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ABSTRACT

This paper investigates the potential reasons for the surprisingly different labor market performance of the United States, Canada, Germany, and several other OECD countries during and after the Great Recession of 2008-09. Unemployment rates did not change substantially in Germany, increased and remained at relatively high levels in the United States, and increased moderately in Canada. More recent data also show that, unlike Germany and Canada, the U.S. unemployment rate remains largely above its pre-recession level. We find two main explanations for these differences. First, the large employment swings in the construction sector linked to the boom and bust in U.S. housing markets can account for a large fraction of the cross-country differences in aggregate labor market outcomes for the three countries. Second, cross-country differences are consistent with a conventional Okun relationship linking GDP growth to employment performance. In particular, relative to pre-recession trends there has been a much larger drop in GDP in the United States than Germany between 2008 and 2012. In light of these facts, the strong performance of the German labor market is consistent with other aggregate outcomes of the economy.

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An online appendix is available at:
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I. Introduction

Five years after the onset of the Great Recession of 2008-09, the U.S. labor market remains in a depressed state relative to its pre-recession level. After hovering between 4 and 5 percent in 2006 and 2007, the unemployment rate spiked up to 10 percent in October 2009 and declined very slowly since then. More than six years after the onset of the Great Recession, it remains substantially above its pre-recession level. Both the magnitude of the increase in the unemployment rate, and the slow pace of its decline since 2009 are unprecedented in the post-war era. For instance, the unemployment rate increased by 3-4 and 2-3 percentage points in the 1981-82 and 1990-91 recessions, respectively, and recovered to its pre-recession level in a matter of a few years. The employment performance of the U.S. economy over recent years has been unusually poor compared to other advanced OECD economies as well, with the largest increase in unemployment rates during the Great Recession among all G7 countries. Moreover, while the U.S. unemployment rate has declined faster than the OECD average after peaking in 2009, only Southern European economies like Italy and Spain have witnessed a similar persistent increase in the level of their unemployment rates since the onset of the Great Recession.

The goal of this paper is to understand why the U.S. employment performance has been so weak during and in the aftermath of the Great Recession of 2008-09. We use two main empirical strategies to explore this issue. First, we contrast the experience of the United States to the experiences of a large set of OECD countries using aggregate labor market data and various other standard economic indicators. Second, we conduct a detailed analysis using rich micro data for the United States and two comparison countries: Canada and Germany. Canada has often been used as a comparator for the United States as the two countries share many common features, such as their institutional settings and the decentralized nature of their labor markets, and are strongly connected by international trade. Interestingly, Canada's unemployment rate was higher than the U.S. unemployment rate from the early 1980s (Ashenfelter and Card, 1986, Card and Riddell, 1993) to the onset of the 2008-09 recession, but has remained below the U.S. rate since then. While the German and U.S. labor markets may not be quite as comparable, the stellar performance of the German labor market in the Great Recession raises a number of interesting questions about why that country has been able to sustain relatively healthy labor market outcomes since then. Hopefully, a better understanding of the core reasons behind the

different performances of the U.S., Canadian and German labor markets in recent years could help inform policies aimed at dealing with high unemployment in the United States.

We explore a number of possible explanations for the lackluster performance of the U.S. labor market from this comparative perspective and identify two key channels: First, the boom and bust in the construction industry; and second the overall macroeconomic performance as captured by GDP growth. The local nature of boom and busts in the construction industry enables us to rely on evidence from both between- and within-country. The main result from this analysis is that the U.S. unemployment rate would have been more similar to unemployment rates of Canada, Germany and most other major OECD economies had employment remained stable in the construction sector during both the boom and bust phases of the U.S. housing boom. More precisely, we show that over half of the between-country variation in the magnitude of the employment rate decline in 2007-10 relative to 2000-07 can be accounted for by the construction sector. Likewise, this phenomenon accounts for the lion share of the within-country variation in the United States. Interestingly, Germany did not experience any swings in construction sector employment in recent years, as its own construction boom linked to the reconstruction of Eastern Germany ended in the early 2000s. On the other hand, Canada had a housing boom that was much milder than the one in the United States. Taken together, this is consistent with our main finding that the U.S. housing boom is central for an understanding of its poor aggregate labor market performance.

Our second key finding is that, relative to pre-recession trends, there has been a much larger drop in GDP in the United States than Germany since the onset of the Great Recession. Given the well-known connection between changes in GDP and changes in the unemployment rate, commonly referred to as Okun's law, we show that the poor overall performance of the U.S. economy goes a long way towards accounting for the persistent increase in the unemployment rate -- relative to other OECD countries -- since 2007.

The rest of this paper proceeds as follows. In Section II we present some key trends in GDP and unemployment in a dozen of OECD countries, and discuss the connection between these two factors. Section III focuses on the role of the construction sector in the evolution of unemployment across countries and within regions of the United States, Canada, and Germany. Section IV discusses in more detail the how institutions and labor market reforms may have helped explain the impressive labor market performance of that country since the onset of the

Great Recession. A number of other explanations are explored in Section V, and we conclude in Section VI.

II. Country-level trends

We start our analysis with presenting basic trends of unemployment rates in a set of OECD countries.[1] The data comes from the now defunct BLS International Labor Comparisons Program.[2] Unlike other sources of comparative employment data, like the OECD, the BLS adjusts the unemployment rates reported by national statistical agencies to make them comparable across countries, if possible.[3] We focus on the set of ten countries for which the BLS reports an unemployment rate that is fully consistent with the U.S. concept -- G7 countries plus Sweden, the Netherlands and Australia. In some of the figures we also report data for Spain despite the fact their unemployment rates are unadjusted. As we will see later, the case of Spain is interesting as it is the only major industrialized country that experienced a boom and bust in the construction industry that is even more dramatic than the one in the United States.

In Figure 1, we present the trends in the U.S. unemployment rate relative to three sets of countries: Canada, the United Kingdom, and Japan in Figure 1a; Germany, France, and Italy in Figure 1b; Sweden, the Netherlands, Australia and Spain in Figure 1c. All figures start in 1991 since it would be difficult to have consistent measures of unemployment in Germany prior to reunification in 1990. Figure 1a shows that for most of the 1991-2013 period the unemployment rates of Canada and the United Kingdom were substantially higher than those in the U.S., while Japan almost always had the lowest unemployment rate. The only exception is the Great Recession, during which the U.S. unemployment rate increased much faster than in these three comparison countries and remained at a higher level since then.

Figure 1b shows that throughout most of the 1990s and 2000s, the unemployment rate in Italy, France and Germany – the three largest continental European economies – was much higher than in the United States. The unemployment rate increased much faster in the United

[1] According to the NBER's business cycle dating committee, the "Great Recession" lasted from December 2007 to June 2009.

[2] The program was discontinued on March 1st 2013 as part of the across-the-board spending cuts (commonly referred to as sequestration) required by the Balanced Budget and Emergency Deficit Control Act. The Conference Board is now maintaining these data series using the same methodology as the BLS. The employment numbers for 2013 were downloaded from the Conference Board website (https://www.conference-board.org/ilcprogram/).

[3] For example, in Canada "passive" job searchers who only look at job ads are classified as being unemployed, while they are classified as being out of the labor force in the United States.

States during the Great Recession, however, and was the highest among these three countries by 2009. In sharp contrast, the German unemployment rate declined between 2007 and 2009, a remarkable fact that has been investigated in a number of studies such as Burda and Hunt (2011). On the other hand, it increased steadily in France and especially Italy after 2009. Some of these recent developments are linked to the European debt crisis, and a systematic exploration of its labor market effects is beyond the scope of this paper.

Except for the unusual case of Spain, Figure 1c shows once again that the unemployment rate increased much faster in the United States than in either Sweden, the Netherlands, or Australia between 2007 and 2009.

Taking together, the evidence in Figures 1a, 1b, and 1c shows that in the space of just two years, the United States went from a low to a high unemployment country. Only Spain experienced a faster growth in its unemployment rate over this period. A similar conclusion emerges when analyzing the employment-to-population ratio instead. We show in Appendix Figures 1a-c that its evolution during the Great Recession is a mirror image of the time-series pattern of unemployment rates.[4] In particular, the employment-population ratio declined in all countries except Germany between 2007 and 2009, and only Spain experienced a larger drop in the employment-population ratio than the United States.[5] This shows that relative movements in the unemployment rate across countries during the Great Recession truly reflect changes in joblessness, as opposed to spurious movements in labor force participation or in how people "classify themselves" as unemployed.[6]

Macroeconomic performance and unemployment

Perhaps the simplest explanation for the cross-country differences in recent trends of unemployment rates is differences in their macro-economic performances. According to Okun's law we expect a larger increase in the unemployment rate in economies where GDP fell the most

[4] These data were also obtained from the BLS International Labor Comparison Program.

[5] The correlation coefficient between changes in the unemployment rate and changes in the employment-population ratio is above 0.9 for the 2007-09 period, with or without Spain included.

[6] Card and Riddell (1993) show that most of the growth in the Canada-U.S. unemployment rate gap in the early 1980s was not linked to a corresponding change in the employment-population ratio. Rather, people without jobs started increasingly classifying themselves as unemployed in Canada relative to the United States. While the unemployment rate is still relatively high in Canada relatively to the United States, given the much larger employment rate in Canada, the unemployment rate and the employment-population ratio have very much moved in tandem in the two countries over recent years.

during the Great Recession.[7] Existing work suggests this may not be a very promising explanation for the evolution of unemployment during the Great Recession. For instance, Burda and Hunt (2011) show that GDP fell at about the same rate in the United States and Germany in 2008-2009, but (consistent with Figure 1a) the unemployment rate increased much more in the United States than in Germany. Daly and Hobijn (2010) also point out that U.S. unemployment increased substantially more between 2007 and 2009 than what would have been predicted by Okun's law. As we will see below, we reach very different conclusions using more recent data on GDP and unemployment.

We start exploring this hypothesis using OECD data on real GDP in Figures 2a-b.[8] Figure 2a shows the evolution in real GDP for the same eleven countries used in Figure 1 indexed to 100 in the first quarter of 2000. Looking first at the pre-recession (2000-07) period, we see that there are substantial differences in trend growth in GDP during that period with countries like Australia, the United Kingdom, and Spain at the top end of the range, and Germany and Japan at the bottom end. One simple explanation for this difference is that population has been growing at different rates in different countries. Indeed, annual data on GDP per capita reported in Appendix Figure 2 indicates that trend growth is much more similar across countries when expressed on a per capita basis.[9] For instance, GDP per capita in Germany and Japan grew at about the same rate as in other G7 countries like France, Canada, and the United States, and faster than in Italy over the 2000-07 period. The United Kingdom is somewhat an exception since it was growing at an especially fast rate until 2007 in absolute and in per capita terms.

A second clear fact that emerges from Figure 2a is that most countries experienced a sharp decline in GDP during the Great Recession. The only noticeable exception is Australia, which was hardly affected at all by the downturn, likely because of its close trade relationship with China. The United States is more or less in the middle of the pack with a 4.7 percent decline of real GDP between the last quarter of 2007 and the second quarter of 2009, compared to an average drop of 4.6 percent in all eleven countries. The drop in Germany, Japan, and the United Kingdom is slightly larger, while it is slightly smaller for Canada, France and Italy. By contrast,

[7] Abel, Bernanke and Croushore (2013) provide a nice textbook treatment of Okun's law where they report that a percentage point increase in unemployment is typically associated with a two percent decline in output relative to its potential.

[8] We focus on the 2000-13 period since data are missing for some countries prior to 2000. Furthermore, other important explanations we consider, in particular the boom and bust in housing, starts around 2000 too.

[9] We use data from the IMF World Economic Observer to compute the per capita figures.

there are large cross-country differences in the extent of the economic recovery since the second quarter of 2009. For instance, between the second quarters of 2009 and 2012, Australia, Canada, Germany, and Sweden all grew by over 8 percentage points, while other European economies grew little (e.g. France and the United Kingdom) or kept shrinking (Spain). The United States (6.9 percent growth) and Japan (5.9 percent) did slightly better than average (5.6 percent), though not quite as well as Canada and Germany. In per capita terms, however, Germany was clearly the best performer among G7 countries (Appendix Figure 2), while Italy performed particularly poorly.

In light of the strong GDP performance of Germany since 2007 the decline in its unemployment rate since the onset of the Great Recession may not be surprising after all. We explore this more formally in Figure 3 by plotting the de-trended changes in GDP between the last quarters of 2007 and 2011 against the change in the unemployment rate over the same period. Okun's law suggests there should be a strong negative relationship between these two variables. Importantly, the change in GDP should be adjusted for changes in potential GDP that encompasses all non-cyclical factors such as technological progress, changes in capital and other production factors. Since estimating potential GDP is beyond the scope of this paper, we simply de-trend GDP using country-specific pre-recession linear trends. The resulting time series are reported in Figure 2b. The figure shows that Germany and Australia have been doing particularly well since 2007 in terms of GDP growth, while the United Kingdom and Spain have done particularly poorly. Interestingly, all other countries, including Canada and the United States look fairly similar, with their GDP standing at about 10 percentage points below what would have been predicted on the basis of observed trends in GDP prior to the Great Recession.

Returning to Figure 3, we see a clear negative relationship between changes in de-trended GDP and changes in the unemployment rate across countries. Note that Spain is not included since it is a case of its own with an increase in the unemployment rate of 14.3 percentage points compared to 3.9 percent for the second worst performer (the United States). The estimated coefficient from an Okun-type regression is -1.73 (standard error of 0.72), which is quite close to standard estimates based on time-series data for the United States (Abel, Bernanke, and

Croushore, 2013).[10] Note that as in all the other regression estimates reported in the paper, countries (or regions of a country) are weighted equally regardless of their size.

Most countries, including the United States and Germany, lie relatively close to the regression line in Figure 3. The estimates remain similar (coefficient of -2.37 with a standard error of 0.86) when trends are computed over a longer period (1994 to 2007) to avoid the potentially confounding effect of the strong 2000-07 housing boom in several countries. However, the Okun relationship becomes substantially weaker when only data from the Great Recession (2007 to 2009) are used to estimate the model. The coefficient drops to -1.01 and is no longer significant. As we saw in Figure 2b, the problem is that GDP dropped by fairly similar amounts in most countries between 2007 and 2009, while unemployment followed quite a different path in countries like Germany, with a small decline in unemployment, and the United States, with a large increase in unemployment. We conclude from Figure 3 that differences in unemployment performance between the United States and Germany are very much in line with the observed difference in GDP performance once we look at more recent years than earlier studies such as Burda and Hunt (2011). In particular, de-trended U.S. GDP is 10 percentage points below its pre-recession level while Germany's GDP is very much in line with the pre-recession trends. The estimated Okun relationship maps this 10 percentage point gap in GDP into a 5 percentage point difference in the unemployment rates, which is close to the actual difference of 6.5 percentage points shown in Figure 3. Many observers have pointed to a puzzling "jobless recovery" in the United States where unemployment has remained stubbornly high despite a rebounding GDP, which stands in sharp contrast with the "German employment miracle". The results reported here indicate that these two phenomena are the two sides of the same "Okun coin". There is not much of a puzzle or miracle, but rather a 10 percent deficit in de-trended GDP in the United States relative to Germany.

III. Role of the Construction Industry

Background and conceptual framework

A number of recent papers suggest that the boom and bust in the housing sector may have played a leading role in the growth of U.S. unemployment during the Great Recession. This may

[10] The estimated coefficient drops slightly to -1.1 but becomes more significant when Spain is also included in the regression.

have happened through a variety of channels. In their influential work, Mian and Sufi (2014) show that U.S. counties where housing net worth declined the most also experienced large falls in employment in non-tradeable sectors such as retail trade and restaurants (but excluding construction). This suggests that the negative wealth effect linked to the collapse in house prices reduced household spending, which had a negative impact on employment.[11]

Mian and Sufi (2014) focus on the effect of the decline in housing prices on employment in sectors other than construction. While some of the decline in construction employment, for instance in renovation work, may be a consequence of the decline in housing net worth – a wealth effect – most of it was likely due to other factors such as the credit crisis and the oversupply of housing during the 2000-07 boom. This negative shock in one particular sector, construction, may have then lead to an aggregate decline in employment if workers displaced from the construction sector were unable to find jobs in other sector. This alternative channel goes back to the sectoral shock hypothesis of Lilien (1982). Generally speaking, when labor is imperfectly mobile across sectors, a large negative shock to a given sector may lead to an increase in overall unemployment even in the presence of offsetting positive shocks to other sectors. Recent work by Mehrotra and Sergeyev (2012) suggests that the construction shock during the Great Recession accounts, through this channel, for a large fraction (1.4 percentage points) of the increase in the national unemployment rate.

Anecdotal evidence suggests that differences in the magnitude of the boom and bust in the construction sector may also help explain some of the differences in employment changes across countries. For instance, Spain experienced a dramatic boom and bust in the construction sector and a stunning rise in its unemployment rate. By contrast, Germany did not have a construction boom, or at least not in the period leading to the Great Recession.[12]

It is beyond the scope of this paper to estimate the relative importance of the housing net worth and "construction shock" effect in the evolution of employment during and in the aftermath of the Great Recession. Our more modest objective is to assess how much of the change in overall employment can be accounted for by changes in construction employment. This approach is similar to Charles, Hurst and Notowidigdo (2013) who argue that the collapse

[11] Mian and Sufi also show that, as expected, changes in housing net worth has no effect on tradeable employment in the county, since demand for tradeable goods should depend on global, as opposed to local demand.

[12] There was a large construction boom in Germany linked to the reconstruction of Eastern Germany, but as we discuss at the end of the section, this came to an end in the early 2000s.

in the employment rate of non-college men during the Great Recession was a combination of two factors. First, the share of these individuals working in manufacturing had been on the decline for a long time, but it was "masked" during the 2000-07 period by an offsetting increase in the share of construction employment among this group. Second, when the housing market collapsed during the Great Recession, overall employment plummeted as the construction sector could no longer offset other negative labor market trends, and instead contributed to the decline in overall employment.

We look at the connection between construction employment and total employment using variance decompositions and simple accounting exercises that rely both on between- and, for Canada, the United States, and Germany, within-country variation. Consider the population P_{it} that consists of E_{it} employed individuals and N_{it} non-employed individuals in country (or region) *i* at time *t*. By further dividing the employed individuals into three employment sectors we get:

$$P_{it} \equiv N_{it} + E_{it}^{c} + E_{it}^{m} + E_{it}^{o},$$

where the employment sectors considered here are construction (E_{it}^{c}), manufacturing (E_{it}^{m}), and all other sectors combined (E_{it}^{o}). In per capita terms we get the following identity linking the non-employment rate n_{it} to the fraction of individuals in each employment sector

$$n_{it} \equiv 1 - e_{it}^{c} - e_{it}^{m} - e_{it}^{o}, \qquad (1)$$

where $e_{it}^{k} = E_{it}^{k} / P_{it}$ for k=c, m, and o. We use this identity to compute a counterfactual non-employment rate that would have prevailed if the share of the population in the construction sector had remained constant over time. Holding the construction share constant and differencing yields:

$$\Delta \tilde{n}_{i} = - \Delta e_{i}^{m} - \Delta e_{i}^{o}, \qquad (2)$$

where $\tilde{n}_{it}$ is the counterfactual non-employment rate. Following, Charles, Hurst and Notowidigdo (2013), it is also interesting to look at how much the boom and bust in the housing sector has contributed to the different evolution of employment between the 2000-07 boom period and the bust period (after 2007). This can be computed using the double difference, or difference-in-differences, version of equation (2).

To summarize the contribution of the construction sector to inter-country or interregional differences in employment changes we also employ a variance decomposition procedure. This

decomposition is easier to interpret when using the change in the employment-to-population ratio Δe_i as dependent variable, where $\Delta e_i = -\Delta n_i$. Since $\Delta e_i \equiv \Delta e_i^c + \Delta e_i^m + \Delta e_i^o$ we have:[13]

$$\begin{aligned} Var(\Delta e_i) &= Cov(\Delta e_i, \Delta e_i^c + \Delta e_i^m + \Delta e_i^o) \\ &= Cov(\Delta e_i, \Delta e_i^c) + Cov(\Delta e_i, \Delta e_i^m) + Cov(\Delta e_i, \Delta e_i^o). \end{aligned}$$

Dividing through by $Var(\Delta e_i)$ we get:

$$1 = b_c + b_m + b_o,$$

where $b_k = Cov(\Delta e_i, \Delta e_i^k) / Var(\Delta e_i)$ is the slope coefficient from a regression:

$$\Delta e_i^k = a_k + b_k \Delta e_i + \varepsilon_k, \qquad (3)$$

for k=c, m, and o.

The b_k coefficients are a convenient way of summarizing the contribution of each employment sector to the variation in employment (or non-employment) changes across countries, or regions of a country. For instance, if the fraction of the population working in the manufacturing industry and other sectors is completely constant over time, then by definition all the variation in the employment-population ratio will be attributable to the construction share, and we will have $b_c = 1$ and $b_m = b_o = 0$.

By contrast, if all three relative employment shares e_{it}^k / e_{it} were constant over time, the b_k coefficients would be equal to s_k, the share of sector k in total employment.[14] Thus, comparing b_k to s_k indicates how much "excess" variation in the overall employment rate can be related to the construction share. Note that, in general, sectors like manufacturing that tend to be more cyclically sensitive than others should have a b_k larger than s_k. When looking at the contribution of the construction sector during the Great Recession, we will thus contrast it to manufacturing to make sure that its estimate is not merely a reflection of the fact that it is a more cyclically sensitive sector. To further highlight the special role that the construction sector played during the Great Recession we will also compare our results to the coefficient b_c obtained when computing the decomposition for earlier recessions in the U.S.

[13] In the empirical section we also discuss an alternative variance decomposition based on $Var(\Delta e_i) = Var(\Delta e_i^c) + Var(\Delta e_i^m) + Var(\Delta e_i^o) + 2Cov(\Delta e_i^c, \Delta e_i^m) + 2Cov(\Delta e_i^c, \Delta e_i^o) + 2Cov(\Delta e_i^m, \Delta e_i^o)$. In that alternative setting, we would expect $Var(\Delta e_i^c)$ to be the most important component of $Var(\Delta e_i)$ if the construction sector was the key contributor to changes in overall employment. One advantage of this approach is that the variances are always positive, while our approach based on covariances can yield negative b_k coefficients, which is undesirable for a variance decomposition.

[14] When employment shares s_{kt} are constant over time we have $e_{it}^k = s_k e_{it}$ and $cov(e_{it}, e_{it}^k) = s_k Var(e_{it})$. It follows that $b_k = Cov(\Delta e_i, \Delta e_i^k) / Var(\Delta e_i) = s_k Var(e_{it}) / Var(e_{it}) = s_k$.

Analysis at the country level

Figure 4 shows the share of the labor force employed in construction (Figure 4a), manufacturing (Figure 4b), and all other sectors (4c). The fourth category, not shown in the graphs, is simply the share of the labour force that is unemployed, i.e. the unemployment rate. These shares are obtained using OECD data on employment by industrial sector for 2000 to 2012.[15] We also use labor force as the denominator here because the OECD data doesn't provide consistent measures of the working age population.

A number of interesting patterns emerge from Figure 4a. First, the construction share in Germany drops sharply from 2000 to 2005 to reach five percent, the lowest of all countries, and remains unchanged for the rest of the sample period. The decline observed in the early 2000s in Germany actually started back in 1995, when the German construction share was at 8 percent, higher than any other countries except Japan at that time. This three percentage point drop in the construction share most likely reflects the impact of the reconstruction of Eastern Germany that peaked in the mid-1990s before winding down in the subsequent decade.

A second interesting fact is the boom and bust in the construction share in Spain, the United States, and, to a smaller extent, the United Kingdom. The boom and bust is particularly dramatic in Spain, suggesting that the construction sector was a major factor behind the growth in its unemployment rate. Other countries like Canada did also experience a bit of a housing boom in 2000-07, but no bust, at least not yet.

Turning to the manufacturing share in Figure 4b, we see a steady decline in all countries, especially during the Great Recession. The latter is not surprising since manufacturing, like construction, is an employment sector that tends to be more sensitive to the cycle than other sectors. Germany experienced an unusual increase in its manufacturing share between 2006 and 2008, and has generally performed better than other countries in terms of manufacturing employment over the last few years.

The share of employment in all other sectors is the mirror image of manufacturing, as it generally increases over time with the Great Recession being a notable exception, especially in countries like the United States and Spain. The positive trend is not surprising, as it mostly

[15] The figures stop in 2012 as more recent data are not available for some key countries like Japan and the United States. Data for Australia are only available until 2011. In the case of Canada employment by sector was not available in the OECD data base, so we have used figures from the Labour Force Survey instead.

reflects the secular growth of the service sector. Note also that relative to the size of this sector, changes observed during the Great Recession are relatively small.

The evidence presented in Figures 4a-c is summarized in Table 1 where we show how much of the total employment changes in the 2000-07 and 2007-10 periods can be decomposed into the contribution of each employment sector.[16] We first show in Panel A the 2007-10 change in the share of the labor force employed in construction (column 1), manufacturing (column 2), and all other sectors (column 3). Summing up columns 1 to 3 yields the change in the share of the labor force employed in any of these sectors (column 4). We then show in column 5 the percentage of the total change (column 4) solely due to the change in construction share. This is simply obtained by taking the ratio of columns 1 and 4, and expressing it in percentage terms. In most countries, this percentage is surprisingly large given the relative small size of the construction sector. For instance, in the United States the construction share hovers around 7 percent, which is only small fraction of total employment. By contrast, close to 40 percent of the decline in employment is solely due to the decline in construction employment. Likewise, in Spain over 40 percent of the large decline in employment (11.5 percentage points) is due to the collapse of employment in the construction sector.

We perform a similar exercise in Panel B of Table 1, except that we now contrast the boom (2000-07) and bust (2007-10) periods. For instance, column 4 indicates that U.S. employment as a share of the labor force declined by 4.3 percentage points in 2007-2010 relative to 2000-2007. Of this 4.3 "difference-in-differences", 2.6 percentage points, or 60 percent of the total, is solely due to the construction industry. The contribution of the construction sector is qualitatively similar in most other countries. Interestingly, 60 percent of the 2.4 growth of employment in Germany in 2007-10 relative to 2000-2007 is also due to the changes in employment in the construction sector. Remember from Figure 4a that the construction share in Germany stabilized around 5 percent in 2005 after declining steadily prior to that. Thus, an important part of the reason why employment in Germany did better in 2007-10 than 2000-07 is that construction employment stabilized after a long period of decline.

We summarize the connection between the evolution of employment in each sector and total employment by running the regressions shown in equation (3) using cross-country

[16] We focus on the 2007 to 2010 period because the U.S. unemployment rate peaked in 2010. Similar results are obtained using the 2007-09 or 2007-11 period instead.

variation. In both panels A and B, the estimated coefficients are the largest in the construction sector (around 0.5), despite the fact that construction accounts for a relatively small fraction of total employment. The coefficients indicate that a 1 percentage point drop in employment during the Great Recession is typically associated with a 0.4-0.5 percentage point decline in construction employment. As noted earlier, one could argue that this simply reflects the strong cyclicality of construction employment. However, employment in manufacturing is similarly cyclical, but despite its much larger size its estimated coefficient is substantially smaller and not even significant in the difference-in-differences specification. Although these regressions are only based on 11 observations, Appendix Figure 3 shows that in the case of construction, most observations line up closely to the regression lines, and the regression is not unduly affected by extreme observations such as Spain and, to some extent, the United States. Taken together, these results suggest that the boom and bust in the construction industry can account for a substantial part of the cross-country differences in aggregate labor market outcomes during the Great Recession, most importantly for the striking differences between the United States and Germany.

Within-country analysis

We now explore in more detail the role of the construction industry in the Great Recession using micro data from the United States, Canada, and Germany. The key advantage of these data is that they allow us to perform a more fine-grained study of the trends in employment and unemployment at the sub-national level. This is particularly useful for understanding the role of the construction sector in driving the depth and persistence of unemployment in the United States. For instance, Charles, Hurst and Notowidigdo (2013) show that there is a lot of regional variation in the housing boom and that it mostly affected the employment of less educated men, something we can directly check using our micro data.

For the United States we use data from the outgoing rotation group supplement (ORG) of the Current Population Survey (CPS). We start with year 1997 to have an analysis period similar to the one available in the other countries.[17] We limit our analysis to individuals age 16-64, but otherwise keep a sample as inclusive as possible. Although trends in the unemployment and the

[17] In the case of Canada there was a major change in the Labour Force Survey that started asking question about wages, union status, and a few other variables in 1997.

non-employment rate are broadly similar, we focus our analysis on the latter since it is more easily connected to changes in employment shares by sector.

Figure 5 shows the evolution of the non-employment rate in different regions of the United States. We focus on the "sand states" of California, Arizona-Nevada (pooled together), and Florida that were particularly affected by the boom and bust in the housing sector (Davidoff, 2013). Since these are all Southern States, we also look at the other large Southern state, Texas, as a comparison, as well as all other states pooled together. The detailed employment changes during the Great Recession (2007 to 2010) are also reported for these states and the nine census regions in Table 2a.

While Figure 5 and Table 2a show that non-employment increased substantially in all regions of the United States during the Great Recession, the increase was largest in Arizona-Nevada and Florida, followed by California. The non-employment rate increased by 6-8 percentage points in these regions between 2007 and 2010 (column 11 of Table 2a), compared to less than five percentage points in most other regions.

Figure 6 shows that men with a high school education and less were by far most affected by the Great Recession. Their non-employment rate increased by 8 percentage points between 2007 and 2010, compared to only three percentage points for male college graduates, and less than 2 percentage points for female college graduates. While these relative employment patterns are consistent with less educated men being particularly affected by the collapse of the construction sector, that sub-group of the population also tends to exhibit a more cyclical employment pattern than the rest of the population. This can be observed, for instance, during the milder recession of the early 2000s where it also experienced the steepest growth in non-employment. Therefore, we have to go beyond these aggregate national trends for all sectors combined to get more decisive evidence on the contribution of the construction sector on employment during the Great Recession.

In Table 2a we decompose the 2007-10 change in non-employment by employment sector using equation (2). We show the results of this decomposition for men with a high school degree or less (columns 1-4), all men (columns 5-8), and all men and women combined (columns 9-12). We then show corresponding results in a "difference-in-differences" setting contrasting the housing boom (2000-07) and bust (2007-10) periods in Table 2b.

A striking pattern illustrated in Table 2a is the dramatic decline in the employment of men with a high school degree (or less) in Arizona-Nevada and Florida where it collapsed by 14 percentage points, a drop that even exceeds what we documented for Spain earlier. At the same time, the share of men in this group working in construction declined by around 10 percentage points during that period. Hence, in a purely accounting sense, most of the increase in non-employment for this group is due to the collapse in construction employment. Indeed, column 4 indicates that 50 to 75 percent of the increase in non-employment in the different regions can be linked to the drop of construction employment. This is remarkable since construction employment accounts for less than 20 percent of total employment for that group.

While the growth in non-employment is less dramatic in broader segments of the population (columns 5 and 9), Table 2a shows that construction remains an important driving force of aggregate outcomes. For instance, between one sixth and one third of the overall non-employment rate increase for all men and women combined can be accounted for by the decline in construction employment.

Comparing the boom and bust periods in Table 2b shows that construction plays an even more important role in that setting. For example, in Arizona-Nevada and Florida the entire decline in 2007-10 employment relative to the 2000-07 period is essentially due to the construction industry. By contrast, there is not much of a systematic pattern in manufacturing employment, consistent with Mian and Sufi (2014) who find that changes in employment in tradeable sectors (mostly manufacturing) is unrelated to the extent of the housing bust (as captured by change in housing net worth).

Note, however, that Mian and Sufi (2014) did not look explicitly at the role of the construction sector is their analysis at the county level. Since the sand states are also those where house prices declined the most (Davidoff, 2013), it may be that some of the decline in construction employment is due to the wealth effect emphasized by Mian and Sufi (2014). It is difficult, however, to establish a causal connection between these two factors since negative regional housing shocks directly affect houses prices and new housing supply (and construction employment).[18] But while these issues are important for the interpretation of our findings, this

[18] Mian and Sufi use an instrumental variable strategy (based on regional variation in housing supply elasticities) to show that housing shocks do not confound their estimates of the effect of housing net worth on other non tradeable employment. This is does not mean, however, that construction employment did not play an important role during the Great Recession. In that sense our findings complement, and do not contradicst theirs.

does not affect our main conclusion that, in an accounting sense, changes in construction employment are a major contributor in overall employment changes across regions of the United States (and across countries).

We explore the role of the construction sector more systematically by reporting the regression estimates based on equation (3) at the bottom of the tables. For either all men, or men and women combined together, we find that the coefficient in the construction share equation is around two thirds in both specifications considered. The estimates are even larger when only looking at men with a high school degree or less. Overall the results indicate that the relative performance of overall employment across education groups and regions is systematically linked to what happened to employment in the construction sector. In particular, the estimated coefficients are much larger than the share of employment in the construction sector. Furthermore, manufacturing is usually believed to be a highly cyclical sector, but the manufacturing share is not systematically linked to overall employment, as evidenced by the fact that the coefficient for that sector is not statistically significant in most cases.

We confirm these results using the alternative variance decomposition introduced in Section II (footnote 6) where $Var(\Delta e_i) = Var(\Delta e_i^c) + Var(\Delta e_i^m) + Var(\Delta e_i^o) + 2Cov(\Delta e_i^c,\Delta e_i^m) + 2Cov(\Delta e_i^c,\Delta e_i^o) + 2Cov(\Delta e_i^m,\Delta e_i^o)$. We compare the results of this alternative variance decomposition to our main decomposition based on regressions in Appendix Table 1, estimated on a sample of men. As in our main regression-based decomposition (Panel A), most of the variation in the overall employment rate can be accounted for by the construction sector under the alternative decomposition reported in Panel B. The difference between the two approaches depends on whether or not covariances between construction and the other sectors are attributed to the "construction effect".[19]

While the results reported here are based on simple variance decompositions, they are very much consistent with the cross-country evidence reported earlier that established a similar connection between the construction share and overall employment. This is illustrated in Appendix Figure 6a-b which plots the data used to estimates the construction sector regressions (for men). The figures are similar to the one reported for countries in Appendix Figure 3. Changes in the construction share closely line up with changes in the overall employment rate

[19] The results are similar under both decompositions because these covariances are relatively small compared to the variance of the construction share ($Var(\Delta e_i^c)$).

and as in the case of Spain in Appendix Figure 3, extreme observations (men with a high school degree or less in Arizona, Nevada, or Florida) are more or less on the same regression line as the rest of the sample. This clearly shows that groups and states where overall employment plummeted are the ones for which the employment bust in construction was also most dramatic.

In the case of Canada we use data from the Labour Force Survey (LFS) which are very similar to the U.S. CPS. One small difference is that we look at individuals age 15-64, while 15 years old are not included in the CPS.[20] Generally speaking, the main employment patterns for Canada are qualitatively similar to those we just documented for the United States and are reported in a series of Appendix Figures 7-9.

As in the U.S. case, Table 3a and 3b show some fairly dramatic differences in non-employment by region when focusing on men only, especially those with a high school diploma or less. The non-employment rate for the latter group increased by 7-8 percentage point in British Columbia and Alberta during the 2007-10 period, compared to 5.5 percent in Ontario and only one percentage point in Quebec. In the case of Ontario, most of the drop comes from the manufacturing sector, while a mix of sectors is involved in the case of Alberta and British Columbia. The construction sector plays a modest role in the 2007-10 period, reflecting the fact that the growth in construction employment stopped around 2007-08, but remained relatively stable after that. Construction plays a much more important role, however, when contrasting the 2007-10 and 2000-07 periods (Table 3b). In fact, the construction boom in Western Canada that stopped around 2007 now accounts for a large fraction of the relatively poor employment performance of British Columbia and Alberta in 2007-10 relative to 2000-07. Yet, the regression coefficient reported at the bottom of the table shows that the construction share is not as closely related to overall employment performance as is the case in the United States.

Another noticeable fact is that primary sector employment (mostly in oil and gas) in Alberta is also an important part of its economic slowdown – its employment share grew quickly until 2007 but slightly declined afterwards. The importance of this sector is confirmed by the regressions coefficient which shows that, despite its small size, the primary sector accounts for a substantial share of the variation in employment.

[20] We cannot exclude individuals age 15 since age is reported in aggregate groups (including one group for age 15-16) in the public use files of the LFS we use in this paper.

For the analysis of the German labor market we mainly rely on the Mikrozensus, a repeated cross-sectional data set which is similar in survey design and coverage to the U.S. CPS. We apply the same sample restrictions as those we use for the CPS.

The evolution of non-employment rates by region are shown in Appendix Figures 10a and 10b. There is a significant amount of regional variation, with the Southern states persistently outperforming the Northern states. Levels of non-employment were consistently high at the end of the 1990s, often exceeding the corresponding U.S.-levels by 10 to 15 percentage points. However, non-employment rates have been on a downward trend in Western Germany for the entire sample period, only interrupted by a recession between 2001 and 2004. In contrast, non-employment rates in Eastern Germany have started to decrease only since the 2003-05 labor market reforms, described in more detail below. As is now well-documented, the Great Recession did not have a significant impact on non-employment rates in either parts of Germany. As a consequence, in 2011 they were close to pre-crisis levels in the United States.

Tables 4a and 4b show employment changes by industry and are directly comparable to Tables 2 and 3, which report the corresponding results for the United States and Canada. While aggregate employment rates have remained nearly unchanged between 2007 and 2010 in most states, there has been a slight reallocation of labor from the goods-producing-sector to the service-sector. This reallocation started from a much higher employment share of the manufacturing sector than in the United States: Its average employment share among German men during the decade was 22.7 percent compared with only 13.5 percent in the United States. Interestingly, in some states employment in the construction sector has actually increased. Whether these reallocations are short-term adjustments or long-run structural changes remains to be seen in the future. In any case, regression results documented at the bottom of Table 4a imply that the drop in non-employment rates between 2007 and 2010 was mostly associated with the rising employment share in the service sector and not at all with the changing employment shares in the construction sector. The difference-in-differences listed in Table 4b clarify that the increases in employment rates have generally slowed-down during the Great Recession, with the exception of Berlin. In sharp contrast to the U.S. experience, the change in the relative size of the

construction sector was larger between 2007 and 2010 than between 2000 and 2007.[21] Again we show results from corresponding regression models at the bottom of the table. They provide further evidence for the major role of the service sector and the weak role of the construction sector in driving the recent evolution of non-employment rates.

Construction Shocks: Further Evidence and Discussion

A central difference between Germany and the United States we are highlighting is the lack of a construction boom in Germany before the Great Recession and a subsequent bust. Our results suggest this to account for a major part of the cross-country differences in the labor market impact of the Great Recession. A remaining question is whether such boom-bust periods in the construction sector have particularly severe impacts on the labor market more generally, possibly because construction workers are particularly hard to reintegrate in the labor market or because construction busts have severe wealth effects. An interesting case study in the German context is provided by the construction boom in Eastern Germany in the aftermath of the German unification.[22] This was followed by a decline of the construction sector starting in 1995. Non-employment rates soared in subsequent years as well. To investigate if there is a systematic relationship between these trends in non-employment rates and the construction boom-bust period we show the evolution of non-employment and employment shares in Eastern Germany for various industries, including construction, between 1995 and 2003 in Appendix Figure 15.[23] The picture is quite striking: Among all industries, construction was the only one that experienced a pronounced and continuous decline in employment. Service sector employment actually grew over that period, while employment in manufacturing and the primary sector remained fairly stable. Hence, the increase in non-employment was to a significant extent driven by the flow of construction workers into non-employment that was not fully mitigated by flows into the service sector.

To quantify the role of this reallocation in driving the evolution of non-employment we show in Appendix Table 2 the results from single difference regressions described in equation

[21] An analysis of the levels (not shown in tables) clarifies that the positive difference-in-difference was driven by a general decrease of employment in the construction industry during the first half of the decade that has come to a stop afterwards.

[22] This boom was generated because a large part of the infrastructure and building structures had to be renovated or replaced.

[23] We choose 2003 as the final year in the figure since the Hartz4 reforms started to be implemented in that year.

(2). In the upper panel we show results from regressions that are estimated only on data from 1995 and 2003. To trace out the entire transition path we then re-estimate these regressions year-by-year, with results shown in the lower panel of the table. The results corroborate the evidence presented in Appendix Figure 15. In particular, most of the poor labor market performance in Eastern Germany during this period can be explained by a decline in the construction sector and a sluggish uptake of the service sector.

We have analyzed the labor market effects of two major construction busts, one during the Great Recession in the U.S. and one in the aftermath of the German Reunification. It is then natural to ask about the role of the construction sector in earlier recessions that were not intrinsically linked to such boom-bust periods. We briefly study this question in the context of earlier recessions in the United States. Appendix Figure 16 shows the relationship for men between changes in the construction share and changes in the employment rate during the recession of the early 2000s. Unlike the corresponding graph for the Great Recession (Appendix Figure 6a), there is only a weak and statistically insignificant connection between these two variables. It therefore seems that the construction sector does not play a dominant role in driving labor market dynamics during all recessions. Rather, a major impact of the performance of this sector on the aggregate economy seems to be reserved to boom-bust like events.

One may interpret the documented performance of the labor market during such episodes as evidence that shocks to the construction sector tend to have a more persistent effect on employment than other shocks. This could help explain why the U.S. unemployment rate has taken so long to recover in the aftermath of the Great Recession. The limited evidence on Eastern Germany reported in Appendix Figure 15 is also consistent with this interpretation, as the non-employment rate kept increasing for at least eight years while the construction sector kept declining. But what is the distinct fundamental feature that causes the labor market to underperform for a long time after a construction boom? An important part of any promising explanation has to be that displaced workers from the construction sector have a particularly hard time finding jobs in other sectors. Recent evidence documented in Acemoglu and Autor (2011), Charles, Hurst and Notowidigdo (2013) and Jaimovich and Siu (2013) suggests that a major problem may have been that construction workers lost their jobs exactly in periods when the economy-wide demand for skills typically employed in that sector has decreased. If these skills are hard to transfer to growing sectors, a persistent slump in the labor market may be the result.

However, it is difficult to distinguish such an explanation from the alternative hypothesis that construction busts may be a symptom of a deeper problem linked to the financial meltdown of 2008 (e.g. Reinhart and Rogoff, 2009). That said, recent evidence suggest that sectoral shocks can have a fairly persistent effect on local labor markets. For instance, Autor, Dorn and Hansen (2013) do find large adverse labor market impacts of trade shocks with China on local labor markets that are particularly exposed to theses shocks. As in the case of the East Germany construction bust, these adverse shocks are not linked to a financial collapse. This suggests that the connection between construction shocks and overall employment rates we document in the United States during the Great Recession are likely not just a spurious consequence of a deeper underlying shock linked to the financial meltdown of 2008.

IV. Labor Market Reforms and Institutions in Germany

In section 2 we argued that the strong GDP performance of Germany in the aftermath of the Great Recession was an important explanation for the continuing decline in its unemployment since 2008. But while the lack of a construction bust may have shielded the German labor market, it fails to explain why employment barely declined early in the Great Recession despite a sharp fall in output. We now explore whether the large-scale labor market reforms implemented between 2003 and 2005 – commonly referred to as "Hartz reforms" –, reforms to the retirement benefit system, and the institutional setting, such as short-week programs, may serve as explanations for this puzzle.[24]

We start with plotting the evolution of non-employment rates by education, gender and age in Figures 7 and 8, again using the Mikrozensus data. The first set of figures shows that there were pronounced downward trends in non-employment rates for women over the whole sample period, no matter the education, which were slightly accelerated by the reforms. Less pronounced trends are detectable for the two higher educated groups of male workers. The most striking fact however emerges when we compute the non-employment rate by age group. Figures 8a and 8b show that the pronounced acceleration of the decline in German non-employment rates after the reforms was almost entirely driven by the oldest workers (age 55-64), regardless of gender. In

[24] The Hartz reforms, described in more detail in the Online Appendix 1, are almost entirely labor-supply oriented, with the primary goal of increasing efficiency of the unemployment agencies and "job centers", increasing the matching rate of unemployed workers to potential employers, and changing the search- and work-incentives of workers. Authors such as Rinne and Zimmermann (2012) argue that labor market reforms go a long way toward explaining the "German labor market miracle" during the Great Recession.

contrast, the middle aged group has fairly stable employment rates while non-employment rates of the youngest workers have increased between 2008 and 2010. One may be tempted to associate the changes in labor market participation rates of older workers with the "Hartz IV" reforms. However, these were broad labor market reforms and did not specifically target older workers. It is more likely that a simultaneous redesign of the retirement benefit system that has increased taxes on retirement benefits while setting tax-incentives for accumulating retirement savings privately while working is the major driving force behind some of these empirical patterns. This is consistent with the fact that the share of older workers who are on short-term contracts, shown in Appendix Figure 17, has remained remarkably stable over time, even though these types of contracts were made more attractive by the Hartz reforms.

None of these empirical regularities explain why non-employment rates have continued to decline at similar rates during the recession despite the large drop in GDP. We thus ask next whether there has been an impact of the output drop on the intensive rather than the extensive margin of labor supply. Using the Mikrozensus data we plot the evolution of actual hours worked conditional on employment in the week prior to the survey for our education- and age-groups in Appendix Figures 11a and 11b respectively. Hours have been on a downward trend for all groups and over the whole sample period, and the labor market reforms accelerated these trends for the youngest and oldest workers further. Most important for our discussion is the finding that actual hours worked dropped noticeably during the Great Recession, with a full recovery by 2011.

Burda and Hunt (2011) among others stress the importance of the German short-time work programs for mitigating the impact of the Great Recession on non-employment rates by allowing firms to adjust their labor demand on the intensive rather than the extensive margin.[25] As shown in Appendix Figure 12, the fraction of workers who report to be on a short-time work program has spiked in 2009, indeed, with a full reversal to pre-crises levels by 2011. When running a simple regression of actual hours worked on a short-time work program dummy and conducting a variance decomposition we find that 18.5 percent of the decline in aggregate hours of work between 2008 and 2009 and 39.5 percent of the subsequent recovery can be explained by this spike. Hence, this government program clearly did buffer the labor market impact of the Great Recession. In the same figure we also plot the evolution of the fraction of workers in

[25] These are government programs that replace a significant fraction of labor earnings paid by firms to their workers if the firm commits not to fire the employees. Cahuc and Carcillo (2010) show that the availability of such programs helped mitigate the impact of the recession in a number of countries other than Germany.

"mini-jobs". These are low-paying jobs and jobs in marginal self-employment which were made financially more attractive by the 2003-05 labor market reforms. A popular hypothesis in the German press is that mini-jobs provide a further margin of adjustment to recessionary output declines. The figure shows that the fraction of employed workers in mini-jobs experienced a temporary decline in 2009, possibly because this group is most likely to enter unemployment or non-employment during a recession. Given the weak response it is unlikely that this can explain the German labor market performance in the aftermath of the Great Recession.

To further analyze the potential effect of the Hartz reforms on the German labor market and its ability to react flexibly to the Great Recession, we now turn to the study of high-frequency labor market flows. Since the reforms changed the search- and work-incentives of workers, it is natural to look at how they may have affected unemployment- rather than non-employment rates through their impact on labor flows. An interesting starting point for this analysis is Elsby's (2011) discussion of Burda and Hunt (2011), which showed that the exit rate out of unemployment in Germany started increasing around the time of the reforms in 2004, and prior to the substantial decline in the unemployment rate that started after 2005. This is not what is typically observed in unemployment flows data, where changes in the unemployment rate tend to precede movements in exit flows (Elsby, Hobijn, and Sahin, 2008). This suggests that labor market reforms did indeed play a role in the decline of the German unemployment rate since the mid-2000s.

We explore this issue by using social security panel data provided by the IAB, currently available until the year 2010. We apply the same sample restrictions to the data as those for the Mikrozensus. Ideally we would like to estimate the impact of the Hartz reform by comparing the evolution of labor market flows in Germany to those in comparison countries like the United States or Canada. Given that we do not have comparable data for these two countries we use the past behavior of German labor market flows as a "comparison group" by computing a long time-series of monthly flows in and out of unemployment. Our working sample starts in January 1977 and ends in June 2010. It is important to note that the IAB data are not nationally representative and only cover the universe of workers who are either unemployed and registered with the German employment agency or who are employed in a job that is subject to social insurance contributions. We therefore cannot compute flows between employment and out-of-the-labor-force.

Aggregate UE and EU flows are shown in Appendix Figures 13a and 13b, respectively.[26] The figures paint a very clear picture. First, UE-flows decreased tremendously at the beginning of the 1980s and remained relatively low until the end of the 1990s, corresponding to the well documented two decades of high unemployment. At the same time, EU-flows remained fairly stable over time, implying that high unemployment rates were a problem of job creation rather than job destruction. Second, there was a clear trend break in UE-flows in 2004, with a pronounced upward trend since then, even during the Great Recession. This is consistent with the findings in Fehr and Sunde (2009) who show, using a more fine-grained analysis of UE flows, that the rate at which the unemployed are matched to the employed has significantly increased in response to the Hartz reforms. Somewhat surprisingly there is also a slight permanent decrease in EU-flows as well. In particular, job destruction rates have not increased noticeably during the Great Recession. Hence, both more job creation and less job destruction have contributed to the falling unemployment rates since 2004/05.

Given the documented importance of the older workers in driving recent employment trends we also compute the two types of flows for our three age groups, shown in Appendix Figures 14a and 14b. Two important facts emerge from these figures. First, flows in and out of employment of the young and the middle-aged groups track each other very closely. In contrast, UE flows of the older workers are noticeable more stable over time, with a smaller decrease at the beginning of the 1980s and a smaller increase since 2004. On the other hand, job break-up rates are the largest for this group, with the exception of the period starting in 2004. Second, both UE and EU rates were lower for the older workers since the 2003-05 labor market reforms, suggesting that jobs have become more stable but also harder to find. Since the recent decline in non-employment of this group has been quite large, it is reasonable to conjecture that it was mostly driven by a change in flows into retirement rather than by the observed changes in flows between employment and unemployment.

These statistics paint a complex picture of recent aggregate labor market dynamics in Germany. On the one hand, the observed changes in flows are likely to be driven by the labor market reforms and clearly worked in favor of lower unemployment rates for the younger

[26] We have cleaned these time-series from season-effects by removing monthly fixed effects in a first-stage regression and smoothing the residuals subsequently using a standard moving average with a fixed symmetric window of 2 months. As is apparent from the figures, some seasonality remains, mainly because the amplitude of monthly seasonality has changed over time.

workers, but with a relatively minor impact on their non-employment rates. On the other hand, flows out of the labor force of the older workers have changed significantly and were arguably the most important part of the recent trends in aggregate non-employment rates. Since the Hartz reforms did not explicitly target older workers, these changes are more likely to be driven by reforms of the retirement benefit system that were implemented around the same time.[27] It is also important to note that the share of mini-jobs, jobs on short-term contracts, and mean and median wages, all of which are commonly thought to have been strongly affected by the Hartz reforms, displayed pre-existing trends, starting in the mid-1990s.[28] This is consistent with work by Dustmann et al (2014) providing evidence that it was the increasing flexibility and decentralization of the wage-setting process starting around the same time which explains recent trends in the performance of the German labor market. It thus becomes reasonable to view the implementation of the Hartz reforms as an endogenous policy reaction and manifestation of deeper labor market trends that were already ongoing.

It remains puzzling however that the Great Recession did not have any noticeable impact on these recent trends. This is hard to reconcile with a persistent shock to output. Instead, it is reasonable to assume that firms and workers perceived the drop in output in 2007 as a transitory shock, possibly because they viewed the German economy as structurally healthy, thus not significantly altering decisions about consumption, investment and hiring. In other words, one may conjecture that agents in the economy expected the strong performance of the German economy as measured by growth in GDP in the aftermath of the recession. This is also consistent with the minor drop of domestic demand in Germany in 2007.

To go beyond pure speculation we build on the observation documented in e.g. Burda and Hunt (2011) that the output drop during the Great Recession can be accounted for to a large part by a decline in domestic consumption in the case of the U.S. but by a decline in net exports in the case of Germany. We thus ask if (a) shocks to domestic demand are more persistent than shocks to net exports and (b) if changes in domestic demand have larger effects on unemployment rates

[27] It is true that one part of the Hartz reforms attempted to improve job opportunities of older workers. The goal was to increase labor force attachment of this group by way of facilitating the use of short-term contracts. As shown in Appendix Figure 17 there are no noticeable changes in the share of workers on short-term contracts among older workers. Together with our finding that jobs held by this group have become more stable in terms of net flows between unemployment and employment it is unlikely that the Hartz reforms can explain a sizeable part of the trends in non-employment.

[28] For a discussion of trends in wages at different parts of the distribution we refer to Dustmann et al (2014).

than changes in net exports. To this end we expand our data on aggregate country-specific outcomes, collected from the BLS and the OECD data bases, by including all years since 1970 and by collecting data on aggregate consumption, investment and net exports. We continue to focus on the 11 countries included in Figures 1a to 1c. Since our time series are now significantly longer we detrend all aggregate variables but unemployment using country-specific 6^{th}-order polynomials in time.

To address question (a) we run separate regressions of the three components of aggregate demand on their lagged levels, clustering standard errors by country. We find that, indeed, deviations from trend are most persistent for consumption, with an AR(1)-coefficient of .38, followed by net exports (.33) and investment (.32). All coefficients are estimated very precisely, and no estimate is included in the 5%-confidence interval around another estimate.[29]

To answer question (b) we run regressions of changes in unemployment rates on percentage changes in consumption, investment and net exports. Again we cluster standard errors on the country level. This yields estimates on changes in consumption and net exports that are statistically indistinguishable from zero (-.004 and .001 respectively, with standard errors of .003 and .015). In contrast, the coefficient on the percentage change in investment is large (-.093) and highly significant (standard error of .02). These results are reflections of the well-known business cycle fact that the correlation between investment and total hours of work is much larger than the correlation between consumption and total hours of work. Since changes in the real value of the housing stock is included in our domestic investment variable, the finding that unemployment rates react strongly to changes in this component of aggregate demand but not at all to changes in net exports is consistent with our hypothesis stated above.

V.Additional Discussion

In this Section we discuss two additional explanations, demand from China and wage moderation, that have been suggested to the different labor market performance of difference countries during the Great Recession.

Demand from China

[29] All parameter values are substantially below those we obtain if we use data on the U.S. only (.95, .80 and .96 respectively).

While most advanced economies experienced a decline in GDP during the Great Recession, BRIC countries and China in particular kept growing at a fast pace, albeit not quite as fast as prior to the Great Recession. This means that countries with substantial exports to China may have fared better than others during the Great Recession. For example, compared to other countries we study Germany is a leader in the export of precision machinery and related intermediate inputs that are in high demand in China. This may account for part of the strong employment performance of the German manufacturing sector (Figure 4b) compared to other countries that compete more directly against China in the production of other goods.[30]

Other countries that can benefit from the demand from China are those, like Australia and to some extent Canada, that intensively export natural resources to China. One problem with this explanation is that the more resource-intensive provinces in Western Canada were, if anything, more adversely affected by the recession than the rest of the country (Table 3 and Appendix Figure 7). So while the strong performance of Australia during the Great Recession is arguably linked to its close trade relationship with China, there is no evidence that China helped "shelter" Western Canada from the Great Recession. Perhaps this has to do with the mix of natural resources that is more tilted towards oil and gas in Canada, and that the main export market for most Canadian products remains the United States. But there is clearly no evidence from our U.S.-Canada comparison that the stronger performance of the Canadian labor market during the Great Recession is linked to the resources sector since, if anything, Western Canada did worse than the rest of the country during that period.

Wage moderation

A popular hypothesis, stated in Burda and Hunt (2011) among others, is that Germany's strong labor market performance over the last decade is explained by "wage moderation", i.e. the empirical fact that the cost of labor has grown at very low rates. We see two main problems with this argument. First, wage moderation, which is nothing else than a slow growth of real wages relative to labor productivity, is endogeneous itself and a reflection of deeper economic changes that have led to a stronger labor market. After all, German unions did not refrain from asking for higher wage growth because they have become more "moderate", but because they did not have

[30] Autor, Dorn, and Hanson (2013) indeed show that regions of the U.S. that compete more directly with China experienced adverse labor market consequences following the admission of China to the WTO.

another choice in light of increasing globalization of Germany's industry and the poor labor market performance in the 1990s. At the same time, it is not entirely obvious why some countries engage in wage moderation ceteris paribus while others do not.

Second, real wages were also fairly stable in most other countries at a time when labor productivity continued to rise. Figure 9 shows the evolution of real manufacturing wages as computed from the BLS data in our set of eleven countries since 2000. Consistent with Burda and Hunt (2011) and Rinne and Zimmermann (2012), we see that real wages have been relatively constant in Germany since the mid-2000s, indeed. But at the same time real wages were also fairly stable in most other countries over the same period. For instance, Canada, Australia, and the United States all had arguably more "wage moderation" since 2000 than Germany.

Dustmann et al. (2014) offer the most complete exploration of the wage moderation hypothesis. In their view, Germany's strong performance is mainly explained by the success of the export-oriented industry, which itself had feedback effects to the non-tradable sectors of the economy. This success was caused by an increasing competitiveness of that sector, mainly due to two channels. First, the introduction of the Euro and its subsequent weakening made German goods cheaper in countries outside the Euro-zone. Second, and more importantly, the costs of labor inputs grew at a low rate relative to other countries in the Eurozone, especially when seen in relation to labor productivity. This is the wage moderation channel. Dustmann et al. (2014) argue that it did not take place in other Euro-countries because of the more centralized wage bargaining structure in these countries and because of the weaker trading ties to Eastern European countries that started to grow at that time. Another reason, not discussed in their paper, is that when labor is mobile across countries that share a currency, factor prices will eventually adjust. Since Germany's real wages were high relative to the other Eurozone countries before the introduction of the Euro, they experienced a downward pressure afterwards.

The argument that economic forces, such as globalization, the growth of Eastern European countries, and the introduction of the Euro, lead an export-oriented country like Germany to become more competitive as reflected by wage moderation is highly plausible. In fact, one may argue that the pre-existing trends discussed above, such as the increasing use of short-term contracts and mini-jobs before the Hartz labor market reforms, are just another manifestation of these forces. We therefore agree that they serve as a plausible explanation for the strong performance of the German labor market prior to the Great Recession. However, it is

difficult to link these trends to the lacking response of labor market outcomes to the large drop in output that took place in 2008. In particular, if labor market flexibility and low wage growth are an explanation for this missing response, then one should see an even smaller response in more flexible economies, such as the U.K. or the U.S. Even if we take into account that there was some impact of the Great Recession on the intensive margin of labor inputs, i.e. hourly worked conditional on employment as discussed above, it cannot explain why Germany essentially was back to pre-crisis levels by 2010 while countries with highly flexible and decentralized labor markets were not. Strong GDP performance, mostly due to a non-response in aggregate consumption and investment demand, and the lack of a boom and bust in construction are much more unique features of Germany and arguably more promising explanations for the labor market performance in the aftermath of the Great Recession.

VI. Conclusion

In this study we explore a number of possible explanations for the persistently weak labor market performance of the United States in the aftermath of the Great Recession by contrasting its experience to those of a large set of OECD countries. We also conduct a detailed micro-level analysis of labor market outcomes in two comparison countries, Canada and Germany, that faced similar declines in output during the recession but that have not been troubled by persistently high unemployment since then. Adapting this comparative perspective enables us to rule out a number of previously suggested mechanisms as the main driving forces of Canada's and Germany's relative successes. In particular, we show that the "German labor market miracle" is not a miracle at all as its labor market performance is in line with its strong GDP-growth in the post-recession period. We also argue that wage moderation is not likely to be a main explanation for Germany's low unemployment rates as real wages have remained constant in other countries that fared much worse, such as the United Kingdom. In contrast, our findings support recent studies that emphasize the role of the construction boom in the United States as the main driving force of its troubled labor markets. Absent this boom and subsequent bust, our micro-level decompositions of employment rates suggest that U.S. employment rates would have been much closer aligned with employment rates in Germany and Canada.

Our study raises a number of issues to be addressed in future research. First, our international comparison suggests that industrial composition is strongly associated with the

labor market impact of the Great Recession. Most importantly, countries, states and provinces with a pre-crisis construction boom were particularly severely hit by the crisis. In contrast, countries whose output decline was mainly driven by a decline in exports, such as Canada and Germany, fared much better. This is consistent with balance-sheet recessions as in Kiyotaki-Moore-type models (1996) where a drop in housing prices can have disastrous and long-lasting aggregate impacts because of a house' value as collateral. In contrast, as the drop in output during the recession in Germany was mainly due to a fall in exports, it may have been perceived as a transitory rather than permanent shock by firms and workers, thus not significantly affecting aggregate consumption and investment. Second, the German evidence suggests that large-scale reforms to the labor market and the pension system can have major impacts on aggregate labor market performance. It is much less clear as to how such reforms interact with the labor market impact of a recession.

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Table 1: Change in employment shares by sectors, 2000-2010

	Construction (1)	Manufacturing (2)	Others (3)	Total (4)	% of total due to constr. (5)
A: 2007 to 2010					
Canada	0.2	-1.9	-0.3	-2.0	-12.6
Germany	0.0	-0.4	1.9	1.5	2.8
Italy	-0.2	-1.7	-0.3	-2.2	8.3
Japan	-0.7	-1.4	1.0	-1.2	59.7
Netherlands	-0.2	-0.5	-0.1	-0.9	21.7
Spain	-5.2	-2.6	-3.7	-11.5	42.6
Sweden	0.4	-1.8	-1.0	-2.5	-23.5
UK	-0.8	-1.2	-0.5	-2.5	27.7
US	-1.8	-1.5	-1.6	-4.9	36.9
Australia	-0.1	-1.2	0.5	-0.8	6.8
France	0.1	-1.1	-0.4	-1.5	-3.7
Regr. Coefficient	0.44	0.15	0.41		
(st. error)	(0.06)	(0.04)	(0.05)		
R-square	0.86	0.64	0.90		
B: Diff-in-diff ((2010-2007) - (2007-2000))					
Canada	-1.0	0.9	-2.7	-2.8	35.2
Germany	1.5	1.2	-0.2	2.4	60.6
Italy	-1.4	-0.9	-3.7	-6.0	22.6
Japan	0.2	-0.1	-2.2	-2.1	-13.1
Netherlands	0.2	1.3	-1.9	-0.4	-54.9
Spain	-7.5	1.1	-8.4	-14.7	47.8
Sweden	-0.4	0.5	-0.8	-0.8	51.1
UK	-1.4	2.7	-3.9	-2.6	53.7
US	-2.6	1.6	-3.3	-4.3	60.2
Australia	-1.8	0.4	-1.6	-3.0	60.0
France	-0.8	0.9	-2.1	-2.0	41.3
Regr. Coefficient	0.51	0.02	0.48		
(st. error)	(0.05)	(0.07)	(0.05)		
R-square	0.92	0.01	0.91		

Note: The regression coefficients are obtained by running a regression of the change (or difference-in-differences) in the share of each employment sector on the total employment share. The regressions equally weight each observation. The data used are the annual employment aggregates from the OECD plotted in Figure 4.

Table 2a: Change in employment shares by sectors, United States 2007 to 2010

	Men with HS or less				All men				All men and women			
	Constr. (1)	Manuf. (2)	Total (3)	Constr. as % of total (4)	Constr. (5)	Manuf. (6)	Total (7)	Constr. as % of total (8)	Constr. (9)	Manuf. (10)	Total (11)	Constr. as % of total (12)
New England	-3.4	-2.0	-6.6	52	-2.2	-2.0	-4.7	46	-1.2	-1.3	-3.0	40
Middle Atlantic	-3.0	-1.8	-5.6	52	-1.5	-1.5	-4.6	33	-0.9	-1.2	-3.6	24
E N Central	-3.2	-3.7	-9.8	32	-1.9	-3.5	-7.3	26	-1.0	-2.6	-5.1	19
W N Central	-1.9	-2.7	-5.7	33	-1.0	-1.3	-4.5	23	-0.6	-1.0	-3.6	17
South Atlantic	-5.4	-1.6	-9.1	59	-2.9	-1.3	-6.1	48	-1.6	-1.1	-4.6	34
E S Central	-3.9	-3.4	-8.0	49	-2.9	-2.5	-6.2	47	-1.5	-2.0	-4.0	37
W S Central	-3.1	-0.4	-4.8	64	-2.2	-0.8	-3.7	59	-1.0	-1.3	-3.1	33
Mountain	-5.5	-2.5	-9.9	55	-3.0	-1.1	-7.2	42	-1.9	-1.0	-5.7	33
Pacific	-5.0	-1.9	-8.4	60	-3.0	-1.6	-6.5	47	-1.6	-0.9	-4.2	39
California	-6.1	-1.4	-9.3	66	-3.8	-1.0	-8.0	47	-2.0	-0.9	-5.9	34
AZ & NV	-10.8	-0.6	-14.3	76	-6.3	-0.4	-10.8	59	-3.8	-0.3	-7.7	49
Texas	-3.5	0.0	-5.5	63	-2.3	-0.9	-4.3	55	-1.2	-0.9	-2.8	44
Florida	-9.1	-2.2	-14.9	61	-5.3	-0.9	-9.6	55	-2.9	-0.6	-7.5	39
	Constr.	Manuf.	Others		Constr.	Manuf.	Others		Constr.	Manuf.	Others	
Employment share	0.191	0.195	0.614		0.125	0.165	0.711		0.072	0.125	0.803	
Regr. coefficient	0.798	0.167	0.035		0.785	0.008	0.206		0.685	-0.046	0.361	
(standard error)	(0.161)	(0.176)	(0.099)		(0.098)	(0.089)	(0.102)		(0.074)	(0.056)	(0.078)	

Note: The regression coefficients are obtained by running a regression of the change in the share of each employment sector on the total employment share. All thirteen regions are equally weighted in the regressions. The employment shares are computed using CPS data.

Table 2b: Change in employment shares by sectors, United States (2007-10) - (2000-07)

	Men with HS or less				All men				All men and women			
	Constr. (1)	Manuf. (2)	Total (3)	Constr. as % of total (4)	Constr. (5)	Manuf. (6)	Total (7)	Constr. as % of total (8)	Constr. (9)	Manuf. (10)	Total (11)	Constr. as % of total (12)
New England	-5.6	3.0	-3.7	151	-3.1	1.9	-2.6	118	-1.7	2.2	-1.3	130
Middle Atlantic	-5.5	2.3	-4.5	121	-2.7	2.0	-3.1	86	-1.5	1.7	-3.3	46
E N Central	-2.5	-0.3	-5.6	44	-1.9	0.5	-3.2	59	-1.0	0.6	-2.3	42
W N Central	-1.2	-2.5	-3.3	38	-1.0	-0.6	-3.5	28	-0.6	0.1	-2.8	22
South Atlantic	-8.3	5.7	-6.5	128	-3.9	4.5	-4.0	99	-2.1	3.7	-2.8	75
E S Central	-5.6	2.4	-4.5	123	-4.5	1.4	-2.8	159	-2.3	0.6	-1.3	181
W S Central	-5.8	4.9	-1.7	346	-3.8	3.5	-1.1	350	-1.7	1.5	-1.8	97
Mountain	-8.7	0.1	-11.0	79	-4.4	1.3	-7.5	59	-2.9	0.7	-5.8	49
Pacific	-9.3	-0.1	-9.1	102	-5.1	0.3	-4.9	105	-2.7	0.5	-2.7	102
California	-10.8	4.8	-8.2	133	-6.6	3.7	-6.2	107	-3.5	2.8	-4.7	75
AZ & NV	-14.3	1.2	-12.7	113	-8.7	1.5	-9.5	92	-5.5	1.3	-6.8	80
Texas	-6.6	4.1	-2.8	233	-4.8	3.1	-1.3	353	-2.3	1.7	0.0	---
Florida	-13.4	0.9	-14.4	93	-7.7	2.2	-8.4	92	-4.1	2.0	-7.6	55
	Constr.	Manuf.	Others		Constr.	Manuf.	Others		Constr.	Manuf.	Others	
Employment share	0.191	0.195	0.614		0.125	0.165	0.711		0.072	0.125	0.803	
Regr. coefficient	0.735	0.045	0.220		0.654	0.101	0.245		0.581	0.114	0.304	
(standard error)	(0.100)	(0.104)	(0.048)		(0.061)	(0.056)	(0.080)		(0.072)	(0.125)	(0.059)	

Note: The regression coefficients are obtained by running a regression of the difference-in-differences in the share of each employment on the total employment share. All thirteen regions are equally weighted in the regressions. The employment shares are computed using CPS data.

Table 3a: Change in employment shares by sectors, Canada 2007-10

	Men with HS and less					All men					All men and women				
	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)	Constr. (6)	Manuf. (7)	Primary (8)	Total (9)	Constr. as % of total (10)	Constr. (11)	Manuf. (12)	Primary (13)	Total (14)	Constr. as % of total (15)
Atlantic	1.4	-1.4	-0.3	-0.7	-190	1.1	-1.7	0.0	-0.7	-162	0.5	-1.2	0.1	-0.2	-342
Quebec	1.1	-1.7	-0.6	-1.0	-113	1.1	-2.0	-0.4	-1.1	-103	0.6	-1.5	-0.2	-0.4	-140
Ontario	0.9	-4.2	-0.1	-5.5	-17	0.7	-3.8	0.0	-3.7	-19	0.3	-2.6	0.0	-3.0	-10
Manitoba	0.0	-0.8	-0.9	-2.7	1	1.0	-0.3	-0.4	-1.9	-50	0.5	-0.5	-0.3	-1.3	-41
Saskatchewan	0.7	-1.0	-0.1	-2.7	-27	1.5	-0.9	0.5	-1.7	-86	0.9	-0.2	0.4	-1.0	-89
Alberta	-2.0	-0.5	-2.3	-7.2	28	-1.3	-1.0	-1.1	-4.7	28	-0.8	-0.9	-1.0	-3.5	22
BC	0.2	-3.5	-0.9	-7.9	-3	-0.8	-2.6	-0.3	-5.3	15	-0.5	-1.6	-0.1	-3.0	16
	Constr.	Manuf.	Primary	Others		Constr.	Manuf.	Primary	Others		Constr.	Manuf.	Primary	Others	
Employment share	0.136	0.208	0.066	0.590		0.112	0.179	0.050	0.658		0.179	0.128	0.031	0.775	
Regr. coefficient	0.536	0.114	0.286	0.064		0.540	0.086	0.228	0.146		0.735	0.045	0.220	0.220	
(standard error)	(0.154)	(0.144)	(0.221)	(0.281)		(0.101)	(0.072)	(0.137)	(0.199)		(0.078)	(0.051)	(0.086)	(0.141)	

Note: The regression coefficients are obtained by running a regression of the change in the share of each employment sector on the total employment share. All thirteen regions are equally weighted in the regressions. The employment shares are computed using LFS data.

Table 3b: Change in employment shares by sectors, Canada (2007-10) - (2000-07)

	Men with HS and less					All men					All men and women				
	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)	Constr. (6)	Manuf. (7)	Primary (8)	Total (9)	Constr. as % of total (10)	Constr. (11)	Manuf. (12)	Primary (13)	Total (14)	Constr. as % of total (15)
Atlantic	0.0	-1.2	1.9	-3.0	-1	0.2	-0.5	1.3	-2.7	-7	0.1	-0.5	0.8	-4.3	-3
Quebec	-0.4	-0.1	0.2	-0.3	102	-0.2	0.5	0.2	-1.3	14	-0.2	-0.1	-0.7	-4.5	5
Ontario	0.2	2.0	0.2	-2.6	-9	-0.4	1.1	0.2	-1.7	21	-0.3	0.5	0.1	-3.5	9
Manitoba	-2.0	0.8	-1.4	-4.7	42	-0.3	0.8	-0.3	-2.8	10	-0.3	0.0	-0.3	-2.9	9
Saskatchewan	-2.1	-1.1	-3.0	-6.6	32	-0.5	-0.7	-1.6	-4.6	10	-0.2	-0.1	-0.7	-4.5	5
Alberta	-8.2	1.6	-6.3	-11.0	75	-5.4	0.7	-5.8	-6.7	81	-3.4	0.0	-4.0	-6.1	55
BC	-4.6	-2.5	0.0	-13.6	34	-5.1	-1.4	0.7	-8.6	60	-3.0	-0.9	0.5	-6.1	50
	Constr.	Manuf.	Primary	Others		Constr.	Manuf.	Primary	Others		Constr.	Manuf.	Primary	Others	
Employment share	0.136	0.208	0.066	0.590		0.112	0.179	0.050	0.658		0.179	0.128	0.031	0.775	
Regr. coefficient	0.251	0.189	0.143	0.418		0.362	0.229	0.190	0.219		0.195	0.261	0.173	0.371	
(standard error)	(0.134)	(0.199)	(0.099)	(0.098)		(0.096)	(0.137)	(0.067)	(0.150)		(0.070)	(0.088)	(0.043)	(0.104)	

Note: The regression coefficients are obtained by running a regression of the difference-in-differences in the share of each employment sector on the total employment share. All thirteen regions are equally weighted in the regressions. The employment shares are computed using LFS data.

Table 4a: Change in employment shares by sectors, Germany 2007 to 2010

	Men with HS or less					All men					All men and women				
	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)	Constr. (6)	Manuf. (7)	Primary (8)	Total (9)	Constr. as % of total (10)	Constr. (11)	Manuf. (12)	Primary (13)	Total (14)	Constr. as % of total (15)
South-West	-0.2	-1.3	-0.8	-0.2	116	-0.4	-0.5	-0.6	0.6	-62	-0.1	-1.0	-0.5	1.6	-9
South-Central-West	0.2	-0.6	-0.7	0.2	155	0.4	-0.4	-0.6	1.2	31	0.3	-0.4	-0.4	1.9	16
North-Central-West	0.9	-1.3	-0.8	0.1	707	0.6	-0.7	-0.6	0.8	69	0.4	-0.6	-0.4	1.6	22
North-West	0.8	-1.3	-0.6	-0.4	-197	0.5	-1.2	-0.7	0.0	---	0.3	-1.1	-0.5	1.6	17
South-East	-1.0	1.1	-0.3	2.0	-50	-0.2	0.8	-0.2	3.5	-6	0.0	0.2	-0.1	4.5	1
Berlin	2.0	-0.4	-0.5	3.2	64	1.1	-0.6	-0.5	3.6	32	0.6	-0.4	-0.4	3.4	18
North-East	-0.4	1.1	-0.7	3.2	-13	-0.1	1.3	-0.6	4.6	-2	-0.1	0.9	-0.4	5.2	-1

	Constr.	Manuf.	Primary	Others	Constr.	Manuf.	Primary	Others	Constr.	Manuf.	Primary	Others
Employment share:	0.122	0.317	0.030	0.531	0.106	0.297	0.027	0.570	0.066	0.221	0.021	0.692
Regression coef.:	-0.029	0.377	0.151	0.501	-0.002	0.057	0.046	0.899	0.023	0.037	0.024	0.917
(standard error)	(0.098)	(0.088)	(0.058)	(0.115)	(0.039)	(0.059)	(0.023)	(0.072)	(0.027)	(0.049)	(0.019)	(0.056)

Note: The regression coefficients are obtained by running a regression of the change in the share of each employment sector on the total employment share. All 7 regions are equally weighted in the regressions. The employment shares are computed using Mikrozensus data.

Table 4b: Change in employment shares by sectors, Germany (2007-10) - (2000-07)

	Men with HS or less					All men					All men and women				
	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)	Constr. (6)	Manuf. (7)	Primary (8)	Total (9)	Constr. as % of total (10)	Constr. (11)	Manuf. (12)	Primary (13)	Total (14)	Constr. as % of total (15)
South-West	0.5	-1.4	-0.4	-1.3	-38	0.3	-0.3	-0.3	-1.0	-29	0.3	-0.6	-0.1	-2.1	-12
South-Central-West	1.1	0.5	-0.8	-1.4	-76	1.5	1.2	-0.7	-0.4	-359	1.1	0.6	-0.4	-2.1	-53
North-Central-West	2.3	-0.8	-0.3	-1.1	-216	1.7	0.2	-0.2	-0.6	-286	1.0	-0.2	-0.1	-2.5	-41
North-West	2.2	-2.5	-0.7	-2.4	-90	1.5	-1.8	-0.9	-2.2	-70	0.8	-1.7	-0.6	-2.1	-38
South-East	4.2	-1.6	0.1	0.5	765	4.0	-2.0	0.2	1.3	318	2.6	-2.0	0.5	1.1	234
Berlin	5.9	0.9	-0.6	3.6	165	4.5	0.8	-0.6	3.3	136	2.5	0.5	-0.4	1.8	142
North-East	5.3	-3.0	0.0	0.2	---	4.3	-2.2	0.0	1.4	305	2.5	-1.4	0.2	-0.3	-819

	Constr.	Manuf.	Primary	Others	Constr.	Manuf.	Primary	Others	Constr.	Manuf.	Primary	Others
Employment share:	0.144	0.322	0.038	0.497	0.126	0.305	0.034	0.535	0.080	0.237	0.027	0.656
Regression coef.:	0.157	0.169	0.211	0.464	0.027	0.183	0.015	0.775	0.024	0.147	0.009	0.820
(standard error)	(0.121)	(0.125)	(0.070)	(0.121)	(0.030)	(0.044)	(0.018)	(0.048)	(0.017)	(0.032)	(0.013)	(0.036)

Note: The regression coefficients are obtained by running a regression of the difference-in-difference in the share of each employment sector on the total employment share. All 7 regions are equally weighted in the regressions. The employment shares are computed using Mikrozensus data.

Figure 1a: Unemployment rates in selected G7 countries

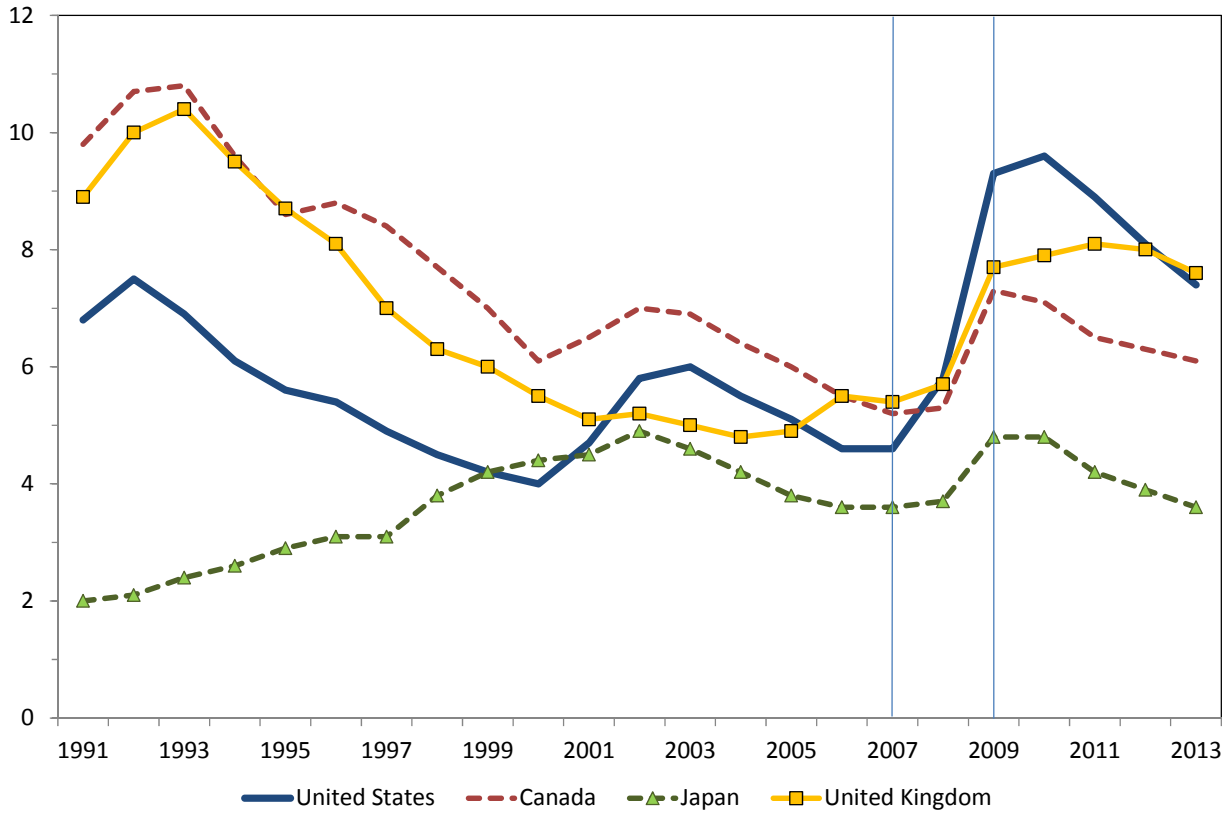
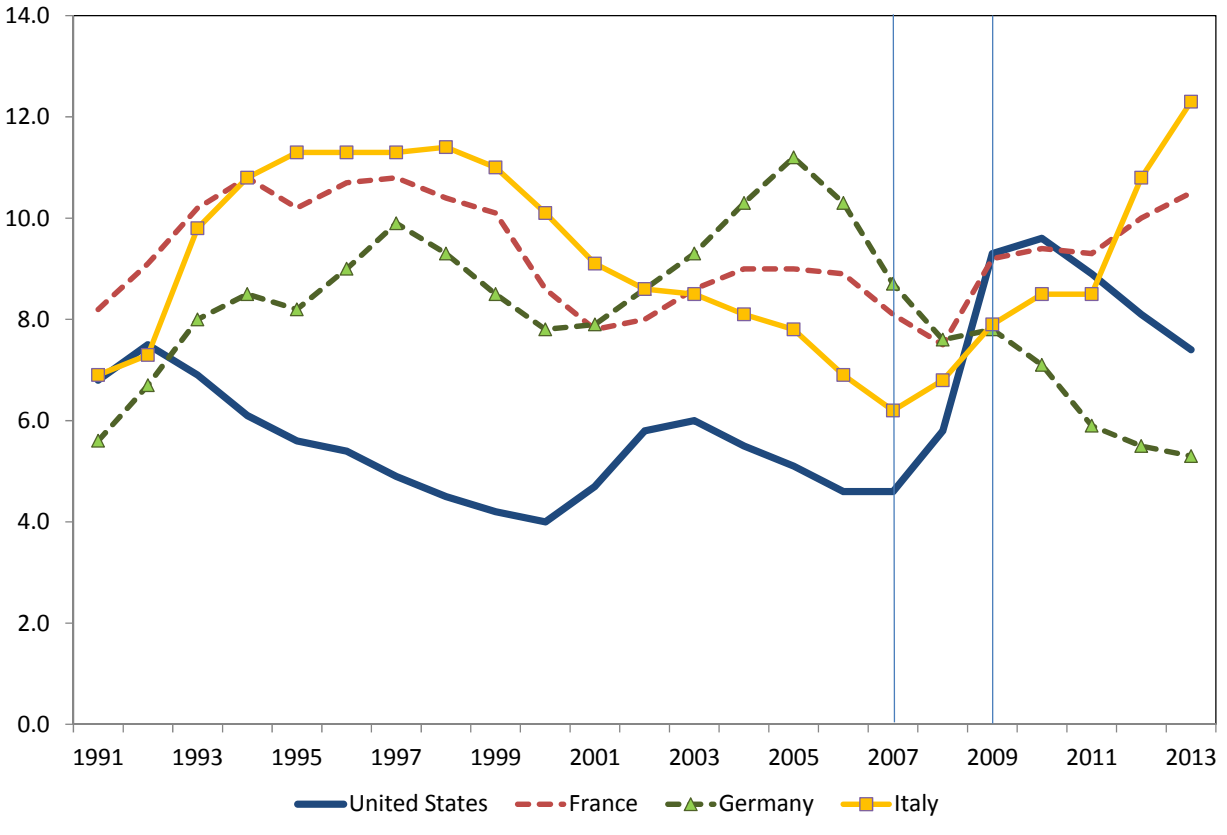
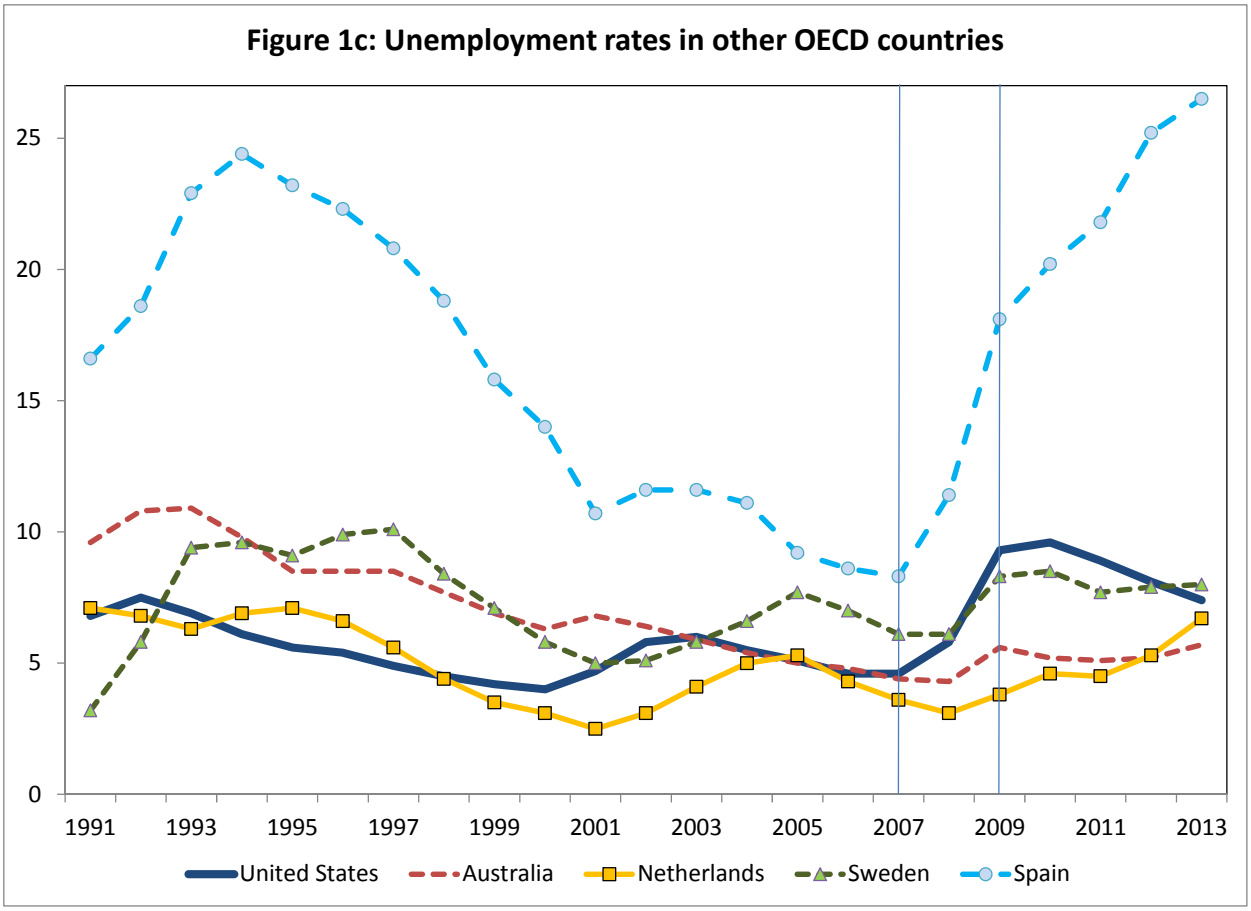


Figure 1b: Unemployment rates in selected G7 countries





Note: Data from the BLS International Labor Comparisons Program (1991-2012) updated using data from the Conference Board for 2013. The two vertical lines indicate the Great Recession time period (2007-09).

Figure 2a: Real GDP in OECD countries

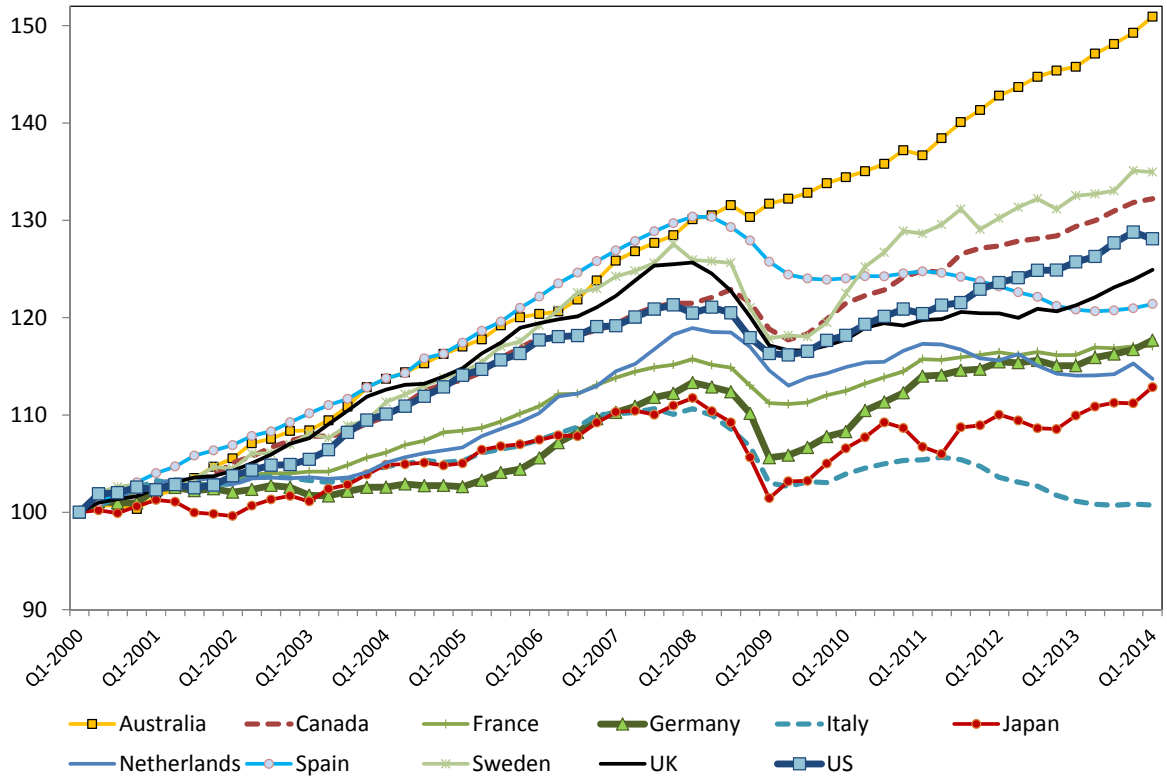
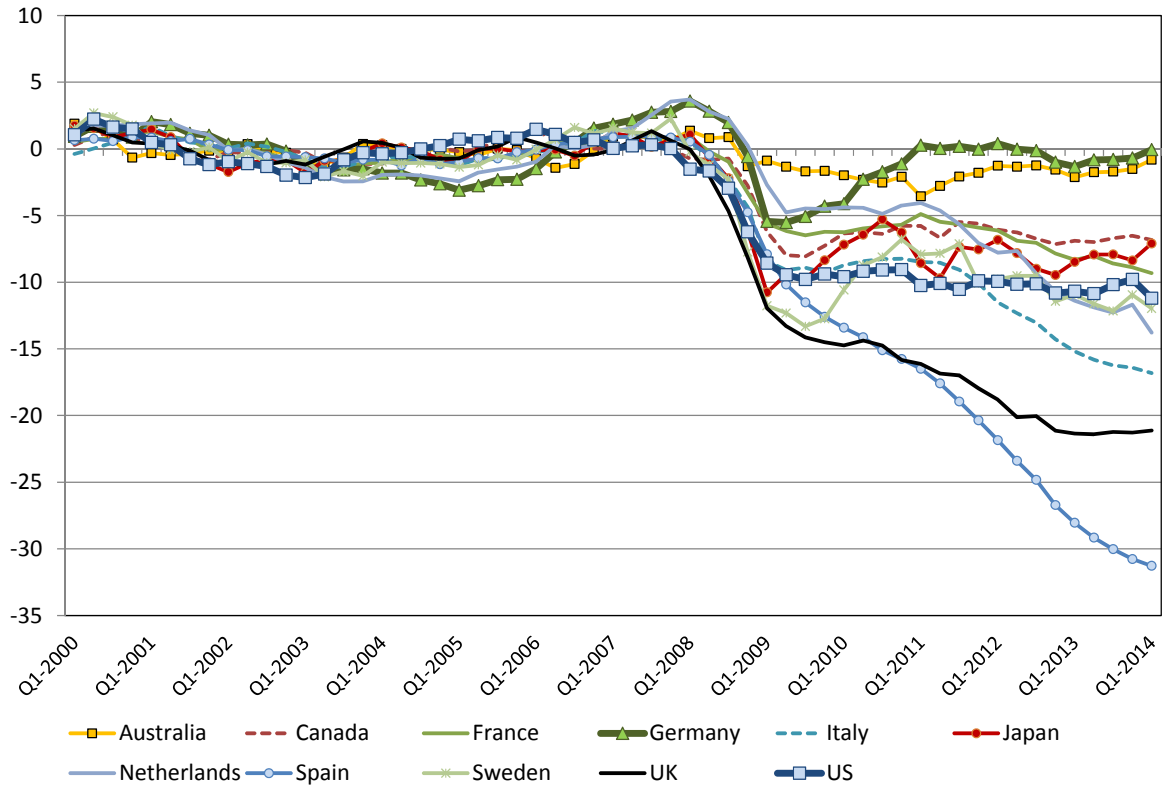
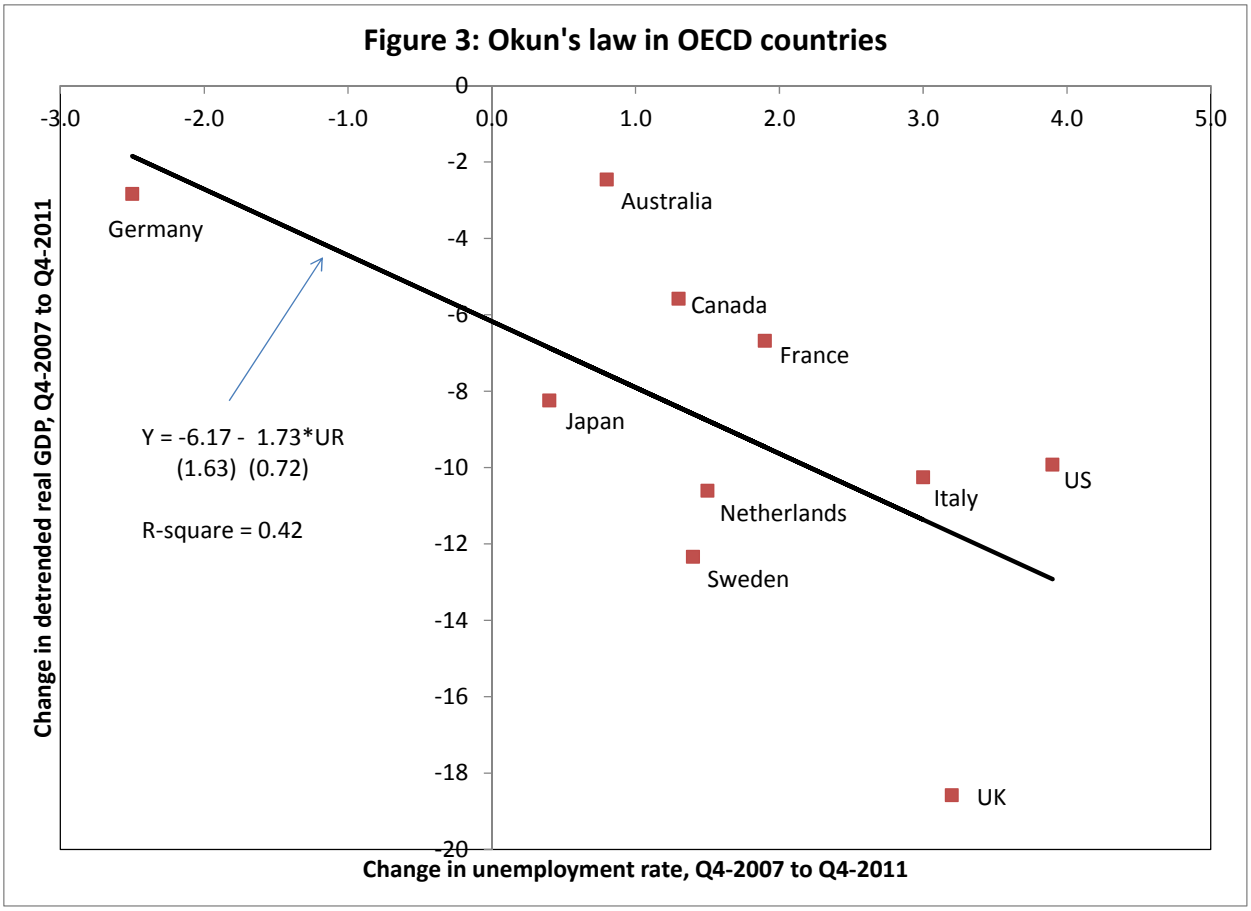


Figure 2b: Detrended Real GDP (using linear trends for 2000-07)



Note: Real GDP data from the OECD. Trends computed over the Q1-2000 to Q1-2007 period.



Note: The changes in unemployment rates are computed using BLS data. Real GDP data come from the OECD. The detrended changes in real GDP are obtained by estimating trend real GDP growth for Q1-2000 to Q4-2007, and subtracting the predicted trend from observed changes for Q1-2007 tp Q-1-2011. The Okun relationship illustrated in the figure is obtained by running an equally weighted regression of changes in detrended real GDP on changes in unemployment rates.

Figure 4a: Share of labor force working in the construction industry

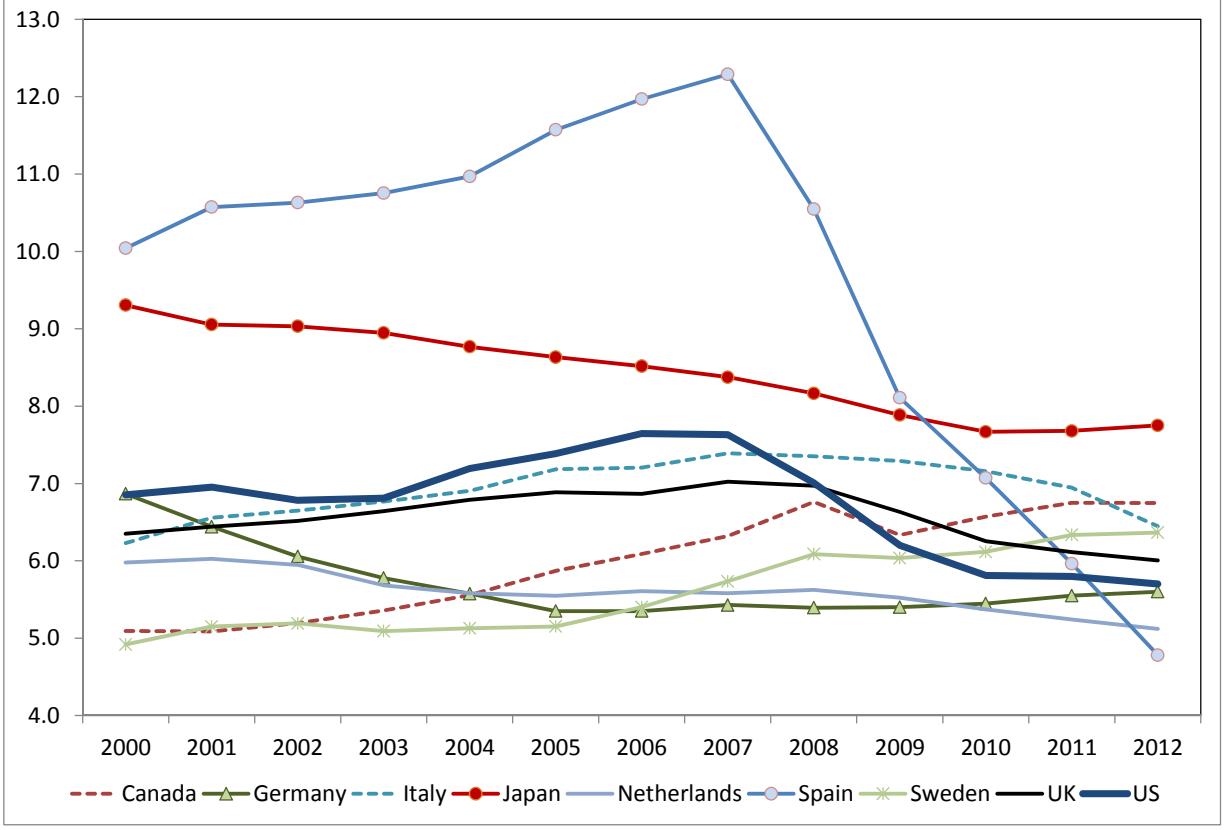
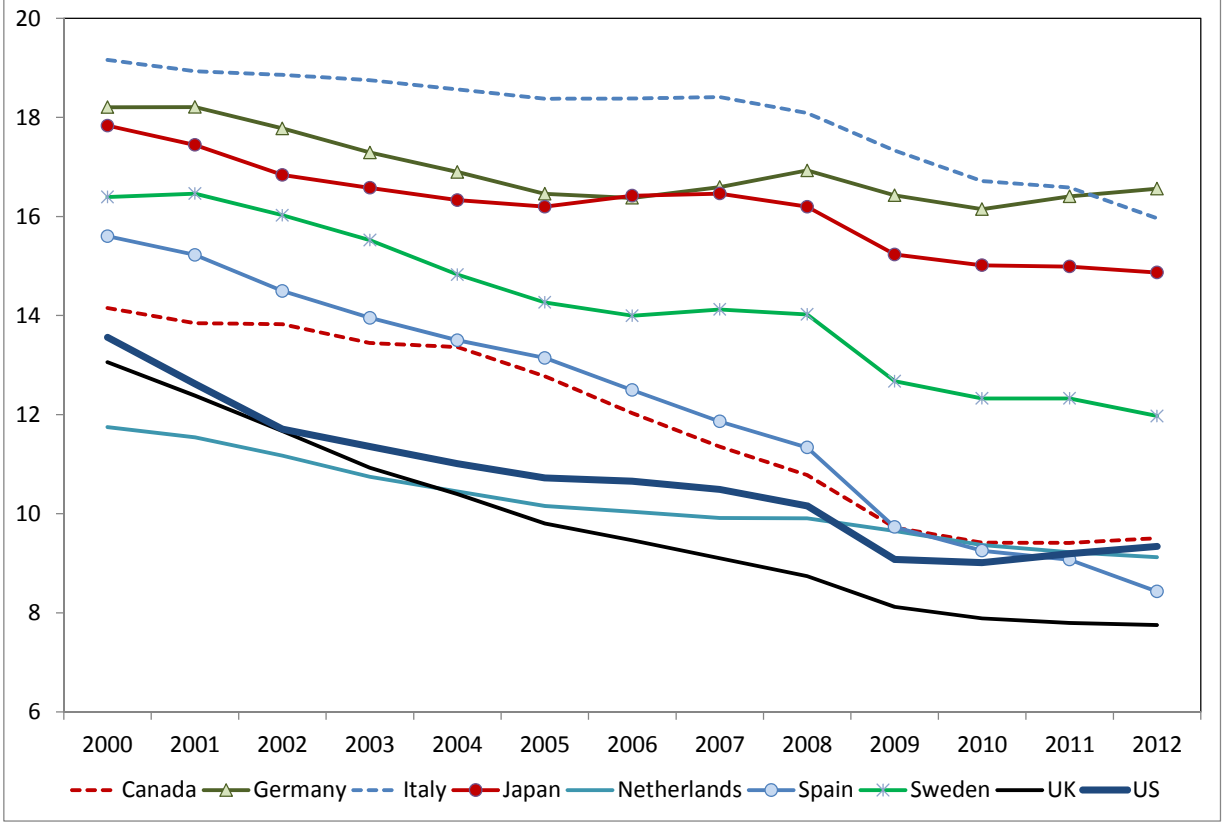
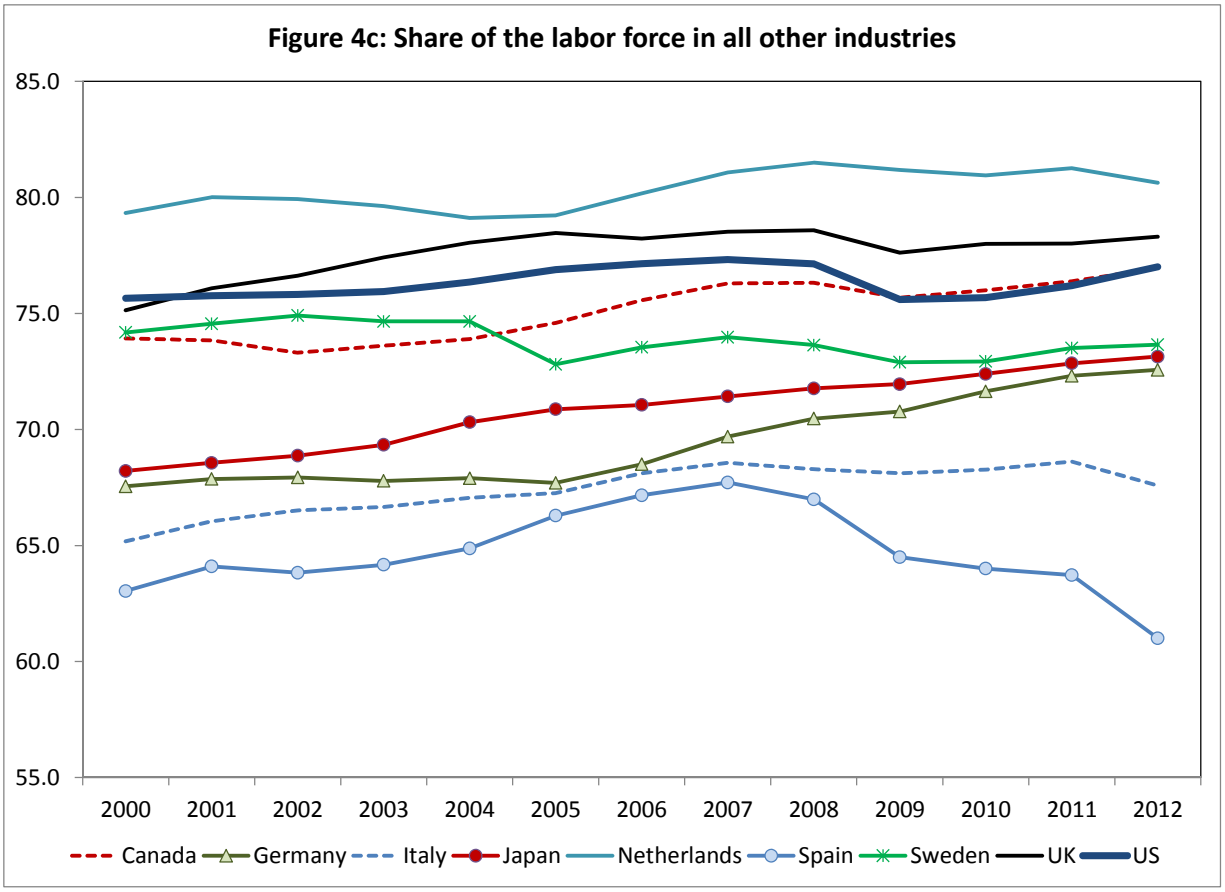
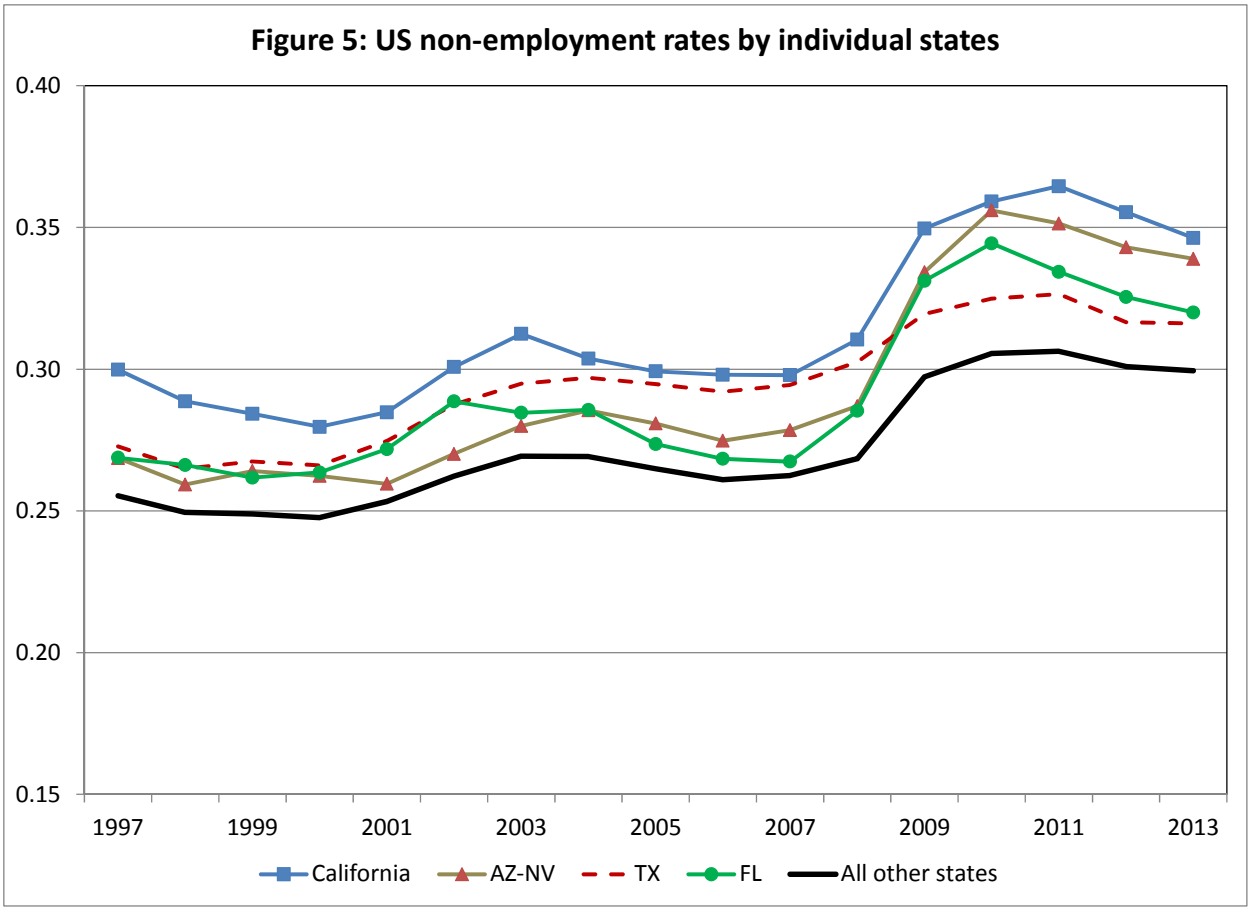


Figure 4b: Share of the labor force in the manufacturing industry





Note: Data from the OECD



Note: Non-employment rates computed from the CPS.

Figure 6a: US non-employment rates by education, men

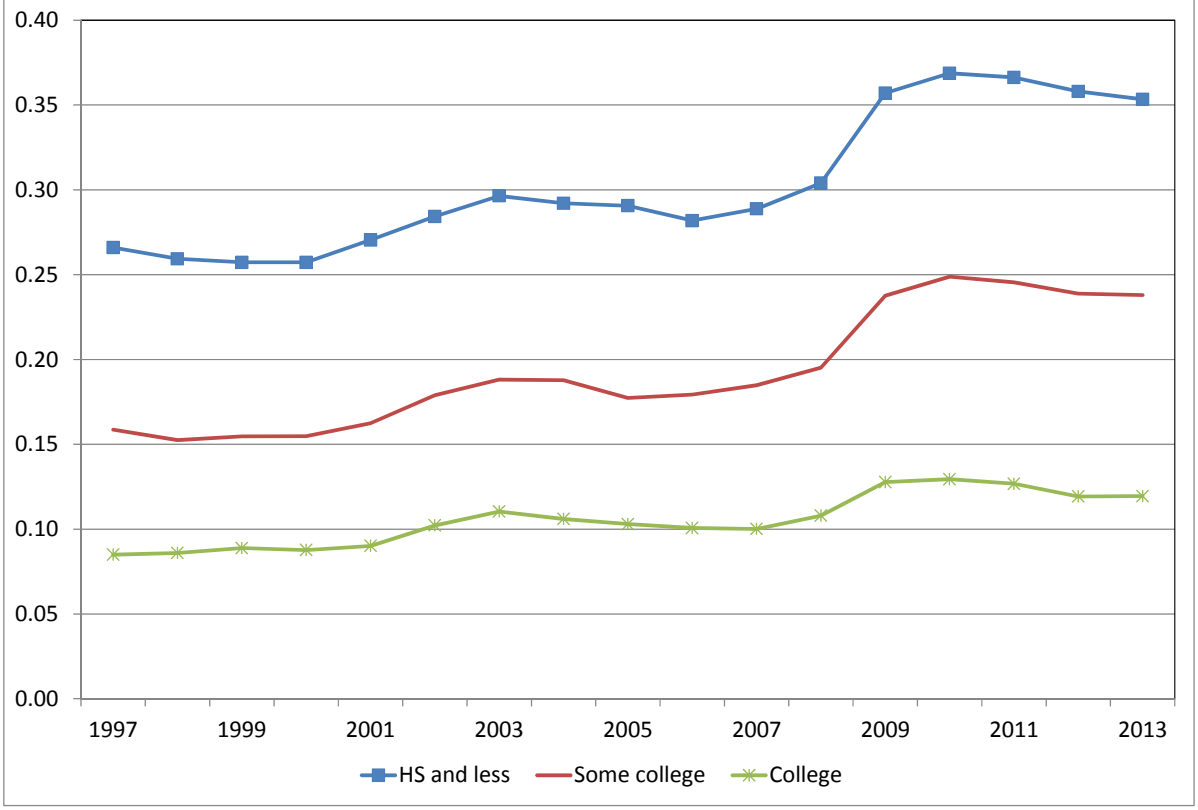
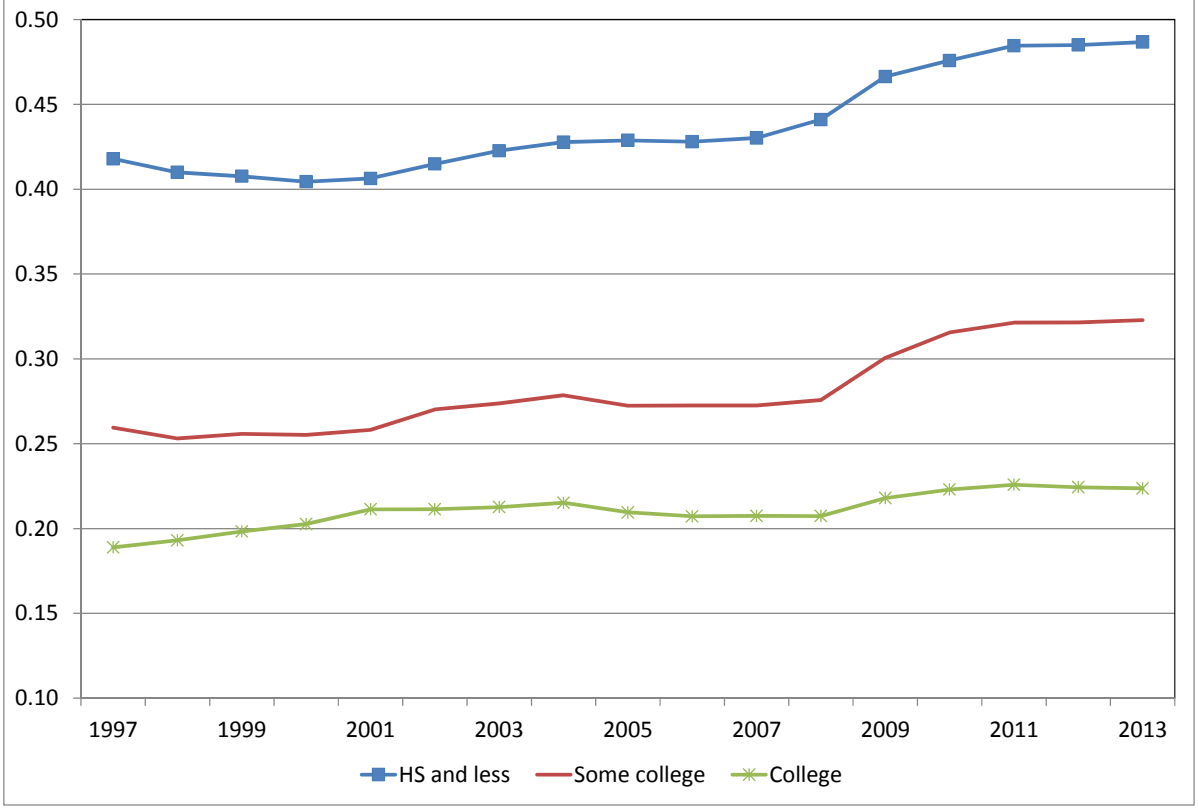


Figure 6b: US non-employment rates by education, women



Note: Non-employment rates computed from the CPS.

Figure 7a: German non-employment rates by education, men

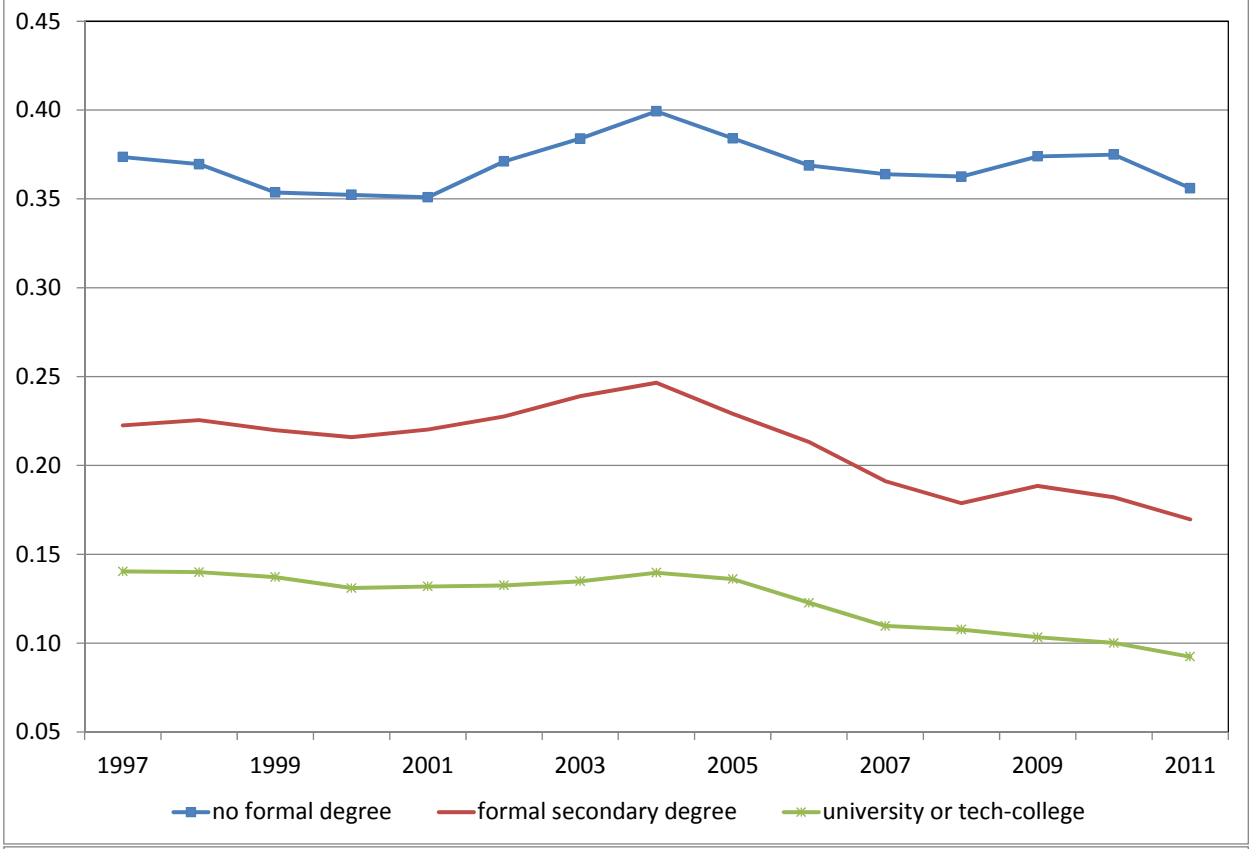


Figure 7b: German non-employment rates by education, women

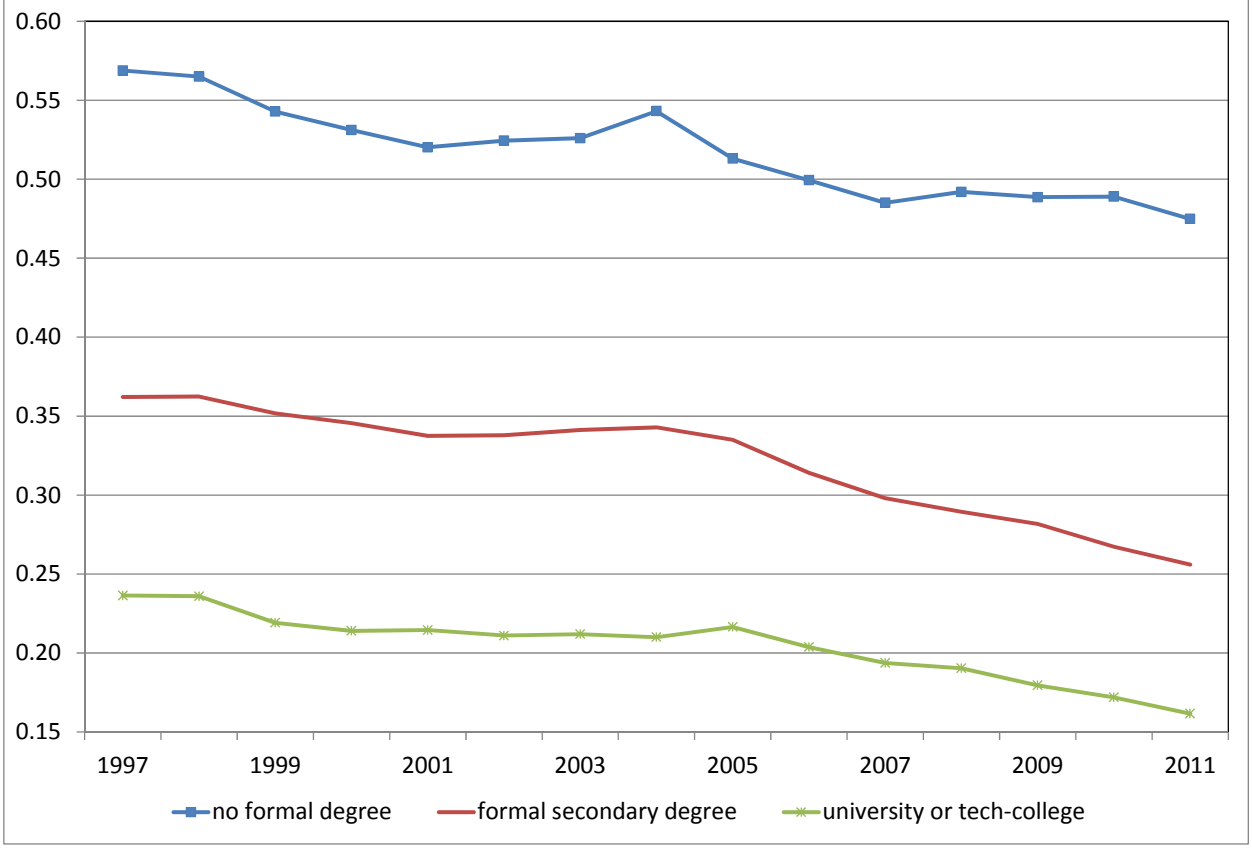


Figure 8a: German non-employment rates by age groups, men

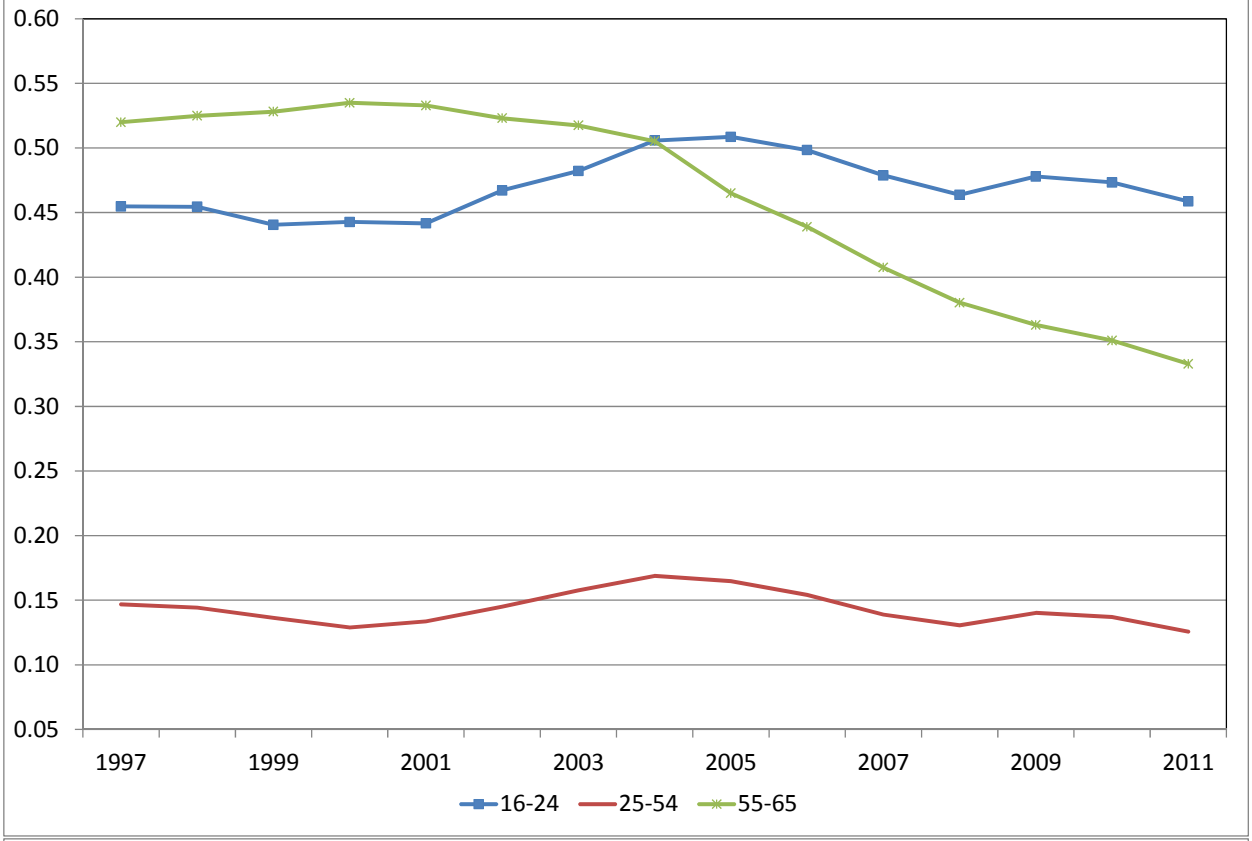


Figure 8b: German non-employment rates by age groups, women

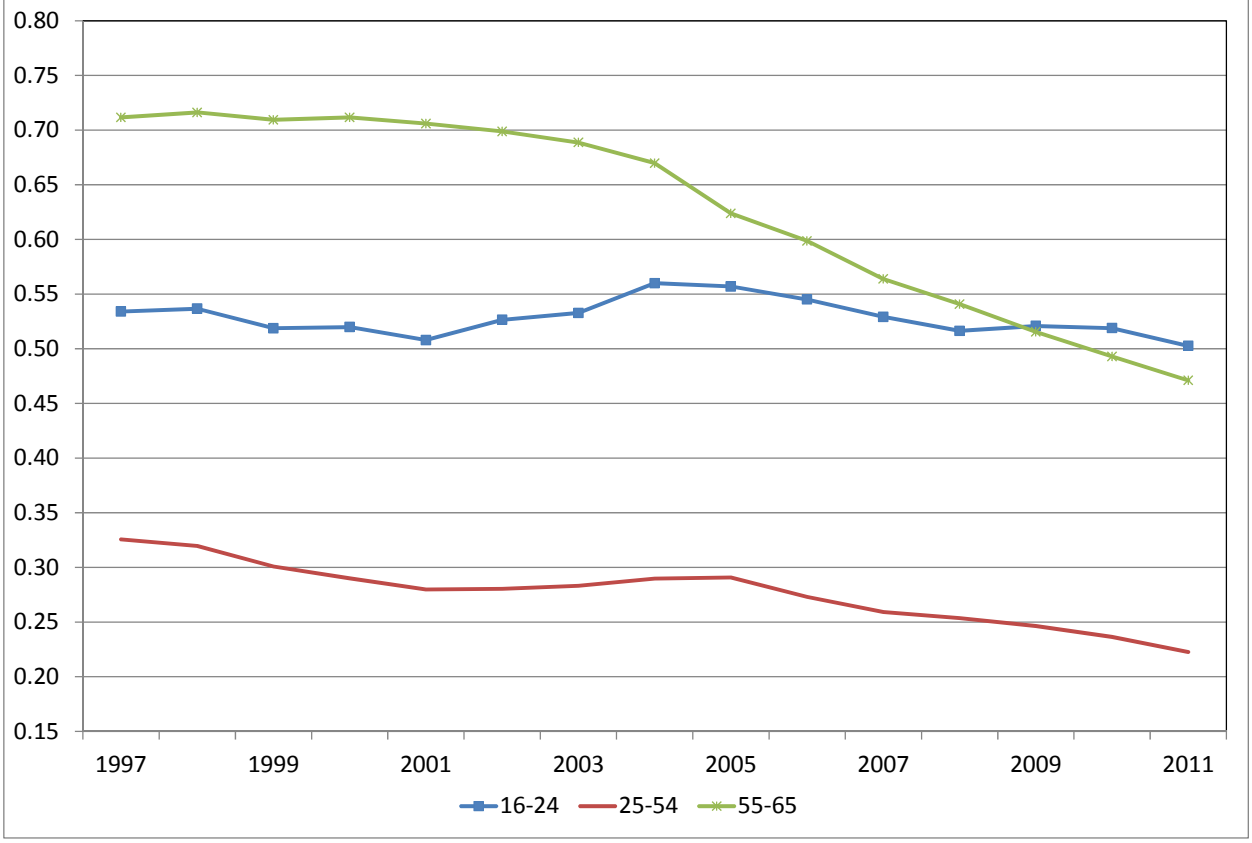
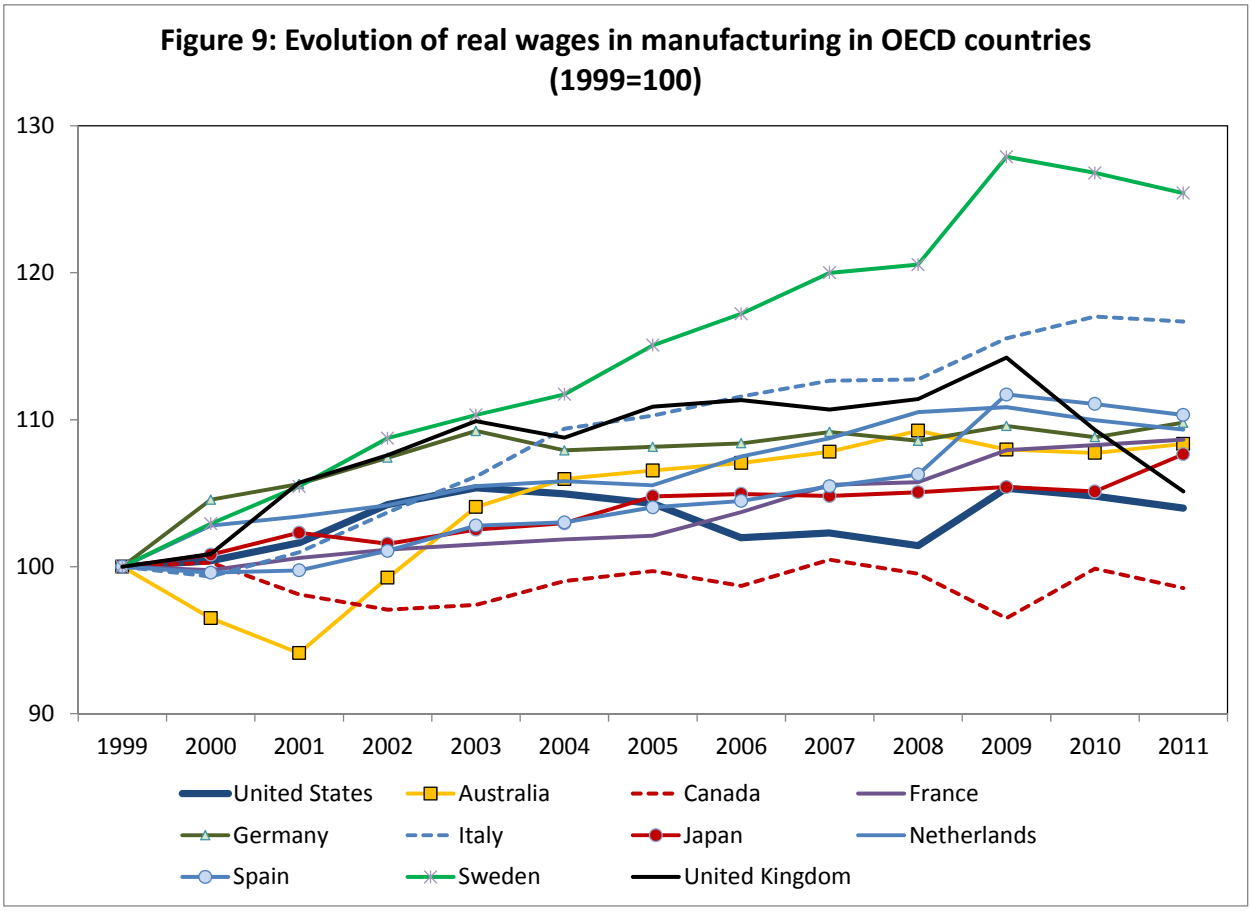


Figure 9: Evolution of real wages in manufacturing in OECD countries (1999=100)



Note: : Data from the BLS International Labor Comparisons Program