	100.0
1984	99.9	97.2	96.7	101.6	95.0	93.2	96.8	105.8	100.6	97.6	104.3	100.0
1985	99.6	97.7	96.8	103.7	94.3	93.2	96.9	105.5	101.2	97.1	104.3	100.0
1986	99.3	97.7	97.7	104.2	94.6	93.5	97.7	105.7	99.9	96.8	101.7	100.0
1987	99.0	97.1	97.1	102.4	96.2	92.6	98.2	106.3	100.6	96.0	101.7	100.0
1988	98.5	97.1	97.8	101.9	96.9	91.9	98.2	106.5	101.3	96.1	102.1	100.0
1989	98.3	97.5	98.0	102.2	96.1	91.0	97.2	106.9	102.4	95.1	103.3	100.0
1990	98.4	97.9	98.6	99.9	94.2	90.0	97.3	107.4	102.9	95.9	101.3	100.0
1991	96.7	95.0	102.4	98.8	92.7	87.3	94.3	105.9	101.9	94.7	100.7	100.0
1992	96.7	94.8	102.2	98.5	92.4	87.0	94.0	105.3	102.8	95.4	100.3	100.0
1993	97.7	95.5	102.1	99.4	90.8	86.9	93.8	105.3	103.3	97.3	99.9	100.0
1994	97.5	95.7	103.4	98.4	91.6	87.5	93.3	105.1	103.7	96.5	100.7	100.0
1995	96.9	95.6	103.5	97.0	89.7	86.6	95.0	104.2	103.8	95.1	100.3	100.0
1996	96.9	95.1	105.2	97.1	89.3	85.6	95.7	105.1	105.3	98.3	100.6	100.0
1997	97.1	95.1	107.2	96.6	88.5	85.1	96.1	105.6	105.1	98.2	100.5	100.0
1998	96.6	94.6	108.8	95.5	87.7	85.1	95.5	106.0	106.5	99.5	100.5	100.0
1999	96.8	94.5	109.9	95.1	87.6	84.1	95.9	106.6	105.2	100.0	101.0	100.0
2000	97.9	93.3	110.2	93.2	86.4	83.6	97.2	107.8	105.8	101.3	100.8	100.0
2001	97.6	94.3	110.8	93.9	85.6	83.8	98.0	107.2	108.1	100.8	100.4	100.0
2002	99.4	93.4	111.3	93.2	84.0	85.4	99.0	106.5	107.0	100.1	100.9	100.0
2003	99.8	93.2	112.1	95.1	84.7	85.9	98.7	106.3	107.1	100.8	100.4	100.0
2004	100.0	93.4	112.7	95.5	84.7	85.5	98.7	106.6	106.9	101.3	99.6	100.0
Min	96.6	93.3	96.5	93.2	86.4	83.6	93.3	100.0	99.9	94.7	97.1	100.0
Max	100.0	101.4	110.2	104.2	100.6	100.1	100.4	107.8	106.5	101.5	105.6	100.0
Average	98.2	97.4	100.7	100.4	94.9	92.4	97.3	104.4	102.2	98.0	101.0	100.0
Min as % of average	98.3	96.1	94.6	93.5	89.6	91.3	95.7	95.5	97.2	96.3	96.2	100.0
Max as % of average	101.7	104.5	110.6	104.5	107.3	109.3	103.0	103.0	105.1	103.3	104.7	100.0

[1]Up to 1990: The old Länder; from 1991: Old and new Länder

Table 2: Change in relative labour unit cost position relative to all of Germany in the eight years following the base year (negative values denote improvement of competitiveness) in %

Base year	Baden-Wuerttemberg	Bavaria	Berlin	Bremen	Hamburg	Hesse	Lower Saxony	North Rhine-Westphalia	Rhineland-Palatinate	Saarland	Schleswig-Holstein
1970	-1.7	-1.0	-1.4	2.9	-1.8	-4.3	-2.1	3.6	2.4	-0.4	-1.0
1971	-0.1	-0.2	-2.1	0.4	-4.1	-4.5	-1.3	2.3	2.2	0.3	0.9
1972	2.1	-0.7	-4.1	-3.4	-3.5	-5.6	-2.1	2.4	2.6	-1.3	2.3
1973	0.8	-2.6	-3.0	-3.9	-2.8	-3.9	-1.0	3.0	0.8	-3.5	5.8
1974	0.3	-4.1	-4.1	-3.0	0.6	-4.1	-2.3	4.2	-0.1	0.1	6.7
1975	1.0	-3.0	-1.6	-1.1	-0.7	-5.1	-1.2	3.0	-1.5	0.1	8.8
1976	1.7	-3.1	-1.1	-1.7	-4.0	-4.3	-1.2	3.1	-0.8	-0.8	6.4
1977	2.2	-1.8	-0.2	1.0	-4.3	-3.4	-1.6	1.8	-0.5	-4.3	6.7
1978	1.1	-1.4	-0.9	1.3	-3.6	-2.3	-0.3	2.0	-2.4	-2.8	2.7
1979	0.1	-1.6	-1.9	-0.4	0.5	-3.1	-0.4	3.0	-2.2	-3.3	0.9
1980	-0.8	-1.6	0.4	2.4	-0.2	-2.4	0.1	2.7	-1.2	-2.8	0.6
1981	-0.3	-0.4	0.4	3.7	-0.7	-4.7	-1.3	2.8	0.7	-2.1	-1.5
1982	-1.0	0.8	2.2	-0.5	-4.4	-4.8	-0.9	2.7	2.9	-2.0	-3.5
1983	-2.6	-2.3	5.9	-3.5	-5.4	-6.6	-3.8	0.9	1.7	-3.3	-4.6
1984	-3.2	-2.5	5.7	-3.0	-2.7	-6.7	-2.9	-0.5	2.1	-2.2	-3.9
1985	-1.9	-2.2	5.5	-4.1	-3.8	-6.7	-3.2	-0.2	2.1	0.2	-4.2
1986	-1.9	-2.0	5.8	-5.6	-3.2	-6.5	-4.5	-0.6	3.8	-0.4	-1.0
1987	-2.1	-1.5	6.5	-5.3	-6.8	-6.5	-3.2	-2.0	3.2	-1.0	-1.4
1988	-1.6	-2.1	7.6	-4.6	-7.8	-6.9	-2.5	-1.4	3.9	2.3	-1.5
1989	-1.3	-2.4	9.4	-5.5	-8.0	-6.5	-1.1	-1.2	2.7	3.3	-2.7
1990	-1.8	-3.4	10.3	-4.4	-6.9	-5.5	-1.8	-1.4	3.5	3.7	-0.8
1991	0.1	-0.5	7.4	-3.8	-5.4	-3.6	1.7	0.6	3.2	5.7	0.2
1992	1.2	-1.5	7.8	-5.4	-6.5	-3.9	3.5	2.4	3.0	6.2	0.5
1993	-0.1	-1.3	8.5	-5.5	-5.7	-3.7	4.5	1.7	4.6	3.7	0.5
1994	2.0	-2.4	7.7	-5.3	-8.3	-2.3	6.2	1.4	3.2	3.8	0.2
1995	3.1	-2.5	8.3	-2.0	-5.6	-0.8	3.9	2.0	3.1	6.1	0.1
1996	3.2	-1.8	7.2	-1.7	-5.2	-0.2	3.1	1.4	1.6	3.1	-1.0
Min	-3.2	-3.4	-4.1	-5.5	-8.3	-6.9	-4.5	-2.0	-2.4	-4.3	-4.6
Max	3.2	-0.2	10.3	2.9	0.6	-0.2	6.2	3.6	3.9	6.2	8.8

Table 3: Maximum increases and decreases in relative unit labour costs over eight-year-periods for the German Länder in %

Base year (eight-year-period starting in)	Max ULC decrease in following 8 years in %	Max ULC increase in following 8 years in %	Max ULC decrease in following 8 years	Max ULC increase in following 8 years	Land with maximum decrease	Land with maximum increase
	Including Berlin		Excluding Berlin			
1970	-4.3	3.6	-4.3	3.6	Hesse	North Rhine-Westphalia
1971	-4.5	2.3	-4.5	2.3	Hesse	North Rhine-Westphalia
1972	-5.6	2.6	-5.6	2.6	Hesse	Rhineland-Palatinate
1973	-3.9	5.8	-3.9	5.8	Hesse	Schleswig-Holstein
1974	-4.1	6.7	-4.1	6.7	Hesse/Berlin	Schleswig-Holstein
1975	-5.1	8.8	-5.1	8.8	Hesse	Schleswig-Holstein
1976	-4.3	6.4	-4.3	6.4	Hesse	Schleswig-Holstein
1977	-4.3	6.7	-4.3	6.7	Hamburg	Schleswig-Holstein
1978	-3.6	2.7	-3.6	2.7	Hamburg	Schleswig-Holstein
1979	-3.3	3.0	-3.3	3.0	Saarland	North Rhine-Westphalia
1980	-2.8	2.7	-2.8	2.7	Saarland	North Rhine-Westphalia
1981	-4.7	3.7	-4.7	3.7	Hesse	Bremen
1982	-4.8	2.9	-4.8	2.9	Hesse	Rhineland-Palatinate
1983	-6.6	5.9	-6.6	1.7	Hesse	Rhineland-Palatinate
1984	-6.7	5.7	-6.7	2.1	Hesse	Rhineland-Palatinate
1985	-6.7	5.5	-6.7	2.1	Hesse	Rhineland-Palatinate
1986	-6.5	5.8	-6.5	3.8	Hesse	Rhineland-Palatinate
1987	-6.8	6.5	-6.8	3.2	Hamburg	Rhineland-Palatinate
1988	-7.8	7.6	-7.8	3.9	Hamburg	Rhineland-Palatinate
1989	-8.0	9.4	-8.0	3.3	Hamburg	Rhineland-Palatinate
1990	-6.9	10.3	-6.9	3.7	Hamburg	Saarland
1991	-5.4	7.4	-5.4	5.7	Hamburg	Saarland
1992	-6.5	7.8	-6.5	6.2	Hamburg	Saarland
1993	-5.7	8.5	-5.7	4.6	Hamburg	Rhineland-Palatinate
1994	-8.3	7.7	-8.3	6.2	Hamburg	Saarland
1995	-5.6	8.3	-5.6	6.1	Hamburg	Saarland
1996	-5.2	7.2	-5.2	3.2	Hamburg	Baden-Wuerttemberg
Max	-8,0	10,3	-8,0	8,8		
Memorandum: relative unit labour cost changes 1998-2006						
Italy	9.4					
Spain	11.3					
Portugal	16.8					
Germany	-8.9					
Greece	8.8					

Table 4: Maximum increases and decreases in relative unit labour costs over eight-year-periods for the US States in %

Base year (eight-year-period starting in)	Max ULC decrease in following 8 years in %	Max ULC increase in following 8 years in %	Max ULC decrease in following 8 years in %	Max ULC increase in following 8 years in %	State with maximum decrease	State with maximum increase
	Including Alaska & Washington, D.C.		Excluding Alaska & Washington, D.C.		Excluding Alaska & Washington, D.C.	
1977	-35.0	12,5	-6,9	12,5	Iowa	Texas
1978	-10.3	12,3	-8,2	9,1	West Virginia	New Mexico
1979	-21.7	14,7	-14,4	7,0	Wyoming	New Mexico
1980	-15.6	16,9	-15,6	11,3	Wyoming	New Mexico
1981	-19.1	14,6	-19,1	12,3	Wyoming	North Dakota
1982	-21.8	12,3	-21,8	6,4	Wyoming	North Dakota
1983	-18.5	15,1	-18,5	5,5	Wyoming	Michigan
1984	-13.8	13,0	-13,8	6,5	Wyoming	Michigan
1985	-14.3	14,5	-14,3	9,3	Wyoming	North Dakota
1986	-14.6	12,2	-14,6	6,8	New Mexico	Louisiana
1987	-12.6	23,1	-12,6	8,0	New Mexico	Montana
1988	-15.6	21,5	-15,6	12,9	New Mexico	Louisiana
1989	-19.2	17,0	-19,2	12,9	New Mexico	Louisiana
Max	-35.0	23,1	-21,8	12,9		
Memorandum: relative unit labour cost changes 1998-2006						
Italy	9.4					
Spain	11.3					
Portugal	16.8					
Germany	-8.9					
Greece	8.8					

Table 5: Different Measures of Relative Unit Labour Cost Developments in the 50 US States and Washington, D.C.

	Highest increase (lowest decrease) over eight-year period	Highest decrease (lowest increase) over eight-year-period	Maximum level	Minimum level	Average level	Maximum as % of average	Minimum as % of average.
Alabama	2.4	-2.3	100.0	96.3	98.4	101.6	97.8
Alaska	23.1	-35.0	100.0	57.9	70.9	141.1	81.7
Arizona	4.5	-4.8	105.7	100.0	102.6	103.0	97.5
Arkansas	3.0	-1.8	102.7	99.2	100.5	102.2	98.8
California	0.4	-2.4	101.0	97.4	99.3	101.7	98.1
Colorado	7.0	-1.4	107.6	100.0	105.0	102.4	95.2
Connecticut	-0.5	-3.8	100.5	95.0	98.2	102.3	96.7
Delaware	1.0	-7.7	103.7	90.5	96.6	107.3	93.7
District of Columbia	16.9	10.0	130.4	97.9	112.9	115.5	86.7
Florida	6.7	1.6	107.6	98.1	102.8	104.7	95.4
Georgia	1.2	-3.1	100.0	96.0	97.9	102.2	98.1
Hawaii	6.0	-0.1	104.9	96.0	100.9	104.0	95.1
Idaho	2.4	-4.1	100.0	91.4	95.2	105.1	96.1
Illinois	1.4	-4.1	100.0	95.6	97.1	103.0	98.5
Indiana	-0.4	-3.8	101.1	94.6	97.7	103.5	96.9
Iowa	3.8	-6.9	100.0	92.4	95.6	104.7	96.7
Kansas	6.2	-1.3	108.0	100.0	103.7	104.1	96.4
Kentucky	1.3	-2.4	102.3	97.5	100.0	102.3	97.5
Louisiana	12.9	-13.9	119.0	99.5	109.1	109.0	91.2
Maine	2.8	-3.5	101.4	97.8	100.0	101.4	97.8
Maryland	5.1	-0.6	105.9	98.7	101.0	104.9	97.7
Massachusetts	1.1	-2.0	100.0	97.0	97.9	102.2	99.1
Michigan	6.5	-3.4	105.4	97.7	102.0	103.3	95.8
Minnesota	6.1	-2.1	104.6	98.0	101.1	103.4	96.9
Mississippi	4.0	-5.8	102.3	95.1	99.4	102.9	95.7
Missouri	1.7	-0.7	102.8	98.9	100.5	102.3	98.3
Montana	8.0	-4.1	107.6	97.8	101.4	106.1	96.4
Nebraska	2.3	-4.7	100.0	92.7	96.2	103.9	96.4
Nevada	3.2	-1.5	105.3	100.0	103.3	102.0	96.8
New Hampshire	-1.5	-8.0	100.0	86.5	93.7	106.8	92.4
New Jersey	-0.3	-3.4	100.0	94.6	96.9	103.2	97.6
New Mexico	11.3	-19.2	114.4	91.6	105.0	109.0	87.2
New York	5.5	0.4	103.0	96.5	100.5	102.4	96.0
North Carolina	3.0	-1.0	103.0	98.5	100.8	102.2	97.7
North Dakota	12.3	-5.5	108.6	91.8	100.4	108.1	91.4
Ohio	0.6	-5.1	100.5	93.6	96.8	103.9	96.7
Oklahoma	7.2	-4.4	111.2	100.0	106.9	104.1	93.6
Oregon	3.3	-5.6	103.4	97.1	101.3	102.1	95.9
Pennsylvania	-0.5	-4.3	100.0	93.7	96.3	103.9	97.3
Rhode Island	-0.4	-4.0	100.9	94.2	97.5	103.5	96.6
South Carolina	-3.4	-5.5	100.0	88.8	93.6	106.8	94.8
South Dakota	5.7	-6.5	100.8	93.2	97.4	103.5	95.8
Tennessee	2.3	-2.4	100.6	96.5	98.2	102.4	98.2
Texas	12.5	-4.6	113.4	100.0	108.6	104.4	92.1

Utah	3.9	-1.6	102.8	98.4	101.0	101.8	97.5
Vermont	1.0	-5.4	100.0	91.5	95.1	105.1	96.2
Virginia	7.1	0.3	108.5	99.5	104.2	104.1	95.4
Washington	8.0	-2.1	108.9	99.4	102.2	106.5	97.3
West Virginia	-1.9	-11.6	102.9	87.0	94.0	109.4	92.5
Wisconsin	2.5	-5.8	101.2	95.4	97.9	103.4	97.4
Wyoming	1.8	-21.8	110.3	86.2	95.8	115.1	90.0
Maximum	16.9		130.4		112.9	141.1	
Minimum		-35.0		57.9			70.9
Max. (without AK & DC)	12.9		119.0		109.1	115.1	
Min. (without AK & DC)		-21.8		86.2			86.9

Table 6: Relative Nominal Unit Labour Costs in the US Census Regions, 1977=100

	New England	Mideast	Great Lakes	Plains	South-east	South-west	Rocky Mountains	Far West	USA
1977	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
1978	99.4	98.8	100.6	99.9	100.1	102.5	100.1	99.9	100
1979	98.7	97.7	100.6	99.7	100.2	104.9	100.9	100.4	100
1980	98.3	97.9	100.5	100.6	100.2	106.8	100.2	99.7	100
1981	98.1	98.3	99.3	98.2	100.5	109.9	102.1	99.8	100
1982	97.9	98.4	98.8	98.2	101.0	111.2	103.1	99.1	100
1983	98.1	98.2	97.3	100.0	101.1	111.5	103.6	99.5	100
1984	98.5	98.5	96.5	99.0	101.6	111.6	104.1	99.5	100
1985	98.1	99.1	96.6	98.5	101.6	110.9	103.6	99.4	100
1986	97.5	99.2	96.7	99.1	101.3	110.6	103.8	99.3	100
1987	97.3	99.2	97.1	99.4	101.4	110.7	102.4	98.8	100
1988	97.8	99.2	97.7	100.1	101.7	108.0	102.4	98.7	100
1989	97.7	99.6	97.4	99.8	102.0	107.9	102.8	98.3	100
1990	97.3	99.4	97.8	100.3	102.5	108.1	102.7	97.7	100
1991	96.5	99.3	98.1	100.0	102.1	108.6	103.7	98.3	100
1992	96.3	99.3	97.6	100.0	102.6	107.3	103.7	98.7	100
1993	97.1	99.5	97.9	101.9	102.4	106.2	103.1	98.2	100
1994	97.0	100.2	97.5	101.0	102.0	105.7	103.5	98.8	100
1995	96.4	100.0	98.1	101.8	102.0	106.0	103.2	98.4	100
1996	96.5	100.2	97.6	101.1	102.5	105.8	103.6	98.4	100
1997	96.4	100.4	97.1	100.9	102.9	105.2	104.3	98.8	100
Max	106.0	101.6	109.6	101.6	98.3	98.6	100.6	99.8	
Min	102.1	99.0	105.1	98.0	95.6	88.4	96.5	97.2	
Average	103.5	100.4	106.9	99.8	97.0	95.1	99.1	98.5	
Max as % of average	102.4	101.2	102.5	101.9	101.3	103.7	101.6	101.3	
Min as % of average	98.6	98.6	98.3	98.2	98.5	92.9	97.4	98.7	

Tabelle 7: Change in relative labour unit cost position of US census regions relative to all of the USA in the eight years following the base year (negative values denote improvement of competitiveness) in %

Base year	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountain	Far West
1977	-1,9	-0,9	-3,4	-1,5	1,6	10,9	3,6	-0,6
1978	-1,8	0,4	-3,8	-0,8	1,2	7,9	3,7	-0,6
1979	-1,5	1,5	-3,5	-0,3	1,3	5,5	1,5	-1,6
1980	-0,5	1,3	-2,8	-0,5	1,4	1,2	2,3	-1,0
1981	-0,4	1,4	-1,9	1,6	1,5	-1,8	0,7	-1,5
1982	-0,6	1,1	-1,1	2,2	1,6	-2,7	-0,4	-1,4
1983	-1,6	1,1	0,8	0,0	1,0	-2,6	0,2	-1,2
1984	-2,2	0,9	1,1	1,0	1,0	-3,8	-0,3	-0,8
1985	-0,9	0,3	1,3	3,4	0,8	-4,2	-0,5	-1,1
1986	-0,6	1,0	0,8	1,9	0,7	-4,5	-0,3	-0,5
1987	-0,9	0,8	1,0	2,4	0,6	-4,3	0,7	-0,4
1988	-1,4	1,1	-0,1	1,0	0,8	-2,1	1,1	-0,3
1989	-1,4	0,7	-0,4	1,0	0,9	-2,4	1,5	0,5
Min	-2,2	-0,9	-3,8	-1,5	0,6	-4,5	-0,5	-1,6
Max	-0,4	1,5	1,3	3,4	1,6	10,9	3,7	0,5