

## **From the `Sick Man of Europe' to the `Economic Superstar': Germany's Rise from the Ashes**

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### **1. Introduction**

Labor market trends in OECD countries have been very different since the early 2000's. While at the beginning of the first decade of the new millennium, the US and the UK experienced low levels of unemployment (around 5% between 1998 and 2005) and robust economic growth, despite the cyclical downturn after the end of the New Economy boom (with average real GDP growth rates of 3.2% for the US and the UK over the period between

1998 and 2005)<sup>1</sup>, Germany's economy was characterized by sluggish growth (averaging just about 1.2% over the same period, with even negative growth in 2003)<sup>2</sup> and high unemployment rates (increasing from 9.2% in 1998 to 11.1% in 2005, and averaging at around 9% over the period). At the time, commentators and economists alike referred to Germany as the 'sick man of Europe'.<sup>3</sup> Although part of this may have been due to Germany still suffering from the high economic cost as a consequence of German reunification, many believed that Germany might have lost its competitive edge in a new global economy, due to its inflexible labor market and rigid product market regulations.<sup>4</sup> Thus, the common perception was that, in order to overcome its severe economic problems, Germany had to improve labor market flexibility, by abolishing rigid labor market institutions and product market regulations. If only the German economy could improve flexibility, then economic growth and lower levels of unemployment would follow suit.

Germany today, after the Great Recession, seems to be an entirely different country. Today's commentators speak of the "Economic Superstar" and refer to Germany as being in a "League of its own". The number of unemployed fell from about 5 Million in 2005 to about 3 Million in 2008, with an unemployment rate amounting to 7.7% in 2010 (6.6% in West Germany), as opposed to 9.6% in the US.<sup>5</sup> In contrast to most of its European neighbors and the US, Germany experienced almost no increase in unemployment during the Great Recession, despite a sharp decline in GDP in 2008 and 2009. Moreover, Germany's exports reached an all-time record in 2011, while other countries suffered large and increasing trade

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<sup>1</sup> Source: <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?display=default>.

<sup>2</sup> Source: <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?display=default>.

<sup>3</sup> See for instance The Economist, November 2004, <http://www.economist.com/node/3352024> and Paul Krugman, <http://web.mit.edu/krugman/www/kompete.html>.

<sup>4</sup> See for instance Krugman's comment, where he singles out inflexibilities inherent to German culture, citing Immanuel Kant's categorical imperative vs. William James' pragmatism.

<sup>5</sup> Source of German figures: Bundesagentur für Arbeit (2011); US figure: Bureau of Labor Statistics, <http://data.bls.gov/timeseries/LNS14000000>.

deficits.<sup>6</sup> Between 2010 and 2011, German exports grew by 15.7% to a level of 1,738 Billion US dollars, which amounts to about 50 percent of its GDP (7.7% of world exports) in 2011. In the same year, exports represent about 14 percent of GDP (9.2% of world exports) for the US, and about 32 percent of GDP (3.5% of world exports) for the UK.<sup>7</sup> Even the Euro crisis seems so far not to have been able to stop Germany's strengthening economy and its new 'employment miracle'.<sup>8</sup> In sum, Germany has transformed itself from an ailing economy, the "sick man of Europe", slacking behind other OECD countries, to the "Economic Superstar" in less than a decade.

What has happened? Some have argued that the increase in competitiveness in Germany and the decrease in unemployment has been the result of a series of legislative labor market reforms that started in the mid-2000's, the so-called Hartz Reforms (see e.g. Rinne and Zimmermann, 2013). We argue in this paper that these reforms may have played a role in reducing the fiscal burden of the high level of unemployment (and of German unification) and in activating the long-term unemployed. However, these reforms did not play a decisive role for the transformation of the German economy, namely the restructuring of its labor market and the increase in competitiveness that has helped German exports.<sup>9</sup> We instead argue and present evidence that, contrary to widespread beliefs, the innate flexibility (to be precise: the use of the innate flexibility margins in times of weakening bargaining power of employees) of Germany's labor market institutions has been the main reason for Germany's economic success over the last decade.

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<sup>6</sup> Source: WTO, <http://stat.wto.org/StatisticalProgram/WsdbExport.aspx?Language=E>.

<sup>7</sup> Source: World Bank, <http://data.worldbank.org/indicator/NE.EXP.GNFS.ZS>.

<sup>8</sup> See Möller (2010) and Burda and Hunt (2011) who investigate why employment did not fall in Germany in 2008/2009 despite the strong decline in GDP.

<sup>9</sup> See also Carlin and Soskice (2008, 2009), who argue that it is restructuring by the private sector itself using traditional German institutions based on employer-worker cooperation, and not government labor market and welfare state reforms that are to be credited for the German recovery.

We explore several pieces of evidence to investigate these issues. We first show that Germany's competitiveness, measured as relative unit labor cost started to dramatically increase in the early- to mid-1990's. This trend coincided with an increase in wage inequality below the median and low wage growth overall, a trend which precedes the Hartz reforms by about 10 years. In a next step, we investigate in more detail whether this increase in wage inequality and the decline in real wages below the median helped to improve Germany's competitiveness. A first piece of evidence seems to contradict this hypothesis: contrary to other sectors of the economy, the manufacturing sector—the backbone of the German export industry accounting for 80% of total exports—experienced only a small increase in wage inequality below the median until the early 2000's, and a decrease in real wages only at the lower percentiles of the wage distribution since the early 2000's. Nevertheless, we demonstrate that unit labor costs in end products have decreased considerably also in this sector. Using input-output relationships, we first show that this is partly due to those industries that provide *inputs* to the tradable manufacturing sector (in particular tradable services) having experienced declines in real wages and rising inequality, particularly at the lower end. Our findings further highlight that the rapid increase in productivity in the manufacturing sector, relative to the increase in wages in that sector, was a second important factor which contributed to the decline in unit labor costs.

Having demonstrated that the moderate increase in the level of real wages relative to productivity, in both the manufacturing sector and the other sectors in the economy, has played an important role in the favorable evolution of unit labor cost in the German tradable manufacturing industry, we then investigate the mechanisms that allowed for wage restraint, and the dramatic decrease in real wages at the lower end of the wage distribution.

The specific feature of the German system of industrial relations that we stress is that it is not rooted in legislation and it is not governed by the political process, but laid out in contracts and mutual agreements between the three main labor market parties, these being employer associations, trade unions, and works councils. We particularly highlight three pertinent features of Germany's labor market institutions: i) there is no statutory minimum wage, but a framework of negotiated base wages; ii) employers can leave union contracts that regulate wages and working hours – or may threaten to do so to obtain wage concessions; and iii) even within union wage contracts negotiated at the industry level, there is scope for wage and working hours flexibility at the firm level, if workers' representatives agree to this. We demonstrate that the share of workers covered by any kind of union agreement sharply declined, while firm-level deviations from industry-wide union agreements sharply increased since the mid-1990's, leading to an unprecedented localization of the wage setting process, from the industry level to the firm level. Hence, this system – removed from the legislator and therefore the median voter—was not at all rigid, as commonly believed, but in fact offered various margins of flexibility—provided that the key decision makers mutually agree to make use of them. This is in contrast to many of Germany's neighbors where the statutory minimum wage is often high, where union wages and work hour regulations apply to all firms in the industry, and where institutional change therefore requires broad consensus along the political spectrum.<sup>10</sup>

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<sup>10</sup> Boeri (2011) provides a recent assessment of the political economy of labor market reforms with a particular focus on Southern Europe. He argues that the political process often allows only for two-tier reforms (affecting only a subset of all employees) instead of complete reforms, which may not result in an increase of competitiveness. See also Carlin (2012) for an insightful comparison between the responses of German vs other European wage setting institutions to the introduction of the Euro.

In the last part of our analysis, we address the question as to why the inherent flexibility in Germany's labor market institutions was so apparent only from the mid-1990's onwards.<sup>11</sup> We argue that this was due to mainly two factors. First, the dramatic cost of German unification burdened the German economy in an unprecedented way, and was partly responsible for the dismal macroeconomic performance of the German economy for more than a decade. Second, the fall of the Berlin wall gave German employers access to neighboring East European countries that were formerly locked away behind the Iron Curtain, and that were characterized by low labor cost, yet stable institutions and political structures.<sup>12</sup> Both factors changed the power equilibrium between employer and employee associations and forced trade unions to react in a far more flexible way than many would ever have expected. Thus, while also preparing the political ground for labor market reforms introduced in the mid-2000's by the Social-Democratic/Green government of Gerhard Schröder, the key changes that led to increased competitiveness of German industry started much earlier, in the mid-1990's.

## **2. How Did Germany improve its Competitiveness?**

### **2.1 Relative Unit Labor Cost**

In figure 1 we plot the relative unit labor costs (RULC) for a country's overall economy adjusted for the changing composition of the markets in which it competes, for a selection of countries, in dollar terms. This index is computed as the relative change in the unit labor

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<sup>11</sup> See Streeck (1997) for a fascinating description and history of German economic institutions. Streeck points out that these institutions are important in explaining Germany's international competitiveness in the decade before unification.

<sup>12</sup> Burda (2000) predicted that the EU-accession of Eastern European countries would benefit the labor markets in the old EU member countries (including Germany), partly by fostering a reduction of labor market rigidities in these countries.

costs over time (normalized to 1995) translated into US dollars at the current exchange rate compared to a weighted average of a country's trading partners.<sup>13</sup> The weights of the trading partners adjust annually to changes in trading patterns. If a country does not change its competitiveness relative to other countries, this index would remain constant. An increase in this index indicates a real effective appreciation and a corresponding deterioration of the competitive position. Competitiveness can be improved in three ways: First, by decreasing the wage per worker (or per hour); second, by increasing productivity (per worker or per hour); and finally, by nominal depreciation of one's currency.

Figure 1 shows that – from the beginning of the observation window onwards, in 1995 – Germany's competitiveness has persistently improved, while the competitiveness of some of its main trading partners within the EU – Spain, Italy, and France – has deteriorated (Spain and Italy) or remained close to the 1995 position (France). The UK's competitiveness has likewise deteriorated, but improved dramatically between 2007 and 2009, which is due to the sharp depreciation of the British Pound against other currencies. Such a depreciation was not possible for France, Italy and Spain, as they share the Euro as a common currency with Germany, which leaves these countries only with two options to improve competitiveness: wage restraint, or improvement in productivity. The US has also lost competitiveness relative to Germany in the late 1990's as the euro depreciated following its

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<sup>13</sup> This index accumulates the annual change in the relative unit labor costs of country *i* compared to a weighted average of its main trading partners where labor costs are translated into dollars and the weights are adjusted annually to the change in trade pattern. The annual change in logs is calculated as  $\Delta \log(RULC_{it}) = \Delta \log(ULC_{it} e_{it}) - \sum_{j \neq i} g_{ij}^{t-1} \Delta \log(ULC_{jt} e_{jt})$  where  $ULC_{it} = (w_{it} L_{it}) / Y_{it}$  are the unit labor cost for country *i* in period *t*, computed as the total wage bill  $w_{it} L_{it}$  divided by the value added of the country's industry  $Y_{it}$ . The unit labour costs are translated into in US dollars using the exchange rate  $e_{it}$ . Both the unit labor costs and the exchange rates are defined as index relative to some base year. The weighting scheme  $g_{ij}^{t-1}$  takes account of the structure of competition in both export and import markets of the goods sector of those countries, and it adjusts on a year-by-year basis. See OECD Economic Outlook, Volume 2012 Issue 2 - No. 92 and OECD Economic Outlook Sources and Methods (<http://www.oecd.org/eco/sources-and-methods>) for details on the method of calculation.

introduction, but improved consistently after the 2001 recession, partly achieved through a dollar depreciation (for instance, while the €/ \$ Exchange rate was around 1 in 2001, it deteriorated to 0.8 in 2009). Thus, figure 1 demonstrates that the German economy has continuously gained competitiveness. This was not achieved through nominal devaluation, as that would have improved competitiveness also in countries like France, Italy and Spain (who are members of the Eurozone). Rather, it was achieved because wages grew at a slower pace than productivity.

## **2.2 Wage Trends and Wage Inequality**

How have wages developed in Germany over that period? Figure 2 shows the evolution of real wages in West Germany from 1990 onwards.<sup>14</sup> The figure illustrates the dramatic development in wage inequality in West Germany over the past 1 ½ decades, which has been demonstrated in Dustmann et al. (2009) (see also Antonczyk et al., 2010 and Card et al., 2013).<sup>15</sup> Real wages at the 15<sup>th</sup> percentile fell dramatically from the mid-1990's onwards, and moved away from wages at the median. From the early 2000's onwards, also median real wages started to fall, and only wages at the top of the distribution continued to rise.

If the increase in wage inequality and the modest growth in wages overall —and in particular the dramatic decline in real wages at the bottom of the wage distribution—has contributed to the favorable evolution of unit labor costs in Germany relative to the US and other EU countries, then one should expect this development to have been particularly pronounced in the tradable manufacturing sector – the backbone of the German exporting

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<sup>14</sup> We provide details on the data sets used in Appendix A.

<sup>15</sup> Notice that all wage figures that we report stand for West Germany (although, henceforth, we refer to them most of the times as “Germany”), as developments in East Germany are affected in a specific way by the transition after German unification, and East Germany has played a minor role for the overall international competitiveness of the German economy.



industries accounting for 80% of German exports. Breaking down the evolution of real wages along the wage distribution into three sectors, non-tradables, tradable manufacturing, and tradable services, a first glance seems to contradict this hypothesis.<sup>16</sup> In stark contrast to the non-tradable sector and tradable service sector, real wages in the tradable manufacturing sector rose at all percentiles of the wage distribution until the mid-2000's, and afterwards continued to rise at the median and the 85<sup>th</sup> percentile. Quite remarkably, real wages in the non-tradable sector hardly increased at all at any part of the wage distribution during the 1990's and started to decline from the early 2000's onwards even at the 85<sup>th</sup> percentile, but particularly so at the 15<sup>th</sup> percentile. The sharpest increase in inequality occurred in the tradable service sector, where between 1990 and 2008 real wages did not show an increase at the median, increased by 12 percent at the 85<sup>th</sup> percentile and declined by almost 15 percent at the 15<sup>th</sup> percentile. Thus, these figures do not seem to lend strong support to the hypothesis that wage restraint in the manufacturing sector was an important factor in improving competitiveness in that sector. However, this neglects at least two factors. First, the end product in manufacturing contains a large share of inputs produced in other sectors: the value added in manufacturing is only roughly 1/3 of the value of the end product, the remainder being contributed through inputs from other industries, either domestically, or from abroad.<sup>17</sup> Hence, the manufacturing industry may have benefitted from low wages in other domestic sectors or from cheap imports from abroad. Second, the manufacturing sector may have experienced increases in productivity which

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<sup>16</sup> We define tradable and non-tradable sectors based on the amount of total exports of a sector in 1995. "Tradable manufacturing" are all those tradable sectors that belong to the manufacturing sector, and "tradable services" are all other tradable sectors. Details on the construction of these categories can be found in Appendix A.

<sup>17</sup> The literature focuses almost exclusively on the role of imports of intermediate products from abroad (see e.g. Geishecker 2006, Sinn 2006, OECD 2007, chapter 3, and OECD 2012, chapter 3).

exceeded the increases in productivity in the other domestic sectors as well as the increases in wages in the manufacturing sector.

### **2.3 Real Wages, Restructuring, and Unit Labor Cost in the Manufacturing Sector**

Table 1 provides some preliminary evidence that both factors may be at play. The table first shows that in contrast to the non-tradable and tradable service sector, the tradable manufacturing [henceforth abbreviated by manufacturing] sector has been continuously shrinking in employment since 1995, while it has kept its share in value added at current prices (produced in Germany) roughly constant. These developments point to larger productivity increases in the manufacturing sector than in the other sectors (which is common across countries, see e.g Pilat et al. 2006), as the same amount of output is now produced with fewer workers.<sup>18</sup> The table further highlights that in contrast to the other sectors, the share in production value in the manufacturing sector considerably exceeds its share in value added, and this difference has been steadily increasing throughout the observation period. This suggests that the manufacturing sector indeed relies on inputs from the other two domestic sectors, and may thus have benefitted from the low wage gains in these sectors. It further suggests that the manufacturing sector has outsourced part of its production—either by increasing inputs from domestic sectors, or by increasing imports from abroad.<sup>19</sup>

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<sup>18</sup> Pilat et al. (2006) point out that the relatively fast productivity growth in manufacturing is associated with relative declines of the prices for manufacturing products (this is Baumol's cost disease). Thus, shares in value added at current prices understate the share of value added at constant prices in manufacturing to total value added at constant prices, and it is even more remarkable that manufacturing in Germany has retained its share in value added at current prices.

<sup>19</sup> Agency workers provide another source margin of flexible labor input, which has grown in Germany from 1.1% of employment in 2003 to 2.6% in 2008 (Spermann 2011, Figure 4).

Table 2 reports the value of inputs over the value of output (Panel A), the value of domestic inputs over the value of output (Panel B), and the value of domestic inputs over the value of total inputs (Panel C), for the three sectors. In line with Table 1, the figures in Panel A first highlight that the value of inputs over the value of output is nearly twice as high in manufacturing as in the other two sectors (66.13% in 1995 vs. 37.86% in the tradable service sector). The figures in Panel A also point to increased outsourcing in the manufacturing sector, as this share has increased by about 7 percentage points to 72.9% in 2007. The figures in Panel B reveal that this increase is entirely driven through increased use of inputs from abroad as opposed to increased inputs from domestic industries, as the value of domestic inputs has slightly decreased over the same period, from about 51.7% in 1995 to 51.2% in 2007. In consequence, the ratio of domestic inputs over the total inputs has decreased in the manufacturing sector (as well as in the other sectors) over that period. However, this decrease has not been dramatic, and even in 2007, 70% of inputs in the manufacturing sector are domestically produced. Thus, based on these figures, the argument that Germany's manufacturing sector has become an assembly place for foreign produced inputs, as argued by Sinn (2006) and mirrored in the public debate in Germany during the mid-2000's (see e.g. the front page story in the weekly "Der Spiegel" 2004), is hardly justifiable. Rather, what the figures show is that a substantial fraction of the final output value in manufacturing remains to be contributed by domestic inputs.

Table 3 focuses on the manufacturing sector, and shows the sector shares of the value of overall (Panel A) and domestically produced (Panel B) inputs into manufacturing, while Panel C provides the ratio of domestic to total inputs. For instance, for 1995, Panel A shows that 6%, 62%, and 32% of the value of inputs into manufacturing come from the non-tradable,

tradable manufacturing, and tradable service sectors. While the input of tradable services into manufacturing has decreased overall, the share of domestic inputs has remained high, and relatively constant, at around 90% (see Panel C). Thus, given that between 22% and 29% of inputs into manufacturing stem from domestic tradable services, and around 4% from the domestic non-tradable sector (see Panel B), the manufacturing sector may well have been able to take advantage of the lower wage growth in these two other domestic sectors.

We next investigate to what extent domestic inputs have contributed to competitiveness in the export oriented manufacturing sector and the two other sectors. In Figure 4, we plot the evolution of unit labor costs in the three sectors (Panels A-C), where industries are weighted with respect to their exports for the two tradable sectors.<sup>20</sup> When computing unit labor costs, we first consider only the value added in a sector (“value added”, denoted by the solid line in Figure 4). We then consider total output value in the sector, that is, the sum of value added in the sector and inputs from other sectors (“end products”, denoted by the dotted lines in Figure 4). This latter index incorporates gains in competitiveness in one sector due to the usage of inputs from other domestic sectors. We also plot median real wages, adjusted using the CPI index, for the three sectors. While real wage growth in the manufacturing sector is relatively modest, at about 8.2% over the 12 year period, it is—as Figure 3 suggests—considerably higher than in the other two sectors, where average wages fell in real terms by 1.2% and 4.1%, respectively, over the same time period. Thus, the overall competitiveness of tradable manufacturing industries, as measured by unit labor costs in end products, may have partly improved because of the decline in real wages in the two other sectors.

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<sup>20</sup> Details on how the figure was constructed can be found in Appendix B.

Indeed, as visible in the figure, domestic unit labor cost for total production in manufacturing, taking account of inputs produced in other sectors ("end products"), declined far more rapidly than unit labor costs in value added, by about 27.9% as opposed to 6.5% over the 12 year period. Moreover, unit labor costs in end products start to decline already at the start of the observation period, in 1995, while unit labor costs in value added decrease rapidly only from 2002 onwards when mean wages, and in particular wages at the 15<sup>th</sup> percentile of the wage distribution start to decrease in real terms (see also Figure 3). Thus, Germany's manufacturing sector partly improved competitiveness by drawing on inputs from domestically provided non-tradable and especially tradable services, where real wages fell between 1995 and 2007. In comparison, total unit labor costs fell less in the Non-Tradable Sectors (minus 22.2%) and much less in the Tradables Services (minus 9.7%), even though nominal wage grew much less in these two sectors compared to Tradable Manufacturing. Also note that, in line with the evidence in Table 1, the decline in unit labor costs, coupled with the increase in mean real wages, implies that productivity increases in the manufacturing sector have outpaced wage increases in that sector. Note also that productivity increases in the manufacturing sector have exceeded the increases in the two other sectors. Finally, a third factor which may have contributed to the increased competitiveness of the manufacturing sector are inputs imported from abroad—which make up 14.46% (66.13% minus 51.67%, see Table 2) of total output in the manufacturing sector in 1995, and 21.53% in 2007. Doing so, German manufacturing has made successful use of the opportunities to outsource and offshore productions to low-wage countries in Eastern Europe in order to increase the competitiveness of its own final products.<sup>21</sup>

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<sup>21</sup> This line of argument is consistent with the growing export surplus of Germany with the low wage countries in Central and Eastern Europe (Dauth et al. 2012) and the rising integration of Central and Eastern Europe into

### **3. How could the Increase in Competitiveness be accommodated by Germany's Labor Market Institutions?**

Having demonstrated that the moderate increase in the level of real wages played an important role in the favorable evolution of unit labor costs in the German tradable manufacturing industry, we now investigate the mechanisms that allowed for overall wage restraint, and for wages at the lower end of the wage distribution to decrease so dramatically. The hypothesis we put forward here is that Germany's labor market institutions are not at all rigid, as commonly believed. We instead argue that the German system of industrial relations offers various margins of flexibility, which led to an unprecedented increase in the localization of the wage setting process. This started in the early- to mid-1990's and helped to bring down wages in particular at the lower end of the wage distribution. In other words, we argue that key for the improvement in Germany's competitiveness since the mid-1990's was an unprecedented move towards localization of wage determination and working time, from the industry- and region-wide level to the level of the single firm or even the single worker.

While a detailed account of the German system of industrial relations is beyond the scope of this paper, the specific feature which we stress here is that it is not rooted in legislation and it is not governed by the political process, but laid out in contracts and mutual agreements between the three main labor market parties, these being trade unions,

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the international division of labor as measured by a strong rise in Foreign direct investment of German firms and growing intrafirm trade (Marin 2006). We also calculate the outsourcing indicator suggested by Egger and Egger (2003, p. 642) for Germany, France, and Italy regarding imported inputs from Poland, Hungary, the Czech and the Slovak Republic (Source: OECD Input-Output-Tables <http://www.oecd.org/trade/input-outputtables.htm> and OECD International Trade and Balance of Payments Statistics <http://www.oecd.org/std/its/>). Relative to GDP in the year 2000, imported inputs from these four countries amount to about 8.5% in Germany, 2.5% in Italy, and 1.9% in France. Thus, Germany has made greater use of trade integration with Eastern European countries compared to Italy and France.

employer associations, and works councils (i.e., worker representatives which are typically present in medium-sized and large firms).<sup>22</sup> As such, there is no statutory minimum wage, imposed by the political process, in Germany. Rather, there is an elaborate system of wage floors, which are negotiated periodically between trade unions and employer associations, typically at the industry and regional level, without the government exerting influence on the parties. Importantly, the recognition of trade unions is at the discretion of the firm, and union contracts cover only the workers in firms that recognize the relevant sectoral wage bargaining (union) contract - regardless of whether the worker is a union member (see e.g. OECD 2004, Fitzenberger et al. 2011 and Fitzenberger et al. 2013). Although still bound by the union agreements for a transitory period, firms that once recognized the union contracts can later opt out of the contracts at their own discretion. Below, we first show that the share of workers covered by union agreements has sharply declined since 1995 (see also Dustmann et al. 2009, Antonczyk et al., 2010), and then provide evidence that this erosion of collective bargaining coverage caused wages to fall, in particular at the lower end of the wage distribution.

Even within union wage contracts negotiated at the industry level, there is scope for wage flexibility at the firm level through so-called “opening” or “hardship” clauses, provided that workers’ representatives agree to this (see e.g., Hassel, 1999, Hassel and Rehder, 2001, or Carlin and Soskice, 2009, Brändle et al. 2011, and Bispinck et al. 2010). Below, we show that opening clauses have become increasingly common, and have further increased the importance of firm-based works councils in wage determination relative to trade unions. Other than trade unions, works councils have the benefit of the single firm at heart, and may

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<sup>22</sup> The principle of autonomy of wage bargaining is laid down in the German constitution and implies that negotiations take place without the government directly exerting influence.

thus be more prepared to agree to changes in wage agreements than unions if it helps to maintain employment. Both de-unionization and firm-level deviation from industry-wide agreements through opening clauses have led to an unprecedented increase in the localization of the wage setting process. The localization hypothesis is consistent with the findings in the literature that the rise in firm level differences in wages contributes strongly to the rise in wage inequality in Germany (see Antonczyk et al., 2010 and Card et al., 2013).

### **3.1 Unions and Employer Associations**

Contractual agreements between unions and employer associations are negotiated either on the region-industry level, or on the firm level. In addition to wages, working time regulations are an important component of the negotiations between unions and employer associations.

Since the mid-1990's, union coverage rates have declined sharply. While in 1995 only 14.1% of West German workers were neither covered by a firm- nor by an industry-wide agreement, this number has more than doubled (to 34.6%) by 2008.<sup>23</sup> This decline in union coverage is almost entirely driven by a decline in industry-wide agreements. Has this decrease in union coverage rates contributed to a reduction in wage growth and to an increase in inequality? We investigate this in Figure 5, where we plot the observed changes in log real wages between 1995 and 2008 along the wage distribution, together with the counterfactual changes which we compute by keeping unionization rates at the same level as in 1995.<sup>24</sup> The figure clearly shows that wages in 2008 would have been higher if union coverage had remained the same as in 1995 throughout the entire wage distribution, but

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<sup>23</sup> Own calculations based on the LIAB.

<sup>24</sup> We use the re-weighting approach developed in DiNardo, Fortin and Lemieux (1996) to recover the counterfactual wage distribution.



particularly so at the lower end of the wage distribution. For instance, the decline in union coverage is associated with a decrease in real wages of 6.7% at the 15<sup>th</sup> percentile, of 3.8% at the median, and 2.1% at the 85<sup>th</sup> percentile. Thus, the reduction in union coverage, partly driven by employers leaving the employers' associations, has contributed to the overall wage restraint, and the fall in real wages at the lower parts of the wage distribution.

### **3.2 Works councils and Opening Clauses**

Our analysis of wage inequality further reveals that wage inequality has also increased strongly among employees covered by union contracts, thus suggesting that the German system of industrial relations has allowed for flexibility even within the unionized sector.<sup>25</sup> Next, we argue that this is due to the increased importance of works councils within that sector. Works councils have to be set up in establishment with more than 5 employees when demanded so by the employees, and the size of the works council then depends on the size of the establishment. About 92 percent of employees in establishments that have more than 50 employees work in establishments with a works council, while it is only 18 percent of employees in establishments that are smaller.<sup>26</sup>

Works councils have become more important since the beginning of the 1990s, when industry-level collective bargaining came under increasing pressure from employers who demanded more firm-specific, differentiated regulations. In response, the trade unions and employers' associations agreed on an increasing number of "opening clauses" in industry-level collective agreements (first these were only opening clauses regarding hours of work regulations only; later on these became opening clauses regarding also wages), which

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<sup>25</sup> Calculations based on the LIAB show that among employees covered by union wages, wages at the 15<sup>th</sup> percentile declined by 5.1%, while wages at the 85<sup>th</sup> percentile rose by 11.9%, between 1995 and 2008.

<sup>26</sup> See Addison et al. (1997) and Beckmann et al. (2010).

enlarged the scope of decision-making on the firm level. Opening clauses allow firms to deviate from collectively agreed industry-wide standards, and to achieve differentiated establishment agreements that are tailored at the needs of the particular firm. Initially, they were only temporarily allowed for to avoid bankruptcy (hardship clauses); later they were also implemented to ensure competitiveness in more general terms. They cover both pay and working time agreements, and supersede the industry-level collective bargaining agreements. Firms that use opening clauses negotiate the details concerning pay and working time agreements with the works council.<sup>27</sup>

Brändle et al. (2011, figure 1) report that opening clauses for wages only started to gain importance in 1995 (which is about the time when wage inequality at the bottom of the wage distribution started to increase considerably). Among industry-wide collective contracts in manufacturing, in 1995 less than 5% involved opening clauses for wages, while this number increased to about 60% in 2004. Bispinck (2007) reports that, according to a survey of works councils in 2005, about 75 percent of all firms with collective agreements use opening clauses (see also Bispinck et al. 2010). As a result, even though the industry-wide collective wage contracts are still the most prevalent form of regulation of pay and work conditions in the German labor market, they have lost strength and power of impact in favor of works councils.

#### **4. What led to higher Flexibility of the German Labor Market?**

Why did the inherent flexibility in Germany's labor market institutions come to bear only from the mid-1990's onwards and not earlier, in the sense that it lead to visible wage

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<sup>27</sup> Firms without a works council cannot use opening clauses. Instead, such firms may decide to stop recognizing a union contract. Firms with a works council not covered by a union contract may reach an agreement on wages with the works council.

restraint and decreasing real wages at the lower end of the wage distribution? After all, firms have always had the option not to recognize a union contract and to pay wages below the union wage, and opening clauses had been possible before the mid-1990's. The short answer is that none of the changes in the economic conditions has put the German economy, which is, and has always been much export oriented, in such a dramatic situation as the fall of the Berlin wall and the opening up of Middle and Eastern European economies to the market model. On the one hand, the extraordinary cost of German unification burdened the German economy in an unprecedented way, which is partly responsible for the Germany's dismal performance throughout the 1990's and early 2000's.<sup>28</sup> On the other hand, Central and Eastern European countries constituted a unique opportunity for German industry to move production abroad, for two reasons. First, it was clear very early on that political stability and a firm commitment to the market model would create a stable investment climate, with little risks and uncertainties. Second, despite being locked away for several decades behind the iron curtain, most Central European countries had a long history of trade and interaction with Germany. The structure of industry and education systems for instance, shared many similarities, which survived the Soviet era. For example, vocational training plays, similar to Germany, a key role in the education system in countries like Hungary or Poland. German was also a language widely spoken in parts of Central and Eastern Europe. At the same time, wages in these countries were far lower than in Germany, and working regulations more flexible (see e.g. Geishecker 2006, Marin 2006). Although in

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<sup>28</sup> The German Council of Economic experts (SVR 2004, Table 100, p. 644) estimates net transfers of about 900 billion Euros from former West Germany to East Germany during the time period 1991 to 2003. The total sum of net transfers corresponds to about 48% of the average of one year's GDP during that time period.

the end moving production abroad to these countries took place at a moderate pace<sup>29</sup> and Germany experienced a growing export surplus<sup>30</sup>, the threat of German firms to locate production to these low-wage countries was very credible, and widely discussed in public (see, for instance, DIHK 2003, FAZ 2004, and Der Spiegel 2004, the latter two being among the key German media outlets).

Therefore, the fiscal burden of German re-unification, coupled with an ever more competitive global environment, made it increasingly costly for firms to recognize the union and pay high union wages. At the same time, new opportunities to move production abroad, changed the power equilibrium between trade unions and employer federations, and forced unions and/or works councils to accept, through opening clauses, deviations from industry-wide agreements which often resulted in lower wages for workers. Unions' willingness to agree to opening clauses was reinforced by the fact that firms could opt out, or threaten to opt out, of collective agreements altogether which put unions in a situation in which they realized that they had to make concessions in order not be further marginalized. In that situation, trade unions reacted in a way far more flexibly than many would ever have expected, and Germany's economic institutions allowed them to do so.

## **5. Discussion and Outlook**

We argue in this paper that the remarkable transformation of the German economy from the "sick man of Europe" to a lean and highly competitive economy within little more than a decade, is rooted in the inherent flexibility of the German system of industrial relations. This

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<sup>29</sup>The stock of German foreign direct investment to Poland, Hungary, as well as the Czech and the Slovak republics amounted to only about 1% of German GDP in 2000 and to about 2.3% in 2010 (Source: [http://stats.oecd.org/Index.aspx?DatasetCode=FDI\\_POSITION\\_PARTNER](http://stats.oecd.org/Index.aspx?DatasetCode=FDI_POSITION_PARTNER) and own calculations).

<sup>30</sup>See Dauth et al. (2012), who reports that growing international trade with Eastern Europe has been associated with employment gains in Germany.

system allowed German industry to react appropriately and flexibly to the demands of German unification, and the global challenges of a new world economy. Although the potential flexibilities within the system to localize negotiations always existed, firms had little incentives to use them in the relatively positive economic climate until the late 1980's. This dramatically changed in the early to mid-1990's, when the immense cost of German reunification, coupled with an increasingly competitive global environment, and helped by new opportunities of outsourcing to Eastern European countries, changed the power balance between employee representatives and employers, and unleashed a continuing process of wage de-centralization, both in the form of shrinking union coverage and in the form of firm-level deviations from industry-wide collective agreements, through opening clauses. Most likely, this development did not only bring down overall wages, but also led to a dramatic increase in wage inequality below the median, which until that point had, in sharp contrast to the UK and US, changed remarkably little. As we argue in this paper, it is these processes, together with an increase in productivity, which led to an increase of competitiveness of Germany relative to all its main trading partners.

But why did other Continental European countries not react in the same way? First, the particular economic situation in which Germany found itself in the early 1990's was to a large part specific to Germany, and was not felt in the same way in other countries. It is only later that countries like Italy and France felt the pressures of globalization and increased competition mainly from Asian countries, possibly being reinforced by the introduction of the Euro. Second, and perhaps more importantly, the system of industrial relations in other Continental European countries does not allow for the same inherent opportunities of flexible adaptation as the German system. For example, in countries like France and Italy,

union wages, often bargained at the national level, apply to all firms in the economy, regardless of whether the firm explicitly recognizes the union contract.<sup>31</sup> More generally, many of the regulations which are contractual in Germany are either legally enforced in other countries (such as the minimum wage in France) or nationally implemented (e.g., union agreements extend to all firms in the economy), and therefore require consent on a much higher level (nationally, or even on the political level) to be modified and changed. Only recently similar efforts of flexibilisation, although yet very limited, have become apparent. For instance, Fiat's CEO Sergio Marchionne has initiated in 2011 changes in industrial relations in Italy, with a shift toward the practice of regional and local bargaining over the traditional model of national agreements. Similar to the German situation in the mid-1990's, this shift has been the result of a tremendous economic pressure on Fiat, lacking competitiveness due to high labor costs, coupled with the threat of Marchionne to take production away from Italy. So far, however, this development has not been implemented more widely, but the decentralization of union agreements is certainly discussed.

Will other European countries be able to improve their competitiveness, through a similar process of restructuring and localization of wage and working hours negotiations? The answer depends on two factors. First, will their institutions allow such changes? Second, will the power balance between employer and employee associations shift in a direction that allows for such changes? The example of Fiat suggests that institutional changes are in principle possible. However, whether the small and medium sized employers in Italy that are

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<sup>31</sup> In Italy and France, coverage by union wage contracts has remained remarkably stable at very high levels (at about 90% in France and 80% in Italy) during the 1990s and the 2000s, see OECD (2004, 2012). Furthermore, in contrast to Germany, union wage contracts are typically extended to all workers in an industry (see OECD 2004, Table 3.4, p. 148). Adding flexibility into collective agreements would require political reforms at the national level.

so characteristic for the Italian economy will be able to achieve local agreements in the same way as Fiat remains to be seen.

In sum, we conclude that the localization of agreements affecting pay and working conditions was the key factor in improving the competitiveness of German industry. Our view therefore differs from the commonly presented argument that the improvement in German competitiveness has been the result of the labor market reforms implemented under the government of Gerhard Schröder, the so-called “Hartz Reforms” (see e.g. Rinne and Zimmermann, 2013). These reforms essentially reduced and limited the benefits while unemployed, liberalized agency work, reformed active labor market policies, and reorganized the Federal Labor Agency. These reforms were implemented starting in 2003, hence nearly a decade after the process of wage decentralization, and the improvement in competitiveness, had begun in Germany. We therefore believe that these reforms were not essential in this process, although they may have contributed to the recent decline in long-term unemployment and to the continued increase in wage inequality at the lower end of the wage distribution. In consequence, the argument that other European countries can go the same path than Germany, where all that is needed is the political will to implement similar reforms, brought forward by economists and politicians alike, may be misleading. Clearly, the inherent flexibilities built into Germany’s system of industrial relations have paved the way for the remarkable localization of wage determination, from the industry level to the level of the single firm or single worker, which together with a significant increase in productivity ultimately improved Germany’s competitiveness. Whether the political process alone would have been able to achieve a similar degree of wage decentralization, had these flexibilities not existed, is doubtful. Nevertheless, Germany’s

experience suggests that reforms targeting the system of industrial relations, by decentralizing bargaining to the firm level within the scope of the existing labor market institutions keeping workers' representatives involved, can improve the competitiveness of Continental European countries.

Some argue that it is the common European currency that has helped Germany to improve competitiveness. Again, we believe that that may have been one factor, but certainly not the main one, for various reasons. First, as we show in Figure 1, Germany has improved its competitiveness already during the 1990's, before the introduction of a common currency in 2001. Second, within the common currency area, and after 2001, Germany continued to gain competitiveness with respect to its main trading partners like Italy and Spain (again see figure 1). Third, the Euro, upon its introduction in 1999, and after a brief period of depreciation, persistently appreciated against the dollar, leading to the increase in competitiveness of the US. At least until the onset of the great recession, the Deutschmark (if the Euro had not been introduced) might not have appreciated much more against the dollar than the Euro has. It may have after the recession, but this is possibly more related to the nature of the German economy where the contamination of the financial sector was less severe than in the US or the UK. And finally, it is not clear whether an appreciation of a German currency (which probably would have taken place not before 2009) would have had a dramatic impact on overall competitiveness. For example, the depreciation of the pound by nearly 30% in 2008/2009 has done very little to help manufacturing exports for the UK.

What the Euro does for the countries within the Eurozone is another matter. Certainly, lacking the possibility of depreciation of national currencies, the only way to gain



competitiveness for countries like France, Italy and Spain is to reduce unit labor costs, through increasing productivity relative to real wages. Critics of the common currency claim that this is a main disadvantage. However, it increases the pressure for these countries to improve the flexibility of their labor market institutions and to restructure their economies – which is important to survive in the global market, and which would be less likely to happen without the straightjacket of the Euro and the possibility of depreciation. Whether these countries will succeed in this endeavor remains an open question. The more centralized and legally anchored nature of their labor market institutions, in comparison to Germany, puts them certainly at a disadvantage (see also Boeri 2011 and Carlin 2012).

What is the outlook? Recent negotiations between employers and employee associations in Germany suggest that future wage settlements will try to make good for the loss in real wages many workers experienced. Also, having recognized their loss of influence, unions are increasingly pressuring for new legislation that sets minimum standards on national level, and these demands are partly supported by politicians. The recently discussed introduction of a nationally binding minimum wage is only one example.<sup>32</sup> Thus, while Germany may still be able to improve its competitiveness through increases in productivity, the possibilities to do that by reducing labor costs seem limited in the future. This may help convergence between competitiveness of the countries in the Eurozone.

### **7998 words**

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<sup>32</sup> For instance, the German chancellor Angela Merkel agrees in 2013 to the introduction of a minimum wage, for cases where no union wage contract exists or is recognized.

## References:

- Addison, J., C. Schnabel and J. Wagner (1997). On the Determinants of Mandatory Works Councils in Germany, *Industrial Relations*, Vol. 36(4), 419-445.
- Antonczyk, D., B. Fitzenberger and K. Sommerfeld (2010). Rising Wage Inequality, the Decline of Collective Bargaining, and the Gender Wage Gap. *Labour Economics*, 17(5):835--847.
- Beckmann, M., S. Foehr and M. Kraekel (2010). Rent Seeking, Employment Security and Works Councils: Theory and Evidence for Germany, *Schmalenbach Business Review*, Vol. 62, 2-40.
- Bispinck, R. (2007) . Löhne, Tarifverhandlungen und Tarifsysteem in Deutschland 1995 - 2005, WSI Discussion Paper, No. 171, Düsseldorf.
- Bispinck, R., H. Dribbusch and T. Schulten (2010). German Collective Bargaining in a European Perspective: Continuous Erosion or Re-Stabilisation of Multi-Employer Agreements? WSI Discussion Paper, No. 171, Düsseldorf.
- Boeri, T. (2011). Institutional Reforms and Dualism in European Labor Markets, in: Ashenfelter, O. and D. Card (eds.). *Handbook of Labor Economics*, Volume 4A and 4B, North Holland, Elsevier, Amsterdam, Chapter 13, 1043-1171.
- Burda, M. (2000). Mehr Arbeitslose - der Preis für die Osterweiterung? Zur Auswirkung der EU-Osterweiterung auf die europäischen Arbeitsmärkte im Osten und Westen [More unemployment - the price of eastwards expansion? The impact of the eastwards expansion of the EU on European labor markets in the east and west], *Duncker & Humblot*, Serientitel: *Schriften des Vereins für Socialpolitik* , Neue Folge, 274, 79-102.
- Burda, M. and J. Hunt (2011). What Explains the German Labor Market Miracle in the Great Recession? *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, vol. 42(1), 273-335.
- Brändle, T., W.D. Heinbach and M.F. Meier (2011). Tariflich Öffnung in Deutschland: Ausmaß, Determinanten, Auswirkungen. *Journal for Labour Market Research*, Vol. 44(1-2), 163-172.
- Card, D., J. Heining and P. Kline (2013). Workplace Heterogeneity and the Rise of German Wage Inequality. Forthcoming in: *Quarterly Journal of Economics*.

- Carlin, W. (2012), 'Real exchange rate adjustment, wage-setting institutions, and fiscal stabilization policy: lessons of the eurozone's first decade' *CESifo Economic Studies*
- Carlin, W. and D. Soskice (2009). German Economic Performance: Disentangling the Role of Supply-side Reforms, Macroeconomic Policy and Coordinated Economy Institutions, *Socio-Economic Review*, Vol. 7, 67-99.
- Carlin, W and D. Soskice (2008) 'Reforms, Macroeconomic Policy and Economic Performance in Germany', in Schettkat, R., Langkau, J. (Eds.) (2008) *Economic Policy Proposals for Germany and Europe*. London and New York: Routledge.
- DIHK [Deutscher Industrie- und Handelskammertag] (2003). Offshoring of production as part of the globalization strategy of firms: Results of a firm survey in May 2003, Berlin (download from [www.dihk.de/ressourcen/downloads/produktionsverlagerung.pdf](http://www.dihk.de/ressourcen/downloads/produktionsverlagerung.pdf) on 27 May 2013).
- Dauth, W., S. Findeisen and J. Suedekum (2012). The Rise of the East and the Far East: German Labor Markets and Trade Integration. IZA Discussion Paper, No. 6685.
- Egger, H. and P. Egger (2003). Outsourcing and skill specific employment in a small economy: Austria after the fall of the Iron Curtain, *Oxford Economic Papers*, vol. 55(4), 625-643.
- DiNardo, J., N. Fortin and T. Lemieux (1996). Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach, *Econometrica*, vol. 64(5), 1001-1044.
- Dorner, M., Heining, J., Jacobebbinghaus, P. and S. Seth (2010): Sample of Integrated Labour Market Biographies (SIAB) 1975-2008, FDZ-Datenreport 01/2010.
- Dustmann, C., J. Ludsteck and U. Schönberg (2009). Revisiting the German Wage Structure. *The Quarterly Journal of Economics*, 124(2):843--881.
- FAZ [Frankfurter Allgemeine Zeitung] (2004). Outsourcing „Bis ich mit der Gewerkschaft klar bin, hat die Konkurrenz schon geliefert“ [„Until I have reached an agreement with the union, the competitor has already delivered“]. Newspaper Article from March 21, 2004 [downloaded from <http://www.faz.net/aktuell/wirtschaft/outsourcing-bis-ich-mit-der-gewerkschaft-klar-bin-hat-die-konkurrenz-schon-geliefert-1144367.html> on May 27, 2013].
- Financial Times (2013). Germany shows how to score on and off the football pitch, Newspaper Article from May 26, 2013, page 2.

- Fitzenberger, B., K. Kohn und A.C. Lembcke (2013). Union Density and Varieties of Coverage: The Anatomy of Union Wage Effects in Germany. *Industrial Labor Relations Review*, 66(1), 169-197.
- Fitzenberger, B., K. Kohn and Q. Wang (2011). The Erosion of Union Membership in Germany: Determinants, Densities, Decompositions. *Journal of Population Economics*, 24 (1), 141—165.
- Gartner, H. (2005). The Imputation of Wages above the Contribution Limit with the German IAB Employment Sample, FDZ-Methodenreport 02/2005.
- Geishecker, I. (2006). Does Outsourcing to Central and Eastern Europe really threaten Manual Workers' Jobs in Germany?, *The World Economy*, 29(5), 559-583.
- Hassel, A. (1999). The Erosion of the German System of Industrial Relations, *British Journal of Industrial Relations*, Vol. 37(3), 483-505.
- Hassel, A. and B. Rehder (2001). Institutional Change in the German Wage Bargaining System - The Role of Big Companies, MPIfG Working Paper 01/9.
- Jacobebbinghaus, P. and S. Seth (2010): Linked Employer-Employee Data from the IAB: LIAB Cross-sectional (Model 2, 1993-2008), FDZ-Datenreport 05/2010.
- Marin, D. (2006). A New International Division of Labor in Europe: Outsourcing and Offshoring to Eastern Europe, *Journal of the European Economic Association, Papers and Proceedings*, Vol. 4, No. 2/3, 612-622.
- Möller, J. (2010). The German labor market response in the world recession - de-mystifying a miracle. *Journal for Labour Market Research*, 42(4), 325-336.
- OECD (2004, 2007, 2012). *Employment Outlook*, OECD Publishing, Various Annual Issues, Paris.
- Pilat, D., A. Cimper, K. Olsen, and C. Webb (2006). The Changing Nature of Manufacturing in OECD Economies, OECD, STI Working Paper 2006/9, OECD, Paris.
- Rinne, U. und K.F. Zimmermann (2011). Another Economic Miracle? The German Labor Market and the Great Recession. *IZA Journal of Labor Policy*, Article 3.
- Rinne, U. und K.F. Zimmermann (2013). Is Germany the North Star of Labor Market Policy? IZA DP No. 7260.
- SVR (German Council of Economic Experts) (2004). *Erfolge im Ausland – Herausforderungen im Inland*, Annual Report to the Government, Wiesbaden [downloaded from

[http://www.sachverstaendigenrat-wirtschaft.de/fruehere\\_jahresgutachten.html](http://www.sachverstaendigenrat-wirtschaft.de/fruehere_jahresgutachten.html) on May 27, 2013].

Sinn, H.W. (2006). The Pathological Export Boom and the Bazaar Effect: How to Solve the German Puzzle," *The World Economy*, Wiley Blackwell, vol. 29(9), 1157-1175.

Spermann, A. (2012). The New Role of Temporary Agency Work in Germany. In: Bouncken, Ricarda B. u. Lutz Bellmann u. Manfred Bornewasser (ed.), *Die neue Rolle der Zeitarbeit in Deutschland, Beiträge zur Flexibilisierung, Volume 3*, München and Mering, 203-224.

Der Spiegel (2004). Bye-bye „made in Germany“, Article in Issue 44/2004, 94-109.

Streeck, W. (1997): German capitalism: Does it exist? Can it survive?, *New Political Economy*, 2:2, 237-256.

## **Appendix A: Data**

Our main analyses are based on data from two institutions: First, the Institute for Employment Research (IAB), and second, the German Federal Statistical Office (FSO).

### **IAB data**

From the IAB, we use two data sources, the SIAB, a 2% random sample of social security records, and the LIAB, a linked employer–employee data set. Although the SIAB is in principle available from 1975-2008, we show results here for the time period 1990-2008. The data is representative of all individuals covered by the social security system, roughly 80% of the German workforce. It excludes the self-employed, civil servants, individuals currently doing their (compulsory) military service, and individuals on so-called “marginal jobs” (i.e., jobs with at most fifteen hours per week or temporary jobs that last no longer than six weeks). A detailed description of the data can be found in Dorner et al. (2010). The data set includes information on daily wages. The wage information has the advantage of being very accurate, as it stems from administrative records of the employers. On the downside, wages are top-coded at the social security contribution threshold. For employees with censored wage information, we impute and replace the right-censored wages using an imputation algorithm developed originally for the IABS (the predecessor of the SIAB) by Gartner (2005). To construct real daily wages, we deflate nominal daily wages by the common consumer price index (base year: 2000) for West Germany provided by the Federal Statistical Office.

We restrict the sample to full-time workers (men and women) who are between 20 and 60 years old for the analyses concerning wages. We also exclude those working in the agricultural sector. When calculating labor inputs into sectors (or when calculating the wage bill), we use the information in the SIAB on employment spells, involving the length of

employment in days and taking into account both full-time and part-time workers (again men and women).

The results involving information on unionization are based on the LIAB, a linked employer–employee data set also provided by the IAB. A detailed description of this data set can be found in Jacobebbinghaus and Seth (2010). Although the LIAB is principally available from 1993 to 2008, information on union coverage exists from 1995 only. The LIAB combines information from the IAB Establishment Panel with information on all workers who were employed in these firms as of the 30th of June. The information on workers is drawn from the same social security records as the SIAB data. We impose the same sample restrictions as in the wage analysis for the SIAB, and use the sample weights provided to make our results representative for workers.

#### **FSO data**

For the calculation of input shares and unit labor costs, we rely on input-output tables from the German Federal Statistical Office (Source: [https://www.destatis.de/DE/Publikationen/Thematisch/VolkswirtschaftlicheGesamtrechnungen/InputOutputRechnung/InputOutputRechnungUeberblick5815116099004.pdf?\\_blob=publicationFile](https://www.destatis.de/DE/Publikationen/Thematisch/VolkswirtschaftlicheGesamtrechnungen/InputOutputRechnung/InputOutputRechnungUeberblick5815116099004.pdf?_blob=publicationFile)), that give a detailed representation of the interdependencies between different sectors of the German economy. This data is available for the Federal Republic of Germany only, that is for East and West Germany combined. In this data, the German economy is categorized into 71 sectors. We use data from 1995 to 2007 because changes in classification systems make consistent analyses for years before 1995 and after 2007 difficult.

We rely on the information on export volumes in these data when categorizing the sectors into non-tradable sectors, tradable manufacturing, and tradable services. We classify

sectors with export volumes below the 25<sup>th</sup> percentile of the distribution of export volumes in 1995 as “non-tradable sectors”, and those with export volumes above this threshold and that belong to the manufacturing sector as “tradable manufacturing”. The sectors above this threshold that do not belong to the manufacturing sector are classified as “tradable services”. A detailed list of sectors is provided by the authors upon request. Note that all our analyses are robust to changes in the classification schemes.



## Appendix B: Calculation of total real unit labor costs

Calculation of total real unit labor costs in figure 4 (Unit labor costs: “End product”):

$$tulc_j = \sum_{i=1}^I \beta_{ij} pulc_i, j=1, \dots, I \text{ (I is number of industries)}$$

with  $\beta_{ij}$ =inverse coefficient from domestic production (tells you how much from production of sector i goes into final unit of sector j as used by final demand). The inverse coefficients are taken from the input-output tables of the German Federal Statistical Offices.

$tulc_j$  are total domestic unit labor costs per € of production and  $pulc_j$  are total direct labor costs in sector j per € of production.

$$pulc_i = \frac{WB_i}{Output\_Value\_in\_current\_€}$$

The total wage bill is taken from the SIAB data (including full-time and part-time workers)

$$WB_i = \sum_{spells\_i} days * dailywage.$$

based on data on employment spells involving the length of employment in days and the reported daily wage. The output value involves total production (“Gesamte Verwendung von Gütern”) of sector i from the German input-output tables.

To assess the change in competitiveness, the industries in the tradable sectors are weighted by their export values in 1995. There is no weighting for the Non-Tradable sectors. Direct unit labor costs in Figure 4 only consider the value added in the respective industries (“Unit Labor Costs: Value Added”), not total production. Unit labor costs in the respective industries as a whole (“Unit Labor Costs: End Product”) considers total production in that

sector, i.e. both the value added and inputs from other sectors, again weighting industries with respect to their export values in 1995 for the tradable sectors.

Table 1: Evolution of Employment, Value Added, and Output Value by Sector for the German Economy, in Percent of Total, 1995-2007.

Year	Employment Shares			Value Added Shares			Output Value Shares		
	Non-Tradable	Tradable Services	Tradable Manufacturing	Non-Tradable	Tradable Services	Tradable Manufacturing	Non-Tradable	Tradable Services	Tradable Manufacturing
1995	0.326	0.341	0.332	0.282	0.490	0.227	0.244	0.406	0.350
1996	0.324	0.346	0.330	0.287	0.488	0.225	0.242	0.403	0.354
1997	0.324	0.351	0.325	0.284	0.497	0.219	0.234	0.400	0.366
1998	0.326	0.354	0.320	0.279	0.494	0.226	0.235	0.413	0.352
1999	0.329	0.360	0.311	0.280	0.501	0.218	0.232	0.421	0.347
2000	0.325	0.367	0.308	0.286	0.496	0.218	0.227	0.413	0.360
2001	0.322	0.372	0.306	0.282	0.502	0.216	0.222	0.417	0.361
2002	0.325	0.374	0.301	0.283	0.505	0.212	0.223	0.421	0.356
2003	0.326	0.375	0.299	0.282	0.506	0.212	0.224	0.421	0.355
2004	0.325	0.378	0.297	0.277	0.504	0.219	0.217	0.417	0.365
2005	0.324	0.383	0.294	0.276	0.507	0.217	0.213	0.416	0.371
2006	0.323	0.389	0.288	0.272	0.505	0.223	0.209	0.408	0.383
2007	0.323	0.393	0.284	0.270	0.505	0.225	0.205	0.402	0.393

Note: Calculations based on input-output statistics from the German Statistical Office (Fachserie 18, Reihe 2, Years: 1995-2007). We classify sectors with export volumes below the 25th percentile of the distribution of export volumes in 1995 as “non-tradable sectors”, and those with export volumes above this threshold and that belong to the manufacturing sector as “tradable manufacturing”. The sectors above this threshold that do not belong to the manufacturing sector are classified as “tradable services”.

Table 2: Evolution of the Share of Value of Total Inputs and Domestic Inputs over the Value of Output, Overall and by Sector, 1995-2007.

	Overall	Non-Tradable	Tradable Manufacturing	Tradable Services
Panel A: (Value of Inputs/Output Value)*100				
1995	48.22	39.91	66.13	37.86
2000	50.98	37.92	70.07	41.42
2007	53.20	38.21	72.9	41.63
Panel B: (Value of Domestic Inputs/Output Value)*100				
1995	39.81	35.25	51.67	32.39
2000	40.29	32.19	51.65	34.78
2007	40.49	32.07	51.23	34.23
Panel C: (Value of Domestic Inputs/Value of Total Inputs)*100				
1995	82.56	88.32	78.13	85.55
2000	79.03	84.89	73.71	83.97
2007	76.11	83.93	70.27	82.22

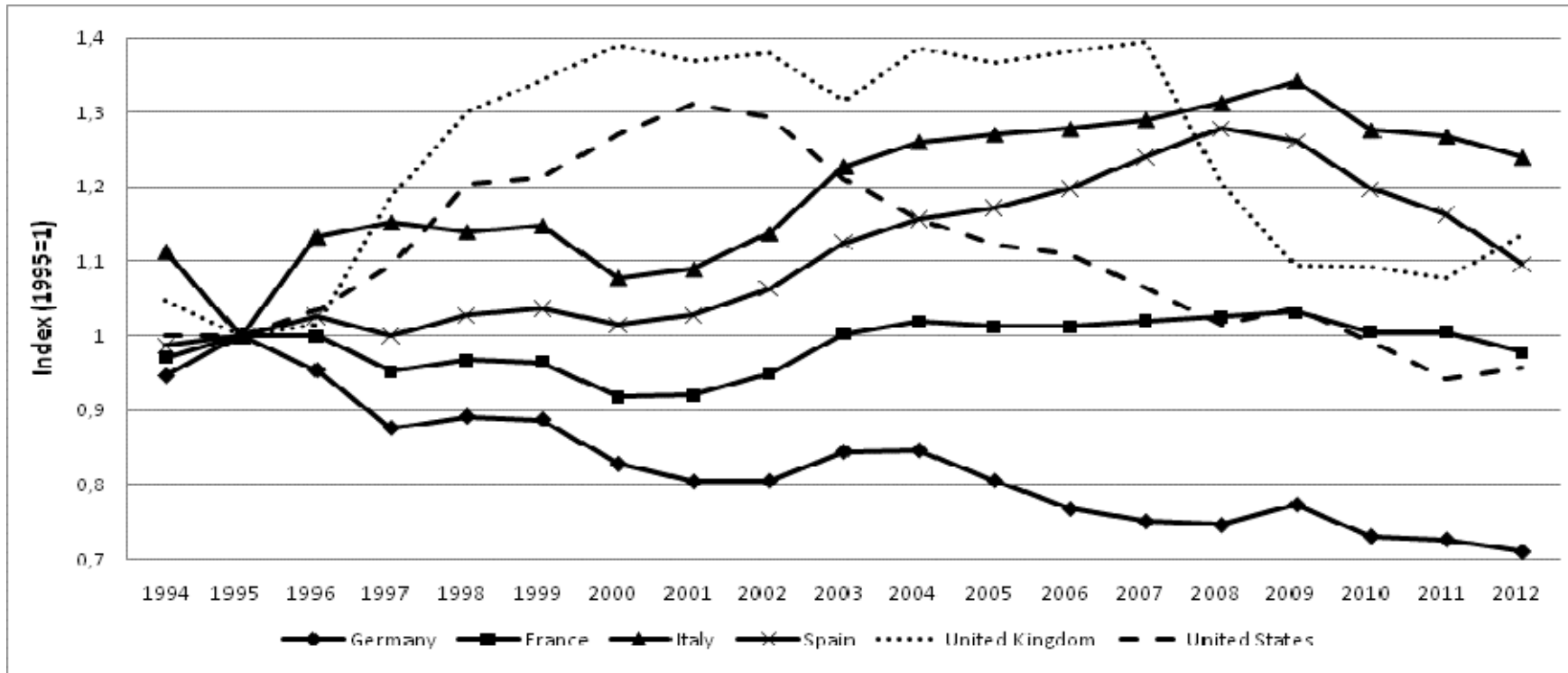
Note: Calculations based on input-output statistics from the German Statistical Office (Fachserie 18, Reihe 2, Years: 1995-2007). We classify sectors with export volumes below the 25th percentile of the distribution of export volumes in 1995 as “non-tradable sectors”, and those with export volumes above this threshold and that belong to the manufacturing sector as “tradable manufacturing”. The sectors above this threshold that do not belong to the manufacturing sector are classified as “tradable services”.

Table 3: Evolution of the Sector Composition of the Value of Inputs into Tradable Manufacturing, 1995-2007.

	Non-Tradable Sectors	Tradable Manufacturing	Tradable Services
<b>Panel A: Sector Shares of Value of Inputs</b>			
1995	6.13	61.94	31.92
2000	7.07	64.05	28.87
2007	8.01	67.30	24.68
<b>Panel B: Sector Shares of Value of Domestic Inputs</b>			
1995	4.45	44.81	29.35
2000	3.91	44.05	26.27
2007	3.93	44.92	22.15
<b>Panel C: (Value of Domestic Inputs/Value of Total Inputs)*100</b>			
1995	72.59	72.34	91.95
2000	55.30	68.77	90.99
2007	49.06	66.75	89.75

Note: Calculations based on input-output statistics from the German Statistical Office (Fachserie 18, Reihe 2, Years: 1995-2007). We classify sectors with export volumes below the 25th percentile of the distribution of export volumes in 1995 as “non-tradable sectors”, and those with export volumes above this threshold and that belong to the manufacturing sector as “tradable manufacturing”. The sectors above this threshold that do not belong to the manufacturing sector are classified as “tradable services”.

Figure 1: Evolution of Competition-Weighted Relative Unit Labor Costs, Selected Countries, 1994-2012.



Source: OECD Economic Indicators.

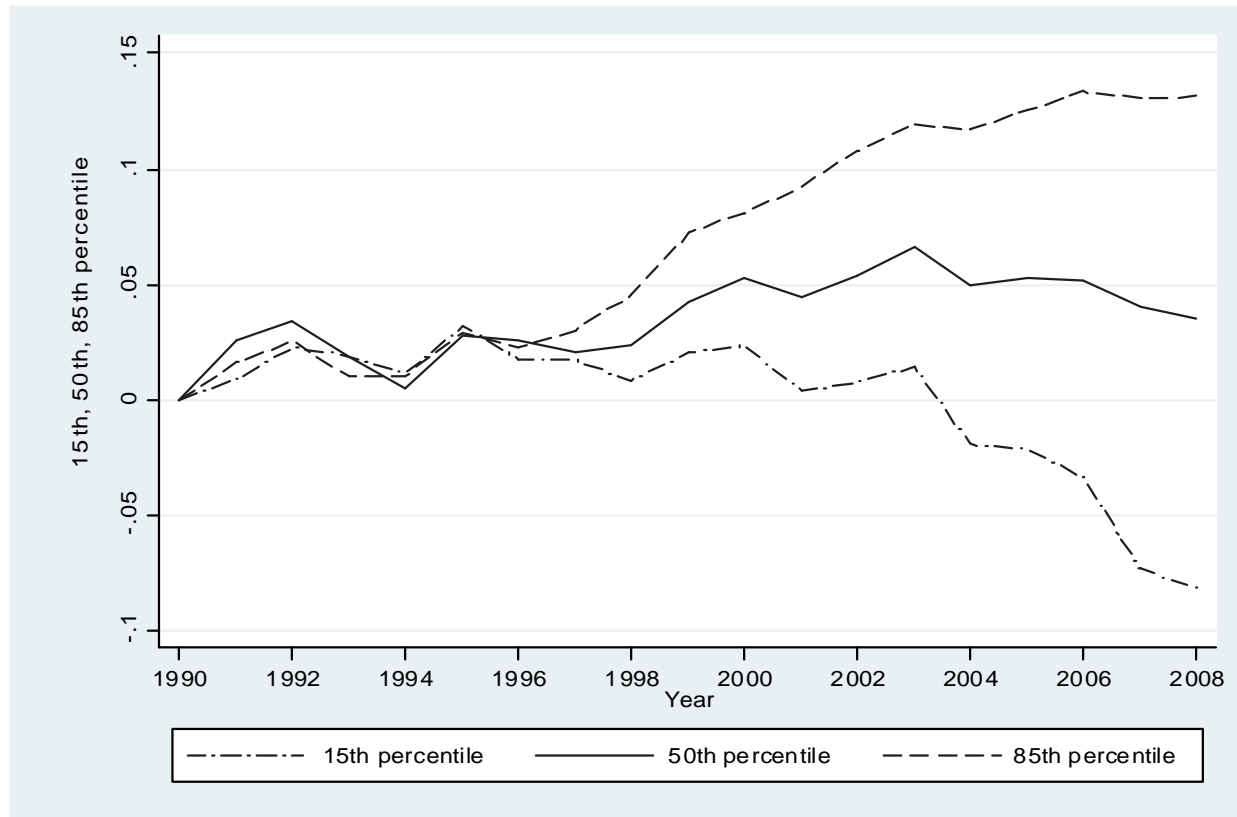
Note: These indices accumulate the annual change in the relative unit labor costs of country *i* compared to a weighted average of its main trading partners where labor costs are translated into dollars and the weights are adjusted annually to the change in trade pattern.

The annual change in logs is calculated as  $\Delta \log(\text{RULC}_{it}) = \Delta \log(\text{ULC}_{it} * e_{it}) - \sum_{j \neq i} g_{ij}^{(t-1)} \Delta \log(\text{ULC}_{jt} * e_{jt})$  where  $\text{ULC}_{it} = (w_{it} * L_{it}) / Y_{it}$  are the unit labor cost for country *i* in period *t*, computed as the total wage bill  $w_{it} L_{it}$  divided by the value added of the country's industry  $Y_{it}$ .

The unit labour costs are translated into in US dollars using the exchange rate  $e_{it}$ . Both the unit labor costs and the exchange rates are defined as index relative to some base year. The weighting scheme  $g_{ij}^{(t-1)}$  takes account of the structure of competition in both export and import markets of the goods sector of those countries, and it adjusts on a year-by-year basis.

See OECD Economic Outlook, Volume 2012 Issue 2 - No. 92 and OECD Economic Outlook Sources and Methods (<http://www.oecd.org/eco/sources-and-methods>) for details on the method of calculation.

Figure 2: Indexed Wage Growth of the 15th, 50th, 85th Percentiles, West Germany, 1990-2008.

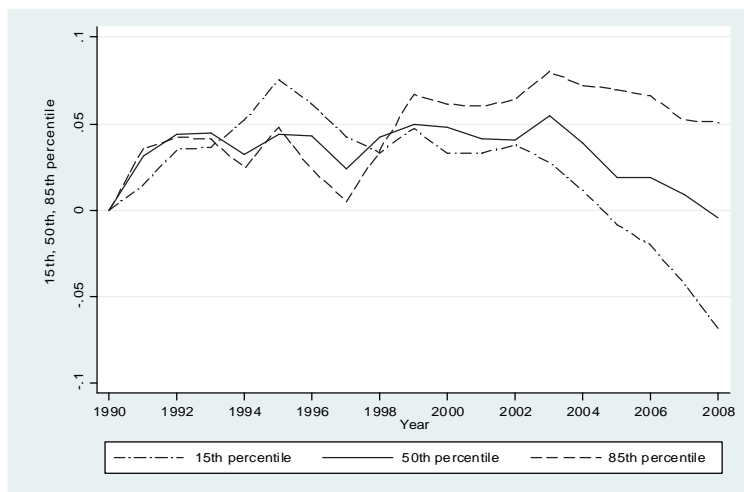


Note: Calculations based on SIAB Sample for West German Full-Time Workers between 20 and 60 years of age. The figure shows the indexed (log) real wage growth of the 15th, 50th, and 85th percentiles of the wage distribution, with 1990 as the base year.

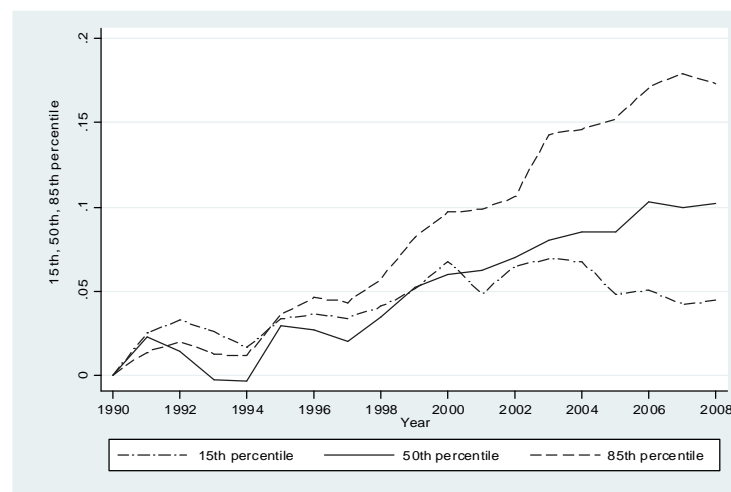
Nominal wages are deflated using the consumer price index (1995=100) provided by the German Federal Statistical Office.

Figure 3: Indexed Wage Growth of the 15th, 50th, 85th Percentiles, West Germany, by Sectors, 1990-2008.

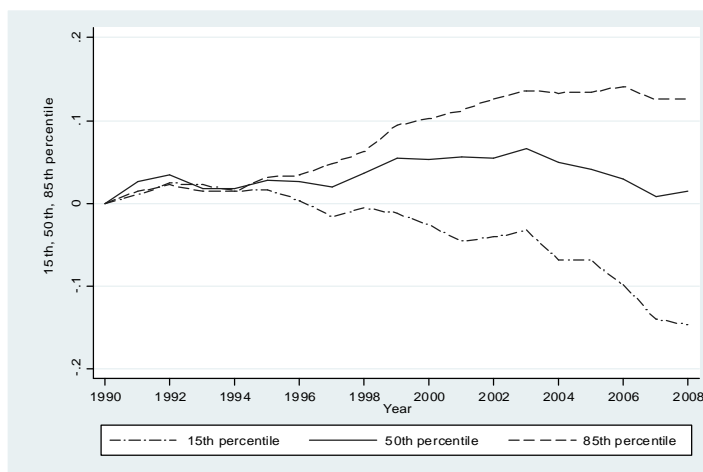
Panel A: Non-Tradable



Panel B: Tradable Manufacturing



Panel C: Tradable Services

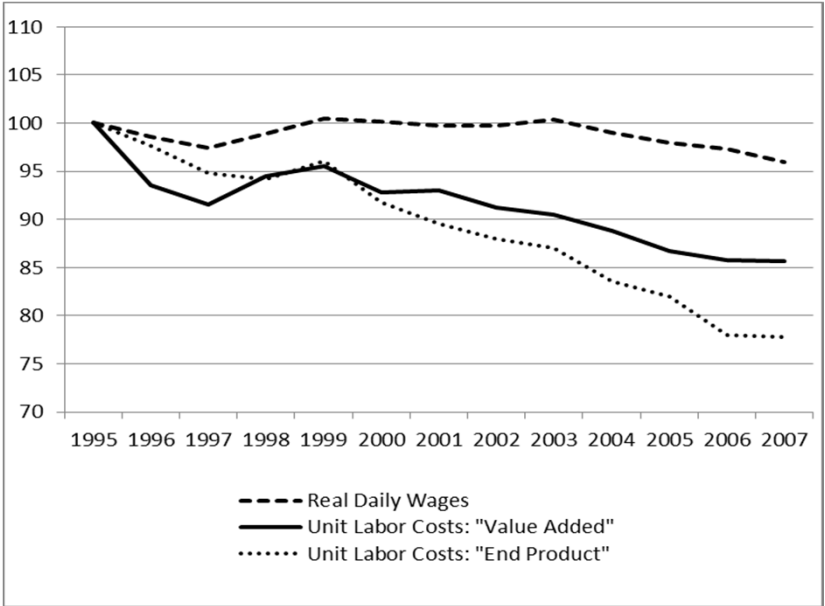


Note: Calculations based on SIAB Sample for West German Full-Time Workers between 20 and 60 years of age. The figures show the indexed (log) real wage growth of the 15th, 50th, and 85th percentiles of the wage distribution, with 1990 as the base year. Nominal wages are deflated using the consumer price index (1995=100) provided by the German Federal Statistical Office. Panel A shows the evolution of these figures for the non-tradable sectors, Panel B for tradable manufacturing and Panel C for tradable services. We classify sectors with export volumes below the 25th percentile of the distribution of export volumes in 1995 as “non-tradable sectors”, and those with export volumes above this threshold and that belong to the manufacturing sector as “tradable manufacturing”. The sectors above this threshold that do not belong to the manufacturing sector are classified as “tradable services”.



Figure 4: Evolution of Real Daily Wages and Unit Labor Costs by Sector, 1995-2007.

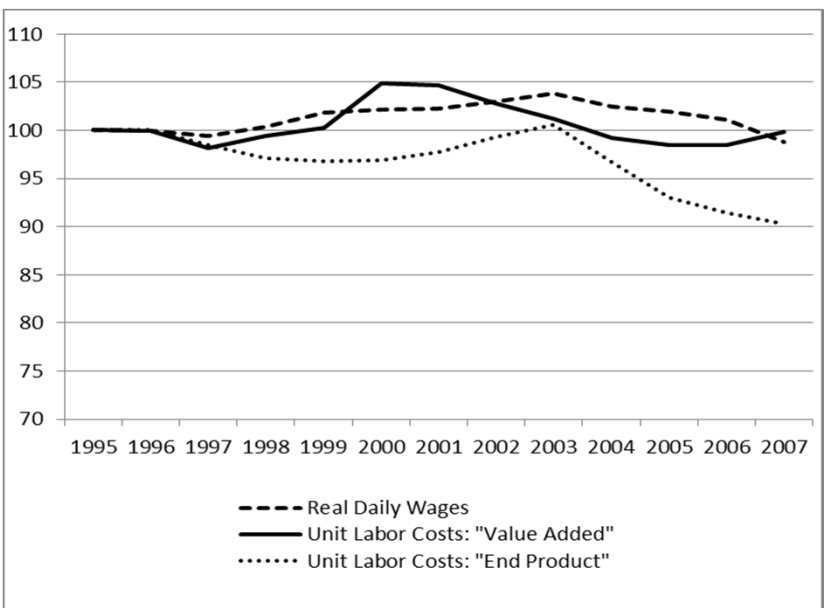
Panel A: Non-Tradable Sectors



Panel B: Tradable Manufacturing



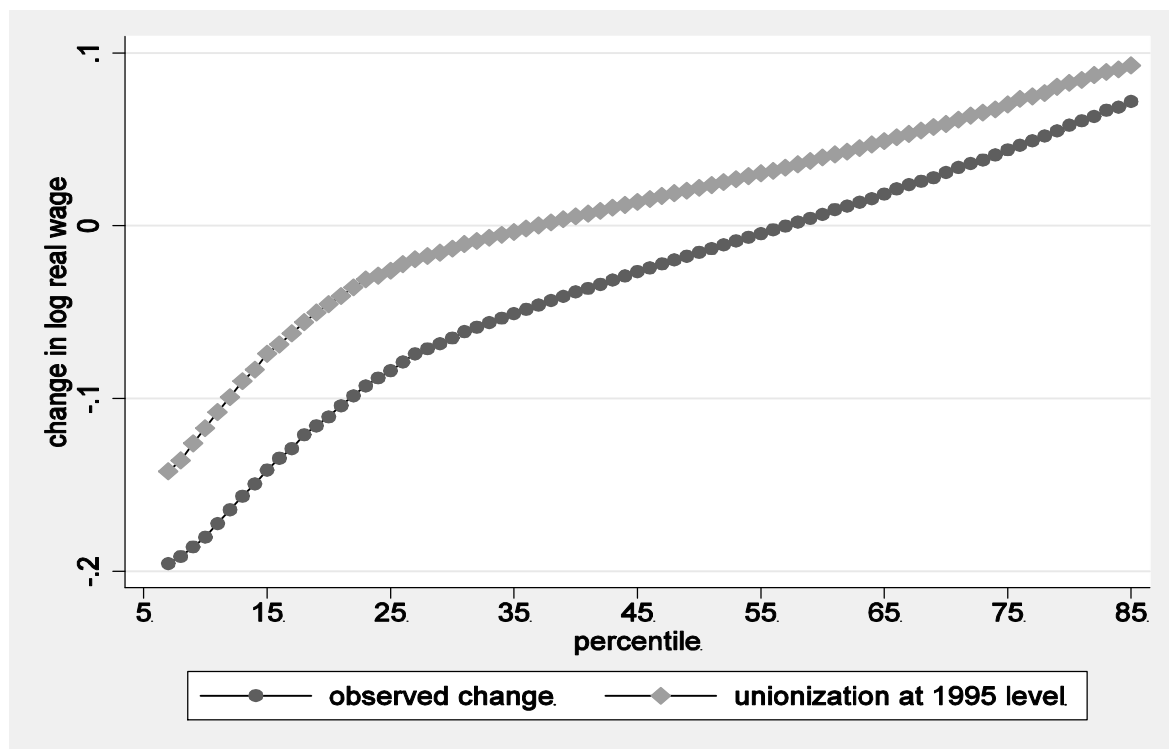
Panel C: Tradable Services



Note: The figures show indexed real mean daily wages by sector (base year 1995=100). Nominal wages are deflated using the consumer price index (1995=100) provided by the German Federal Statistical Office. The data underlying these indices are in columns (1), (4), and (7) of "Appendix Table 1".

The figure also shows indexed unit labor costs both "Value Added" and "End Product" by sector. The data underlying these indices are in columns (2), (3), (5), (6), (8) and (9) of "Appendix Table 1". "Appendix Table 1" includes a detailed description of data and methods of calculations.

Figure 5: Observed vs Counterfactual Wage Growth between 1995 and 2008 along the Wage Distribution: The Role of De-Unionization



Note: The figure shows the observed wage growth by percentile between 1995 and 2008, as well as the counterfactual wage growth which would have prevailed if the share of workers covered either by industry-wide or firm-wide agreements had remained at its 1995 level. The counterfactual wage distribution is computed using the re-weighting approach developed by DiNardo, Fortin and Lemieux (1996). Calculations are based in the LIAB.

Appendix Table 1: Evolution of Real Daily Wages and Unit Labor Costs by Sector, 1995-2007.

Year	Tradable Manufacturing			Non-Tradable Sectors			Tradable Services		
	Real Daily Wage (in Euro)	Unit Labor Costs: "Value Added"	Unit Labor Costs: "End Products"	Real Daily Wage (in Euro)	Unit Labor Costs: "Value Added"	Unit Labor Costs: "End Products"	Real Daily Wage (in Euro)	Unit Labor Costs: "Value Added"	Unit Labor Costs: "End Products"
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1995	87.92	0.80	0.26	74.80	6.37	0.20	81.34	0.46	0.041
1996	88.15	0.81	0.27	73.75	5.96	0.19	81.30	0.46	0.041
1997	87.88	0.81	0.26	72.84	5.83	0.19	80.87	0.45	0.040
1998	88.95	0.78	0.25	74.01	6.02	0.18	81.61	0.45	0.039
1999	90.52	0.79	0.25	75.11	6.09	0.19	82.86	0.46	0.039
2000	91.56	0.82	0.24	74.95	5.92	0.18	83.07	0.48	0.039
2001	91.24	0.84	0.23	74.62	5.93	0.18	83.20	0.48	0.040
2002	92.36	0.84	0.24	74.63	5.81	0.17	83.81	0.47	0.040
2003	94.05	0.82	0.23	75.1	5.76	0.17	84.44	0.46	0.041
2004	93.99	0.79	0.22	74.04	5.66	0.16	83.38	0.45	0.039
2005	93.72	0.78	0.21	73.25	5.53	0.16	82.92	0.45	0.038
2006	95.02	0.75	0.2	72.82	5.46	0.15	82.27	0.45	0.037
2007	95.11	0.75	0.19	71.77	5.46	0.15	80.36	0.46	0.037
Change in % (1995-2007)	8.18	-6.52	-27.86	-4.05	-14.37	-22.18	-1.21	-0.17	-9.70

Notes: Calculations in Column (1), (4), and (7), are based on SIAB Sample for West German Full-Time Workers between 20 and 60 years of age. They show the evolution of the mean of real daily wages by sector and by year (using Tobit regressions).

Nominal wages are deflated using the consumer price index (1995=100) provided by the German Federal Statistical Office.

Column (2) and (8), shows the export weighted total wage bill by sector and by year; calculated based on the SIAB data, including full-time and part-time workers ( $WB_i = \sum \text{spell}_i \text{ days} * \text{dailywage}$ , with  $\text{dailywage}$  being the nominal daily wage).

Column (3) and (9): Unit Labor Costs "End Product" is the export weighted mean of total real unit labor costs across sectors  $j$  ( $\text{tulc}_j$ ), with  $\text{tulc}_j = \sum_{i=1}^I \beta_{ij} * \text{pulc}_i$ , and

$\beta_{ij}$ =inverse coefficient from domestic production (tells you how much from production of sector  $i$  goes into final unit of sector  $j$  as used by final demand, as going into exports), and

$\text{pulc}_i = \text{WB}_i / \text{Output\_Value\_in\_current Euro}$ . So  $\text{tulc}_j$  are total domestic unit labor costs per € of production and  $\text{pulc}_j$  are total direct labor costs in sector  $j$  per € of production.

Column (5) and (6) include information that is analogue to that in column (2), (3), (8), and (9), but is not export weighted.

Export data, data on output value and value added, as well as the inverse coefficients are taken from the input-output tables of the German Federal Statistical Offices (Fachserie 18, Reihe 2, Years: 1995-2007).