Unemployment in the Great Recession: A Comparison of Germany, Canada and the United States[*]

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ABSTRACT

This paper looks at the surprisingly different labor market performance of the United States, Canada, and Germany in the Great Recession of 2008-09. Unlike real GDP which dropped and recovered in a similar fashion in all three countries, the unemployment rate followed a very different path. It barely increased in Germany, increased and remained at stubbornly high levels in the United States, and increased moderately in Canada. More recent data also shows that, unlike in Germany and Canada, the U.S. unemployment rate remains largely above its pre-recession level. We explore several possible explanations for this phenomenon, and conclude that large employment swings in the construction sector linked to the boom and bust in U.S. housing markets is a very important factor behind the different labor market performance of the three countries during the Great Recession. Looking at more recent years also suggest that the strong GDP performance of Germany since 2009 is another important explanation for the continuing decline in unemployment in that country.

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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 remained stubbornly high since then. 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. The unemployment rate also recovered to its pre-recession level in a matter of a few years after those two earlier recessions. By contrast, more than five years after the onset of the Great Recession of 2008-09, the unemployment rate remains about 3 percentage points above its pre-recession level.

The employment performance of the U.S. economy over recent years has also been unusually poor compared to other advanced OECD economies. The increase in the U.S. unemployment rate during the Great Recession was substantially larger than in all other G7 countries. Compared to other OECD economies, the U.S. unemployment rate has declined faster than average after peaking in 2009. Nonetheless, at the end of 2012 the U.S. unemployment rate was still about 3 percentage point above its pre-recession level. Of all major OECD countries, only Southern European economies like Italy and Spain have witnessed such a persistent growth in their unemployment rate over this five-year period.

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 2008-09 recession. We use two main empirical strategies to explore this issue. We first contrast the experience of the United States to those of a large set of OECD countries using aggregate labor market data and other standard economic indicators such as GDP. We then 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 (institutions, decentralized labor markets, etc.) and are strongly connected by international trade. 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 doing so well lately. 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.

Using these two empirical strategies, we explore a number of possible explanations for the lackluster performance of the U.S. labor market from a comparative perspective. Those explanations include *i)* the overall macroeconomic performance, as captured by GDP, *ii)* the boom and bust in the construction industry, *iii)* the role of China in keeping up the demand for natural resources and intermediate inputs such as precision machinery, *iv)* labor market institutions and reforms, *v)* wage moderation, and *vi)* differences in the composition of the workforce in different economies. Since several of the explanations have implications for differences in labor market performance in different local labor markets within a country, we can combine evidence from both between- and within-country variation to evaluate the empirical importance of the explanations.

We conclude from our empirical analysis that the large employment swings in the construction sector linked to the boom and bust in U.S. housing markets is a key factor behind the relatively poor performance of the U.S. labor market over the last five years. Had employment remained stable in the construction sector during both the boom (2000-07) and bust (2007-12) phases of the U.S. housing boom, the unemployment performance of the United States would have been much more similar to those of Canada, Germany, and most other major OECD economies. More precisely, we show that over half of the between-country variation in the magnitude of the employment rate decline in 2007-12 relative to 2000-07 can be accounted by the construction sector. Likewise, this phenomenon accounts for the lion share of the within-country variation in the same concept (employment rate decline in 2007-12 relative to 2000-07) in the United States. This is broadly consistent with Charles, Hurst, and Notowidigdo (2013) who show that the U.S. housing boom had the hiding negative labor market trends linked to declining manufacturing employment in the 2000-07 period.

Interestingly, Germany did not experience any swings in construction sector employment in recent years, as its own construction boom linked to the reconstruction of East Germany ended in the early 2000s. Canada had a relatively milder housing boom than the United States. The experience of these two key comparisons countries is, therefore, consistent with our main findings on the importance of the housing boom in the recent unemployment experience of the United States.

Another finding is that the strong GDP performance of Germany since 2009 is an important explanation for the continuing decline in unemployment in that country. While it was somehow of a puzzle why unemployment did not increase much in Germany in 2008-09 despite a sharp drop in GDP (Burda and Hunt, 2011), the performance of Germany when also including more recent year is more or less consistent with a conventional "Okun's Law" relationship.

The rest of this paper proceeds as follows. In Section II we discuss several explanations that have been raised to explain the comparative performance of U.S. employment, and explain how to test those explanations empirically. Section III examines these explanations using aggregate data on a dozen of OECD countries. A more detailed analysis based on microdata for the United, Germany, and Canada is presented in Section IV. We conclude in Section V.

II. COMPETING EXPLANATIONS FOR THE RELATIVE PERFORMANCE OF THE U.S. LABOR MARKET

Before discussing various possible explanations for the poor employment performance of the United States since the onset of the Great Recession in late 2007, we present some basic trends on unemployment rate in a set of OECD countries in Figure 1.[1] The data come from the now defunct BLS International Labor Comparisons Program.[2] Unlike other source of comparative employment data like the OECD, the BLS does some adjustments to the unemployment rates reported by national statistical agencies to make them comparable. For example, in Canada

[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.

"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.

We focus our analysis on the set of ten countries for which the BLS reports an unemployment rate adjusted to reflect 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 the unemployment rate has not been adjusted to reflect the U.S. concept. 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 what happened in the United States.

In Figure 1, we present the trends in the U.S. unemployment 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 1991-2011 period the unemployment rates of Canada and the United Kingdom were substantially higher than the U.S. ones, while Japan almost always had the lowest unemployment rate in this set of country. The U.S. unemployment rate then increased much faster than in the three other countries between 2007 and 2009, and has remained at a higher level since then.

Figure 1b shows that throughout most the 1990s and 2000s, the unemployment rate in the three large continental European countries (Italy, France and Germany) was much higher than in the United States. The unemployment rate increased much faster in the United States during the Great Recession, however, and by 2009 that country had the highest unemployment rate in that group. The other striking feature in Figure 1b is that the German unemployment rate actually declined between 2007 and 2009, a remarkable fact that has been investigated in a number of studies such as Burda and Hunt (2011).

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 two years (2007 to 2009), the United States went from a low to a high unemployment country. Only Spain experienced a faster growth in the unemployment rate over this period. Since 2009 the U.S. unemployment rate has declined a little faster than in most other countries, but not nearly fast enough to offset the much more dramatic increase in the unemployment rate experienced during the Great Recession.

We also show in Appendix Figure 1a to 1c that changes in the employment to population ratio during the Great Recession are a mirror image of what happened to the unemployment rate.[3] 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. The correlation coefficient between changes in the unemployment rate and changes in the employment-population ratio is above 0.9 for either the 2007-09 or 2007-11 periods, with or without Spain included. 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.[4]

In the rest of this section, we systematically go through a number of explanations that have been suggested for explaining the poor employment performance of the United States since 2007, and explain how to empirically assess the relevance of these explanations.

Overall macroeconomic performance

Perhaps the simplest explanation for the difference in recent trends in unemployment in different countries is that these economies have performed differently from a macro-economic point of view. Indeed, according to Okun's law we should expect the unemployment rate to grow faster in economies where GDP fell the most during the Great Recession. Existing work suggests this

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

[4] 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.

may not be a very promising explanation. 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. We are nonetheless able to revisit this issue using more recent data on GDP and unemployment in the aftermath of the great recession.

Boom and bust in the construction industry

Charles, Hurst and Notowidigdo (2013) argue that the collapse in the employment rate of non-college men during the great recession was a combination of two factors. The share of these individuals working in manufacturing had been on the decline for a long time, but this was "masked" during the 2000-07 by an offsetting increase in the share of these individuals working in the construction sector. When the housing market collapsed during the Great Recession, employment plummeted as the construction sector could no longer offset other negative labor market trends, and instead contributed to the decline in employment.

Charles, Hurst and Notowidigdo (2013) use regional variation in the housing boom to estimate the contribution of this factor to the collapse of employment during the Great Recession. Anecdotal evidence suggests that this explanation may also help explain some of the differences across countries. For instance, Spain experienced a dramatic boom and bust in the construction sector and a stunning rise in its unemployment rate. Likewise, Germany did not have a construction boom, or at least not in the period leading to the Great Recession. As we will see below, there was indeed a construction boom in Germany linked to the reconstruction of Eastern Germany, but this came to an end in the early 2000s.

We assess the importance of this explanation by carrying simple accounting exercises using both between- and within-country variation (for Canada, the United States, and Germany). 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 a few employment sectors we get:

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

where the three 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

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

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 fixed at $\bar{e}_{i}^{c}$, we get the counterfactual non-employment rate $\tilde{n}_{it}$:

$$\tilde{n}_{it} = 1 - \bar{e}_{i}^{c} - e_{it}^{m} - e_{it}^{o}.$$

It is then straightforward to compute by how much the non-employment rate would have changed if the construction employment share had remained constant:

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

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 2000-07 (boom period) and the bust period after 2007. This can simply be computed using the double-difference, or difference-in-differences, version of equation (2).

A useful way of summarizing the contribution of the construction sector to inter-country (or interregional) differences in the changes in non-employment is to estimate the following "decomposition" regression:

$$\Delta e_{i}^{c} = a_{c} - b_{c} \Delta n_{i}, \quad (3a)$$

Where a_c and b_c are the OLS estimates of the intercept and slope coefficients. One can also run similar regressions for other employment sectors (manufacturing and other industries):

$$\Delta e_{i}^{m} = a_{m} - b_{m} \Delta n_{i} \quad (3b)$$

$$\Delta e_{i}^{o} = a_{o} - b_{o} \Delta n_{i} \quad (3c)$$

Note that the identity $n_{it} \equiv 1 - e_{it}^{c} - e_{it}^{m} - e_{it}^{o}$ means that $b_c + b_m + b_o = 1$. The b coefficients are simply a convenient way of summarizing the contribution of each employment sector to the variation in non-employment changes across countries, or regions of a country. For instance, if the fraction of the population working in manufacturing industries and other sectors is completely constant over time, then by definition all the variation in the non-employment rate will be attributable to the construction share, and we will have $b_c = 1$ and $b_m = b_o = 0$. This also means that the b coefficients are related to how cyclically sensitive each employment sector is.

We will first use this approach to study differences across countries, and then move to within-country variation (by region, gender, skill group, etc.) in the case of the three countries for which we have micro data.

Demand from China

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 quit 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. One channel we don't explore in detail here is that countries like Germany that export precision machinery and related intermediate inputs to China may have been less affected by the Great Recession than countries that compete against China in the production of other goods.[5] The only related evidence we present on this is the trends in manufacturing shares across countries. Under the above story we should observed that the manufacturing share didn't decline as fast in Germany than in most other OECD countries.

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. We explore the more general contribution of natural resources to employment in the Great recession by extending equation (2) to the case where the primary industry share (excluding agriculture) is also included

[5] 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.

in the decomposition. While this share tends to be fairly small in most cases, it is sizable in regions like the Canadian province of Alberta that has a large oil and gas industry.

Labor market institutions and reforms

One explanation that has been suggested in the literature for the small increase in unemployment during the Great Recession in Germany is the availability of short-term work programs that allowed firm to keep their skilled workers despite adverse economic conditions (Burda and Hunt, 2011). More generally, Cahuc and Carcillo (2010) show that the availability of such programs helped mitigate the impact of the recession in a few other countries besides Germany. It is unlikely, however, that these types of program, or other informal types of labor hoarding could account for differences in the employment performance of country in the aftermath of the Great Recession. We don't explore this issue any further in this paper given our focus on what also happened in the years following the Great Recession.

In the case of Germany, another potential explanation for the decline in the unemployment rate is the famous Hartz labor market reforms introduced between 2003 and 2005. These reforms 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. Since we can observe unemployment and employment spells in our German micro data (the IAB-data) at high-frequency, and since the different laws were introduced at different times, there is some scope for looking at which of these policies were most effective upon impact.

Indeed, in his comments on Burda and Hunt (2011), Elsby (2011) points out 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 rather suggests that labor market reforms played a role in the decline in the rate of unemployment in Germany in the mid-2000s. While we have high quality flows data in the German IAB data, it is

more difficult to get comparative figures for Canada and the U.S. data, at least with the data sets we are using in this paper (Canadian LFS and U.S. CPS). As a result, the conclusions we are able to draw about the impact of labor market reforms remain at best tentative.

That said, 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. While this may be the case, we argue below that some of the other explanations discussed above also go a long way towards explaining what happened to Germany relative to other countries since the onset of the Great Recession in 2007.

Wage moderation

Another argument commonly used in the literature (e.g. Burda and Hunt, 2011) is that wage moderation in Germany is another important factor behind the strong labor market performance of that country over the last 5-10 years. One difficulty with that explanation is that it is not entirely obvious why some countries engage in wage moderation ceteris paribus while others don't. We will only superficially explore this issue by presenting trends on real wages obtained from the BLS International Labor Comparison Program.

Differences in the composition of the workforce

A final possible explanation that can be easily addressed using micro data is that some of the relative evolution in unemployment in different countries is linked to changes in the skill and demographic composition of the workforce. For instance, age and education are known to have a large impact on employment and unemployment. Countries where the level of education and the fraction of workers in their "prime age" increase over time should experience a decline in the unemployment rate. Whether or not this explains differences across countries can be assessed by computing counterfactual employment or unemployment rates that hold the demographic and skill composition of the population constant over time.

III. A COMPARATIVE ANALYSIS OF OECD COUNTRIES

In this section, we start to assess the empirical importance of the explanations suggested above using aggregate data that national level. We supplement the BLS data on unemployment rates with OECD data on GDP and employment by industrial sector, and BLS data on real wages in the manufacturing sector.[6]

Overall macroeconomic performance

Do differences in the evolution of unemployment rates across advanced economies simply reflect different GDP performance, as one would expect on the basis of Okun's law? We start exploring that explanation by looking at the evolution of real GDP in Figures 2a-d. We focus on the 2000-12 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.

Figure 2a shows the evolution in real GDP for all eleven countries indexed to 100 in the first quarter of 2000. We also report the same figures for G7 countries on in Figure 2b. 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 these different countries. Indeed, annual data on GDP per capita reported in Figure 2c indicates that trend growth is much more similar across countries when expressed on a per capita basis.[7] For instance, GDP per capita in Germany and Japan grew at about the same rate as other G7 seven countries like France, Canada, and the United States, and faster than Italy over the 2000-07 period. This reflect the fact that population was essentially flat in Japan and Germany, while it grew by about 4 percent in France and Italy (and the United Kingdom) and 7 percent in Canada and the United States during this period. Figure 2c also indicates that the

[6] 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.

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

United Kingdom was growing at an especially fast rate until 2007, either in absolute of per capita terms.

A second clear fact that emerges from these figures is that most countries experienced a sharp decline in GDP during the Great Recession. The only one 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 these 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, there are large cross-country differences in the extent of the economic recovery since the second quarter of 2009. 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) over this period. The United States (6.9 percent growth) and Japan (5.3 percent) did slightly better than average (5.2 percent), though not quite as well as Canada and Germany. In per capita terms, however, Germany was clearly the best performer among G7 countries (Figure 2c), while Italy performed particularly poorly.

These figures suggest that the surprising decline in the German unemployment rate since the onset of the Great Recession may not be that surprising in light of the strong GDP performance of that country since 2007. We explore this more formally in Figure 3 that plots the detrended change in GDP since 2007 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, etc. Since estimating potential GDP is beyond the scope of this paper, we simply detrend GDP using country-specific pre-recession trends (up to 2007).

The detrended GDP data is reported in Figure 2d. The figure shows that two countries, Germany and Australia, have been doing particularly well since the onset on the Great Recession in late 2007, while two countries (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 point 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 (detrended) GDP and 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 16.4 percentage points compared to 4.2 percent for the second worst performer (Italy). The estimated coefficient from an Okun-type regression is -1.63, which is a bit smaller than standard estimates based on time-series data for the United States.[8]

Most countries, including the United States and Germany, lie closely to the regression line in Figure 3. The two exceptions are Australia and the United Kingdom. In the case of Australia, the unemployment rate increased by more than what would have been predicted on the basis of its stellar performance on the GDP front. Since Canada also lies above the regression line, it is possible that the resource boom accounts for some of this anomaly. We will discuss the case of the United Kingdom later when we look at wage moderation as a possible explanation for employment performance.

Perhaps the most important conclusion to draw from Figure 3 is that differences in unemployment performance between the United States and Germany are very much in line with the observed difference in GDP performance. This stands in sharp contrast with what happened during the Great Recession when the two countries experienced similar drops in GDP, but very different changes in the unemployment rate (Burda and Hunt, 2011). The big difference is that Germany has done much better than the United States in the aftermath of the Great Recession. This is clear when either comparing GDP growth relative to pre-recession trends (Figure 2d), or looking at GDP per capita (Figure 2c). Viewed under these lenses, what Germany experienced since 2007 is as much a "growth" miracle as an "employment" miracle.

[8] Standard estimates reported in the literature are typically around (minus) 2 or 3, meaning that a 2-3 percentage point drop in GDP (relative to potential GDP) results in a one percentage point increase in the unemployment rate. Note that the estimated coefficient drops a bit (to -1.1) but become more significant when Spain is also included in the regression.

Boom and bust in the construction industry

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. Note that we use labor force as the denominator here because the OECD data doesn't provide consistent measures of the working age population. Note also that we are not reporting information for Australia and France because post-recession data (after 2008) is not available yet for these two countries.

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 there unchanged until the end of the sample period. Note that the decline observed in the early 2000s in Germany 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, as pointed by many labor market observers, that the collapse of the housing sector in that country was a major factor behind the growth in unemployment. 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

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. 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 country, 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 (over 90 percent of the labor force). By contrast, close to the 40 percent of the decline in employment is solely due to the decline in construction employment. Likewise, in Spain close to 50 percent of the large decline in employment (11.6 percentage point) 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 the share of the U.S. labor force employed 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 the United Kingdom, Spain, and Sweden. 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 equations (3a) to (3c) at the country level. Note that since we are showing employment rates (1-n) as opposed to non-employment rates (n) in column 4 of Table 1, we use the latter in the regressions and report the estimated coefficients at the bottom of each panel.[9]

In both panels A and B, the estimated coefficients are largest, and close to 0.5 for the construction sector, despite the fact 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 typical associated by a 0.4-0.5 percentage point decline in construction employment. One could argue that this simply reflect the fact construction employment is highly cyclical. Note, however, that manufacturing is also a highly cyclical sector. But despite manufacturing being a much larger sector than construction, the estimated coefficient is substantially smaller at less than 0.2. Taking together, these results suggest that the boom and bust in the construction industry is a key factor in explaining the different experience of countries like the Unites States and Spain relative to Germany during the Great Recession.

Wage moderation

Figure 5 shows the evolution of real manufacturing wages in the 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. That said, Figure 5 shows that 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.

Another interesting case is the United Kingdom. After experiencing substantial growth in real wages between 2000 and 2009, real wages declined substantially in that country since 2009. At the other end of the spectrum real wages in Sweden and Italy have grown substantially since

[9] Since there is a minus sign in front of the regression coefficients in equations 3a-c, we can rewrite these equations with a plus instead of a minus when the employment rate is used instead on the right hand side. This has no impact on the estimated coefficients.

2000, which may be part of the explanation for the poor labor market performance of the latter country over recent years. But when comparing Germany to most other countries, it doesn't appear that wage moderation is a key component of the "employment miracle" story. Strong GDP performance and the lack of a boom and bust in construction are much more unique features of that country, and arguably more promising explanations for its recent labor market performance.

IV. DETAILED ANALYSIS BASED ON MICRO DATA FOR THE UNITED STATES, CANADA, AND GERMANY

We now explore in more detail some of the explanations discussed earlier using micro data from the United States, Canada, and Germany. The key advantage of these data is that they allow us to further break down the trends in employment and unemployment at the subnational level, by skill and gender group, etc. This is particularly useful for looking at the role of the construction sector as an explanation for the depth and persistence of unemployment in the United States compared to the two other countries. 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 also directly check using our micro data.

In what follows, we first describe the data sets and the main labor market trends by region and sub-groups for each of the three countries. We then present estimates of the regression models in equations 3a-c, and then discuss the evolution of labor market flows in the German IAB data. In the latter case, our goal is mostly to see how the Hartz reforms may have played a role the labor market trends in that country since the mid-2000s.

UNITED STATES

For the United States we use data from that 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.[10] We limit our analysis to individuals age 16-64, but otherwise keep a sample as inclusive as possible. Although trends in the unemployment rate and the non-employment rate (fraction of the population not employment) are broadly similar, we focus our analysis on the latter since the unemployment rate may be affected by movements in and out of the labor force (e.g. because of "discouraged" unemployed individuals) that we prefer to abstract from in our analysis. That said, all results presented below are very similar when the unemployment rate is used instead of the non-employment rate.

Figures 6a-c show the evolution of the non-employment rate in the nine main census regions, as well as a subset of states, California, Arizona-Nevada (pooled together), and Florida that were particularly affected by the boom and bust in the housing sector. Since these are all Southern States, we also look at the other large Southern state, Texas, as a comparison, since that state has not been as adversely affected by the swings in the housing sector. Note that the data we show for the nine census regions exclude these states.

While Figure 6 shows 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 and the other mountain states. The non-employment rate increased by 5-10 percentage points in these regions between 2007 and 2010, compared to less than five percentage points in the rest of the country.

Figures 7a-b show that men with a high school education and less were by far the 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 that group also experienced the steepest growth in non-employment. Therefore, we have to go beyond these aggregate national trends for all sectors

[10] 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.

combined to get more decisive evidence on the contribution of the construction sector on employment during the Great Recession.

Another interesting trend that we do not further explore here is that secular increase in non-employment among women. Prior to the analysis period reported in Figure 7b, there had been a large secular decline in non-employment among women. While some of the recent increase is surely a cyclical phenomenon, the upward trend in non-employment since 1997 is a remarkable reversal relative to earlier trends.

Figures 8a-b show that, not surprisingly, young individuals age 16-24 were the most adversely affected by the Great Recession. It is clear from the figures that an important part of the growth in non-employment has been concentrated among young people, though part of this may be reflecting increasing school attendance.

By contrast, older individuals age 55-64 experienced only a modest increase in non-employment during that period, and a secular decrease in non-employment since 1997. However, the non-employment rate for that group remains substantially higher than for prime-age individuals (age 25-54). Since the fraction of individuals in the age 55-64 has increased over time with the aging of the baby boom generation, this composition effect has contributed to a small increase in the overall non-employment rate in the United States. Note, however, that composition effects linked to the secular increase in education achievement contribute to a decrease in the non-employment rate instead. Thus, overall composition effects linked to both age and education had little impact on the increase in the non-employment rate over the last 15 years.

In Table 2a we go beyond these trends and decompose the 2007-10 change in non-employment by employment sector using equation (1). 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 exceed what we documented for Spain earlier. As it turns out, the share of these men working in construction declined by around 10 percentage points during that period. This means that, in a purely accounting sense, most of the increase in non-employment 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 for broader segments of the population (columns 5 and 9), Table 2a shows that construction remains an important part of the decline of employment for these broader groups. 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 in even more important role in that setting. For instance, in Arizona-Nevada and Florida essentially the entire decline in 2007-10 employment relative to the 2000-07 period is linked to the construction industry. By contrast, there is not much of a systematic pattern in manufacturing employment. This is consistent with Charles, Hurst and Notowidigdo (2013) who conclude that the decline in manufacturing employment was relatively smooth over time, and that those negative trends in the 2000-07 period were somehow "masked" by the strong performance of the construction sector during that period.

We explore this hypothesis more systematically in Table 3 that presents estimates of equations 3a-3c (in the difference-in-differences version). For either men (Panel A) or men and women (Panel B), we find that the coefficient in the construction share equation is around two thirds in both specifications considered. The first specification uses variation across both regions and the three education groups. The second specification only uses regional variation to estimate equations 3a-3c.

The results indicate that the relative performance of overall employment across education groups and regressions is systematically linked to what happened to employment in the construction sector. While some of this connection should be nearly mechanical (employment in

different sectors tend to move together during recessions), 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 never statistically significant.

While the results reported here are based on simple 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 confirms that the bust in the construction sector in the United States was an important element in the relative poor employment performance of that country since 2007. For instance, the growth in the non-employment rate in regions like New England where there was not much of a boom and bust in housing was much more limited (3.0 percent increase) than in places like Arizona-Nevada where the non-employment rate grew by 7.7 percent instead (column 11 of Table 2a).

CANADA

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.[11]

As in the case of the United States, we first report the evolution of the non-employment rate across regions. As expected, Figures 9a-b show that the impact of the Great Recession was substantially smaller in Canada than in the United States. The rate of non-employment increased by about three percentage points in Ontario, Alberta, and British Columbia between 2007 and 2010, and by even less in the other regions of the country. Another important difference is that unlike the United States, non-employment has been generally trending down in the Canada since 1997. At the national level, non-employment was substantially larger than in the United States back in 1997, but is now substantially lower.

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

Figures 10a-b show the trends in non-employment by gender and education group. As in the United States, the impact of the Great Recession was largest for less educated men, and smallest for college-educated women. As we pointed out while discussing regional trends, the increase in non-employment is substantially smaller in Canada than in the United States during the Great Recession, and employment trends are generally more favorable over the 1997-2012 period. A similar message emerges from Figures 11a-b which shows the evolution of the non-employment rate by age group. The decline in non-employment over time is quite dramatic for the 55-64 age group. Another important difference relative to the U.S. situation is the non-employment was also decreasing for the youngest age group until the onset of the recession. Despite the recession and secular trends in educational attendance that tend to reduce employment for that group, for both young men and women the non-employment rate during and after the recession was lower than it used to be back in 1997.

As in the United States, Table 4a and 4b show some fairly dramatic differences in non-employment by region when focusing on men only, and especially men 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 relative stable after that. Construction plays a much more important role, however, when contrasting the 2007-10 and 2000-07 periods (Table 4b). 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. Another noticeable fact is that primary sector employment (mostly in oil and gas) in Alberta is also an important part of the slowdown in the province. The employment share of that sector grew quickly until 2007 but slightly declined after that.

We then report in Table 5 the results of the regression models (equations 3a-c in difference-in-differences). The main difference relative to the United States is that the construction share is not as closely related to overall employment performance (by region or

region and education group), while primary sector employment is more closely connected despite its relatively small size.

We draw two main conclusions from the Canadian findings. First, the fact that construction did no collapse during the Great Recession did help shelter the overall labor market from the consequences of the recession. The fact that the housing boom up to 2007 was not as dramatic as in the United States may also be part of the explanation.

Second, the more resource-intensive provinces in Western Canada were, if anything, more adversely affected by the recession than the rest of the country. So while the strong performance of Australia during the period 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 particularly in Alberta. Perhaps this has to do with the fact 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.

GERMANY

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, and which is largely underused in research, possibly due to the difficulty of accessing it. Given the recent emphasis in the literature on the role of the 2003-05 large-scale labor market reforms in mitigating the labor market impact of the Great Recession, such as in Elsby (2011), we also document statistics on worker-level flows between employment states. We compute these statistics from social security panel data provided by the IAB. In contrast to the Mikrozensus, the IAB data cover the year 2010.[12] However, they are not nationally representative as they only

[12] In the case of the Mikrozensus, only data up to 2009 were available at the time this paper was written.

include the unemployed and workers who are subject to social security contributions. We apply the same sample restrictions to both data as those we use for the CPS.

In Figures 12a and 12b we show the evolution of non-employment rates for seven regions, four in Western Germany and three in Eastern Germany. There is a significant amount of regional variation, with the Southern states persistently outperforming the Northern states. Levels of non-employment prior to the reforms were consistently high, often exceeding the corresponding U.S.-levels by 10 to 15 percentage points. Between 1997 and 2001 there was a weak downward trend in Western German non-employment rates which was interrupted by a small recession. Since 2004 this pre-trend has been continuous, but with a much larger annual decline in non-employment which was not interrupted by the recession in 2007. Some of the poorer Eastern German states have had particularly large gains in employment, in some cases of up to 10 percentage points. The result is employment rates in 2009 that are close to pre-crisis levels in the United States. At first sight, this is particularly remarkable as Germany has experienced a larger output decline in 2007 than the United States. However, as discussed above, the increase in employment rates may be consistent with the strong economic performance in terms of GDP-growth in the post-crisis period.

Figures 13a and 13b plot the evolution of employment shares by education and gender. Both the variation across education groups and across gender are large. Individuals without a formal degree have by far the largest non-employment rates – up to 40 percent for men and 57 percent for women, while men with a post-secondary degree have non-employment rates of only 10 to 15 percent. Workers with a formal apprenticeship degree are in the middle. They are also the group that have experienced the largest gains in employment rates, about 7 percentage points since 2004. Since this group represents about 65 percent of the labor force, it is the main driving force of the aggregate statistics.

The final two figures show non-employment rates for our three different age groups, again split by gender. It is this graph that produces the most striking regularity: The pronounced decline in non-employment rates since the labor market reforms is almost entirely driven by the oldest group for both male and female. In contrast, the middle aged group has fairly stable employment rates, although females are on a trend towards higher labor force participation rates. In sharp contrast, non-employment rates of the youngest workers have increased between 2008

and 2009, and it will be interesting to see in the future if 2008 was indeed a turning point for this group.

Taken together, these findings suggest that to understand the performance of the German labor market since the mid-2000's one needs to understand the behavior of the older workers. One may be tempted to associate their changes in labor market participation with the much debated "Hartz IV" reforms in 2003-2005. However, these were broad labor market reforms and did not 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. While this may explain the trend break of employment rates in 2004/05 for the older workers, it is not clear why they have continued to decline at similar rates during the recession.

Tables 6a and 6b show employment changes by industry, thus replicating the results in Tables 2 and 4 for Germany. With the exception of some of the Eastern German states, aggregate employment rates have remained nearly unchanged between 2007 and 2009. Since the employment share of the manufacturing sector has declined for all groups and most regions by up to one percentage point for this period, there has been a slight reallocation of labor across industries. In some states, the construction sector has actually experienced an increase in its employment share. However, only in Berlin is this increase larger than one-percentage point. As the employment share of the primary sector has nearly remained constant as well, the decrease of the manufacturing sector suggests there to be a reallocation to the service sector. To analyze if this is a short-term adjustment or a long-run structural change we would need to rely on longer time series.

Table 6b shows a general slow-down of the increase in employment rates with the exception of Berlin, mirroring the results from figures 12a and 12b. Interestingly, the change in the relative size of the construction sector is larger between 2007 and 2009 than between 2000 and 2007. An analysis of the levels (not shown in tables) clarifies this to be driven by a general decrease of employment in this industry during the first half of the decade that has come to a stop afterwards. This is almost the opposite of the corresponding statistics in the United States.

Results from the Difference-in-Difference regressions as shown in Table 7 reflect these findings. In particular, the change in aggregate employment rates has not significantly affected the employment shares in the construction or the primary sector. Rather, it is only the manufacturing and the service sector that have reacted to the aggregate trends. Since employment rates have increased, this is formal evidence of a reallocation from the manufacturing to the service sector. This reallocation starts from a much higher employment share of the manufacturing sector than in the US: Its average employment share among German men during the decade is 22.7 percent compared with only 13.5 percent in the US.

To further analyze the role of the labor market reforms for changing the dynamics of employment over time and during the Great Recession, it is useful to study flows between employment and unemployment. As highlighted by Elsby (2011), 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, pointing towards a significant impact of the reforms on labor market performance. Since we do not have comparable data for the United States or Canada 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 from the IAB-panel. Our working sample starts in January 1977 and ends in June 2010. It is important to keep in mind that the IAB data 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, the latter of which applies to approximately 80 percent of German employees. We therefore cannot compute flows between employment and out-of-the-labor-force.

Aggregate UE and EU flows are shown in Appendix Figures 2a and 3a, respectively. 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. The figures paint a very clear picture, however. First, UE-flows decreased tremendously at the beginning of the 1980's and remained relatively low until the end of the 1990's, 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. 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.

An important and major part of the labor market reforms targeted marginal employment by making low-paying jobs and marginal self-employment – so called "mini-jobs" – financially more attractive. This part of the reform was implemented in 2004 and is distinct from a number of further policy measures introduced in 2005 that changed the rules of unemployment benefit collection. To investigate whether the trend-breaks in flows described above are mainly driven by increasing flows into marginal employment we remove these jobs from the sample in one specification and show the resulting time-series in Appendix Figures 2a and 3a as well. These time-series have to be interpreted with great care, however. "Mini-jobs" have been subsidized since the late 1970's, mostly by offering exemptions from social security contributions. The 2004 reform merely broadened the definition of "mini-jobs" and increased subsidies. Unfortunately, with some exceptions, the IAB-data include these types of employment relationships only since 1999. As a direct consequence, when removing mini-jobs from the sample in all years, the UE-flows do not show any noticeable changes in 1999 and follow a flat trajectory until 2004. In contrast, the addition of mini-jobs to the sample increases the level of UE-flows from 1999 on and generates larger fluctuations over time. However, on average their level remains unchanged until 2004 as well. Most importantly, UE-rates in both samples show a trend break in 2004, with flows into regular jobs and into mini-jobs rising. At the same time, EU-flows are nearly identical in the two samples as shown in Appendix Figure 3a. Taken together, these results suggest that the decrease in unemployment rates since 2004 cannot be solely explained by an increase in marginal employment.

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 panel b of Appendix Figures 2 and 3. 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 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 probably the most important part of the recent trends in aggregate non-employment rates, suggesting that it was the pension- rather than the labor-market reforms that had the largest impact. Surprisingly, 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.

V. 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 key 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. Furthermore, we show that the decrease in non-employment rates in Germany is almost entirely driven by older workers, a finding that is hard to reconcile with wage moderation only. 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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APPENDIX: LABOR MARKET REFORMS IN GERMANY

The labor market reforms in Germany were undertaken by the Social Democrats under chancellor Schroeder and introduced in 4 steps between 2003 and 2005 ("Hartz I – Hartz IV"). They are mostly referred to as the "Hartz-Laws" or "Hartz-Reforms" since the reforms were worked out and proposed by a commission led by Peter Hartz. These reforms 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. Some of the laws were adjusted in later years because it was found that their original designs were not very efficient. We mention one of these changes below. Here are the different components of the reforms:

Hartz I: Effective January 1st **2003**; mostly changed the labor-laws and rights of contractual workers; also modified job training programs for the unemployed that are financed/organized by the employment agency.

Hartz II: Effective January 1st or April 1st ("Minijobs") **2003**. This one may be very important: It modified the rules regarding "Minijobs" and introduced subsidies to small-scale business creation.

"Minijobs" are defined by either hours of work or monthly earnings. These types of jobs are not subject to income taxation and are exempt from certain social security contributions. They existed prior to the reforms, but the reforms made them more attractive, e.g. by increasing the upper earnings limit defining a mini-job and by dropping hours restrictions. Workers in minijobs are still eligible for unemployment insurance, but the amount that can be claimed is means-tested. Both, the IAB and the Mikrozensus provide a variable for these types of jobs.

A new labor market policy is the subsidy for small-scale business creation of the unemployed. Initially (i.e. starting in 2003) they were handled in a fairly lenient way. However, in 2006 this policy was changed. Note that the "unemployment insurance" for individuals who paid into the social insurance prior to unemployment drops after some time to "unemployment

assistance". It turns out that the unemployment agencies did not test the business ideas and practices of the new self-employed very well, and there was a sudden increase in business creation exactly before the drop from unemployment insurance to unemployment assistance: The unemployed just claimed they created the business and took away the money. Hence, since 2006 the application for the subsidy goes through a fairly rigorous process.

Hartz III: Effective January 1st **2004**. Complete reorganization of the employment agency system.

Hartz IV: Effective January 1st **2005**. These set of reforms are the most controversial one. It modified the unemployment insurance system substantially, generally making it more stringent. Also, now the unemployed are required to accept any job the unemployment insurance deems "justifiable and reasonable". It is important to note however that not all unemployed are uniformly worse off compared to the former system. Apparently a substantial fraction (official numbers in 2005: 17%) of the unemployed are eligible for a higher level of unemployment insurance than they would have been under the old system.

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	-0.6	2.0	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	-0.7	0.0	-0.9	21.7
Spain	-4.9	-3.2	-3.4	-11.6	42.6
Sweden	0.5	-1.9	-0.9	-2.3	-23.5
UK	-0.7	-1.2	-0.5	-2.4	27.7
US	-1.8	-1.6	-1.5	-4.9	36.9
Regr. Coefficient	0.42	0.19	0.39		
(st. error)	(0.07)	(0.04)	(0.05)		
B: Diff-in-diff ((2010-2007) - (2007-2000))					
Canada	-1.0	0.9	-2.7	-2.8	35.2
Germany	1.5	1.1	-0.2	2.4	60.6
Italy	-1.4	-0.9	-3.7	-6.0	22.6
Japan	0.3	0.2	-2.5	-2.1	-13.1
Netherlands	0.2	1.3	-1.9	-0.4	-54.9
Spain	-7.1	-0.8	-6.9	-14.8	47.8
Sweden	-0.3	0.6	-0.9	-0.6	51.1
UK	-1.4	2.7	-3.9	-2.6	53.7
US	-2.6	1.5	-3.2	-4.3	60.2
Regr. Coefficient	0.49	0.14	0.38		
(st. error)	(0.05)	(0.07)	(0.05)		

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

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

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

Table 3: Regression models of sector shares on overall employment share:
Difference-in-differences specification (2007-10 relative to 2000-07), United States

	Construction (1)	Manufacturing (2)	Primary (3)	Others (4)
A: Men using variation in				
Region and education	0.785	0.008	0.065	0.141
	(0.098)	(0.089)	(0.037)	(0.100)
Region only	0.601	0.069	0.046	0.284
	(0.171)	(0.164)	(0.076)	(0.149)
Average share:	0.102	0.125	0.013	0.561
B: Men and women using variation in				
Region and educcation	0.685	-0.046	0.059	0.302
	(0.074)	(0.056)	(0.022)	(0.081)
Region only	0.674	-0.067	0.060	0.333
	(0.144)	(0.040)	(0.040)	(0.142)
Average share:	0.055	0.087	0.007	0.586

Table 4a: Change in employment shares by sectors, Canada 2007-10

	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)
A: Men with HS and less					
Atlantic	1.4	-1.4	-0.3	-0.7	-190
Quebec	1.1	-1.7	-0.6	-1.0	-113
Ontario	0.9	-4.2	-0.1	-5.5	-17
Manitoba	0.0	-0.8	-0.9	-2.7	1
Saskatchewan	0.7	-1.0	-0.1	-2.7	-27
Alberta	-2.0	-0.5	-2.3	-7.2	28
BC	0.2	-3.5	-0.9	-7.9	-3
B: All men					
Atlantic	1.1	-1.7	0.0	-0.7	-162
Quebec	1.1	-2.0	-0.4	-1.1	-103
Ontario	0.7	-3.8	0.0	-3.7	-19
Manitoba	1.0	-0.3	-0.4	-1.9	-50
Saskatchewan	1.5	-0.9	0.5	-1.7	-86
Alberta	-1.3	-1.0	-1.1	-4.7	28
BC	-0.8	-2.6	-0.3	-5.3	15
C: All men and women					
Atlantic	0.5	-1.2	0.1	-0.2	-342
Quebec	0.6	-1.5	-0.2	-0.4	-140
Ontario	0.3	-2.6	0.0	-3.0	-10
Manitoba	0.5	-0.5	-0.3	-1.3	-41
Saskatchewan	0.9	-0.2	0.4	-1.0	-89
Alberta	-0.8	-0.9	-1.0	-3.5	22
BC	-0.5	-1.6	-0.1	-3.0	16

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

	Constr. (1)	Manuf. (2)	Primary (3)	Total (4)	Constr. as % of total (5)
A: Men with HS and less					
Atlantic	0.0	-1.2	1.9	-3.0	-1
Quebec	-0.4	-0.1	0.2	-0.3	102
Ontario	0.2	2.0	0.2	-2.6	-9
Manitoba	-2.0	0.8	-1.4	-4.7	42
Saskatchewan	-2.1	-1.1	-3.0	-6.6	32
Alberta	-8.2	1.6	-6.3	-11.0	75
BC	-4.6	-2.5	0.0	-13.6	34
B: All men					
Atlantic	0.2	-0.5	1.3	-2.7	-7
Quebec	-0.2	0.5	0.2	-1.3	14
Ontario	-0.4	1.1	0.2	-1.7	21
Manitoba	-0.3	0.8	-0.3	-2.8	10
Saskatchewan	-0.5	-0.7	-1.6	-4.6	10
Alberta	-5.4	0.7	-5.8	-6.7	81
BC	-5.1	-1.4	0.7	-8.6	60
C: All men and women					
Atlantic	0.1	-0.5	0.8	-4.3	-3
Quebec	-0.2	0.1	0.1	-4.2	6
Ontario	-0.3	0.5	0.1	-3.5	9
Manitoba	-0.3	0.0	-0.3	-2.9	9
Saskatchewan	-0.2	-0.1	-0.7	-4.5	5
Alberta	-3.4	0.0	-4.0	-6.1	55
BC	-3.0	-0.9	0.5	-6.1	50

Table 5: Regression models of sector shares on overall employment share: Difference-in-differences specification (2007-10 relative to 2000-07), Canada

	Construction (1)	Manufacturing (2)	Primary (3)	Others (4)
A: Men using variation in				
Region and education	0.540	0.086	0.228	0.146
	(0.101)	(0.072)	(0.137)	(0.199)
Region only	0.822	0.204	0.347	-0.374
	(0.177)	(0.119)	(0.366)	(0.382)
Average share:	0.092	0.135	0.043	0.526
B: Men and women using variation in				
Region and education	0.388	0.065	0.168	0.379
	(0.078)	(0.051)	(0.086)	(0.141)
Region only	0.548	0.175	0.249	0.028
	(0.190)	(0.078)	(0.225)	(0.329)
Average share:	0.051	0.090	0.025	0.576

Table 6a: Change in employment shares by sectors, Germany 2007 to 2009

	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	-0.351	-0.915	-0.133	-0.757	46	-0.318	-0.353	-0.041	0.148	-216	-0.138	-0.504	-0.035	0.895	-15
South-Central-West	0.171	-0.911	0.061	0.135	127	0.381	-0.665	0.060	0.575	66	0.264	-0.432	0.053	0.922	29
North-Central-West	0.739	-0.593	0.085	0.066	1117	0.331	0.002	0.106	0.904	37	0.169	-0.043	0.103	1.332	13
North-West	0.416	-0.351	-0.046	-0.933	-45	0.249	-0.307	-0.070	-0.420	-59	0.041	-0.335	-0.117	0.955	4
South-East	-0.337	0.089	0.110	0.236	-143	0.369	0.081	0.054	1.620	23	0.222	-0.023	0.093	2.761	8
Berlin	1.569	-0.651	0.143	2.046	77	1.047	-0.622	0.012	2.627	40	0.472	-0.122	-0.068	2.615	18
North-East	-0.631	0.370	0.109	1.508	-42	-0.491	0.982	0.052	3.012	-16	-0.169	0.504	0.095	3.431	-5

Table 6b: Change in employment shares by sectors, Germany (2007-09) - (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	0.354	-0.987	0.255	-1.859	-19	0.333	-0.188	0.246	-1.435	-23	0.272	-0.089	0.283	-2.853	-10
South-Central-West	1.012	0.172	-0.064	-1.434	-71	1.524	0.932	-0.053	-0.999	-153	1.053	0.583	0.037	-2.997	-35
North-Central-West	2.167	-0.155	0.626	-1.112	-195	1.467	0.857	0.570	-0.502	-292	0.863	0.347	0.405	-2.847	-30
North-West	1.773	-1.552	-0.131	-2.930	-61	1.262	-0.949	-0.254	-2.618	-48	0.595	-0.914	-0.185	-2.766	-22
South-East	4.860	-2.646	0.494	-1.195	-407	4.557	-2.697	0.506	-0.584	-780	2.782	-2.177	0.632	-0.650	-428
Berlin	5.491	0.696	0.061	2.497	220	4.415	0.740	-0.067	2.379	186	2.403	0.815	-0.118	0.955	252
North-East	5.056	-3.762	0.823	-1.519	-333	3.899	-2.477	0.640	-0.163	-2397	2.432	-1.751	0.671	-2.050	-119

Table 7: Regression models of sector shares on overall employment share:
Difference-in-differences specification (2007-09 relative to 2000-07), Germany

	Construction (1)	Manufacturing (2)	Primary (3)	Others (4)
A: Men using variation in				
Region and education	0.018	0.199 ***	0.001	0.781 ***
	(0.031)	(0.042)	(0.016)	(0.047)
Region only	0.185	0.243	0.073	0.498 ***
	(0.209)	(0.235)	(0.097)	(0.198)
Average share:	0.094	0.227	0.026	0.397
B: Men and women using variation in				
Region and educcation	0.012	0.160 ***	0.003	0.831 ***
	(0.018)	(0.030)	(0.011)	(0.035)
Region only	0.194	0.073	0.026	0.706 ***
	(0.118)	(0.167)	(0.067)	(0.139)
Average share:	0.054	0.160	0.019	0.440

Figure 1a: Unemployment rates in selected G7 countries

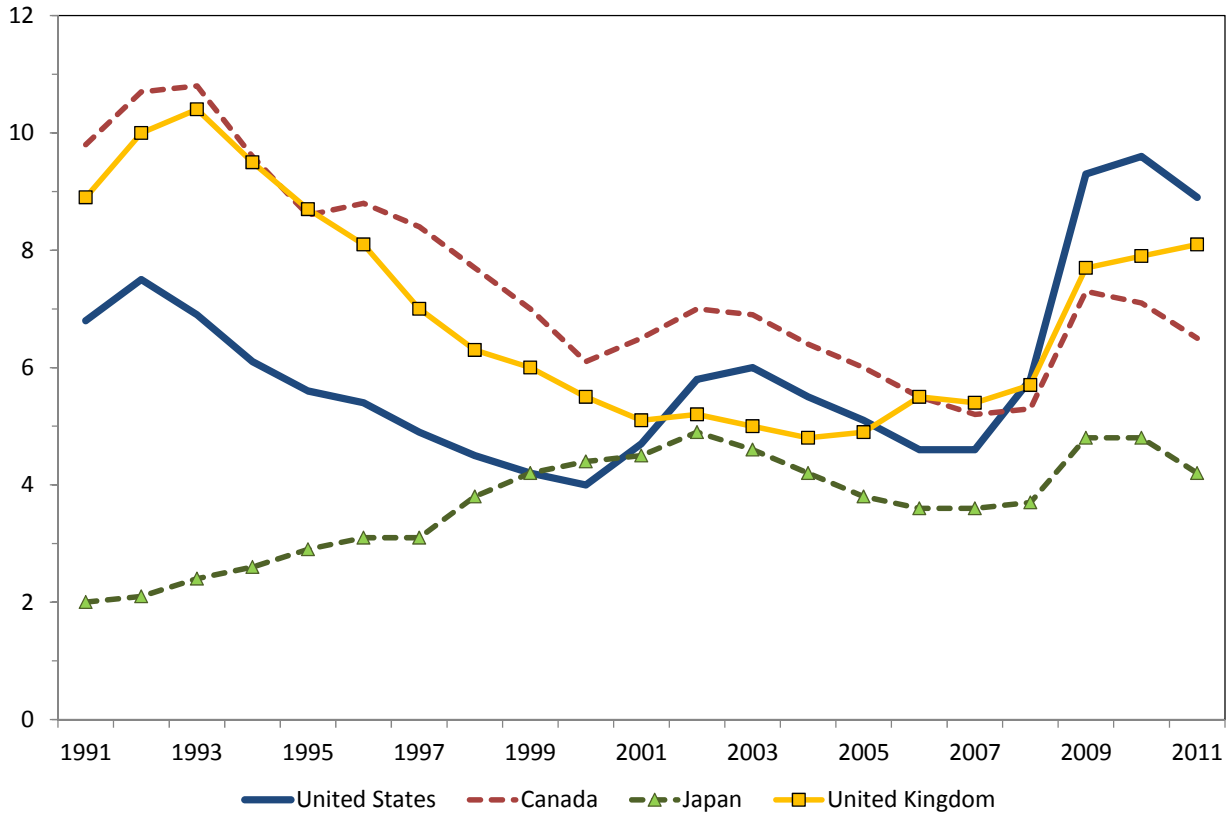
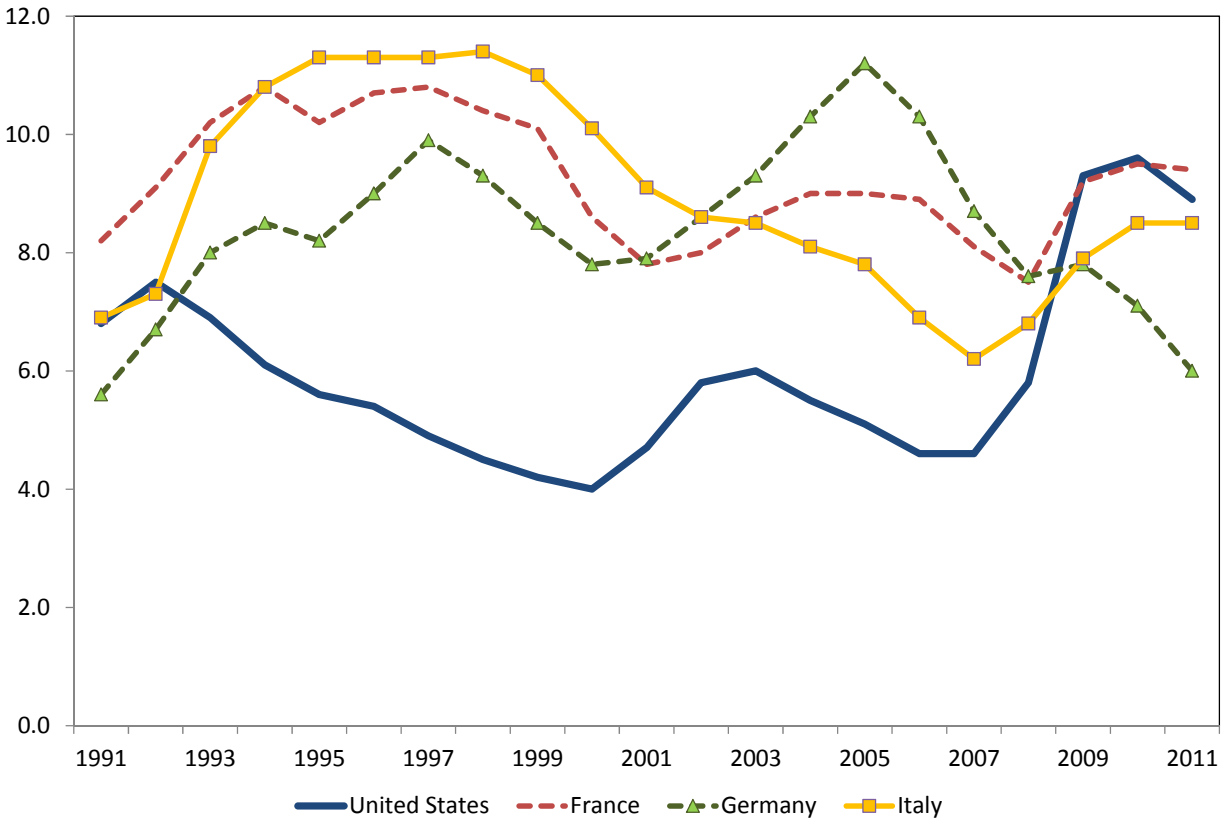


Figure 1b: Unemployment rates in selected G7 countries



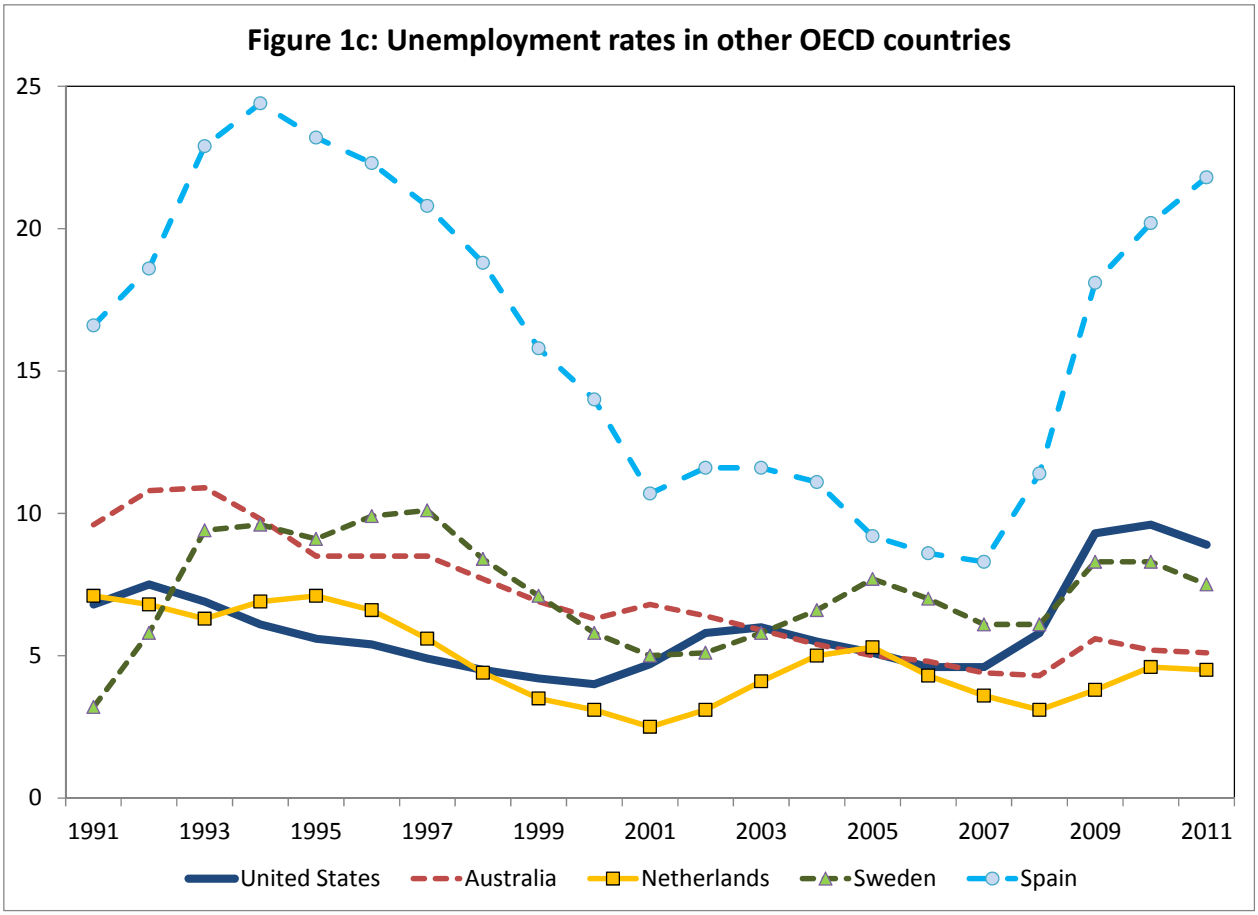


Figure 1c: Unemployment rates in other OECD countries
25
20
15
10
5
0
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
United States
Australia
Netherlands
Sweden
Spain

Figure 2a: Real GDP in OECD countries

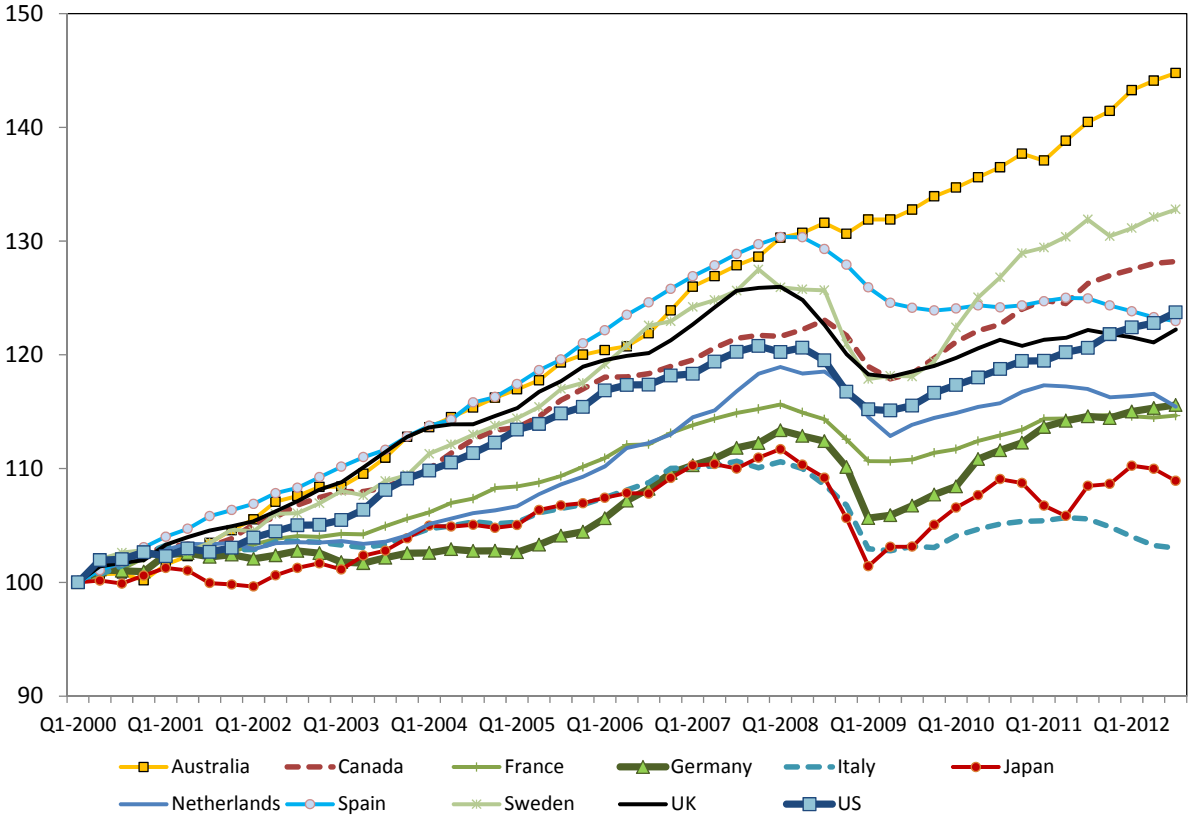


Figure 2b: Real GDP in G7 countries

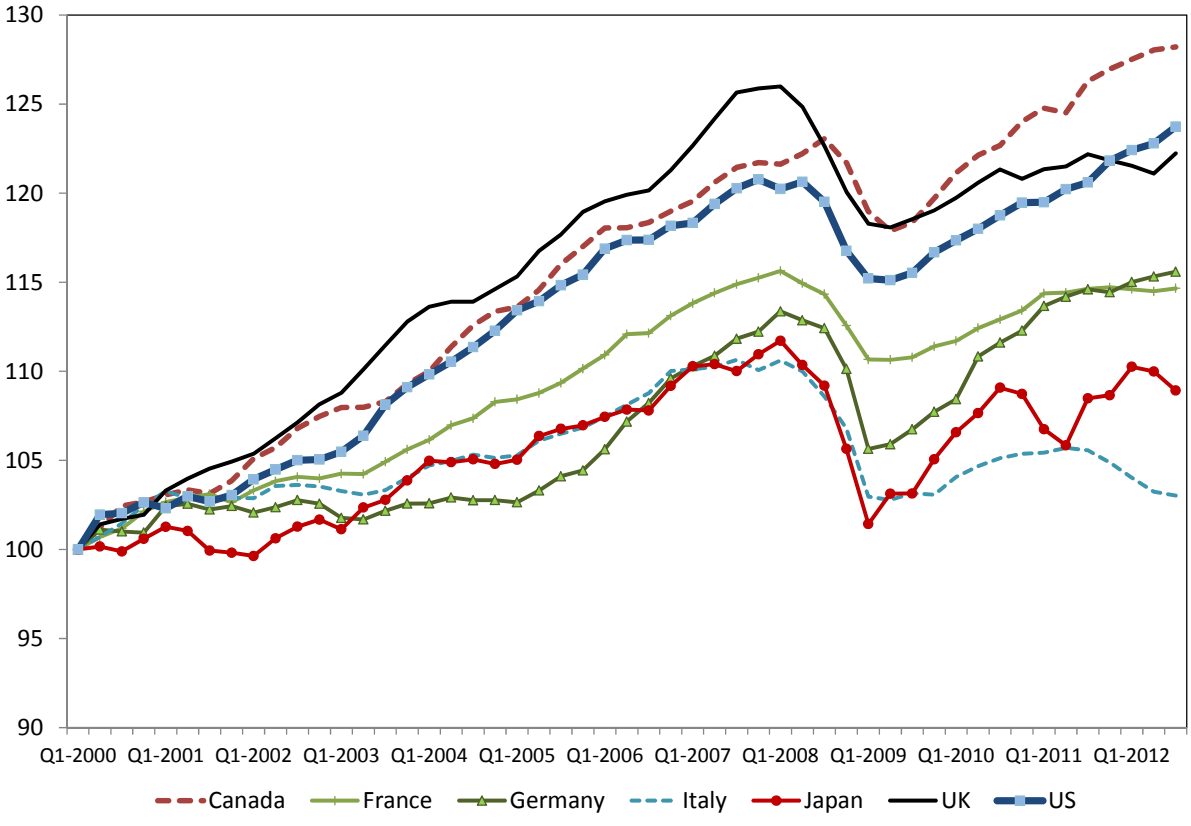


Figure 2c: Real GDP per capita in G7 countries

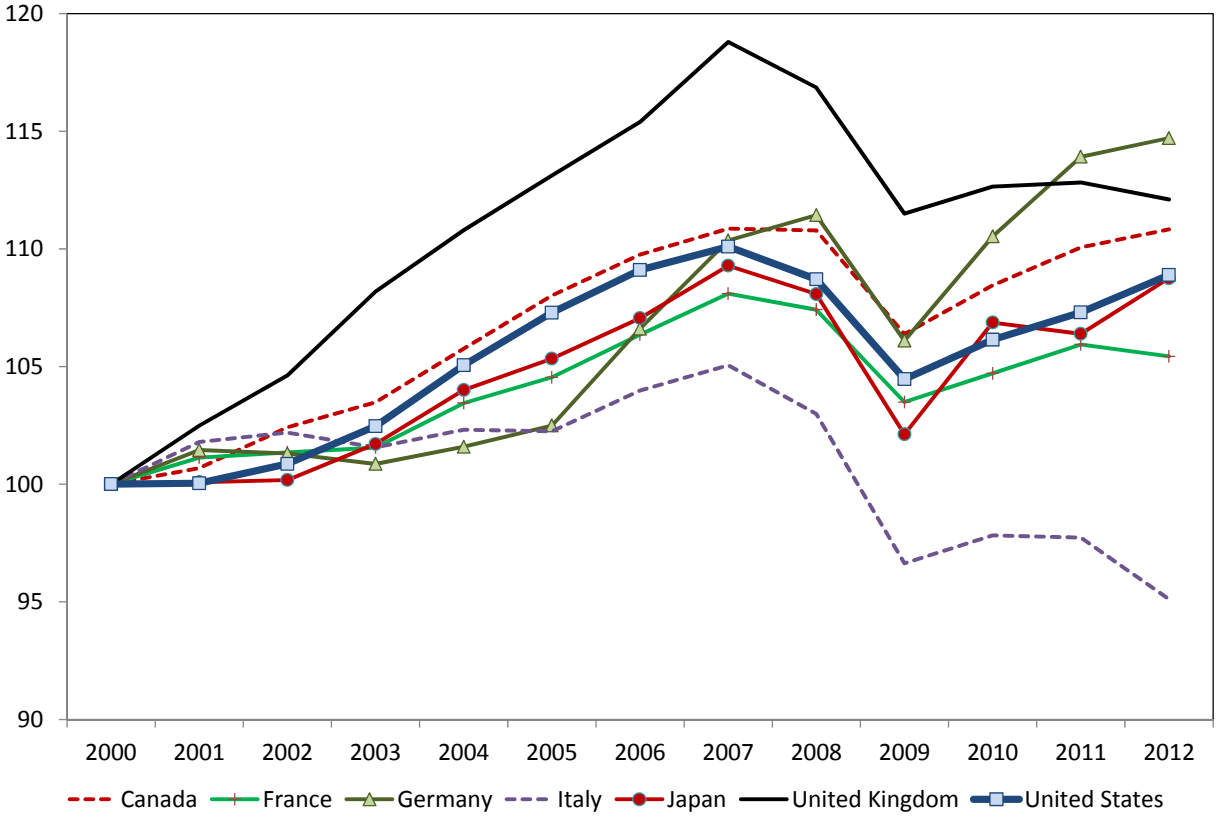
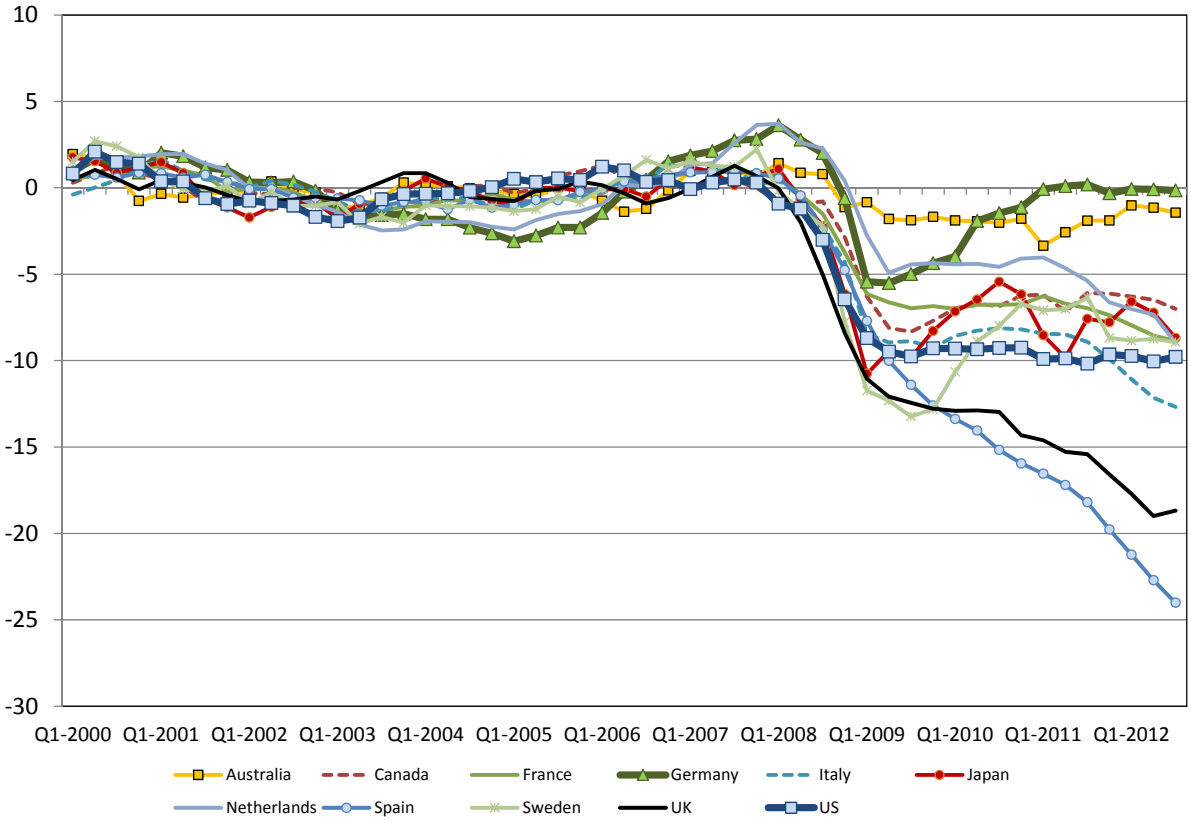


Figure 2d: Detrended Real GDP (using linear trends for 2000-07)



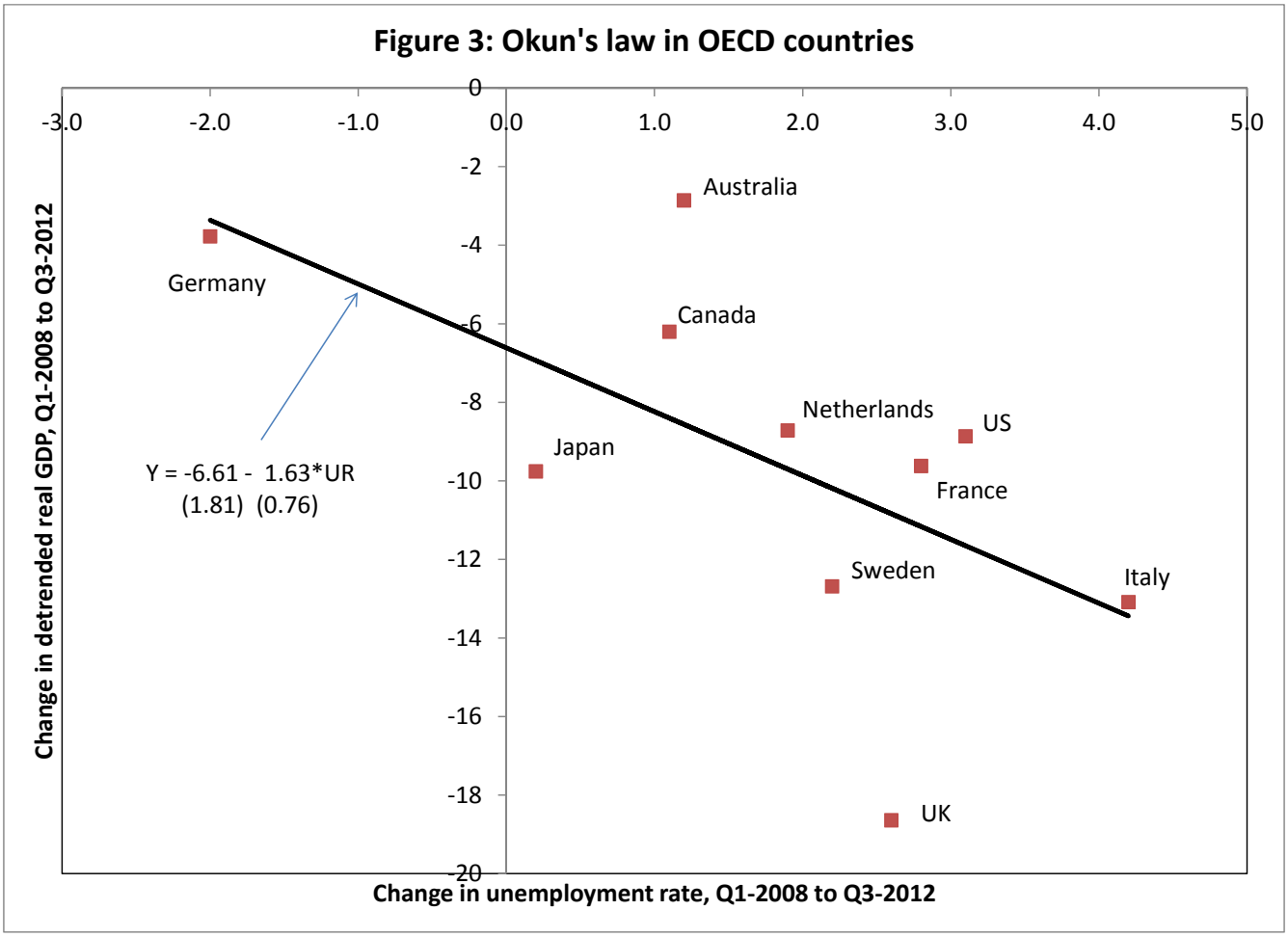


Figure 3: Okun's law in OECD countries
Change in detrended real GDP, Q1-2008 to Q3-2012
Change in unemployment rate, Q1-2008 to Q3-2012
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0
4.0
5.0
Australia
Germany
Canada
Netherlands
US
Japan
France
Sweden
Italy
UK
Y = -6.61 - 1.63*UR
(1.81) (0.76)

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

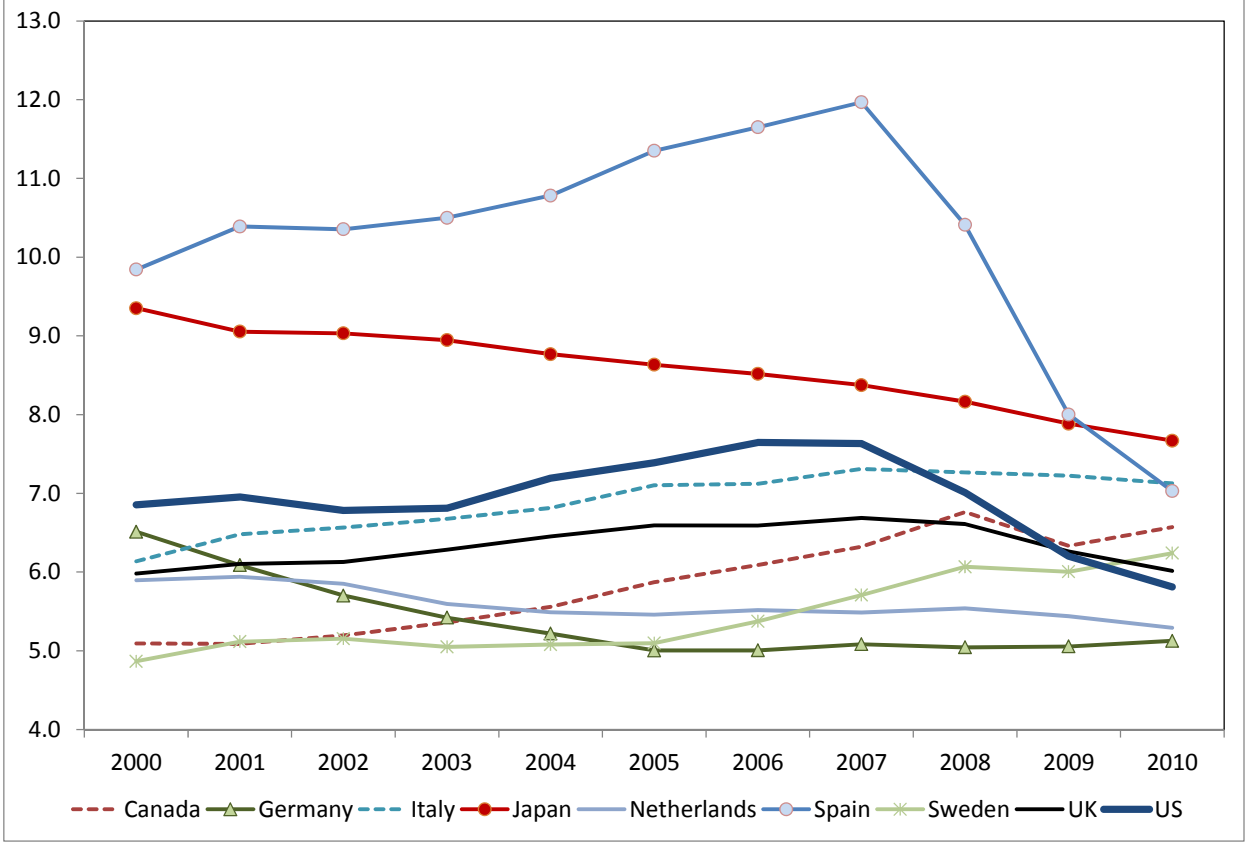
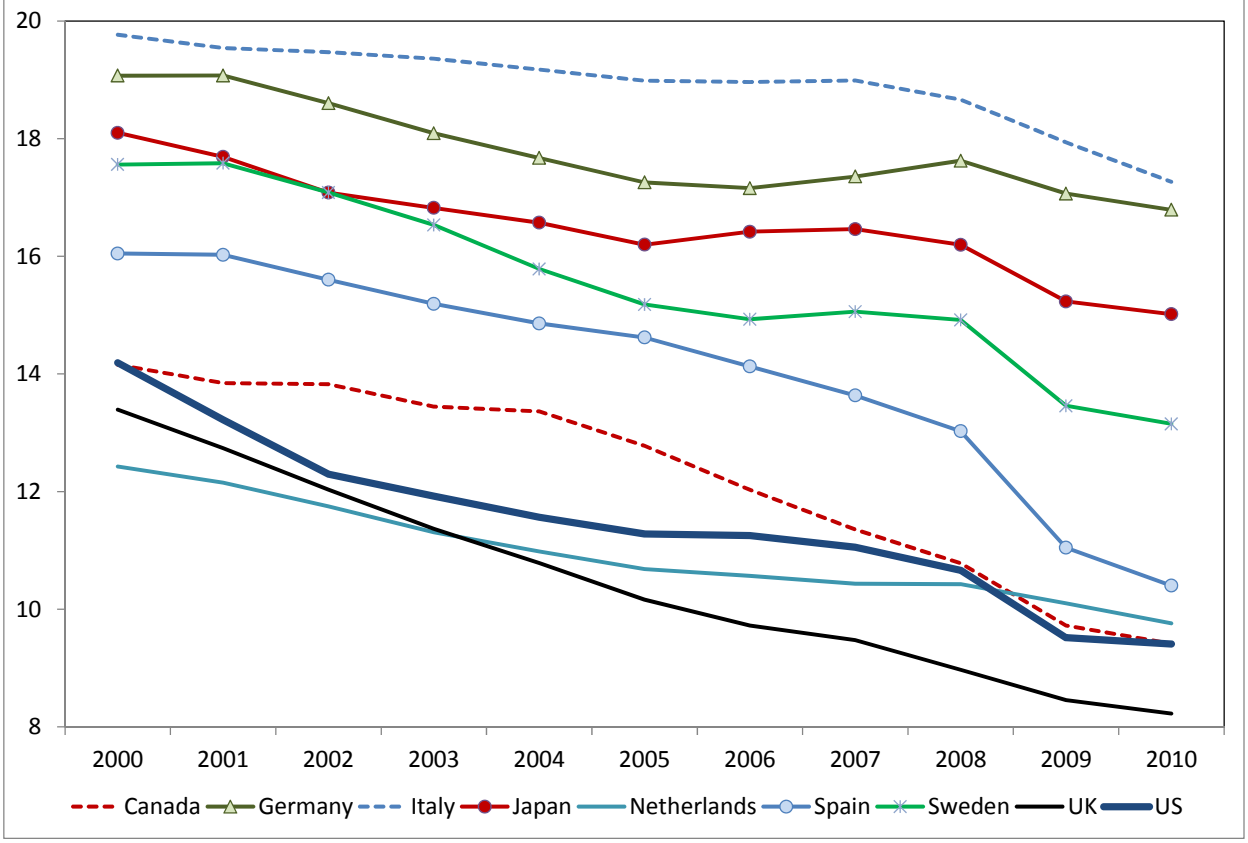


Figure 4b: Share of the labor force in the manufacturing industry



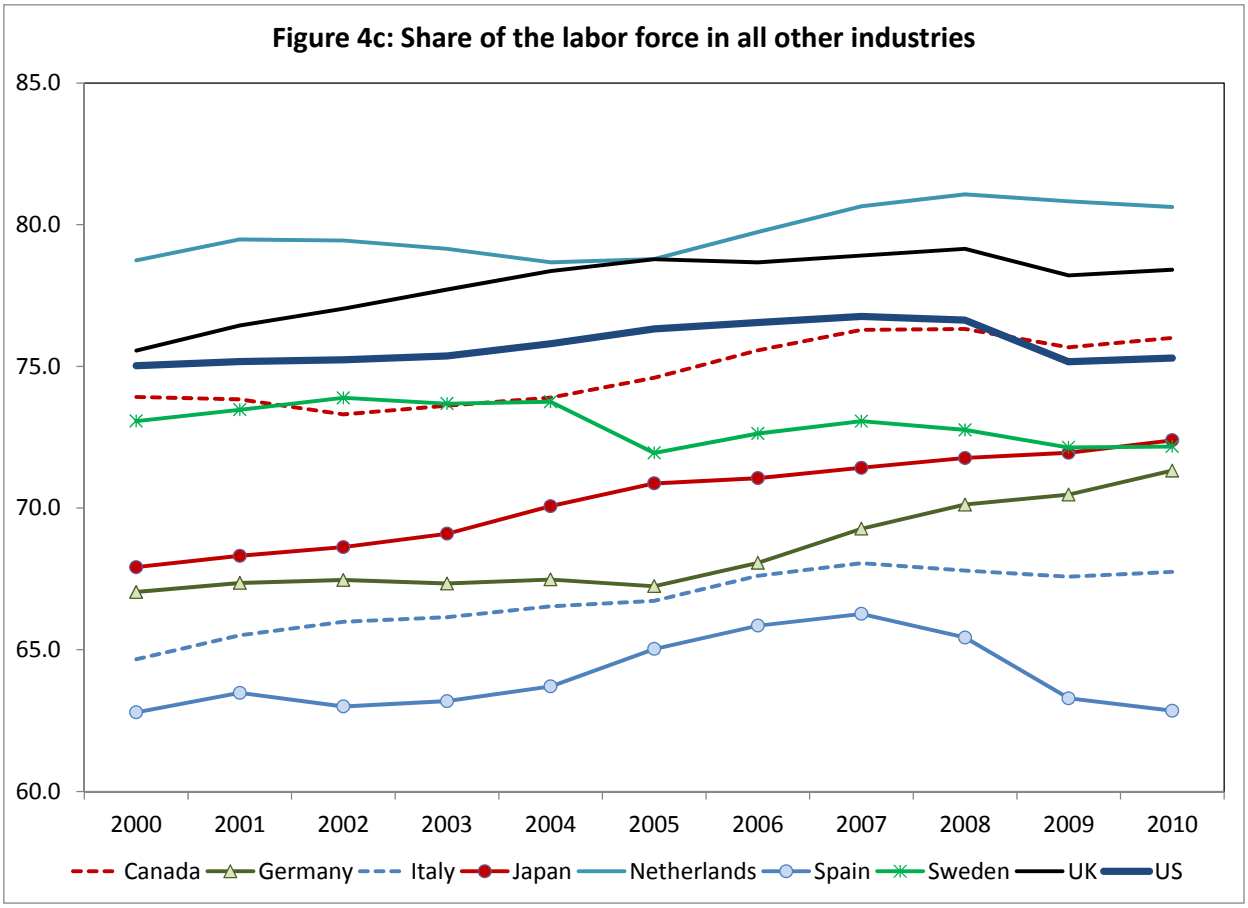


Figure 4c: Share of the labor force in all other industries
85.0
80.0
75.0
70.0
65.0
60.0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Canada
Germany
Italy
Japan
Netherlands
Spain
Sweden
UK
US

Figure 5: Evolution of real wages in manufacturing in OECD countries (1999=100)

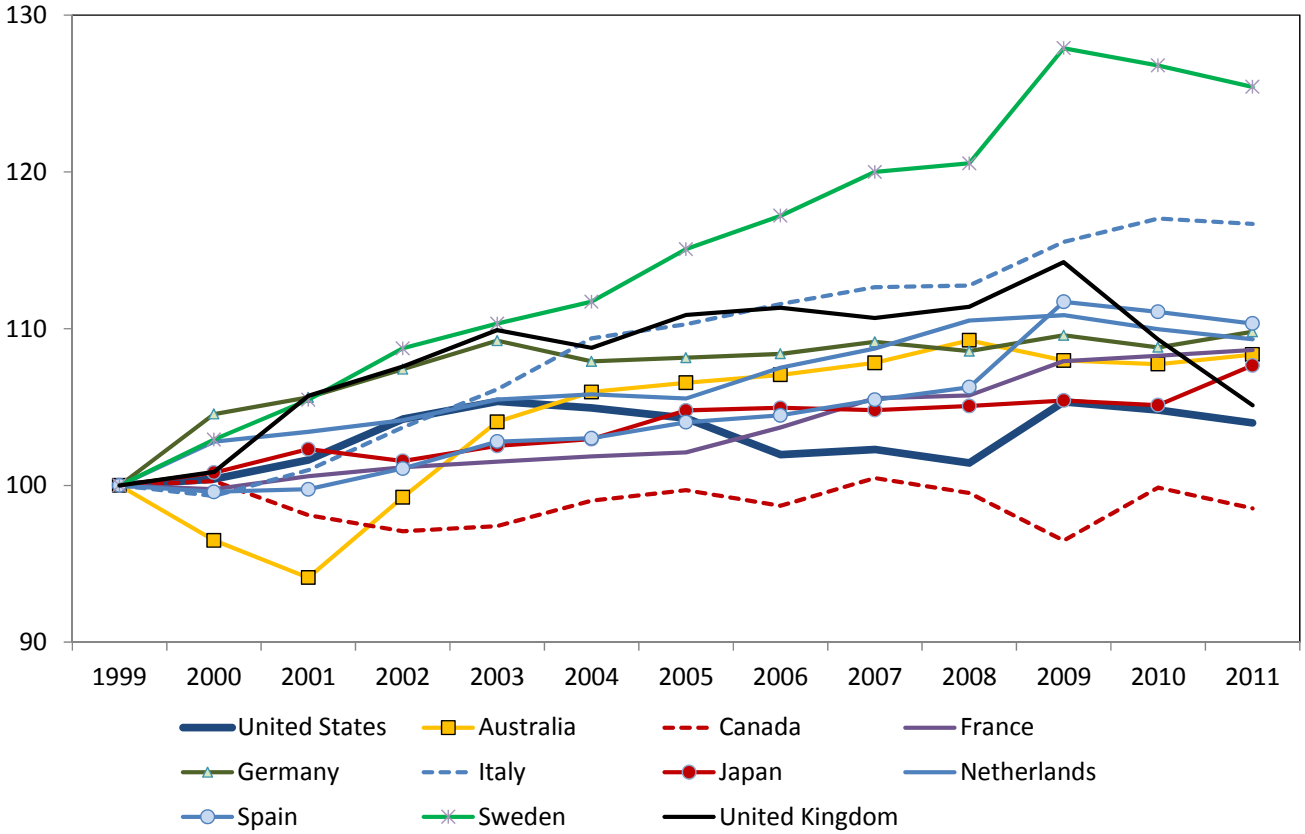


Figure 6a: US non-employment rates by region, North East and Mid West

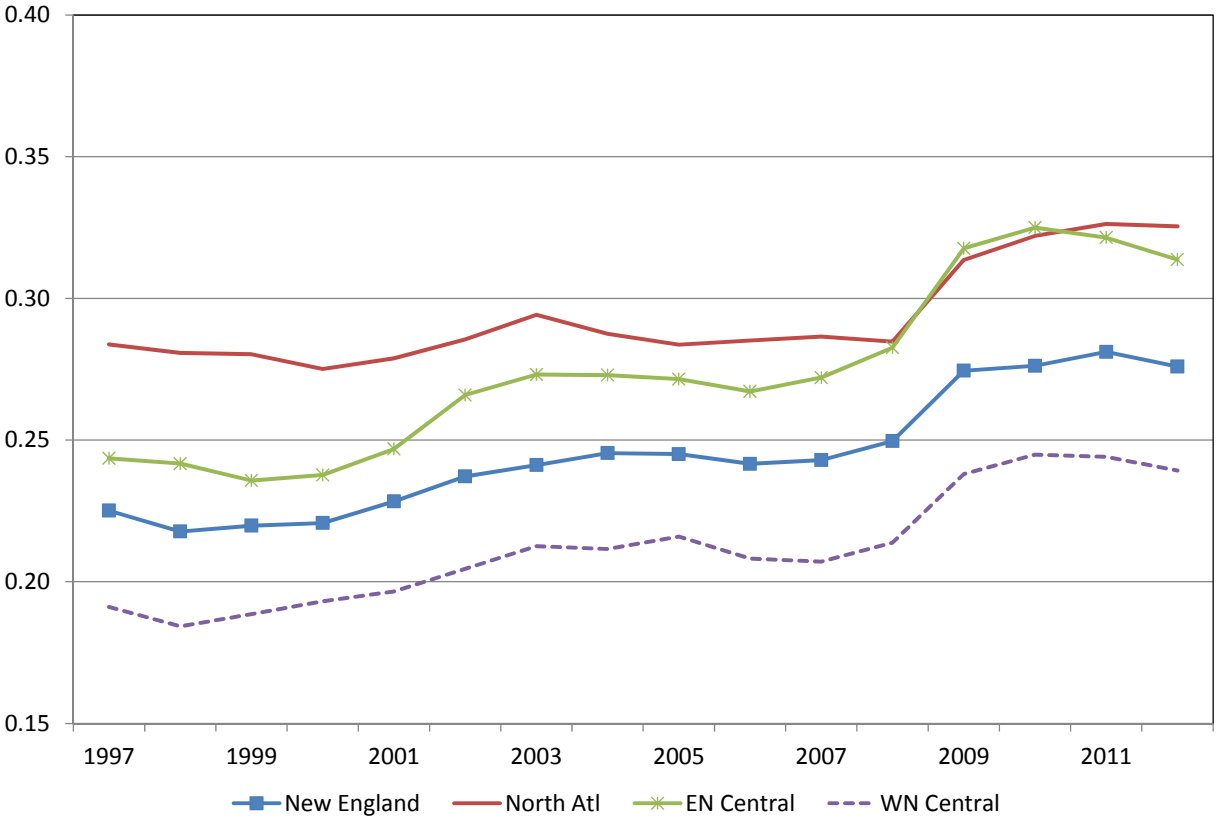
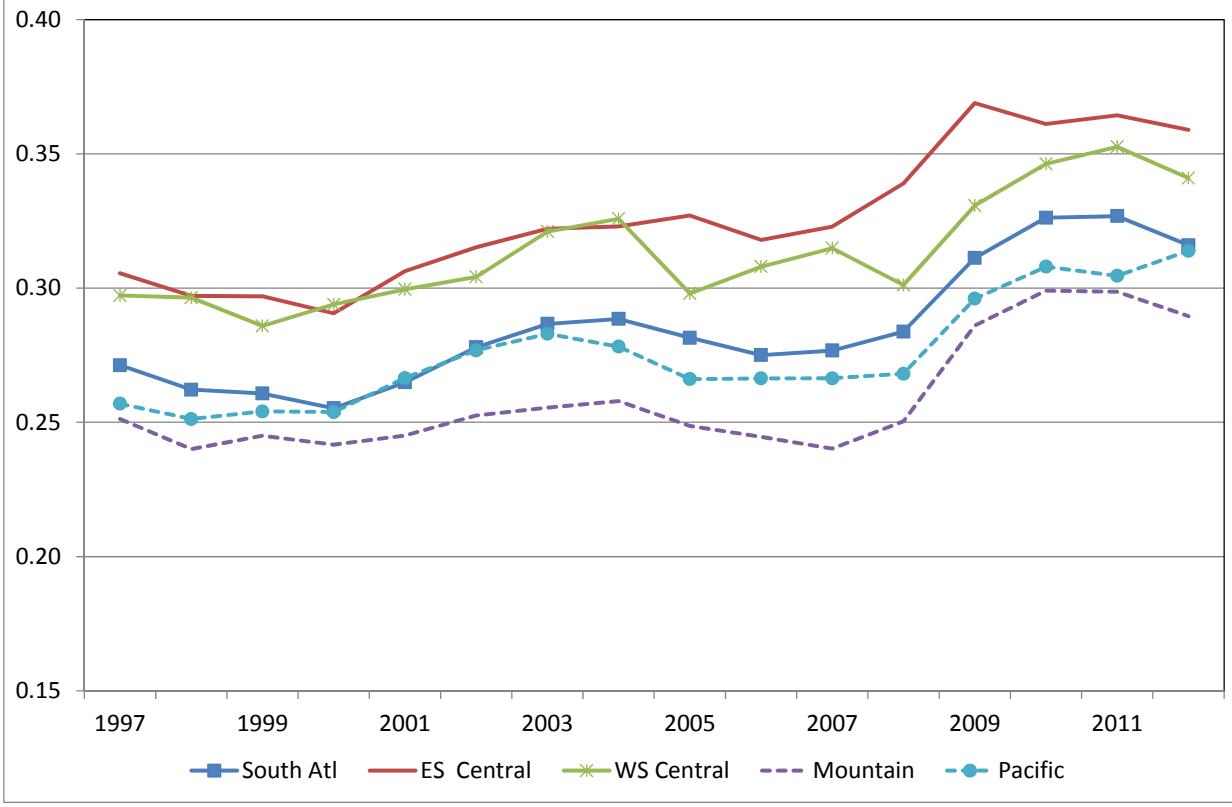


Figure 6b: US non-employment rates by region, South and West (exclusive of individual states in Figure 6c)



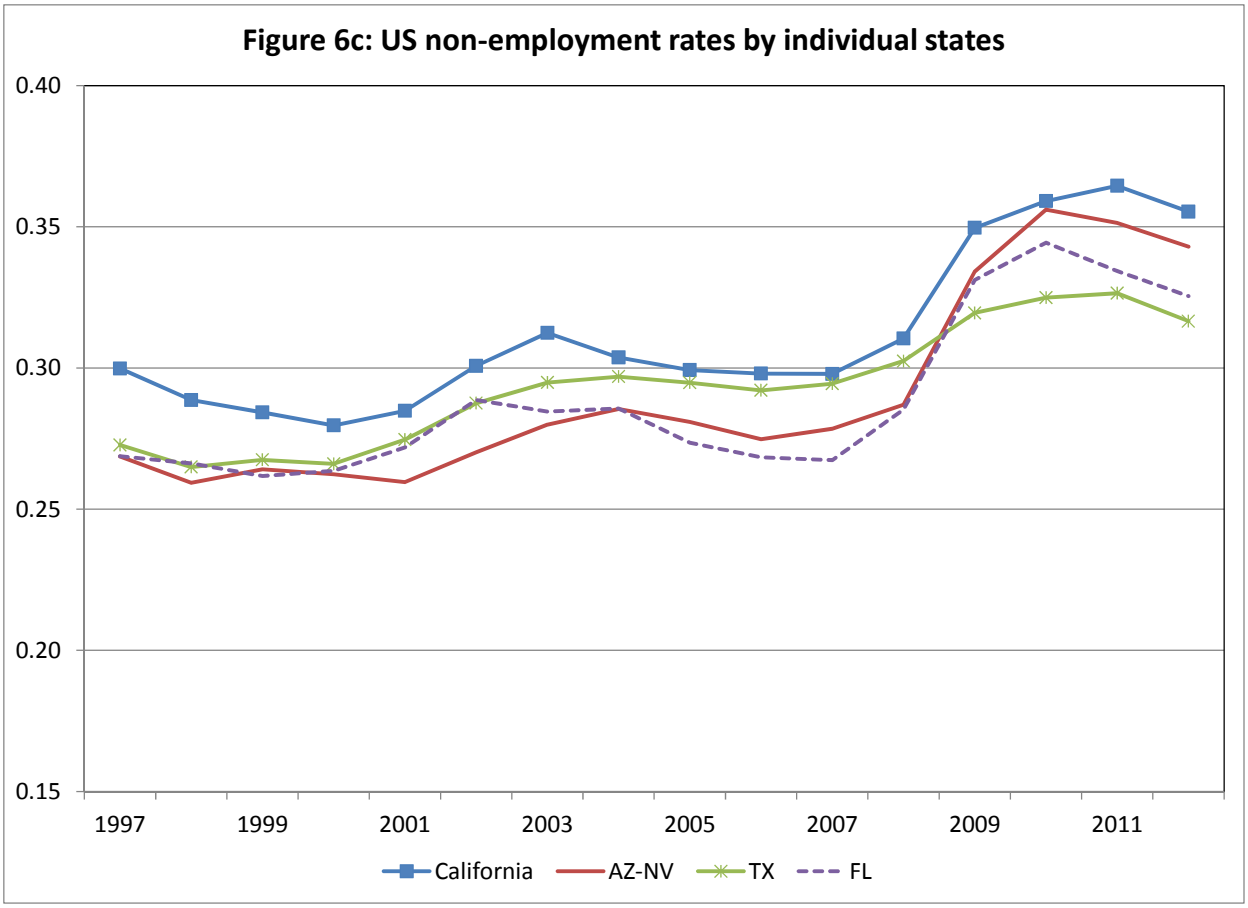


Figure 6c: US non-employment rates by individual states
0.40
0.35
0.30
0.25
0.20
0.15
1997
1999
2001
2003
2005
2007
2009
2011
California
AZ-NV
TX
FL

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

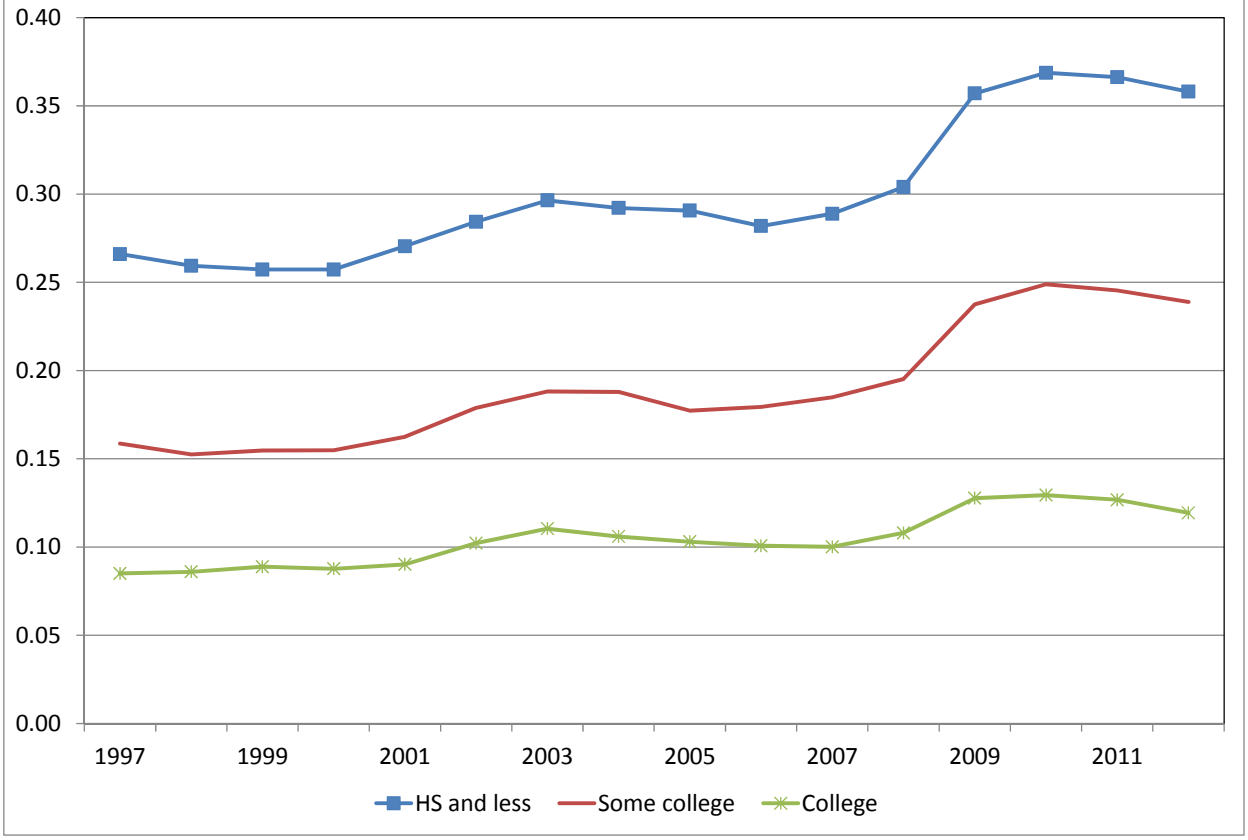


Figure 7b: US non-employment rates by education, women

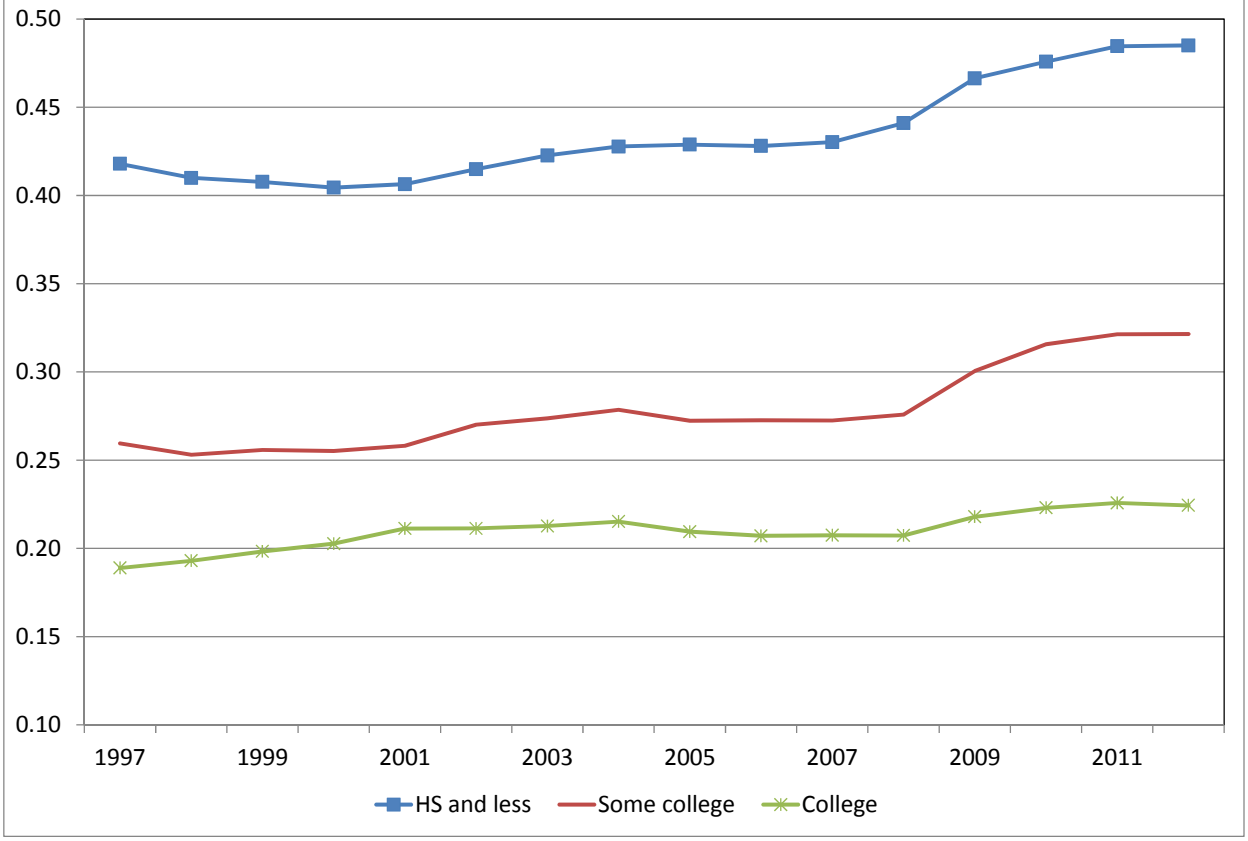


Figure 8a: US non-employment rates by age groups, men

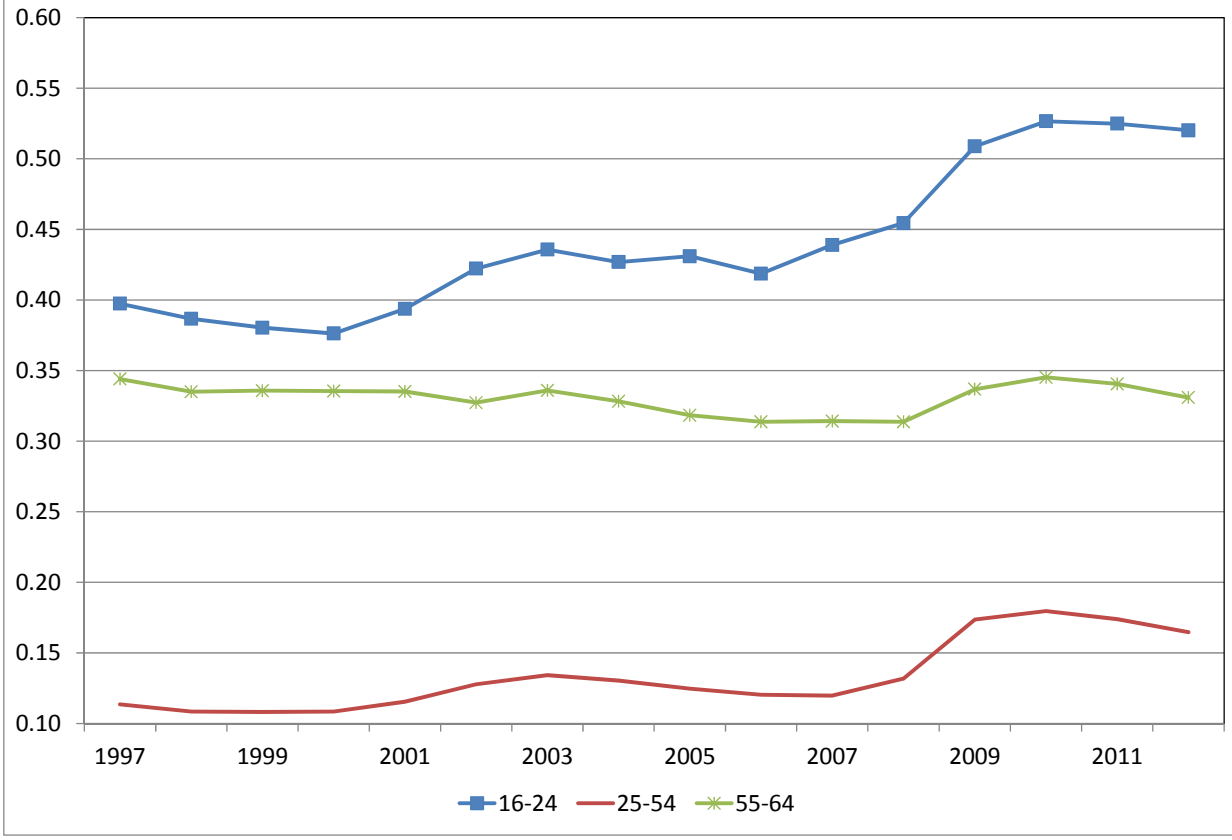


Figure 8b: Non-employment rate by age groups, women

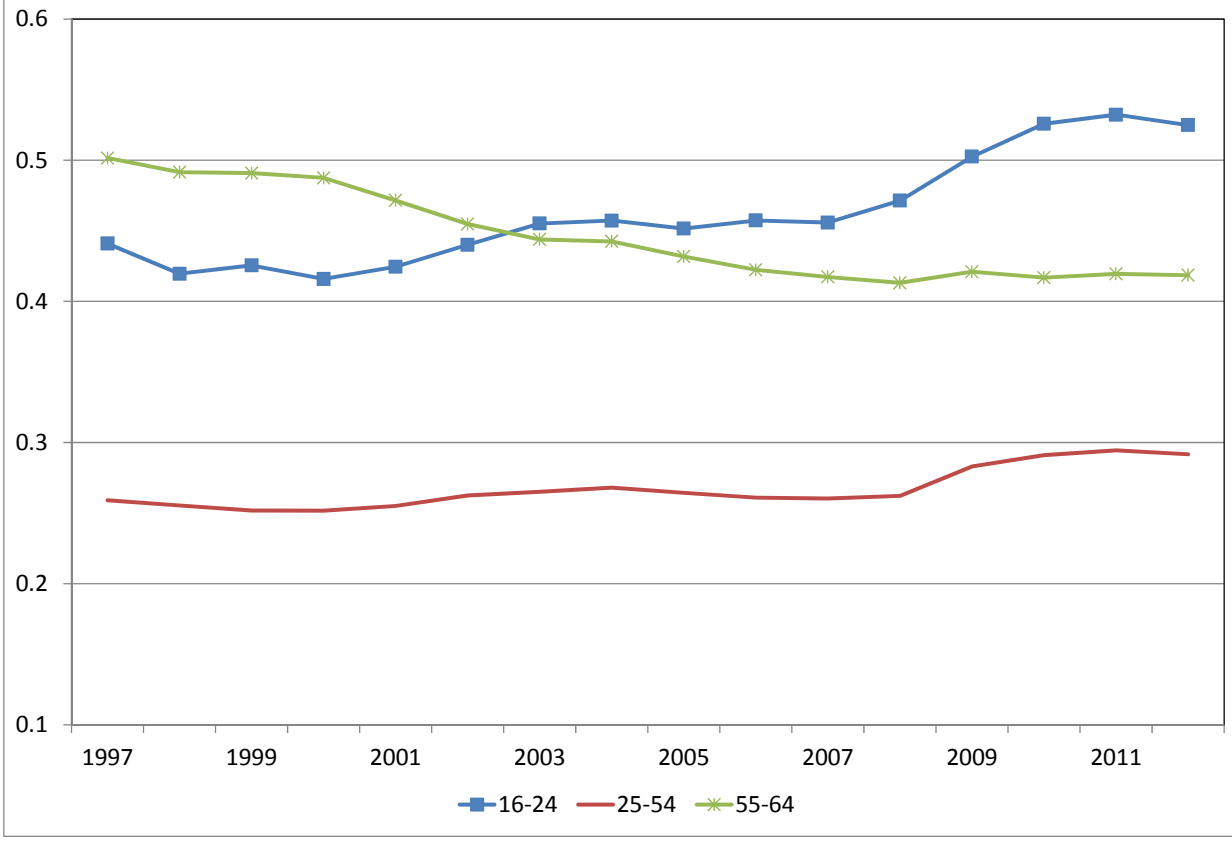


Figure 9a: Canadian non-employment rates by region, East and Central

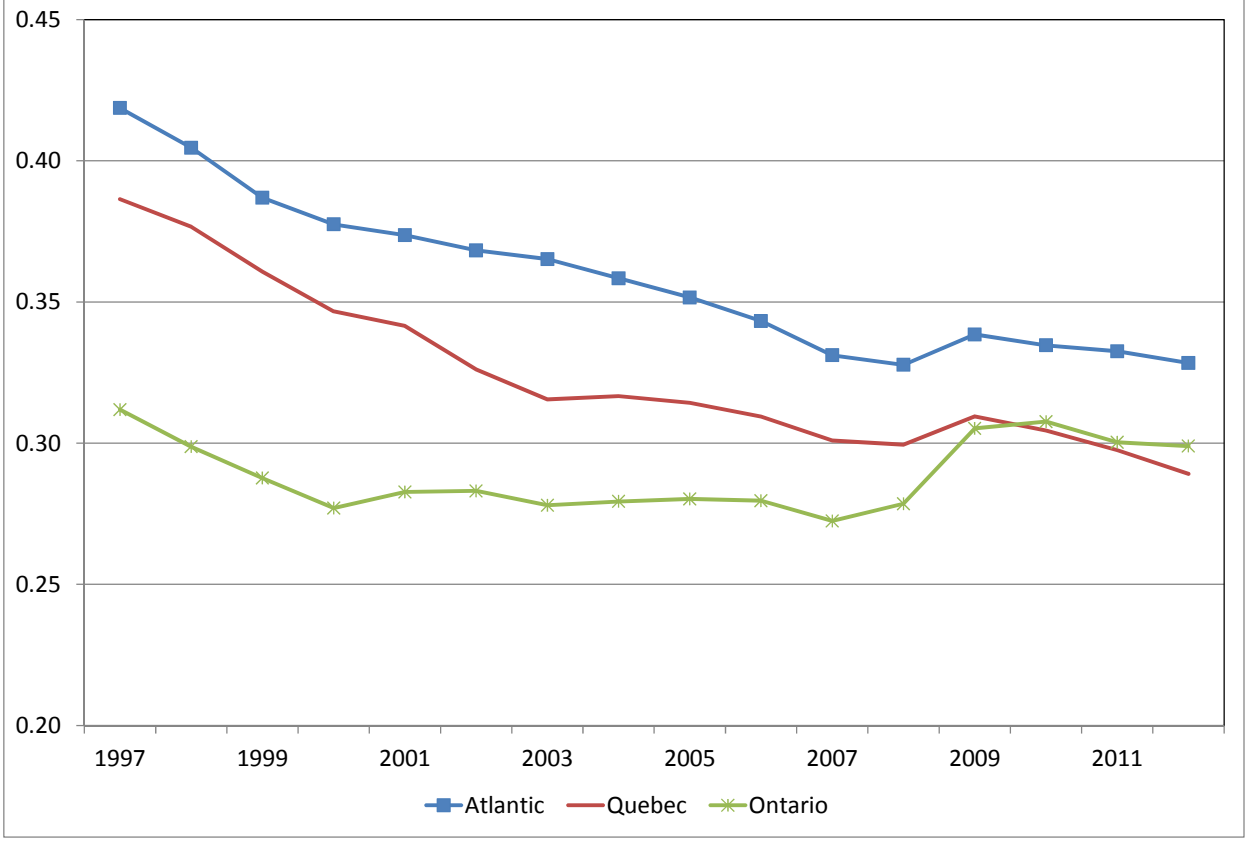


Figure 9b: Canadian non-employment rates by region, West

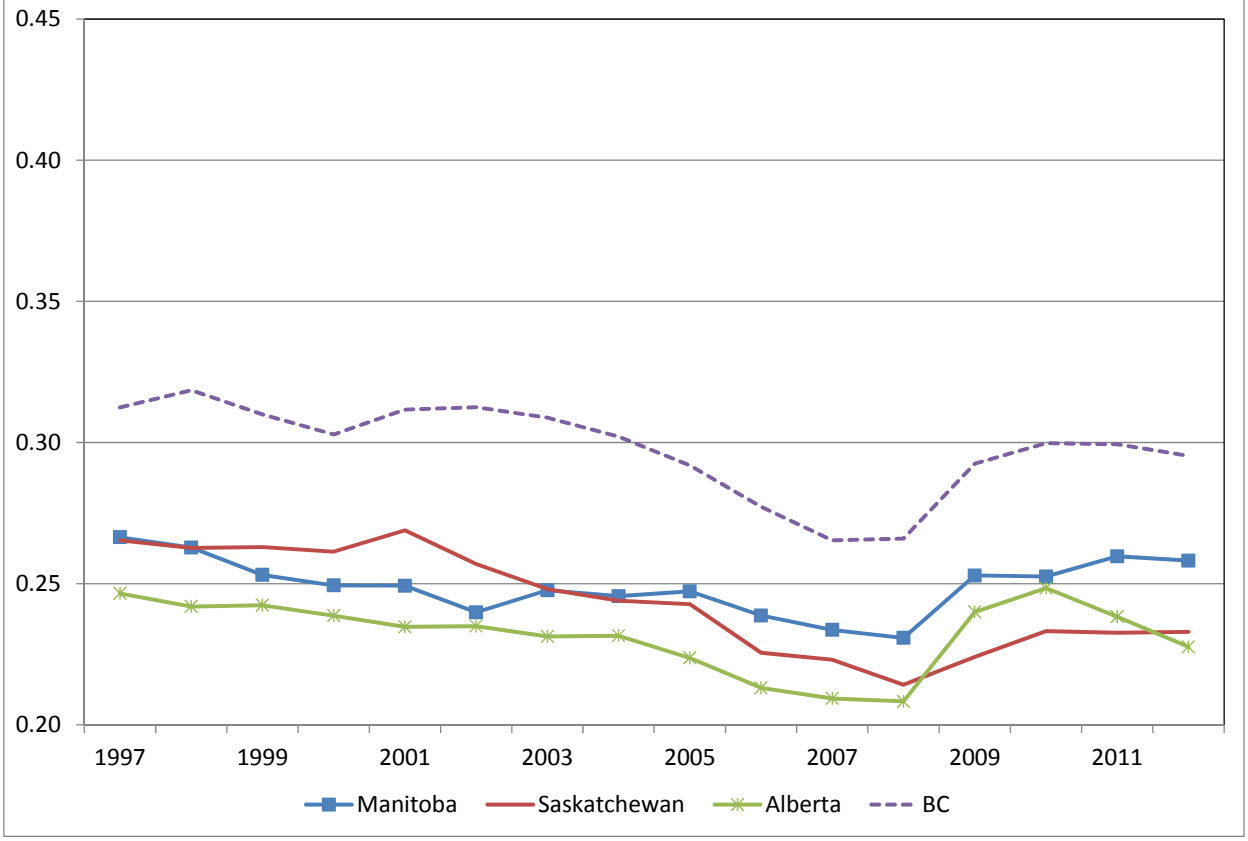


Figure 10a: Canadian non-employment rates by education, men

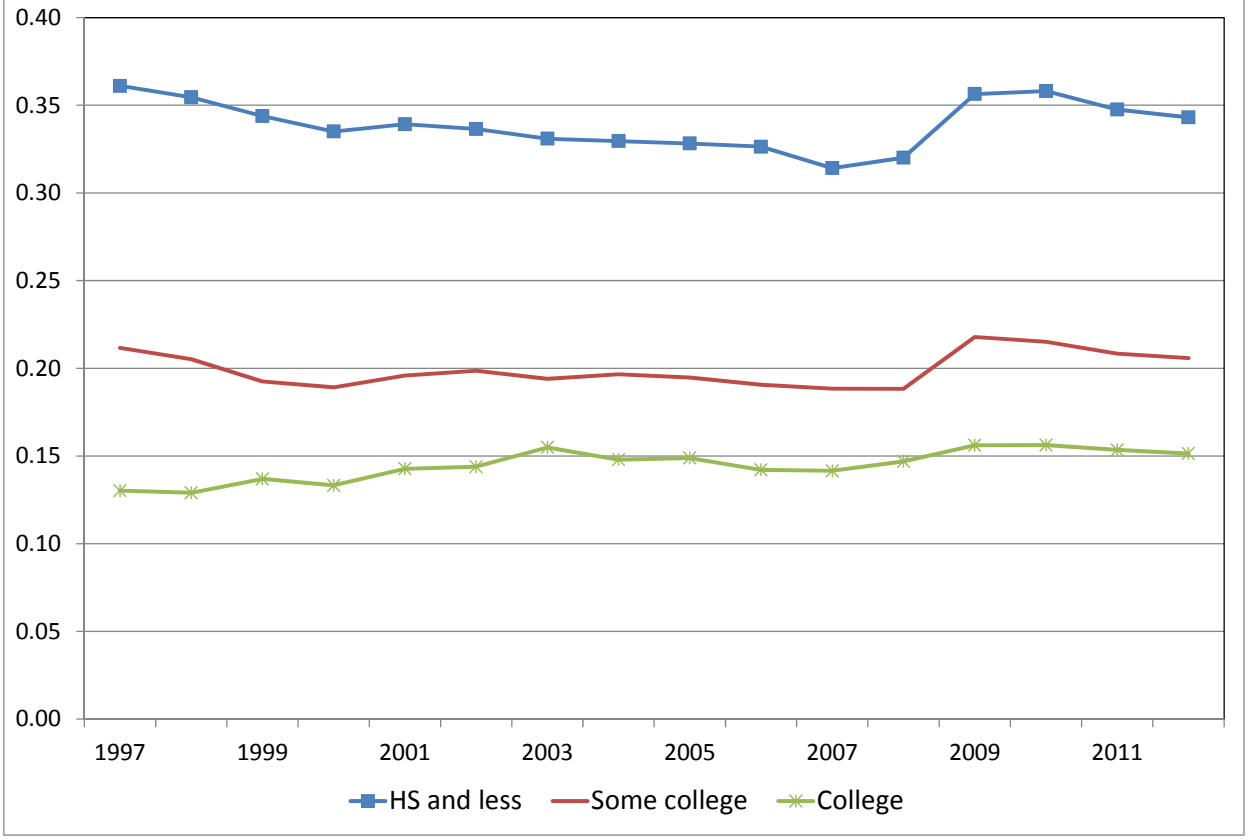


Figure 10b: Canadian non-employment rates by education, women

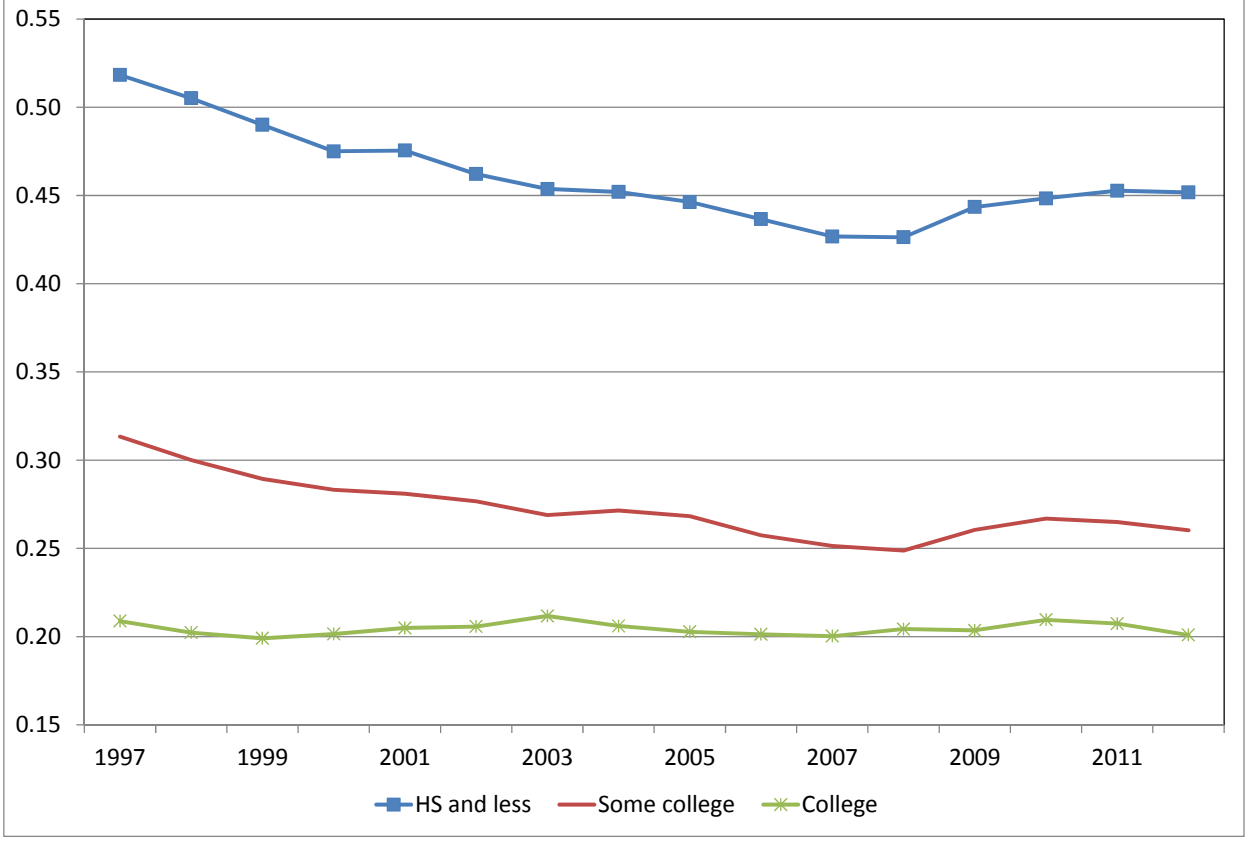


Figure 11a: Canadian non-employment rates by age, men

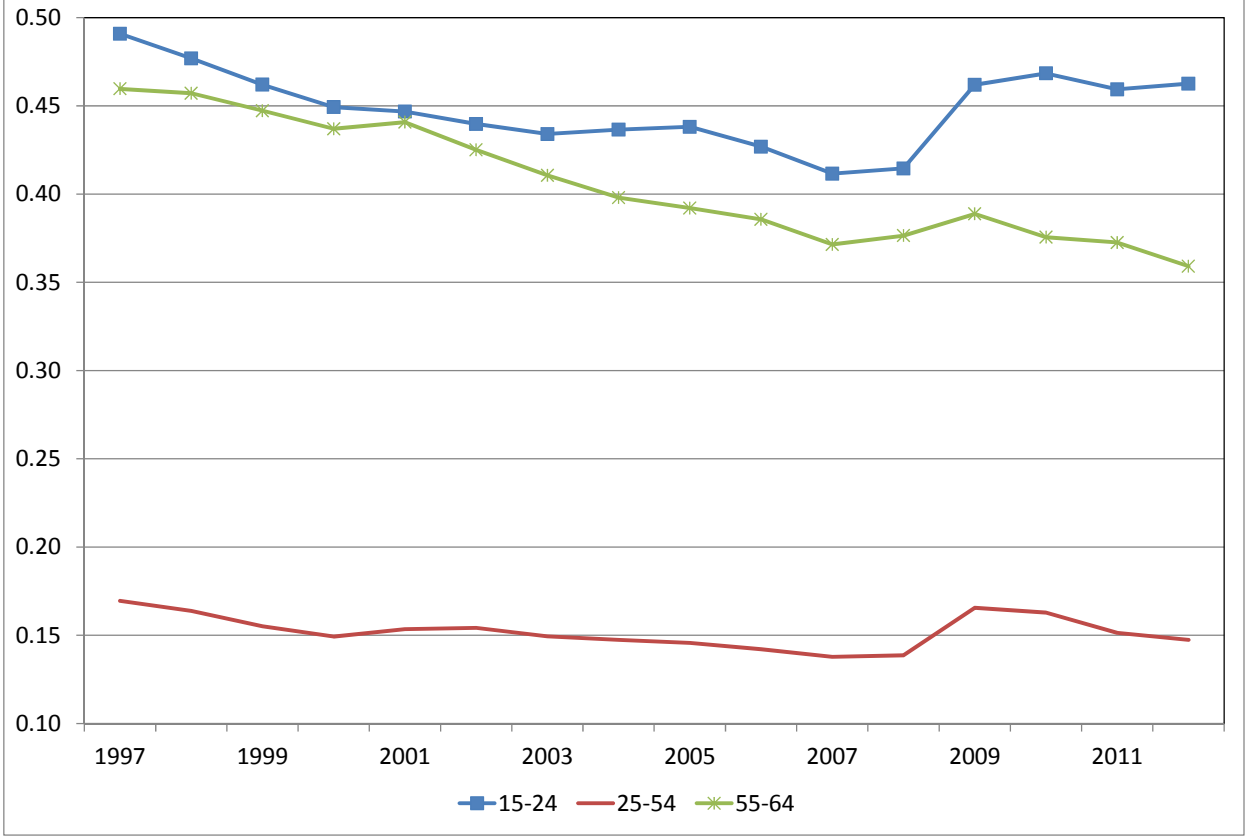


Figure 11b: Canadian non-employment rates by age, women

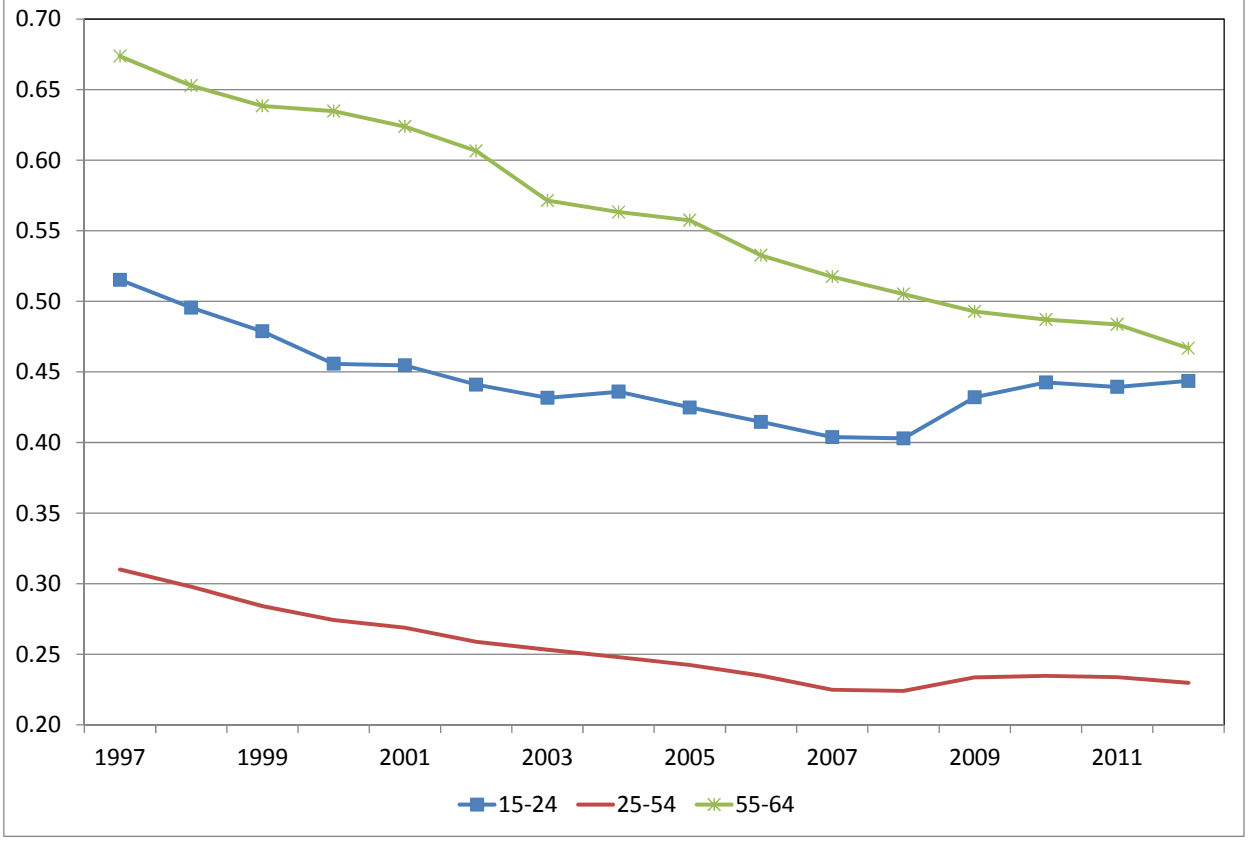


Figure 12a: German non-employment rates by region, Western Germany

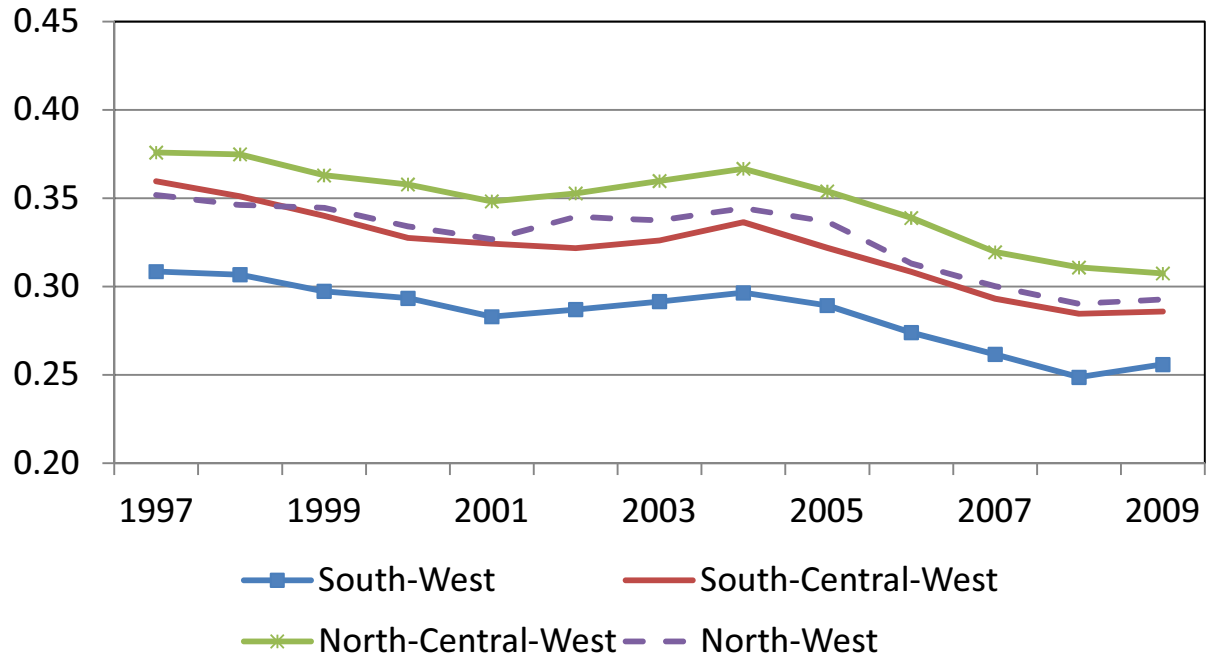


Figure 12b: German non-employment rates by region, Eastern Germany

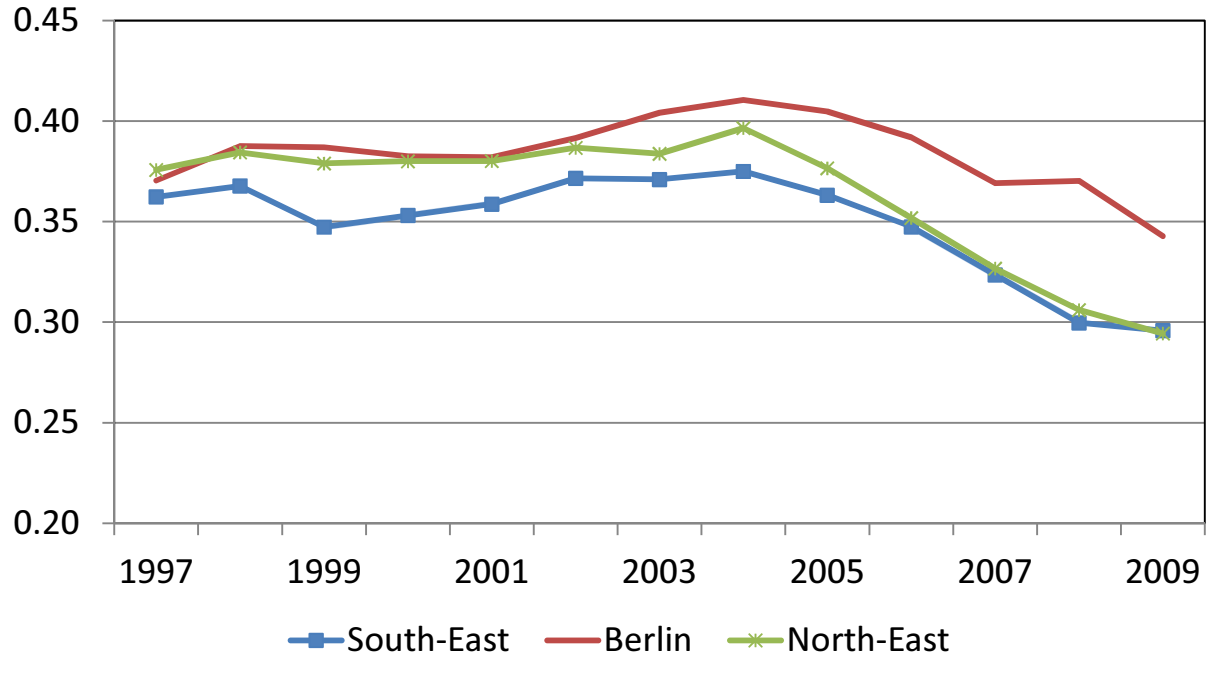


Figure 13a: German non-employment rates by education, men

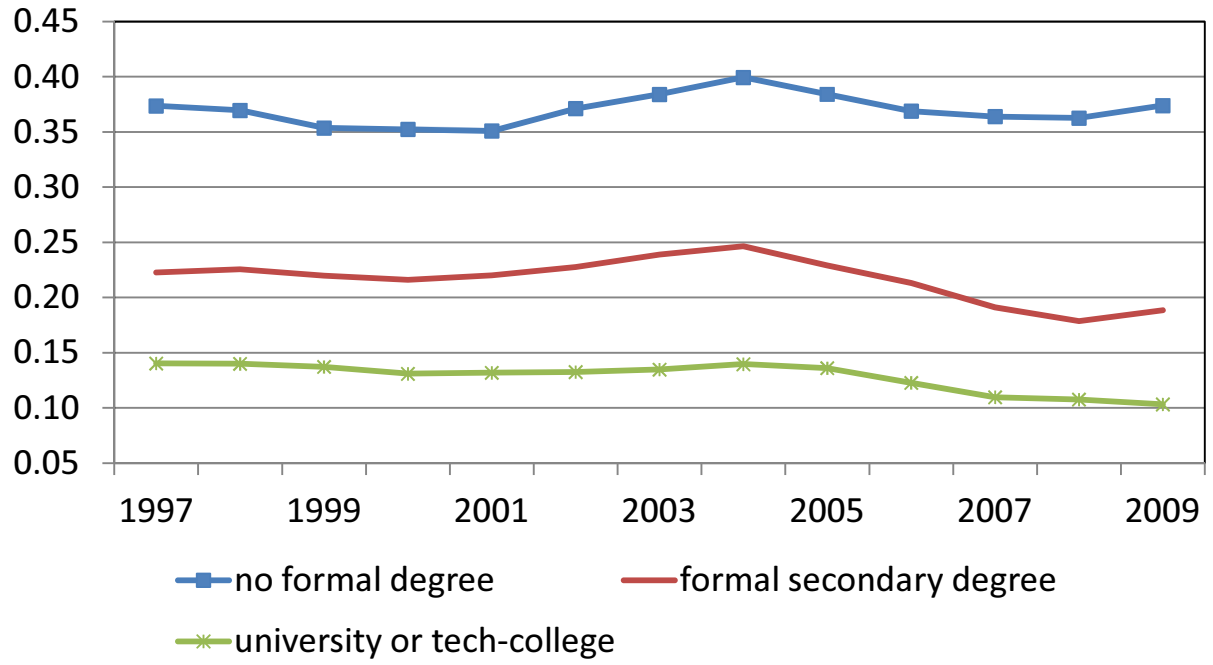


Figure 13b: German non-employment rates by education, women

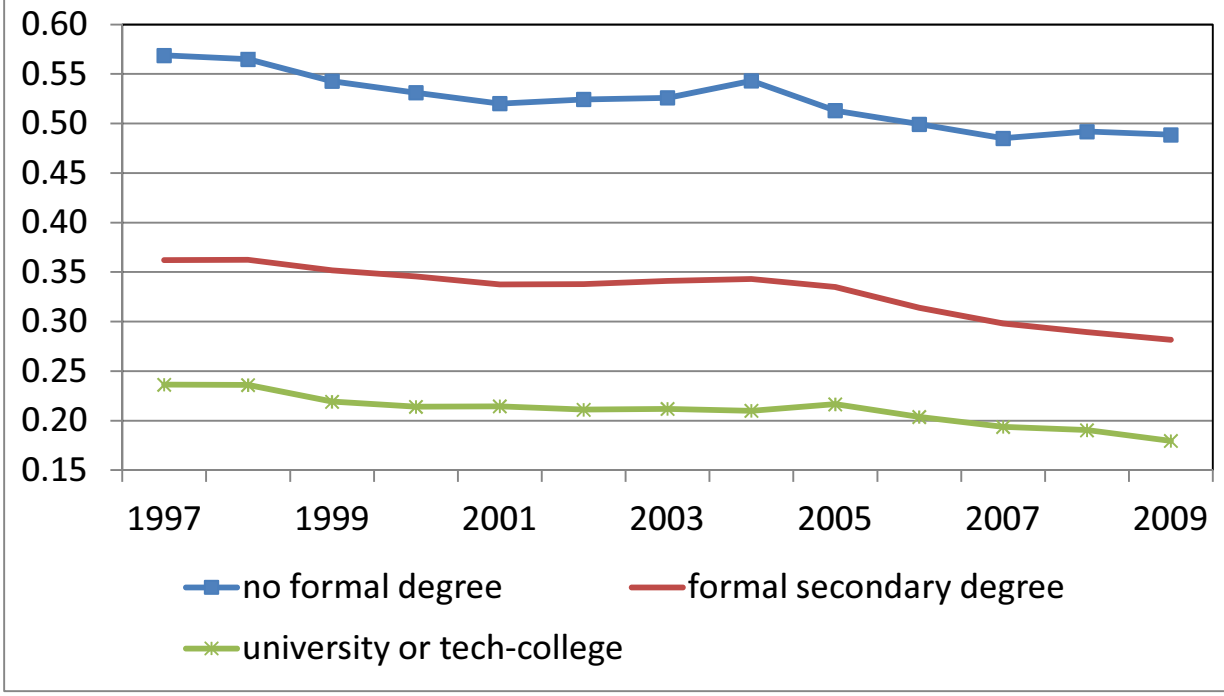


Figure 14a: German non-employment rates by age groups, men

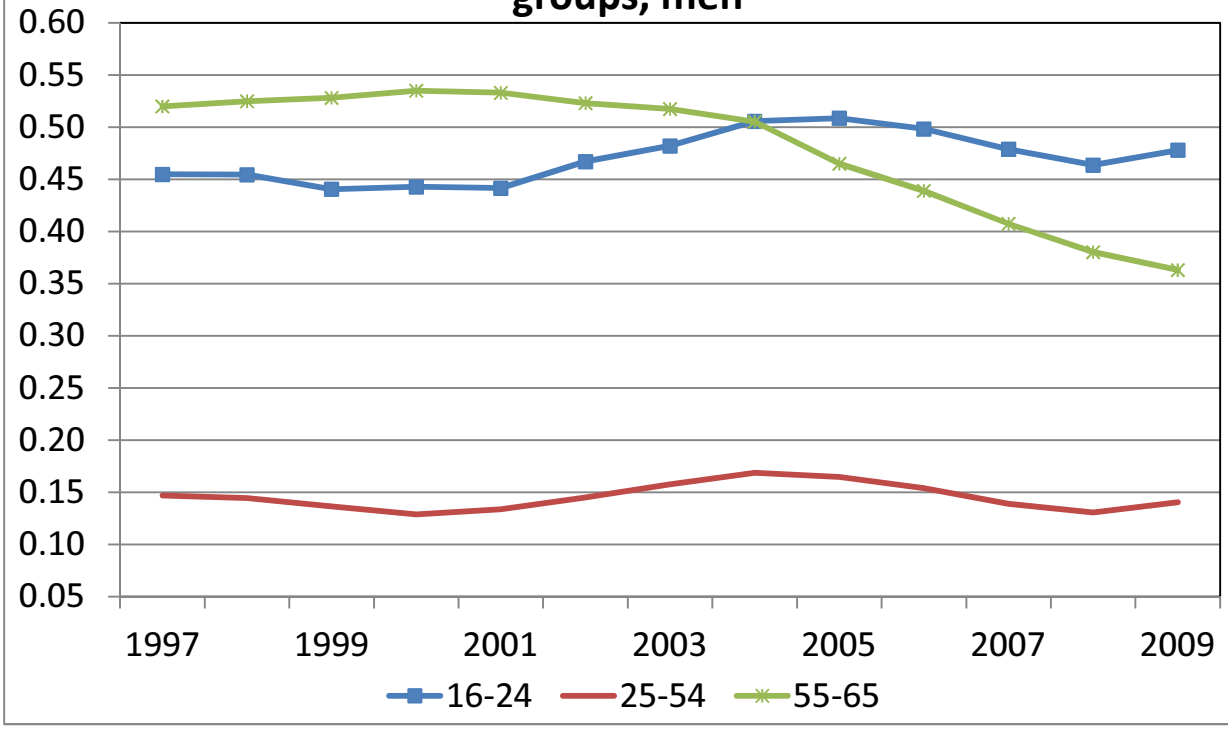
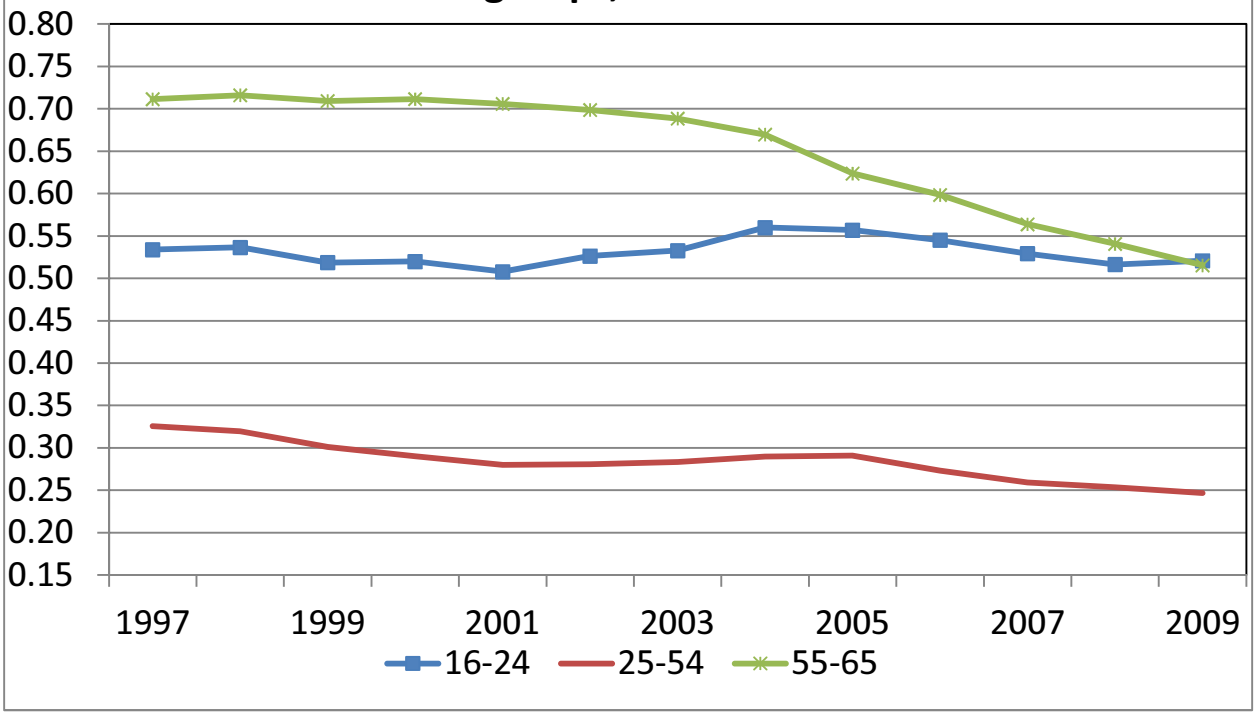
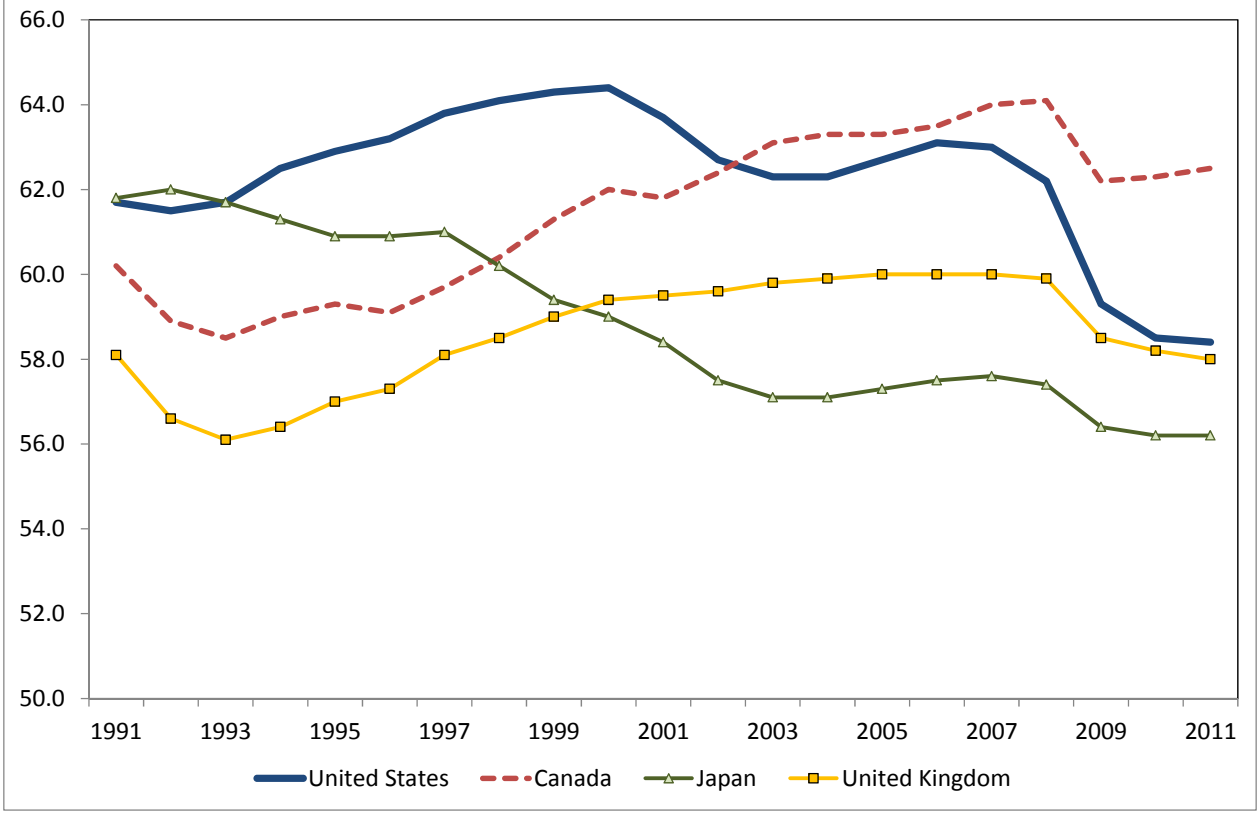


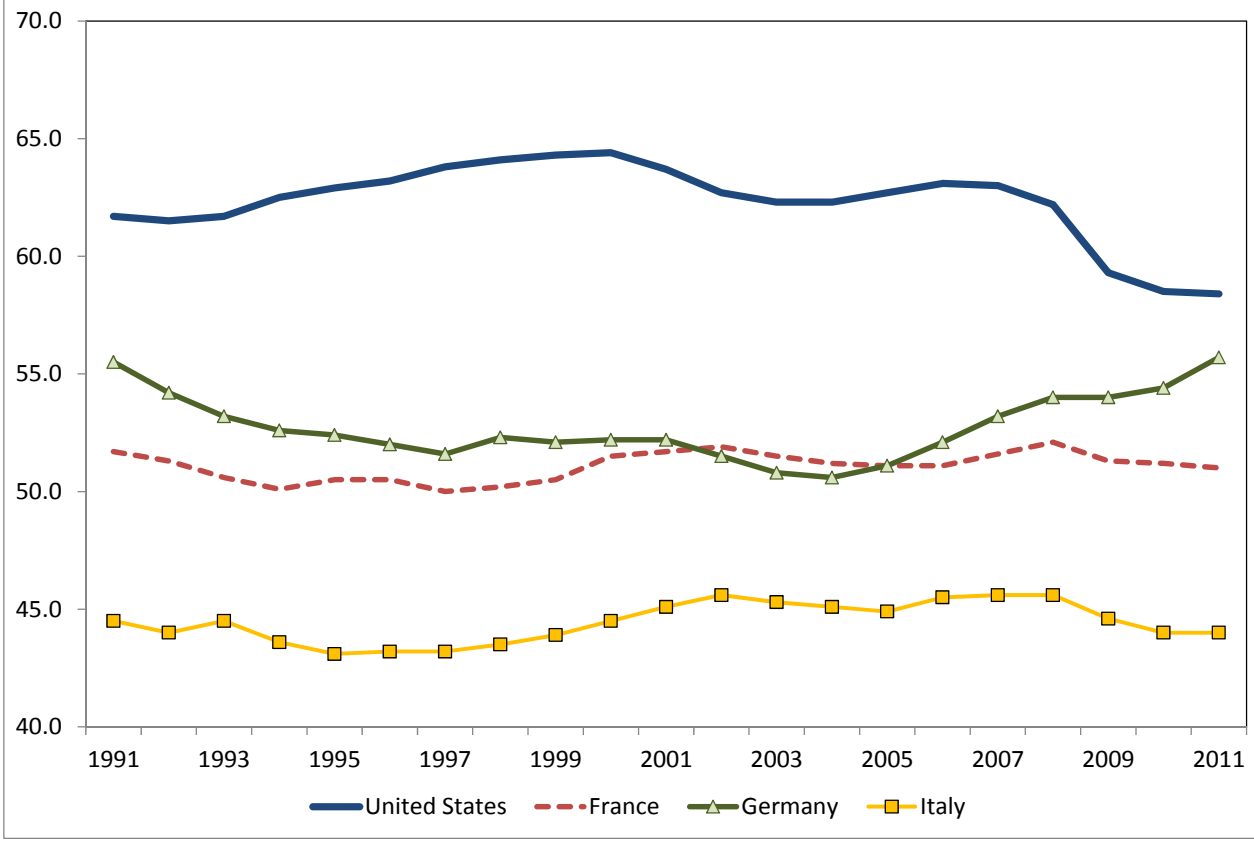
Figure 14b: German non-employment rates by age groups, women

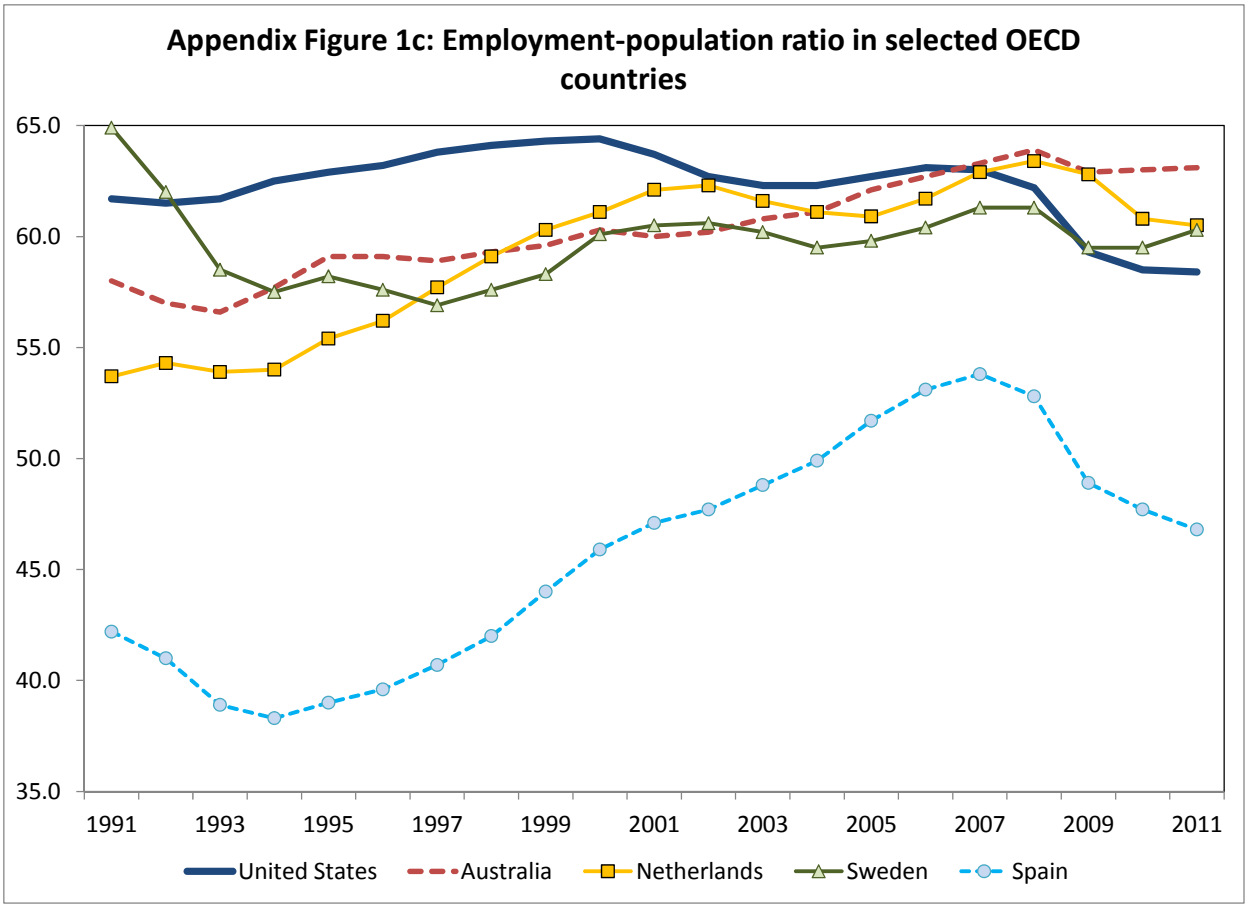


Appendix Figure 1a: Employment-population ratio in G7 countries

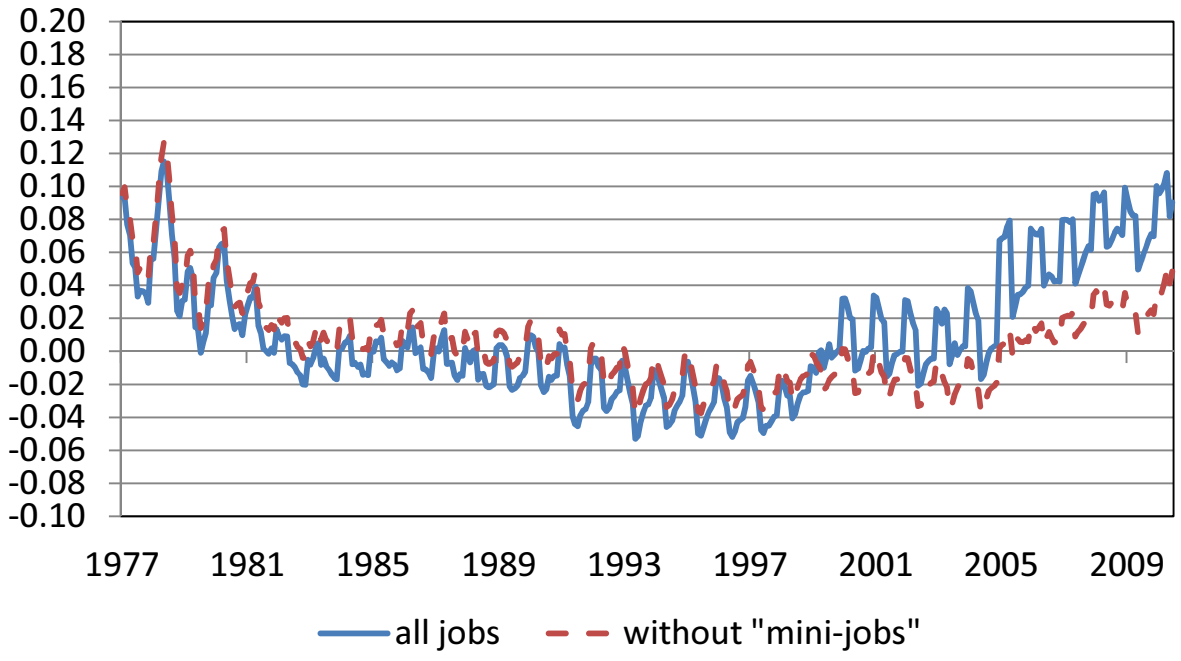


Appendix Figure 1b: Employment-population ratio in G7 countries

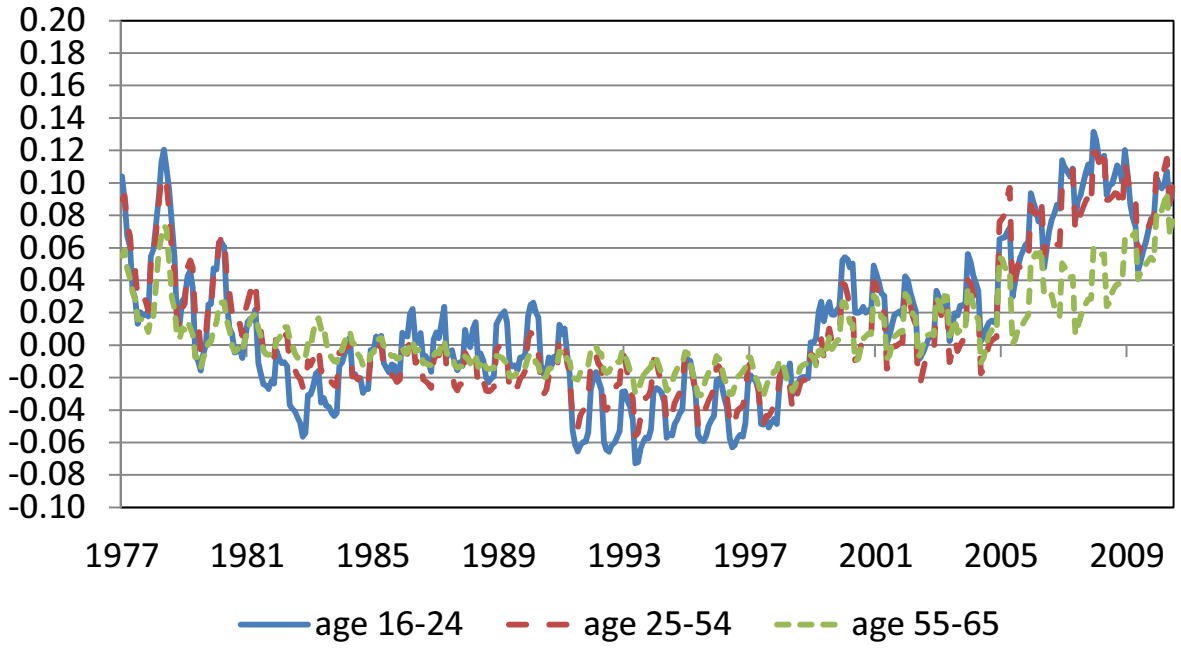



Appendix Figure 1c: Employment-population ratio in selected OECD countries
65.0
60.0
55.0
50.0
45.0
40.0
35.0
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
United States
Australia
Netherlands
Sweden
Spain

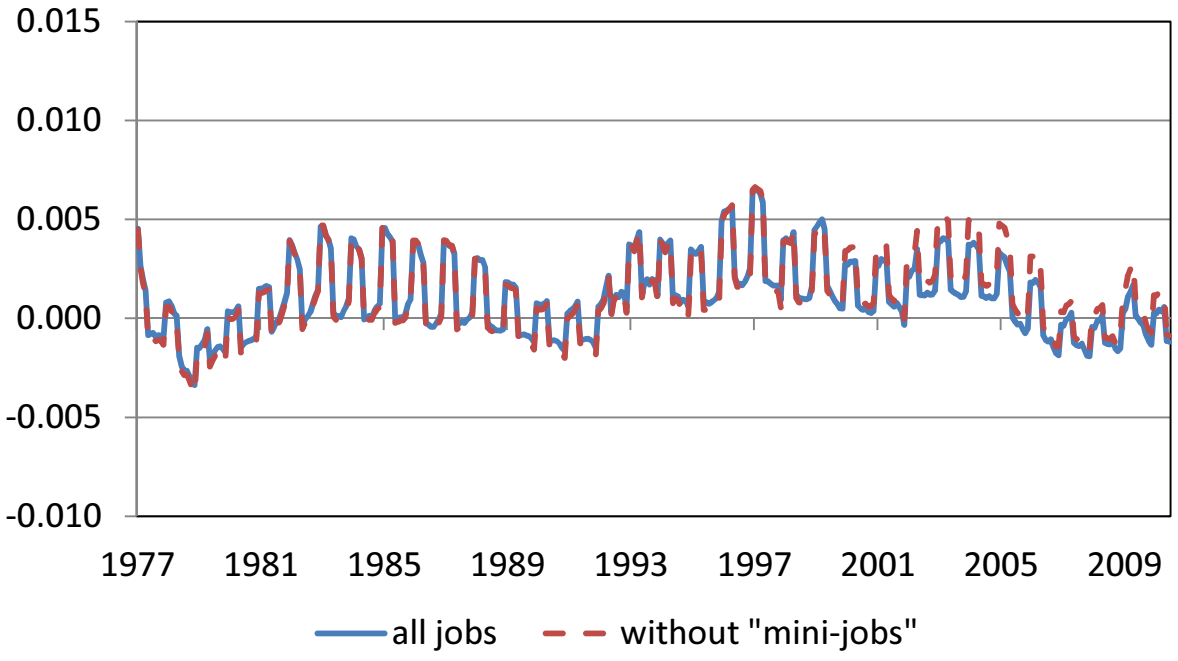
Appendix Figure 2a: monthly unempl-empl flows in Germany 1977-2010, with and without "mini-jobs"



Appendix Figure 2b: monthly unempl-empl flows in Germany 1977-2010, by age-group



Appendix Figure 3a: monthly empl-unempl flows in Germany 1977-2010, with and without "mini-jobs"



Appendix Figure 3b: monthly empl-unempl flows in Germany 1977-2010, by age-group