# Hours Worked in the US and Europe: Different Data, Different Answers*

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**Abstract**

This paper constructs estimates of hours worked per person, employment rates and hours worked per employed on the aggregate level and broken down by demographic groups in the US and 18 European countries for the time period 1983 through 2011. We recur to three different micro data sets, describe in detail how to make the data sets consistent internationally and over time. We compare them to aggregate data from the OECD and the Conference Board (CB). These are the standard sources used by economists so far, but are in contrast to our data based on different type of data sources for different countries which potentially impede cross-sectional comparability. Based on our data, Europeans work on average 18 percent less hours than US citizens during the time period 2003 to 2007, compared to 13 percent based on OECD data and only 7 percent based on CB data. Matching/replicating these larger differences would be a harder challenge for the literature. However, our data predict a similar country ranking and a slightly smaller cross-sectional variation within Europe than the two other data sources. We further use our data to quantify by how much cross-country differences in the demographic structure, employment rates, weeks worked per year and weekly hours worked per employed, contribute to the cross-country differences in aggregate hours worked per person.

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# 1 Introduction

An active recent literature has documented large differences in the levels and trends of aggregate hours worked per person across OECD countries. The literature traces these back to, among others, labor income taxation (e.g., Prescott (2004), Rogerson (2006), McDaniel (2011) to name a few), institutions (Alesina et al. (2005)), and social security systems (Erosa et al. (2012), Wallenius (2013)). To better understand the causes of the large differences in labor supply, it is important to know whether these differences exist uniformly in the population, or are instead driven by specific demographic subgroups. E.g., in a companion paper (Bick and Fuchs-Schündeln (2014)) we investigate whether the taxation hypothesis pioneered by Prescott (2004) for aggregate hours is also successful when considering married couples. Cross-country differences in the tax treatment of couples (joint vs. separate) interacted with the full non-linearity of labor income tax codes are a much richer source of variation than the average tax rates by Prescott (2004). In order to answer this question, one needs micro data to document hours worked by demographic characteristics which so far has not been available. To fill this void, this paper constructs estimates of hours worked per person, employment rates and hours worked per employed on the aggregate level and broken down by demographic groups in the US and 18 European countries for the time period 1983 to 2011. We recur to three different micro data sets, the European Labor Force Survey, the US Current Population Survey, and the German Microcensus. The first part of the paper describes in detail how we measure employment rates and hours worked per employed in a consistent way to overcome differences in the survey setups across countries at a given point in time and across years for a given country. Based on our data set, the differences in hours worked per person between Europe and the US are substantially larger than if calculated based on OECD or Conference Board data, as commonly done in the literature. In the second part of the paper, we quantify by how much each of the different margins, i.e. the demographic structure, employment rates, weeks worked per year and weekly hours worked per employed, contribute to the cross-country differences in aggregate hours worked per person.

The measurement of hours worked per person, employment rates and hours worked per employed from our micro data sets is less trivial than one might think. The main difference between the several surveys, at a given point of time across countries or for a given country across time, regards the coverage of weeks over the year. Specifically, weeks where people typically go on annual leave and/or weeks with public holidays, which we use interchangeably with vacation, are often undersampled. We document that this is not a problem for measuring employment rates, but that without any further adjustment, hours worked per employed would be overestimated. To overcome this problem, the key idea behind our measurement strategy of hours worked per employed is first to obtain hours worked in a *non-vacation* week, i.e. a typical work week without a reduction in work time because of a public holiday or annual leave; second, we require *consistency* of annual leave and public holidays in the micro data with the country-wide average. Information on the latter is collected

from external data sources and not coming from our labor force surveys.

We compare our aggregate data to those published by the OECD and the Conference Board (CB). These two data sources have been used by a series of recent papers in the macroeconomic literature which tries to understand the cross-country differences in hours worked (Prescott (2004), Rogerson (2006), McDaniel (2011) to name a few) focusing on the the role of taxes. The time-trends for hours worked per person, employment rates and hours worked per employed are both qualitatively and quantitatively very similar across the three data sets. Qualitatively this mostly also holds for the cross-sectional estimates in the recent pre-crisis years, but not quantitatively. Based on our data, Europeans work on average 18 percent less hours than US citizens during the time period 2003 to 2007, compared to 13 percent based on OECD data and only 7 percent based on CB data. Matching/replicating these larger differences would be a harder challenge for the literature. However, our data predict a similar country ranking and a slightly smaller cross-sectional variation within Europe than the two other data sources. While eventually it is impossible to judge which approach is the most reliable, we want to emphasize the advantages of our approach. First, in contrast to the OECD and CB, our estimates rely on the same underlying data sources and apply the same algorithm. In fact, the OECD states explicitly that their hours worked measures are not suitable for level comparisons in a given year because of the differences in the underlying data sources. The CB hours are in general based on the OECD data but may be replaced or combined with other data sets to also achieve comparability for level comparisons in a given year. There is however no public information available on which basis and how these adjustments are implemented. For Germany and the US, we investigate further potential reasons for the differences in hours worked per employed in the micro data and as provided by the OECD, and present some evidence that in fact the OECD underestimates hours worked per employed, while our micro data sets might give more reliable information. Second, our approach is the only one which allows us to compare hours worked per person, employment rates and hours worked per employed on a more disaggregated level than the country-wide average.

Analyzing the aggregate data for the recent pre-crisis cross-section (2003-07) in more detail, we document further interesting facts: a strong negative correlation between weekly hours worked per employed and the employment rate of -0.64, but hardly any correlation between the weeks worked in a country and the employment rate or the weekly hours worked per employed. Put differently, less weeks worked per year neither induce systematically more people to work nor to work longer hours during a non-vacation week. In a next step we quantify how much each of the different margins, i.e. employment rates, weeks worked per year and weekly hours worked per employed, contribute to the cross-country differences in aggregate hours worked per person. Differences in weeks worked explain between one third and one half of the differences in European hours worked per person relative to the US. Employment rates have a very large explanatory power of two thirds to almost 100 percent in explaining differences in hours worked per person between Southern

Europe or Eastern Europe and the US, respectively. For Western Europe and Scandinavia, by contrast, weekly hours are the most important driving factor of the differences relative to the US. In Scandinavia, employment rates alone would in fact predict even higher hours than in the US, while in Eastern and Southern Europe the same holds true for weekly hours worked. We repeat the same exercise but also account for differences both in the demographic composition (age, gender, education) as well as the employment rate and hours worked per employed of these different groups. While the age and gender distributions are quite similar across countries (as one might expect), the education distribution is not. The US has the highest share of high educated people and lowest share of low educated people. These compositional differences alone explain a substantial fraction of the differences in hours worked per person relative to the US, namely between one quarter and one half. Put differently, if the European countries had the same share of low, medium and high educated people as the US, the differences in hours worked per person would be quite a bit smaller. The relative explanatory power of work weeks and weekly hours remains essentially unchanged compared to the aggregate decomposition. By contrast, the explanatory power of the employment rate becomes smaller. We show that this is driven by the fact that demographic groups differ much more in their employment rates than in their hours worked per employed. Thus not accounting for the differences in the demographic composition between Europe and the US attributes too much weight to the employment rates as explanatory factors on the aggregate level.

The remainder of the paper is structured as follows: Section 2 describes the micro data sets. The following section explains how we measure hours worked per person, employment rates and hours worked per employed. Section 4 compares aggregate hours worked per employed and employment rates from our data to those reported by the OECD and the Conference Board. Section 5 introduces the aggregated data and conducts the decomposition analysis. Finally, Section 6 concludes.

## 2 Data Sets

We work with three different micro data sets to construct hours worked, namely the European Labor Force Survey, the Current Population Survey, and the German Microcensus.

### 2.1 European Labor Force Survey

The European Labor Force Survey (ELFS) is a collection of annual labor force surveys from different European countries, with the explicit goal to make them comparable across countries. We use the yearly surveys, since the quarterly ones do not provide information on marital status and education. The ELFS covers Belgium, Denmark, France, Greece, Italy, Ireland, the Netherlands,[1] and the UK from 1983 on, Portugal and Spain starting in 1986, Austria, Norway, and Sweden starting in 1995, Hungary and Switzerland starting in 1996, and the Czech Republic and Poland

[1] For the Netherlands, we have information from 1983, 1985, and annually from 1987 on.

starting in 1997.[2] The sample size of the ELFS varies across countries and also within a country over time, but is always of considerable magnitude.

### 2.2 Current Population Survey

For the US, we use the Current Population Survey (CPS), which is a monthly survey of around 60,000 households. Specifically, we work with the CPS Merged Outgoing Rotation Groups data provided by the National Bureau of Economic Research (see `http://www.nber.org/data/morg.html`). This data set includes only those interviews in which the households are asked about actual and usual hours worked, namely the fourth and eighth interview of every household. The data covers around 300,000 individuals per year.

### 2.3 German Microcensus

The German Microcensus covers a one percent random sample of the population of Germany and is an administrative survey. Participation is mandatory. We use the scientific use files, which are a 70 percent random subsample of the original sample. This leaves us with a sample size of between 400,000 and 500,000 individuals per year. The scientific use files are available biannually from 1985 on, and annually from 1995 on. East Germans are included in the sample from 1991 onwards.[3] The German Microcensus groups hours together if the number of observations per indicated hours worked becomes too small. This mostly concerns high numbers of hours worked, and mostly groups two adjacent hours together. In this case, we always take the mid value as the hours worked.[4]

## 3 Measuring Employment and Hours Worked

In the next Subsection we discuss the survey questions used to measure employment rates and hours worked per employed. In Subsection 3.2 we explain exactly how we measure these two variables. This is less not trivial because of differences in the survey design across countries in a given year and over time in a given country. Subsection 3.3 provides the necessary details and documents that our methodology mostly overcomes the problems arising from these specifics of the survey design.

[2] The ELFS also covers Finland from 1995 on. However, the Finish data have large numbers of missing observations for several years, which implies that we could only use data from 1997 to 2002 for our analysis. We therefore exclude Finland entirely from the analysis. The ELFS covers also covers more transition countries, which we however exclude from the analysis because of data limitations along several dimensions.

[3] From 2002 on, data from the German Microcensus are used also as input into the European Labor Force Survey, but before 2002 Germany is missing from the anonymized ELFS available to researchers.

[4] When instead using the maximum values in each grouping, the resulting difference in average annual hours worked per person amounts to only 0.02%.

### 3.1 Key Survey Questions

To measure employment rates and hours worked, we rely on four survey questions. We construct the employment rate based on the self-reported employment status in the reference week. Employed individuals include self-employed and unpaid family workers, and being employed does not require that the individual worked positive hours in the reference week. The reference week usually refers to the week prior to the interview. To estimate hours worked for employed individuals, where employment is defined as just described, we rely on questions about actual hours worked in the main job in the reference week, actual hours worked in additional jobs in the reference week, usual hours worked in the main job in a working week, and reasons for having worked more or less hours than usual in the reference week. Appendix A.1 discusses how we deal with missing values for these questions, explains why we have to drop three country-year pairs (1983 for Denmark, 2001 for the UK, and 2005 for Spain) and provides an overview over the annual sample size per country, which ranges from 10,000 to 450,000 with an average of 115,000 observations.

### 3.2 Variable Definition

Our population of interest contains $i = 1, ..., N$ individuals and may be only a subset of all individuals in our survey data. The employment rate and hours worked per employed are calculated using the individual survey weights.[5]

For each individual we know the self-reported employment status $e_i$. It takes the value 1 for anyone reporting to be employed, and 0 otherwise. The employment rate ($ER$) is then simply given by

$$e = \frac{N^e}{N} \tag{1}$$

with $N$ being the sample size and

$$N^e = \sum_{i=1}^{N} e_i. \tag{2}$$

Our measure of hours worked per employed is a bit more involved, owed to specifics of the comparability of surveys. We need to adjust for the fact that weeks in which people typically go on annual leave and/or weeks with public holidays are often undersampled. Without any further adjustment, we would therefore overestimate hours worked per employed. The key idea behind our measurement strategy of hours worked per employed is first to obtain hours worked in a *non-vacation* week, i.e. a typical work week without a reduction in work time because of a public holiday or annual leave; second, we require *consistency* of annual leave and public holidays in the micro

[5]Section W.2 in the Web Appendix reports alternative measures of the employment rate. These alternative measures rely on defining employment based on working positive hours, and also involve different definitions of employment for women on maternity leave. By construction, hours worked per person remain always the same no matter what definition is used for the employment rate because an increase (decrease) in the alternative employment rate relative to our baseline definition is always offset by a decrease (increase) in hours worked per employed.

data with the country-wide average. Note that we use public holidays and annual leave together interchangeably with vacation. Information on the latter is collected from external data sources and not coming from our labor force surveys. This closely follows a procedure in Pilat (2003).

To calculate hours worked in a *non-vacation* week $h_i$ for each employed individual, we use as a baseline actual hours worked in the main job and all additional jobs in the reference week. However, if a respondent indicates to actually have worked less hours than usual in the main job and states as the main reason for doing so public holidays or annual leave, we replace weekly hours by usual hours in the main job plus actual hours worked in all additional jobs.[6] Thus,

$$h_i = \begin{cases} \text{usual hours in main job plus} & \textit{if actual hours in main job<usual hours in main job} \\ \text{actual hours in all additional jobs} & \textit{because of annual leave or public holiday} \\ \\ \text{actual hours in all jobs} & \textit{otherwise.} \end{cases}$$

Because of this adjustment we are referring to these hours as hours worked in a non-vacation week. Averaging over our population of interest (e.g., everyone or by gender, age, etc.) yields mean weekly hours worked in a non-vacation week $h$, i.e.

$$h = \frac{1}{N^e} \sum_{i=1}^{N} h_i e_i. \tag{3}$$

This measure captures that some people are working less hours than usual, e.g. because of sickness (but not because of a public holiday or annual leave), or more than usual because of overtime. In order to establish consistency of annual leave and public holidays in the micro data with the country-wide average, we multiply our mean weekly hours worked in a non-vacation week $h$ with the number of non-vacation weeks $w$. We obtain our estimate of $w$ by subtracting the country-wide average weeks of annual leave and public holidays from the 52 weeks of a year, [7] i.e.

$$w = 52 - \frac{\text{country-wide average days of annual leave \& public holidays}}{5}. \tag{4}$$

The disadvantage of this procedure is that we cannot account for heterogeneity across the population in terms of days of annual leave and public holidays, but have to assume that these days are actually taken by every employed person. Since in most countries in our sample a minimum of public holidays

[6] Note that respondents can only indicate one reason for working different hours than usual, and for additional jobs we do not have information on usual hours. In Appendix A.3 we discuss some differences between the CPS and ELFS questionnaire regarding the construction of our hours measure, which however have virtually no impact on the statistics presented in the paper.

[7] Appendix A.6 lists the data sources and further adjustments, including a table with the average number of public holidays and annual leave days at the beginning and the end of the sample period for each different country. While there is some time series variation, it is small, namely less than a day, for the majority of countries, with the notable exception of Denmark, where public holidays plus days of annual leave increased by almost 7 days between 1983 and 2011.

and days of annual leave are granted to all employees by the government, this assumption does not seem too strong a priori. In Appendix A.4 we discuss the case of self-employed individuals in more detail, for whom this assumption may be stronger. Thus, hours worked per employed ($HWE$) are given by

$$HWE = w \times h. \tag{5}$$

Finally, using our measures for the employment rate and our measure of hours worked per employed, we obtain annual hours worked per person ($HWP$) by multiplying these two with each other, or more formally

$$HWP = ER \times HWE = e \times w \times h = w \frac{1}{N^e} \sum_{i=1}^{N} h_i e_i. \tag{6}$$

We call the employment rate and hours worked per employed the two margins of labor supply, as usual in the literature, while we talk about components when we further divide hours worked per employed into weekly hours and weeks worked. Hours worked per person can thus be decomposed into two margins or three components.

### 3.3 Comparability of Surveys

The main difference between the several surveys, at a given point of time across all countries or for a given country across time, regards the coverage of weeks over the year. The following paragraphs discuss this issue in detail. A minor difference between the surveys stems from the maximum possible hours reported in each survey. However, our strategy to harmonize these caps has virtually no effect on our hours estimates. Appendix A.2 provides the details.

The CPS covers all 12 months of the year, but uses as a reference week always the week including the 12th day of a month. Therefore, most major US public holidays are not captured by the CPS (e.g. 4th of July, Thanksgiving, Christmas). Through 2004 the German Microcensus covered one single reference week in the end of April or beginning of May and deliberately excluded weeks with a public holiday. From 2005 onwards the entire year is covered. The reference weeks in the national labor force surveys of the European countries initially fell only into specific periods ranging from one single reference week to the coverage of half a year. Eventually all surveys (with the exception of the Irish one) switched to cover every week of the year, albeit in different years. As we will discuss later, this does not mean that each week samples a representative population or is covered with an equal share. Eurostat, in its efforts to harmonize the different surveys as much as possible, treated the changes in reference weeks in a two-step procedure. First, when the actual change to covering all weeks occurred in a country, the ELFS micro data reflects this by changing from covering only single weeks to covering the second quarter of the calendar year (April to June) from then on, with some exceptions to this rule (detailed in Web Appendix W.1). In a second step in 2005, when

the majority of countries included in the ELFS had switched to continuous surveying, Eurostat made all 52 weeks of the year available in the ELFS for all countries that had adapted continuous surveying. The only exceptions to this second step rule are the UK (continuous surveying from 2008 on), Switzerland (from 2010 on), and Ireland, where the switch has not yet taken place.

The differences in the coverage of the year raise the question in how far our estimates for the employment rate and hours worked per employed are comparable across countries in a given year and within a country over time (since there was no change for the US, this is only relevant for the European countries). To give a concrete example, through 2004 for Germany we have information on employment on hours worked only for one single reference week which was either at the end of April or beginning of May. Are our estimates of the employment rate and hours worked per employed measured in this week representative for the entire year? This would be the prerequisite or comparability with say the US, where at least each month of the year is covered, and with years after 2005 for Germany, where all 52 weeks of a year are surveyed. E.g., in the winter months the employment rate may be lower than in April or May because of lower activity in certain sectors like construction. Similarly, hours lost due to a major public holiday are not captured because the reference week was deliberately chosen to not contain a public holiday. In addition, these reference weeks did not coincide with school vacation. Hence, any employed individual with children of school age is very unlikely to take annual leave. As a consequence, annual hours worked per employed based solely on these selected reference weeks will be underestimated without any further adjustment, specifically relative to countries or years which cover all weeks of a year.

In the subsequent subsections, we quantify in how far our measurement strategy is affected by the differences in the coverage of the year, we provide additional supporting evidence and conclude that it mostly overcomes these problems.

### 3.3.1 Employment Rate

We will now document how our measure of the employment rate varies with the coverage of reference weeks over the year. Since the survey design of the CPS with respect to the coverage of the reference weeks does not change, we conduct our analysis only for the European data. From 2005 onwards, the ELFS provides information from all weeks for most countries.[8] Thus, we can calculate employment rates using the full set of weeks as well as "counterfactual" employment rates using only a limited number of weeks corresponding to the survey structure in years prior to 2005. Specifically, we use the

(a) initially covered weeks, i.e. those weeks in the year prior to the change to continuous surveying in each country

[8] From 2005 onwards the ELFS includes Germany, based on the Microcensus. The original Microcensus data set available to researchers does not include the information on the reference week, whereas the ELFS does. We therefore use in this exercise the ELFS for Germany.

Table 1: Absolute % point deviations of the aggregate employment rates of (a) and (b) from (c)

| Period | Mean | 75th | 90th | 95th | 99th | Max |
|---|---|---|---|---|---|---|
| (a) Specific Weeks | 0.7 | 0.8 | 1.4 | 1.9 | 5.3 | 5.9 |
| (b) 2nd Quarter | 0.4 | 0.5 | 0.8 | 1.1 | 1.2 | 1.9 |

(b) second quarter, i.e. those weeks from the year in which the country switched to continuous surveying through 2004[9]

(c) entire year.

Table 1 shows some summary statistics for the absolute percentage deviation of the aggregate employment rate (ages 15 to 64) of (a) and (b) respectively, i.e. using only subsets of the available weeks, from (c), i.e. using all weeks of a year. We are using all available country-year pairs from 2005 to 2011, which are in total 110 observations (for 15 of our 18 European countries we can do the comparison in all years, for the UK only from 2008-2011, for Switzerland for 2010 and 2011, and for Ireland not at all) for case (a) and only 103 observations for case (b) since in Germany the switch was directly from one week to all weeks in 2005. On average, if only the specific weeks or the second quarter are used to calculate the employment rate the absolute percentage point difference from using all weeks amounts to 0.7 and 0.4 percentage points, respectively. We are using absolute values here in order to avoid that positive and negative deviations average out, making the differences look smaller than they actually are. Not surprisingly, using more weeks, (b) vs. (a), results in smaller differences. At the 95th percentile the percentage deviation is below two percent using either restricted subsets of weeks, which suggests that for most countries and years focusing only a restricted subset of weeks seems unproblematic. The five country-year observations above the 95th percentile for case (a) are for Germany (four times, including the largest deviation) and Belgium (second largest deviation). Both countries used only specific week (Germany until 2004, Belgium until 1998) suggesting that the corresponding time-series of the employment rates have to be used with some caution.

### 3.3.2 Hours Worked per Employed

As explained in Subsection 3.2, our measure of hours worked per employed is the product of hours worked in a *non-vacation* week, i.e. a typical work week without a reduction in work time because of a public holiday or annual leave, and the country-wide average non-vacation weeks, i.e. 52 minus weeks of annual leave and public holidays combined. We will subsequently document why the adjustment for vacation is important even if all weeks of a year are surveyed, and why vacation

[9] As discussed in Web Appendix W.1 there are a few exceptions to the rule that the second quarter is available. For the exercise here we always use the country-specific weeks available in the ELFS for that period and only use the label "2nd Quarter" for simplicity. This also the case when we conduct the same exercise for hours worked per employed in the next subsection.

constitutes the most important category to adjust for if not all weeks of a year surveyed. Finally, we will repeat the exercise conducted for the employment rate to demonstrate that our adjustment works well.

For most of the European countries all weeks of the year are surveyed from 2005 onwards. If each week would be surveyed with equal probability and cover a representative sample of the population week by week (rather than only over the entire year), there would be no need to adjust our hours worked measure for vacation. We could simply measure hours worked per employed by taking the mean over actual hours worked in all jobs among the employed. In the following we argue that this approach would yield a biased estimate due to a severe underreporting of hours lost due to public holidays and annual leave. Over the years 2005 to 2011 the average weeks of vacation for our sample of European countries amount to 6.8 weeks per year based on our external data sources. Calculating the same statistic from our raw micro data, i.e. without any adjustment with external data, yields a number of 3.3 "self-reported" vacation weeks.[10] Given that public holidays alone in many countries sum up to 1.5 weeks, the self-reported weeks of annual leave and public holiday seem implausibly low. To get a deeper understanding of this discrepancy, we investigate in more detail the case of Germany as an exemplary country, which features the largest difference among all countries of 5.5 weeks. While we provide all details in Appendix A.7, our results of this analysis can be summarized as follows. First, using the German Socio-Economic Panel, Schnabel (2011) reports that on average 3 agreed days of annual leave per year go unused. Thus, the underusage of days of annual leave can probably explain only a very small portion of the discrepancy of 5.5 weeks between self-reports and official vacation days (which also includes public holidays) used by us. Second, according to the German Statistical Office typical vacation weeks are undersampled and these weeks seem to undersample employed people. Third, the German Statistical Office also claims that there is some evidence that respondents might dislike to use a vacation week as a reference week, either because they are too busy the first week after a vacation to fill out the questionnaire, or because they perceive it as "inappropriate" to use a vacation week when in fact they are generally hard working.

Summarizing, at least for Germany there is evidence of underreporting of days of annual leave and public holidays in the labor force surveys even after the introduction of continuous surveying. It seems at least not implausible that these effects can explain the discrepancies between the self-reported and external vacation weeks for the remaining European countries as well. Therefore, it is important to adjust hours worked per employed for vacation using external data for the ELFS data even when analyzing the recent cross-section from 2005 onwards.

While we documented the need to adjust for hours lost due to public holidays and annual leave, the same could in principal apply e.g. to working less than usual because of sick leave, or more than usual (overtime and additional jobs). There are two dimensions to this problem. First, in how

[10] Table A.8 in Appendix A.7 reporst the results for each country as well as the description of how we construct the self-reported vacation weeks.

Table 2: Other Reasons for Working More or Less than Usual – Mean Weekly Hours

| Ref Weeks | Annual L. | Pub. Holidays | Sick L. | Maternity L. | Other | Add. Jobs+Overtime |
|---|---|---|---|---|---|---|
| (a) Specific Weeks | 1.21 | 0.58 | 0.80 | 0.30 | 0.98 | 1.91 |
| (b) 2nd Quarter | 1.43 | 0.68 | 0.79 | 0.31 | 0.96 | 1.91 |
| (c) All Weeks | 2.43 | 0.45 | 0.79 | 0.30 | 1.02 | 1.87 |

far such differences between usual and actual hours vary with the set of reference weeks available, and second, whether such differences are systematically under- or over-reported. Since we do not have information on a consistent basis on these categories from external data sources, we cannot address the latter point. Regarding the first point, Table 2 displays the average hours lost for our 110 available country-year pairs from 2005 to 2011 under all three possible sets of reference weeks. Annual leave constitutes the most important reason for working less hours than usual followed by a composite of other reasons (bad weather, slack work for technical or economic reasons, labor dispute, education or training, compensation leave, and further reasons like family responsibilities). The only two categories for working more or less than usual that vary with the set of reference weeks are annual leave and public holidays, being around one hour more for annual leave and 0.1 hours less for public holidays when all weeks of the year are used. From this we conclude that an adjustment for the remaining categories seems to be unnecessary.

Finally, we want to quantify in how far our measure of hours worked per employed varies with the coverage of reference weeks over the year. In order to do so, we repeat the same exercise as for the employment rate, i.e. we calculate hours worked per employed for the years from 2005 onwards using the full set of weeks as well as "counterfactual" hours worked per employed using only a limited number of weeks corresponding to the survey structure in years prior to 2005. Specifically, we use the

(a) initially covered weeks, i.e. those weeks in the year prior to the change to continuous surveying in each country

(b) second quarter, i.e. those weeks from the year in which the country switched to continuous surveying through 2004

(c) entire year.

Table 3 shows some summary statistics for the absolute percentag deviation of the aggregate hours worked per person (ages 15 to 64) of (a) and (b), i.e. using only subsets of the available weeks, from (c), i.e. using all weeks of a year. As for the employment rate (Table 1) using more weeks, (b) vs. (a), results in smaller differences. Using only the second quarter (b), the absolute percentage deviation is at most two percent and only exceeds two percent minimally at the 95th percentile for case (a). The three countries for the deviations in the top five percent are Belgium (the two

Table 3: Absolute % deviations of aggregate hours worked per employed of (a) and (b) from (c)

| Period | Mean | 75th | 90th | 95th | 99th | Max |
|---|---|---|---|---|---|---|
| (a) Specific Weeks | 0.8 | 1.1 | 1.5 | 2.1 | 3.7 | 5.0 |
| (b) 2nd Quarter | 0.6 | 0.9 | 1.3 | 1.6 | 1.8 | 2.0 |

largest deviations), followed by Norway (the next two largest deviations) and Poland. Regarding the reliability for the time-series, Belgium is however the only critical case. For Norway the second quarter is available from the second year in our sample (1996) and for Poland from the fourth year in the sample (2000).

## 4 A Comparison with Alternative Data Sources

A series of recent papers in the macroeconomic literature tries to understand cross-country differences in hours worked (Prescott (2004), Rogerson (2006), McDaniel (2011) to name a few) focusing on the the role of taxes. All these papers use data either provided by the OECD or the Conference Board (CB). The OECD and the CB obtain their data from different sources, including labor force surveys, employer surveys, and National Income and Product Accounts, for details see Appendix A.8. Because of the differences in the underlying data sources the OECD states explicitly that their hours worked measures are not suitable for level comparisons in a given year but only for comparisons of trends over time.[11] The CB hours measures are in general based on the OECD data but may be replaced or combined with other data sets to also achieve comparability for level comparisons in a given year. There is however no public information available on which basis and how these adjustments are implemented. In contrast, our hours measures are all based on labor force surveys supplemented with information on public holidays and annual leave from external data sources and computed following the same algorithm. While it ultimately is impossible to judge which hours measure is more reliable, it is useful to compare them with each other and as far as possible also understand where potential differences are coming from. For this comparison, we align our measure of hours worked per person with those provided by the OECD and CB to maintain comparability across the three data sources.

The OECD and CB both provide estimates of total annual hours worked and total employment (to be precise, the average number employed persons over the year). Dividing one by the other yields hours worked per employed. To achieve a comparable measure from our data, we use hours worked and the employment status for all individuals from age 15 onwards. Neither the OECD nor the CB specify whether the exclude individuals younger than 15 or not. To obtain hours worked per person rather than worker, Prescott (2004), and Ohanian et al. (2008) divide total hours by the population aged 15-64. This is the same as multiplying hours worked per employed (total

[11] http://stats.oecd.org/Index.aspx?DataSetCode=ANHRS

hours/total employment) with an employment rate given by the ratio of total employment over the population aged 15-64. Thus, the age definition for the nominator and denominator do not match exactly. To avoid this, we calculate the employment rate as the ratio of all employed individuals aged 15-64 and the population aged 15 to 64, and multiply this employment rate with hours worked per employed (total hours/total employment) to obtain hours worked per person. While the OECD provides an employment rate for the same age group, for the CB, we cannot calculate a separate employment rate (the only information available is total employment and total population) and therefore use the OECD employment rate to obtain hours worked per per person for the CB.

### 4.1 The Recent Cross-Section (2003-07)

Figure 1a plots the percentage points deviations of the OECD employment rates to our data. Recall that for the employment rates we do not have any information from the CB. The employment rates provided by the OECD are very similar to those from our set of labor force surveys. Only for three countries (Netherlands, UK and Spain), the employment rate differences significantly exceed more than one percentage point (in absolute values) but never exceed two percentage points.

Figure 1b plots the percentage deviation of hours worked per employed for the OECD and CB relative to our data. For many countries the OECD and CB agree in their predictions of hours worked per employed since they use the same underlying data sources. The notable exceptions are the US, Poland, Denmark, Austria (for which our estimate coincides with the one from the OECD), Ireland and Portugal. The differences to our data always exceed two percent, with the exception of Denmark for the CB, Austria for the OECD, and Switzerland for both data sources. Since it is unclear which data source or adjustment provides the more reliable estimate and it is impossible for us to dig deeper for all countries, we take the US and Germany as exemplary countries to provide some explanations for such differences. One is suggested by Eldridge et al. (2004). The OECD data come from the Bureau of Labor Statistics, which derives its numbers from the establishment reports from the BLS Current Employment Statistics program (CES). The CES, however, only provides average weekly paid hours for production workers in the goods-producing industries and non-supervisory workers in service-producing industries. For the rest of the workers (except proprietors and unpaid family workers, for which information is taken from the CPS), the BLS imputes hours. Hours for non-production workers in manufacturing are extrapolated using 1978 hours ratio of office to non-office workers in manufacturing (based on the BLS studies of wages and supplements in manufacturing) and growth trends of hours of production workers. Hours for supervisory workers in non-manufacturing industries are set equal to those of non-supervisory workers. According to Eldridge et al. (2004), this leads to an under-estimation of average hours worked relative to numbers resulting from the Current Population Survey (CPS). Thus, for the US, our hours measure might give a better estimate of true hours worked per employed than the OECD. The CB relies on unpublished BLS hours data as sources for hours worked, without being

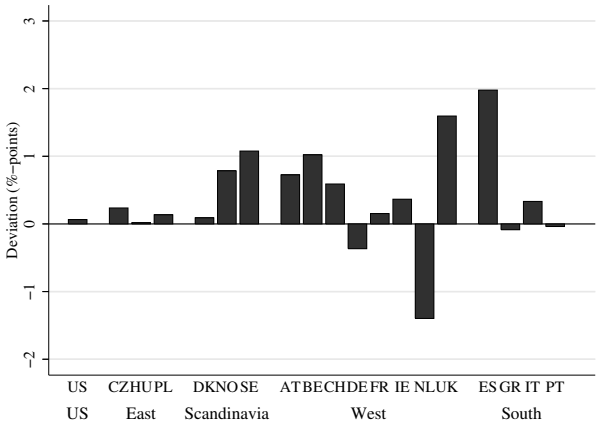
more specific which hours series this relates to. For Germany, the OECD and CB use establishment data collected by the IAB, which does not include unpaid or transitory overtime. In contrast, the Microcensus used for the calculation of our hours measure includes these hours. This is one of the reasons why our hours measure is larger than the OECD numbers for Germany. Since we do not know whether overtime was paid or not in the Microcensus, we cannot quantify how much of the difference between our and the IAB's hours estimates can be attributed to unpaid overtime.

Finally, Figure 1c plots hours worked per person by the OECD and CB relative to our estimate for each country. Since we use for the CB the OECD employment rates, the differences in hours worked per person between the two data sources are originating from the differences in hours worked per employed between the two data sources. Moreover, since for most countries the differences in the employment rates between the OECD and us are rather small, the differences in hours worked per employed are basically driving the differences in hours worked per person.

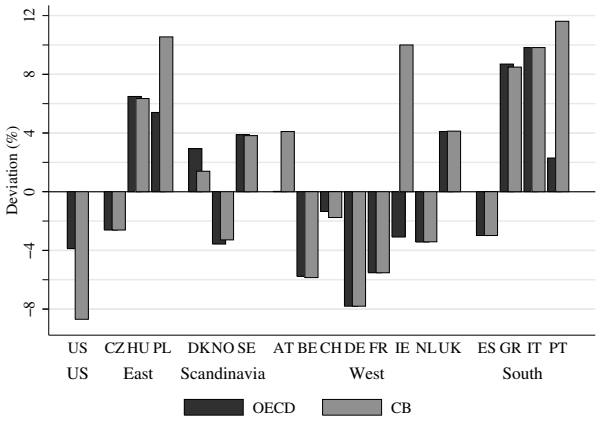
One useful metric to interpret the differences in hours worked per person between the three data sources is to follow the macro literature aiming to explain hours worked per person for a cross-section of countries. This literature usually looks at the differences relative to the US, which we plot in Figure 2 hours worked per person for each country for the three respective data sources. With the exception of Greece, Ireland, Portugal and Switzerland for the CB data, hours worked per person in Europe are always lower than in the US. Furthermore, with the exception of Belgium, Germany, France and the Netherlands for the OECD data, our measure of hours worked per person always predicts a larger difference relative to the US than the OECD measure which in turn always predicts a larger negative difference than the CB. Hence, the ranking of the countries is mostly preserved: the rank-correlation between our hours worked per person measure and the OECD is 0.84 and the CB is 0.83, respectively. Depending on which data source one trusts most, the size of the cross-country differences in hours worked per person one needs to account for in quantitative work differ drastically as well.Table 4 summarizes the information in Figure 2 for hours worked per person from the three data sources. Our data suggests that on average Europeans work 18 percent fewer hours than US-citizens, compared to 13 percent based on OECD data and only 7 percent based on Conference Board data. Thus, the differences between Europe and the US is only 3/4 (2/5) in the OECD (CB) data compared to our data. The smallest deviation (in absolute value) in our data amounts to 4% for Switzerland where the CB and Conference Board predict a difference of 1 and 5%, respectively. The largest deviation in our data is for Italy with 29%, where the other two data sources predict a difference of 18 and 14%, respectively. The smallest disagreement among the three data sources is for Belgium, Germany, France and the Netherlands. On average, the larger differences relative to the US in our data relative to the OECD and CB are driven by the higher hours worked per person estimated for the US in our data. The average hours worked per person over all European countries are virtually the same for our data, the OECD and CB. Finally, in terms of cross-sectional variation our data display the smallest standard deviation, followed by the

Figure 1: OECD and CB vs. Our Labor Supply Measures

(a) Employment Rate: % Point Deviations




(b) Hours Worked Per Employed: % Deviations




(c) Hours Worked Per Person: % Deviations

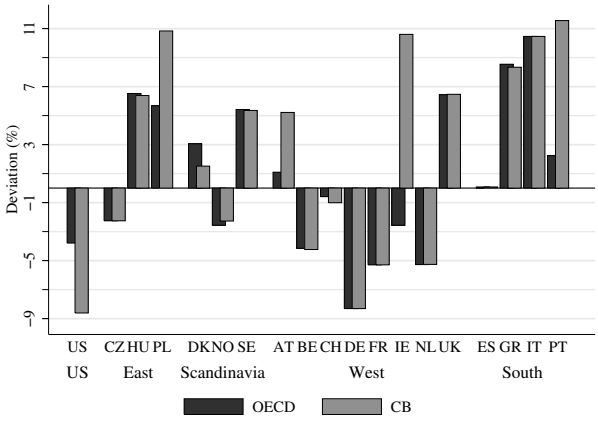
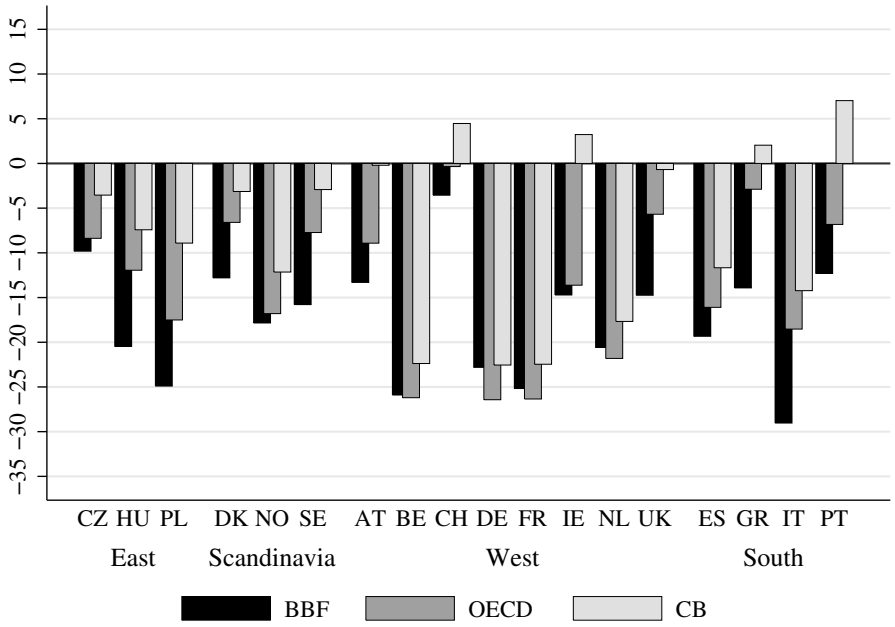


Table 4: Average Hours Worked per Person Relative to the US (in %) - Summary Statistics (2003-2007)

| **Country** | **BBF** | **OECD** | **CB** |
|---|---|---|---|
| Mean | −18 | −13 | −7 |
| Standard Deviation | 7 | 8 | 10 |
| Min Abs Deviation | 4 | 0 | 0 |
| Max Abs Deviation | 29 | 26 | 23 |

Figure 2: Average Hours Worked per Person Relative to the US (2003-2007)




OECD and the CB.

To sum up, the cross-country differences in hours worked per person, which a recent series of macro papers aims to explain via the role of taxes, vary non-negligibly between our measure and those provided by the OECD and CB. Based on our data, Europeans work on average 18 percent less hours than US-citizens during the time period 2003 to 2007, compared to 13 percent based on OECD data and only 7 percent based on CB data. Matching these larger level differences would be an even harder challenge for the literature. However, our data predict a similar country ranking and a smaller cross-sectional variation. While eventually it is impossible to judge which approach is the most reliable, we want to emphasize the advantages of our approach. First, in contrast to the OECD and CB, our estimates rely on the same underlying data sources and apply the same algorithm. While the OECD states explicitly that their hours worked measures are not suitable

for level comparisons in a given year because of this, it is unclear what type of adjustment the CB applies to achieve cross-sectional comparability. Second, our approach is the only one which allows us to compare hours worked per person, employment rates and hours worked per employed on a more disaggregated level than the country-wide average.

### 4.2 Time Trends

We calculate trends by computing the percentage difference between the mean of the last three survey years and the first three survey years for each country. We want to stress that these numbers are not intended for cross-country comparisons, since the time trends refer to different periods across countries.

The results are shown in Figure 3.[12] Table 6 summarizes this information, split by whether a country shows a negative or positive trend in our estimates (BBF), and shows that at least on average the trends are fairly similar across the three data sets. There are however some exceptions: For hours worked per employed, our data and the OECD predict similar trends for Ireland and Portugal whereas the CB's predictions are quite different. In contrast our estimate for the change in Denmark is twice as large as the one by the OECD and CB.

## 5 Labor Supply in the Recent Cross-Section: Aggregate Hours Worked Per Person

In this section, we analyze aggregate hours worked per person in the recent cross-section. All results refer to averages over the years 2003-2007, i.e. before the crisis hit. We take five year averages to avoid that non-synchronized business cycles influence the results too heavily. The objective is to understand how important each margin, i.e. the employment rate, weeks worked and weekly hours worked per employed, is for shaping the cross-country differences in hours worked per person.

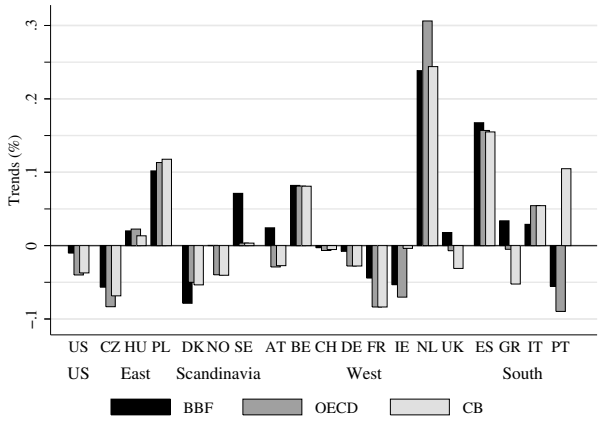
Table 6 shows aggregate statistics on hours worked per person, the employment rate, and hours worked per employed in our sample countries, comprising all individuals aged 15 to 64. On average, hours worked per person amount to 1121 hours, with a minimum of 951 and a maximum of 1354 hours (the cross-country standard deviation is 104 hours). The average employment rate amounts to 67 percent, ranging from 53 to 77 percent (standard deviation of 7 percent), and hours worked per employed to 1691 hours, ranging from 1450 to 1918 hours (standard deviation of 148 hours).

Figure 4 presents hours worked per person on the country level by geographic region. We show results grouping European countries by their geographical location into Eastern Europe (Czech Republic, Hungary, and Poland), Scandinavia (Denmark, Norway, and Sweden), Southern Europe (Greece, Italy, Portugal, and Spain), and Western Europe (Austria, Belgium, France, Germany, Ireland, Netherlands, Switzerland, and the United Kingdom). Within each region, we order countries

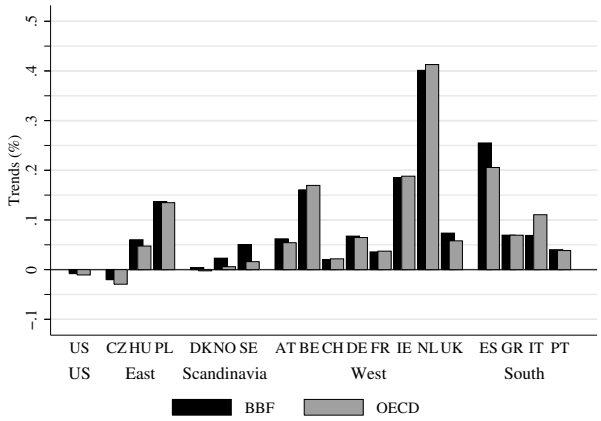
[12] The exact numbers corresponding to the figures can be found in Web Appendix W.4 in Tables W.6 and W.7.

Figure 3: Trends

(a) Hours Worked per Person




(b) Employment Rate




(c) Hours Worked per Employed

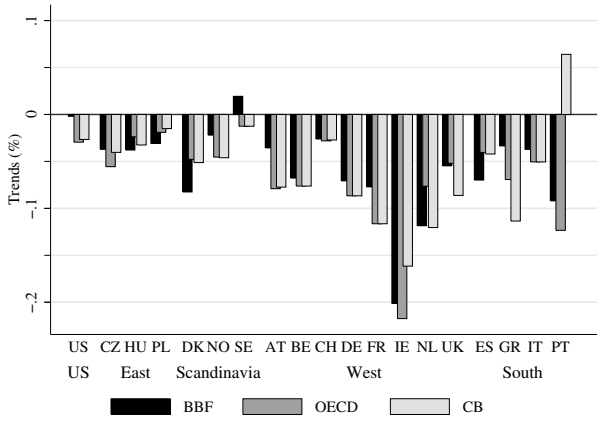


Table 5: Average trends in hours worked and standard deviations for countries with positive and negative trends

| | BBF | OECD | CB |
|---|---|---|---|
| | **Hours Worked per Person** | | |
| Negative trend | −3.87 | −5.64 | −2.19 |
| | (2.80) | (3.02) | (5.84) |
| Positive trend | 7.15 | 5.97 | 4.70 |
| | (7.36) | (10.22) | (9.42) |
| | **Employment Rate** | | |
| Negative trend | −1.42 | −2.01 | – |
| | (0.86) | (1.32) | |
| Positive trend | 10.09 | 9.60 | – |
| | (10.17) | (10.36) | |
| | **Hours Worked per Employed** | | |
| Negative trend | −6.09 | −6.87 | −6.15 |
| | (4.55) | (4.74) | (5.05) |
| Positive trend | 1.93 | −1.25 | −1.25 |

Table 6: Aggregate statistics on hours worked and employment rates

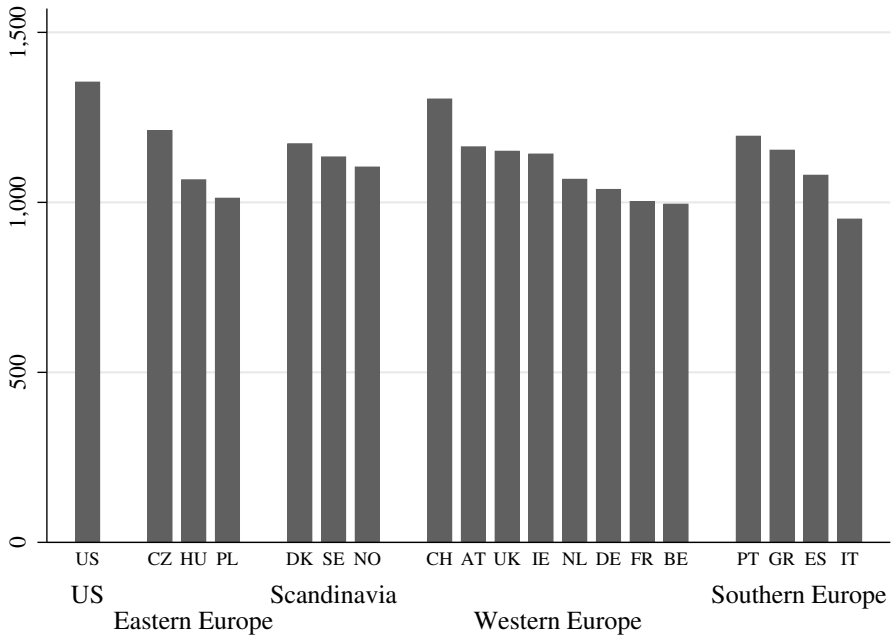
| | Mean | SD | Min | Max |
|---|---|---|---|---|
| HWP: Hours Worked per Person | 1121 | 104 | 951 | 1354 |
| ER: Employment Rate (in %) | 67 | 7 | 53 | 77 |
| HWE: Hours Worked per Employed | 1691 | 148 | 1450 | 1916 |

by average hours worked per person. The US and Switzerland stand out with the highest hours worked per person, exceeding 1300, while Italians and Belgians work less than 1000 hours per year. The mean hours worked per person within each European region are quite similar, ranging from 1095 hours in Southern Europe to 1137 hours in Scandinavia.

### 5.1 Decomposing Hours Worked per Person

Average hours worked per person are the product of the employment rate and hours worked per employed, with the latter being a product of the country-wide number of weeks worked per year (non-vacation weeks) and the weekly hours worked per employed in a non-vacation week. Figure 5

Figure 4: Average Hours Worked per Person (2003-2007)



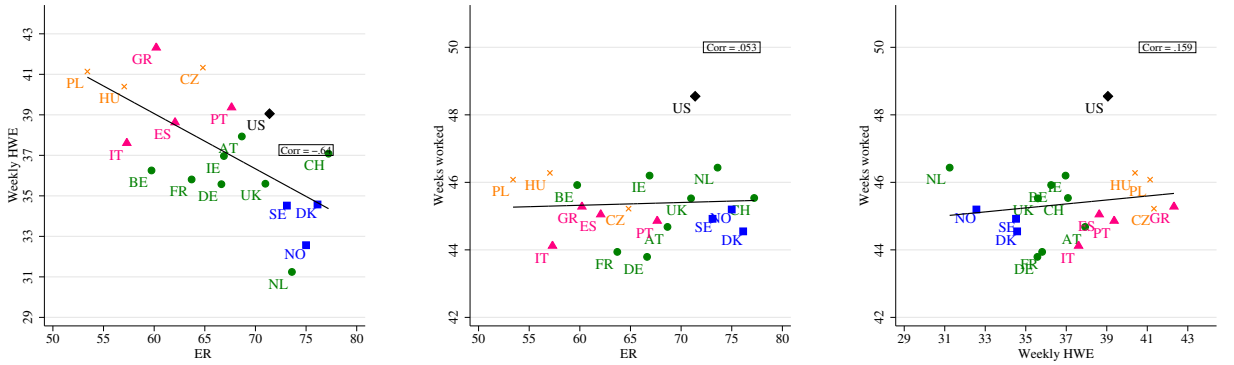

shows how these individual components relate to each other and reveals interesting patterns. The five regions are marked by different markers, namely the US by a diamond, Eastern Europe by an x, Scandinavia by squares, Western Europe by circles, and Southern Europe by triangles.

Figure 5a plots weekly hours worked per employed against the employment rate. While hours worked per person did not differ that much on average across the four European regions, a much clearer region-specific pattern for the relationship between the employment rate and weekly hours worked per employed emerges. Eastern and Southern European countries have above median weekly hours worked per employed, but below median employment rates, with only the latter not being true for Portugal. The Scandinavian countries in turn have below median weekly hours worked per employed and above median employment rates. Weekly hours worked per employed in the Western European countries are between those two groups of countries. The two exception are Austria with above median weekly hours worked per employed and the Netherlands with the lowest weekly hours worked per employed. The employment rates range from the fourth lowest in Belgium to the highest in Switzerland. Taken together this generates a strong negative correlation between hours worked per employed and the employment rate of -0.64.

Figure 5b plots the weeks worked in a given country against the employment rate. The weeks worked range in Europe from below 44 in Germany to above 46 in the Netherlands, with the most cross-country variation coming from annual leave rather than public holidays (not shown here). The US stands out with more than 48 weeks worked per year. Overall, the correlation between

Figure 5: Hours Worked Components

(a) Weekly HWE & ER (b) Weeks Worked & ER (c) Weeks Worked&Weekly HWE




weeks worked and the employment rate is weak amounting to 0.05 for all countries and -0.09 if the US is excluded. Figure 5c plots the weeks worked against the weekly hours worked per employed. Again, the correlation between both variables is rather small with 0.16 and drops further to 0.08 once the US is excluded. The results presented in Figures 5b and 5c are interesting because more public holidays or annual leave, i.e. less weeks worked per year, neither induces systematically more people to work nor to work longer hours during a non-vacation week.

## 5.2 An Aggregate Decomposition

In a next step, we want to quantify by how much each of the different margins, i.e. the employment rate ($e^c$), weekly hours worked per employed ($h^c$), and weeks worked ($w^c$), contribute to the cross-country differences in aggregate hours worked per person ($H^c$):

$$H^c = w^c e^c h^c, \tag{7}$$

where $w^c$ are the weeks worked (non-vacation weeks), $e^c$ the employment rate and $h^c$ weekly hours worked per employed in a non-vacation week in country $c$. Specifically, we want to measure the contribution of each margin to the difference relative to the US. Our decomposition exercise works as follows. We calculate the following three counterfactual hours $H^{c,i},\ i = w, e, h$ by setting for every country one margin after the other equal to the corresponding US value and then measure the incremental fraction of the aggregate hours worked per person difference relative to the US explained by this margin $\Delta^i,\ i = w, e, h$. To give a concrete example, consider the following ordering:

$$\begin{aligned}
H^{c,1} &= w^{US} e^c h^c &\rightarrow \Delta^w &= \frac{H^c - H^1}{H^c - H^{US}} = \frac{e^c h^c (w^c - w^{US})}{H^c - H^{US}} \\
H^{c,2} &= w^{US} e^{US} h^c &\rightarrow \Delta^e &= \frac{H^1 - H^2}{H^c - H^{US}} = \frac{w^u h^c (e^c - e^{US})}{H^c - H^{US}} \\
H^{c,3} &= w^{US} e^{US} h^{US} &\rightarrow \Delta^h &= \frac{H^2 - H^3}{H^c - H^{US}} = \frac{w^u e^u (h^c - h^{US})}{H^c - H^{US}},
\end{aligned} \tag{8}$$

and

$$\sum_{i=w,e,h} \Delta^i = 1. \tag{9}$$

$\Delta^w$ measures what fraction of the hours worked per person relative to the US can be explained by differences in the work weeks. $\Delta^e$ measures what fraction of the hours worked per person relative to the US can be explained by differences in the employment rates, conditional on having already accounted for differences in the work weeks. $\Delta^h$ measures what fraction of the hours worked per person relative to the US can be explained by differences in the weekly hours worked per employed, conditional on having already accounted for differences in the work weeks and the employment rate. With three margins, there are six different ways to make this decomposition, and in general each ordering will be associated with a different incremental contribution of each margin to the aggregate hours worked per person differences relative to the US. Table 7 reports in column one the hours worked per person difference relative to the US, i.e. $\frac{H^c}{H^{US}} - 1$. In column two we report what fraction of the hours worked per person relative to the US can be explained by differences in the number of weeks worked. We however do not report the results from one specific order, like e.g. shown in Equation (8), but rather the mean over all six possible orderings along with the standard deviation across these six orderings in parentheses underneath. Column three and four report the same statistics for the employment rate and weekly hours worked per employed, respectively. The three last columns add up to 1. A positive value here indicates that a factor positively contributes to explaining the (negative) difference, while a negative value means that the respective factor does not contribute to explaining the (negative) difference, but would in fact indicate higher hours in the respective European country than in the US. As an example, Danes work 13% lower hours worked per person than US Americans. 60% of this difference can be explained by the lower number of weeks worked. At the same time, the employment rate is larger in Denmark, in fact, it is the largest in our cross-section of countries. Hence, the differences in the employment rate cannot explain why hours worked per person are lower than in the US and that's why see a negative entry here. In contrast, holding everything else constant the Danish hours worked per person would be actually 6% (-0.13×-0.45) larger in the US rather than 13% lower. The largest fraction of the hours worked per person differences is explained by differences in weekly hours worked per employed and amounts to 85%. This is about the same magnitude as for the two other Scandinavian countries Sweden and Norway. In both countries, weeks worked have a smaller explanatory power for hours worked per person differences relative to the US than in Denmark and hence by Equation (9), which also holds for the mean over all orderings, the "negative" impact of the employment rate is as well lower.

For Eastern Europe, differences in the employment rates alone could explain the whole difference in hours worked per person relative to the US and this effect is very similar across all three countries. Hence, the effect of fewer weeks worked roughly offsets the effect of longer weekly hours worked per employed in Eastern Europe. For the Czech Republic these effects are larger since both the work

Table 7: Decomposition Analysis - Hours Worked per Person Relative to the US

| Country | HWP Difference Relative to the US | Fraction of HWP Difference Relative to the US Explained by US | | |
|---|---|---|---|---|
| | | Weeks | ER | Weekly Hours |
| **Scandinavia** | **−0.16** | **0.46** | **−0.28** | **0.81** |
| Denmark | −0.13 | 0.60 | −0.45 | 0.85 |
| | | (0.04) | (0.04) | (0.04) |
| Norway | −0.18 | 0.35 | −0.24 | 0.89 |
| | | (0.03) | (0.03) | (0.04) |
| Sweden | −0.16 | 0.44 | −0.14 | 0.70 |
| | | (0.03) | (0.01) | (0.03) |
| **Eastern Europe** | **−0.19** | **0.34** | **0.94** | **−0.28** |
| Czech Republic | −0.11 | 0.64 | 0.87 | −0.51 |
| | | (0.03) | (0.04) | (0.04) |
| Hungary | −0.21 | 0.20 | 0.94 | −0.14 |
| | | (0.02) | (0.03) | (0.02) |
| Poland | −0.25 | 0.18 | 1.00 | −0.18 |
| | | (0.03) | (0.03) | (0.03) |
| **Western Europe w/o CH** | **−0.20** | **0.33** | **0.25** | **0.42** |
| **Western Europe** | **−0.18** | **0.51** | **−0.05** | **0.54** |
| Austria | −0.14 | 0.55 | 0.25 | 0.20 |
| | | (0.02) | (0.01) | (0.01) |
| Belgium | −0.27 | 0.18 | 0.58 | 0.24 |
| | | (0.02) | (0.03) | (0.03) |
| France | −0.26 | 0.33 | 0.38 | 0.29 |
| | | (0.03) | (0.03) | (0.03) |
| Germany | −0.23 | 0.39 | 0.26 | 0.35 |
| | | (0.03) | (0.02) | (0.03) |
| Ireland | −0.16 | 0.29 | 0.38 | 0.33 |
| | | (0.02) | (0.02) | (0.02) |
| Netherlands | −0.21 | 0.19 | −0.13 | 0.94 |
| | | (0.02) | (0.02) | (0.02) |
| Switzerland | −0.04 | 1.74 | −2.15 | 1.41 |
| | | (0.08) | (0.11) | (0.06) |
| United Kingdom | −0.15 | 0.40 | 0.03 | 0.57 |
| | | (0.02) | (0.00) | (0.02) |
| **Southern Europe** | **−0.19** | **0.42** | **0.68** | **−0.10** |
| Greece | −0.15 | 0.44 | 1.07 | −0.50 |
| | | (0.04) | (0.05) | (0.06) |
| Italy | −0.30 | 0.27 | 0.62 | 0.11 |
| | | (0.03) | (0.04) | (0.02) |
| Portugal | −0.12 | 0.64 | 0.43 | −0.07 |
| | | (0.02) | (0.02) | (0.00) |
| Spain | −0.20 | 0.33 | 0.62 | 0.05 |
| | | (0.03) | (0.03) | (0.00) |

weeks and the weekly hours worked per employed are lower than in Poland and Hungary.

In Western Europe on average weeks worked and weekly hours worked per employed explain the differences in hours worked per person relative to the US, while the employment rate does not seem to play a role. These average effects mask however substantial cross-country heterogeneity and the role of one extreme outlier, namely Switzerland. In fact, in all Western European countries but the Netherlands and Switzerland, the employment rate contributes positively to the hours worked per person differences relative to the US. The Swiss have only 4% lower hours worked per person than the US, and the division by such a small denominator in (8) simply blows up the $\Delta$s, and in that way also affects the country-group means substantially. Excluding Switzerland, would imply that on average differences in weeks worked explain 33%, differences in the employment rate 25% and differences in weekly hours worked per employed 42%.

In Southern Europe the employment rate differences play quantitatively the largest role, followed by the weeks worked. The role of weekly hours worked per employed is negligible except for Greece, which has substantially higher weekly hours worked per employed as the US.

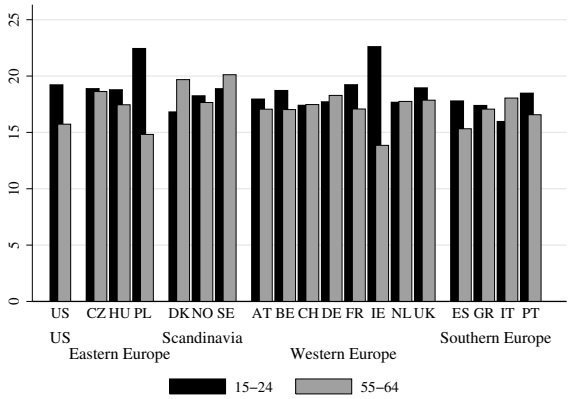
To sum up, this decomposition analysis assigns quantities to the facts shown in Figure 5. Differences in weeks worked explain between one third and one half of the differences in European hours worked per person relative to the US. Employment rates have a very large explanatory power of two third to almost 100 percent in explaining differences in hours worked per person between Southern Europe and Eastern Europe, respectively, and the US. For Western Europe and Scandinavia, by contrast, weekly hours are the most important driving factor of the differences. In Scandinavia, employment rates alone would in fact predict even higher hours than in the US.

### 5.3 A Disaggregate Decomposition

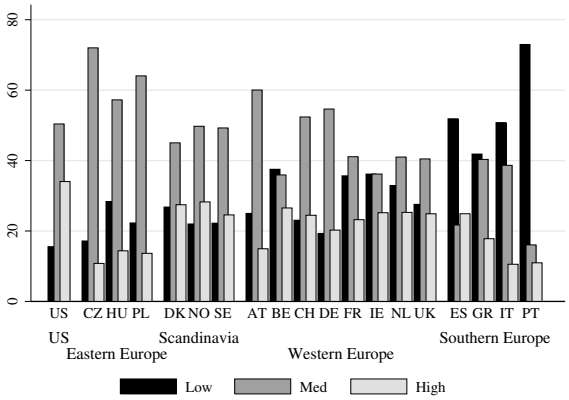
The previous decomposition abstracts from one important dimension along which the countries in our sample differ, namely the demographic structure. Figure 6 shows two dimensions: age (left panel) and education (right panel). We focus on three commonly used age groups, the young (15-24), core ages (25-54), and the old (55-64), omitting the middle age group, which dominates quantitatively, in the figure. There is some variation in the age composition, but compared to the cross-country differences in educational composition the age differences are relatively minor. Turning to education in the right panel, the US stands out with the lowest (highest) share of low (high) educated individuals below 20% (above 30%) whereas in Portugal and Italy only around 10% have high education. The low number of high educated individuals in Southern and Eastern Europe comes with a high share of low educated individuals in Southern Europe, while Eastern Europe stands out with a high share of medium educated individuals. The different levels of education are defined according to the ISCED classifications, with "low" corresponding to lower secondary education, "medium" to upper secondary education, and "high" being every third-level degree starting with a Bachelor degree or equivalent. In the next paragraphs, we investigate in how far

Figure 6: Demographic Structure

(a) Age Composition




(b) Educational Composition




these differences in the demographic structure contribute to the cross-country differences in hours worked per person.

Explicitly accounting for demographic groups, we can write aggregate hours worked per person as

$$H^c = w^c \sum_{j=1}^{J} f_j^c e_j^c h_j^c, \tag{10}$$

where $w^c$ are the weeks worked (non-vacation weeks), $f_j^c$ the fraction of individuals with a given set of characteristics and $\sum_{j=1}^{J} f_j^c = 1$, $e_j^c$ is the employment rate of group $j$ and $h_j^c$ the weekly hours worked per employed in a non-vacation week by group $j$ in country $c$. Each group $j$ is defined by one of the three age groups (15-24, 25-54, 55-64), education (low, medium, high), and gender. Note that in all countries the fraction of women in the working age population is nearly the same as the fraction of men. We conduct exactly the same decomposition analysis as before, but have four margins now. Specifically, to analyze the incremental contribution of the demographic structure, we set $f_j = f_j^{US}\ \forall\ j = 1, ..., J$, and proceed similarly for the employment rate and hours worked per employed. Other than that we follow the same logic in our decomposition analysis as for the aggregate data and report the means over all possible 24 orderings.

To facilitate the comparison, we show only the averages over the regions in the decomposition and show again the results for aggregate data from before in Table 8a, and the disaggregate data in Table 8b. Table A.9 in Appendix A.9 shows the country-specific data for the disaggregated decomposition. The demographic structure (here abbreviated with "Weights") explains a substantial fraction of the hours worked per person differences relative to the US, namely between one quarter and one half. This means that the demographic composition in all European regions predicts substantially lower hours than in the US. By definition, the importance of work weeks is not affected by the demographic decomposition, as we impose the same number of work weeks for all demographic

Table 8: Decomposition Analysis - Hours Worked per Person Relative to the US

(a) Aggregate Data

| Country | HWP Difference Relative to the US | Fraction of HWP Difference Relative to the US Explained by US | | | |
|---|---|---|---|---|---|
| | | Weights | Weeks | ER | Weekly Hours |
| Scandinavia | −0.16 | – | 0.46 | −0.28 | 0.81 |
| Eastern Europe | −0.19 | – | 0.34 | 0.94 | −0.28 |
| Western E. w/o CH | −0.20 | – | 0.33 | 0.25 | 0.42 |
| CH | −0.04 | | 1.74 | −2.15 | 1.41 |
| Southern Europe | −0.19 | – | 0.42 | 0.68 | −0.10 |

(b) Disaggregated Data

| Country | HWP Difference Relative to the US | Fraction of HWP Difference Relative to the US Explained by US | | | |
|---|---|---|---|---|---|
| | | Weights | Weeks | ER | Weekly Hours |
| Scandinavia | −0.16 | 0.27 | 0.46 | −0.48 | 0.74 |
| Eastern Europe | −0.19 | 0.41 | 0.34 | 0.49 | −0.24 |
| Western E. w/o CH | −0.20 | 0.40 | 0.32 | −0.09 | 0.37 |
| CH | −0.04 | 1.03 | 1.74 | −2.81 | 1.04 |
| Southern Europe | −0.19 | 0.56 | 0.41 | 0.12 | −0.09 |

subgroups within a country. In addition, the relative explanatory power of weekly hours remains almost unchanged compared to the aggregate decomposition. By contrast, the introduction of the demographic structure heavily affects the explanatory power of the employment rate, which always becomes smaller. This already indicates that the demographic groups differ more in their employment rates than in the hours worked per employed, and thus not accounting for the differences in the demographic composition between Europe and the US attributes too much importance to the employment rates as explanatory factors. Moreover, since differences in the compositions are virtually non-existent for gender, and comparably small for age, differences in the educational composition are responsible for this result. In fact, using only gender and age to define a demographic group yields results very similar to using the aggregate data only (not shown here).

The following figures provide more evidence for this result. Figure 7 shows differences in labor supply by educational level. In the top panel Figure 7a plots the employment rate of low educated vs. medium educated, while Figure 7b does the same for high vs. medium educated. The bottom panel follows the same logic but focuses on weekly hours worked per employed. It is well-known that the employment rate is increasing in education. The gap between low and medium educated in the employment rate is quite similar in absolute terms for Western Europe, Scandinavia and the

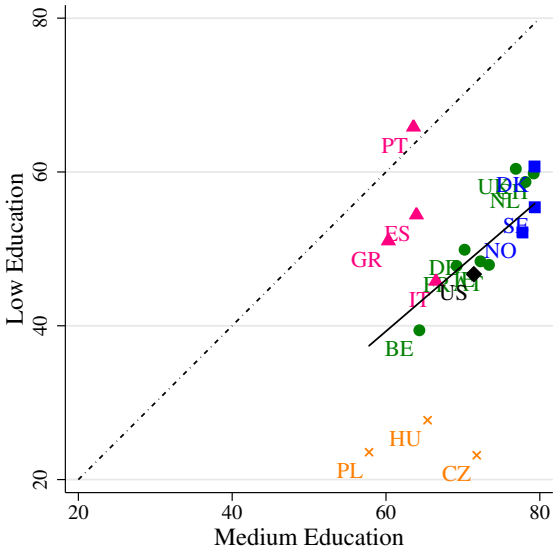
US, while being much larger in Eastern Europe and smaller in Southern Europe except Italy. For the high educated in contrast, the cross-country variation in employment rates is much smaller. On average, the employment rate among low educated is 32 percentage points lower than among the medium educated, which in turn have on average a 20 percentage point lower employment rate than the high educated. The pattern for the gaps in weekly hours worked per employed by education are very different. Both for low and highly educated individuals weekly hours worked per employed are not that much different from medium educated, the average of the absolute differences is 7% and 6%, respectively. Put differently, labor supply differences in education manifest themselves in different employment rates while weekly hours worked per employed are not that affected. This explains the differences found between the aggregate and disaggregate decomposition exercise. The US has a higher (lower) share of high (low) educated than any other country in our sample. Applying the US education composition to all the European countries increases the counterfactual hours worked per person. The effect comes through an increase in the newly-weighted aggregate employment rate because the high educated work so much more. There is only a small effect through weekly hours worked per employed because the difference in weekly hours worked per employed between the different education groups is small.

Figure 8 repeats the same exercise for our three age groups, where we compare the young and the old with core ages. The variation in employment rates for the core age group is small but large for the other two groups. Among the young, the Eastern and Southern European countries stand out with the lowest employment rates, while for the elderly the Scandinavian countries with the highest employment rates. The weekly hours worked per employed gap is quite small between the old and the core ages and similar across all countries. The gap between the young and core ages is only large in Western Europe, the US and especially Scandinavia and the Netherlands. Even though cross-country differences in the age composition themselves are smaller compared to education, the conclusions are similar. Differences in employment rates among groups within a country are much larger than differences in weekly hours worked per employed. The average over the absolute differences of the employment rates amounts to 48 and 42 percentage points for the young and old, respectively, whereas for weekly hours worked per employed the average of the absolute differences are only 13% and 4%.

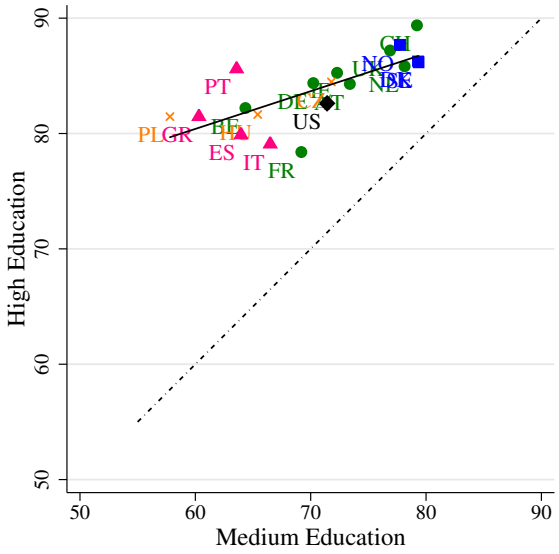
Figure 9 compares labor supply by gender. Since men and women make up around half of the population in each country, the weighting itself only matters if the age or educational composition of women relative to men is different across countries. Women have on average lower education than men, the cross-country differences in the educational distribution are however very similar. As is well known, the employment rate of women is lower than the one for men. Interestingly, the fitted line is virtually parallel to the 45 degree line indicating that the difference in the employment rate by gender is very similar in absolute terms for most countries, a pattern neither true for differences by education nor by age. Scandinavia is an outlier with a much smaller gender gap,

Figure 7: Labor Supply broken down by Education

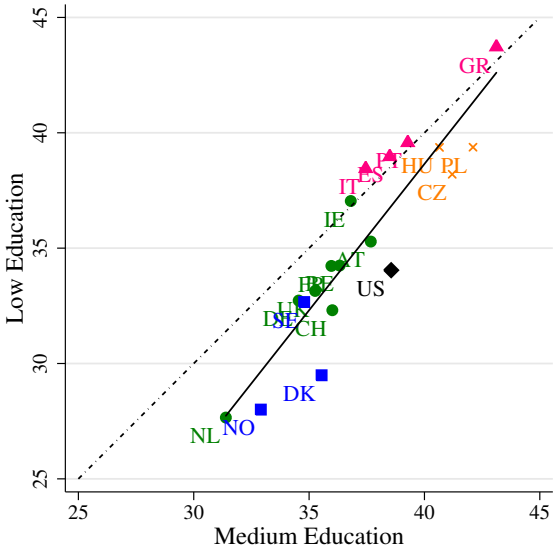
(a) ER: Low & Medium




(b) ER: High & Medium




(c) Weekly Hours: Low & Medium




(d) Weekly Hours: High & Medium

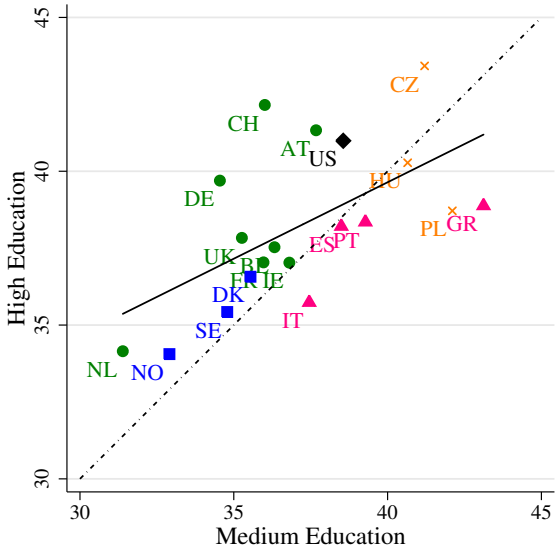
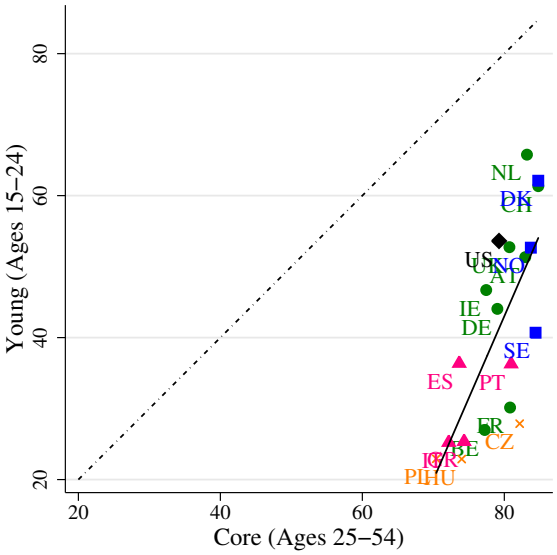
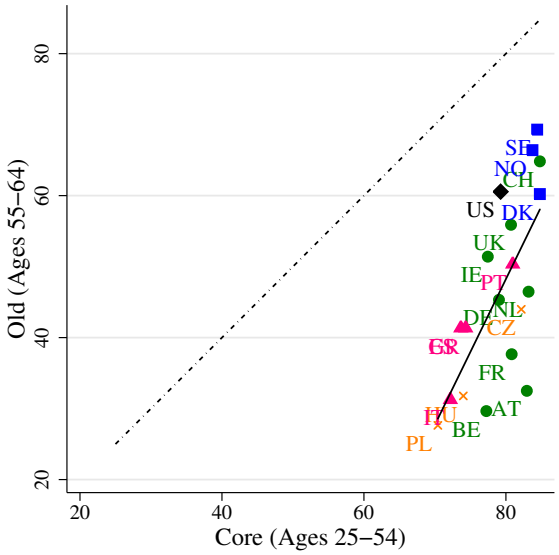


Figure 8: Labor Supply broken down by Age Groups

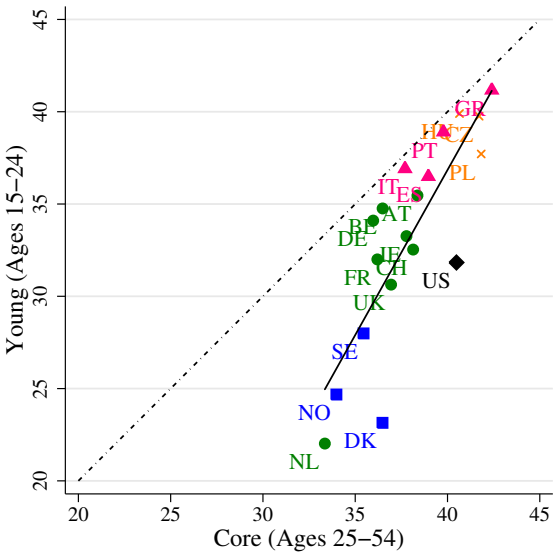
(a) ER: Young & Core Ages




(b) ER: Old & Core Ages




(c) Weekly Hours: Young & Core Ages




(d) Weekly Hours: Old & Core Ages

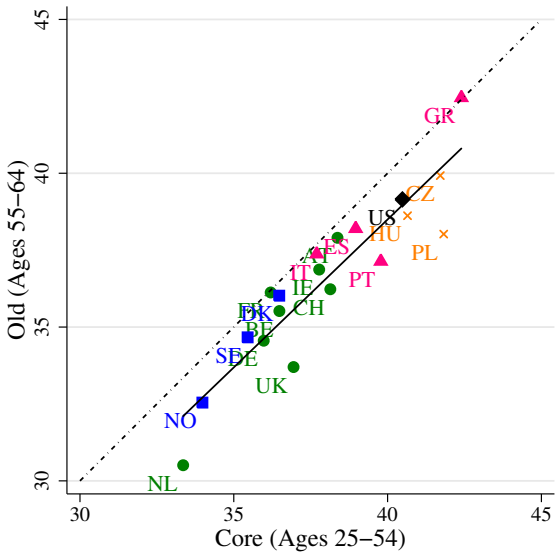
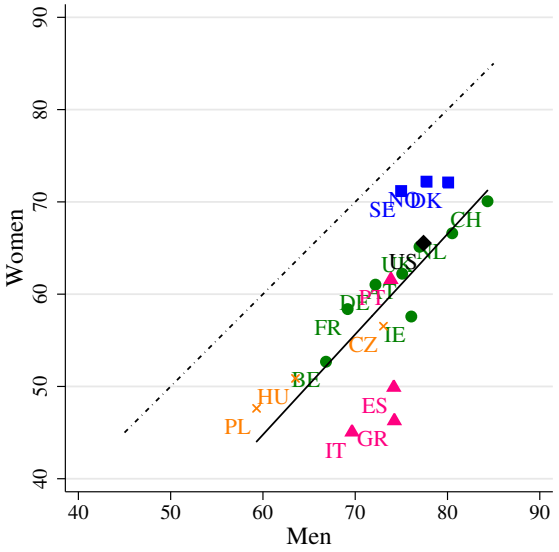
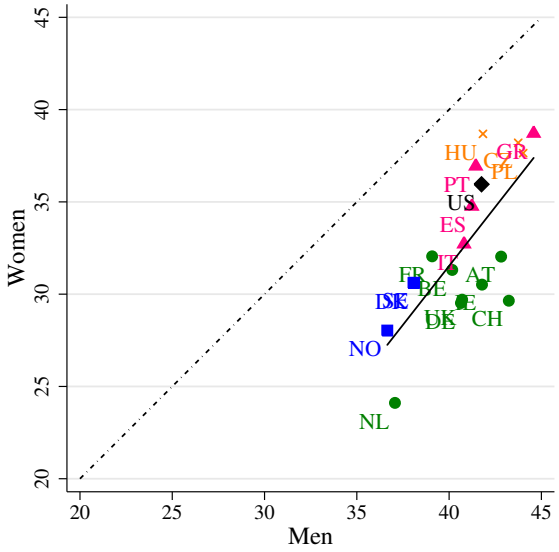


Figure 9: Labor Supply broken down by Gender

(a) Employment Rate




(b) Weekly Hours




whereas the Southern European countries with the exception of Portugal feature a substantially larger gap. For hours worked per employed the fitted line is also quite similar to the 45 degree line with the Western European countries as an outlier featuring a larger gender gap than all other countries. Put differently, overall gender differences seem to be relatively constant (with a few exceptions) both for employment rates and weekly hours worked per employed, which is in contrast to differences by education and weekly hours worked per employed. For the employment rate the gender gap amounts to 19 percentage points and for weekly hours worked per employed to 20%.

In general, a pattern that emerges in these pictures is that regions with high employment rates often exhibit low hours worked per employed, especially for the medium educated, the young and old, and women. This confirms on a disaggregate level the negative relationship between weekly hours and employment rates in Figure 5a. We plan to extend this type of analysis for the time trends in aggregate hours worked per person in the next iteration of the paper.

## 6 Conclusion

In this paper, we document the construction of a new data set that allows for the comparative analysis of hours worked along the extensive and intensive margin across countries and over time for different demographic subgroups. The main difference between the several surveys at a given point of time across countries or for a given country across time regards the coverage of weeks over the year. Specifically, weeks where people typically go on annual leave and/or weeks with public

holidays, which we use interchangeably with vacation, are often undersampled. We overcome this problem for the measurement of hours worked per employed by obtaining hours worked in a *non-vacation* week, i.e. a typical work week without a reduction in work time because of a public holiday or annual leave, and requiring *consistency* of annual leave and public holidays in the micro data with the country-wide average. Information on the latter is collected from external data sources and not coming from our labor force surveys.

We compare our aggregate data to those from the OECD and the Conference Board (CB). These two data sources have been used by a series of recent papers in the macroeconomic literature which tries to understand the cross-country differences in hours worked focusing on the the role of taxes. Based on our data, Europeans work on average 18 percent less hours than US-citizens during the time period 2003 to 2007, compared to 13 percent based on OECD data and only 7 percent based on CB data. Matching/replicating these larger differences would be a harder challenge for the literature. However, our data predict a similar country ranking and a slightly smaller cross-sectional variation within Europe than the two other data sources. While eventually it is impossible to judge which approach is the most reliable, we emphasize that our approach is the only one using the same underlying data sources and applying the same algorithm in a consistent and transparent way. Moreover, only going back to the micro data allows to construct employment rates and hours worked per employed for demographic groups and not only the aggregate.

In the second part, we derive stylized facts based on the new data set. Via a decomposition exercise we show that differences in weeks worked explain between one third and one half of the differences in European aggregate hours worked per person relative to the US. Employment rates have a very large explanatory power of two thirds to almost 100 percent in explaining differences in hours worked per person between Southern Europe or Eastern Europe and the US, respectively. For Western Europe and Scandinavia, by contrast, weekly hours are the most important driving factor of the differences relative to the US. In Scandinavia, employment rates alone would in fact predict even higher hours than in the US. We repeat the same exercise but also account for differences both in the demographic composition (age, gender, education) and the employment rate and hours worked per employed by these different groups. The compositional differences in education alone explain a substantial fraction of the hours worked per person differences relative to the US, namely between one quarter and one half. Put differently, if the European countries had the same share of low, medium and high educated women as the US, the differences in hours worked per person would be quite a bit smaller. The relative explanatory power of work weeks and weekly hours remains essentially unchanged compared to the aggregate decomposition. By contrast, the explanatory power of the employment rate always becomes smaller. We show that this is driven by the fact that demographic groups differ much more in their employment rates than in their hours worked per employed. Thus not accounting for the differences in the demographic composition between Europe and the US attributes too much weight to the employment rates as explanatory factors on

the aggregate level.

All our results leave much scope for future research. While we give some suggestive evidence, the underlying sources for differences across countries and genders could be manifold and will be interesting to analyze in more detail.

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# A Appendix

## A.1 Key Survey Questions

We drop some observations from the sample due to missing values. If actual hours are missing for employed respondents, we replace them by zero if the respondent indicates not having worked in the reference week. If the respondent states that he/she has been working in the reference week, but actual hours are missing, we drop the observation. Observations with missing usual hours are only dropped when we need usual hours, see the next subsection for further details. Table A.1 shows the percentage of observations dropped due to the different reasons. With the exceptions of Belgium and Switzerland, the percentages are far below 1 percent.

Table A.1: Average fraction of observations (all years) that are dropped because of missings in usual or actual hours worked (in %)

| **Country** | $h_{act}$ = . and set to zero | $h_{act}$ = . and dropped | $h_{usu}$ = . and dropped |
|---|---|---|---|
| Denmark | 0.00 | 0.65 | 0.01 |
| Norway | 1.14 | 0.77 | 0.04 |
| Sweden | 0.00 | 0.09 | 0.00 |
| *Mean* | *0.38* | *0.51* | *0.02* |
| Austria | 0.30 | 0.00 | 0.00 |
| Belgium | 0.00 | 1.49 | 0.03 |
| Switzerland | 0.00 | 2.07 | 0.00 |
| France | 0.00 | 0.04 | 0.01 |
| Ireland | 0.00 | 0.32 | 0.00 |
| Germany | 0.00 | 0.00 | 0.00 |
| Netherlands | 0.00 | 0.44 | 0.00 |
| United Kingdom | 0.00 | 0.90 | 0.01 |
| *Mean* | *0.04* | *0.66* | *0.01* |
| Spain | 0.00 | 0.52 | 0.01 |
| Greece | 0.00 | 0.01 | 0.00 |
| Italy | 0.01 | 0.13 | 0.00 |
| Portugal | 0.00 | 0.26 | 0.01 |
| *Mean* | *0.00* | *0.23* | *0.01* |
| Czech Republic | 0.00 | 0.19 | 0.00 |
| Hungary | 0.00 | 0.02 | 0.00 |
| Poland | 0.00 | 0.00 | 0.00 |
| *Mean* | *0.00* | *0.07* | *0.00* |
| US | 2.54 | 0.41 | 0.20 |

There are a number of country/year observations that have been dropped in the calculation of

averages due to different inconsistencies and particularities. Specifically, we exclude the years 1983 for Denmark, 2001 for the UK, and 2005 for Spain from our analysis. The Danish data for 1983 suggest that only around 23 percent of all observed individuals were employed, which is around one third of the employment rate that we observe in other years. In the UK in 2001, 3.2 percent of the respondents report not having worked at all in the reference week despite having a job due to bad weather ("other" reasons), compared to around 0.03 percent before and after 2001. By contrast, in 2001 only 0.32 percent report not having worked in the reference week despite having a job due to annual leave, compared to more than 3 percent in 2000 and 2002. This suggests that the categories have been switched accidentally, but since we cannot be certain, we do not include 2001 into our analysis. For Spain, 3.4 percent of the respondents report having worked less than usual due to compensation leave in 2005, compared to less than 0.03 percent in 2004 and 2006. Average hours lost due to "other" reasons are seven times larger in 2005 than in the previous and subsequent years (2.8 as opposed to 0.4), which ultimately leads to a large drop in hours worked in 2005.

Table A.2 gives the final total sample size of individuals aged 15-64, for each country/year combination. The annual sample size per country ranges from 10,000 to 450,000 with an average of 115,000 observations.

Table A.2: Final Sample Size, individuals aged 15-64, part 1

| Year | BE | DK | FR | GR | IT | IE | NL | UK | US | DE | PT | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1983** | 71106 | . | 104800 | 80661 | 222945 | 84597 | 110693 | 137949 | 293223 | . | . | . |
| **1984** | 29413 | 19415 | 106242 | 91681 | 230151 | 89464 | . | 105106 | 289019 | . | . | . |
| **1985** | 60804 | 19821 | 106487 | 91867 | 223136 | 90676 | 107118 | 106409 | 288542 | 303863 | . | . |
| **1986** | 54186 | 18591 | 105463 | 92171 | 222753 | 89780 | . | 106717 | 282810 | . | 59098 | 128768 |
| **1987** | 49152 | 18407 | 106881 | 93192 | 237109 | 91013 | 35103 | 104823 | 281228 | 305693 | 57850 | 120401 |
| **1988** | 51087 | 17793 | 107535 | 94192 | 238476 | 89977 | 52160 | 106626 | 266234 | . | 57351 | 128927 |
| **1989** | 48450 | 18691 | 108020 | 93048 | 258153 | 90527 | 54459 | 106607 | 269559 | 265745 | 54678 | 130375 |
| **1990** | 48009 | 18853 | 105893 | 93271 | 258764 | 90202 | 52877 | 102994 | 283563 | . | 54546 | 132278 |
| **1991** | 49854 | 19279 | 105914 | 92380 | 130290 | 90235 | 52309 | 101466 | 280001 | 352462 | 55271 | 131593 |
| **1992** | 50111 | 17953 | 107691 | 90788 | 137370 | 93697 | 53592 | 100113 | 275042 | . | 32222 | 130074 |
| **1993** | 51357 | 19576 | 112283 | 112590 | 136621 | 92749 | 51610 | 101991 | 270768 | 349187 | 32636 | 126612 |
| **1994** | 51432 | 11480 | 115299 | 110089 | 135404 | 92408 | 57438 | 98985 | 263369 | . | 31845 | 127268 |
| **1995** | 50545 | 11225 | 115257 | 108555 | 138114 | 92832 | 61021 | 96051 | 260273 | 345465 | 29699 | 129209 |
| **1996** | 51419 | 11146 | 114278 | 108795 | 136776 | 91637 | 54693 | 95019 | 230148 | 343270 | 29533 | 129376 |
| **1997** | 50465 | 11002 | 112160 | 107759 | 136315 | 94167 | 62782 | 91624 | 232887 | 343871 | 29534 | 128514 |
| **1998** | 50831 | 10972 | 112808 | 56220 | 136325 | 72439 | 39115 | 89468 | 233029 | 342754 | 32749 | 128966 |
| **1999** | 17212 | 10639 | 113230 | 55238 | 135308 | 72205 | 36429 | 88718 | 235273 | 341589 | 30812 | 132046 |
| **2000** | 17062 | 10763 | 113621 | 53669 | 134892 | 70129 | 48178 | 85849 | 236168 | 338031 | 29594 | 121626 |
| **2001** | 16056 | 10509 | 111631 | 52735 | 131656 | 69923 | 64988 | . | 252663 | 336765 | 29743 | 116583 |
| **2002** | 18140 | 10582 | 109689 | 50305 | 129271 | 70378 | 69641 | 84286 | 274879 | 335396 | 29405 | 115254 |
| **2003** | 18082 | 10001 | 55759 | 47349 | 127244 | 67712 | 69411 | 80871 | 273909 | 333615 | 30027 | 117254 |
| **2004** | 18593 | 10024 | 56289 | 52268 | 110413 | 57276 | 82160 | 77417 | 269087 | 329707 | 33109 | 116925 |
| **2005** | 73692 | 37864 | 219384 | 200842 | 448246 | 60590 | 343516 | 76367 | 268752 | 312325 | 123711 | . |
| **2006** | 76889 | 36787 | 216427 | 192420 | 434234 | 56970 | 77719 | 74700 | 266688 | 324161 | 116170 | 68048 |
| **2007** | 76217 | 73656 | 224295 | 186256 | 426063 | 56643 | 76256 | 74170 | 264106 | 312952 | 110960 | 69017 |
| **2008** | 72462 | 70657 | 222326 | 184897 | 420881 | 49292 | 78729 | 119280 | 262758 | 313384 | 107887 | 70328 |
| **2009** | 71063 | 73216 | 264813 | 188855 | 409672 | 179531 | 68640 | 58743 | 265326 | 316452 | 104944 | 72958 |
| **2010** | 70520 | 84449 | 315206 | 192444 | 409654 | 160114 | 59932 | 56983 | 264798 | . | 103056 | 72978 |
| **2011** | 65855 | 89419 | 325751 | 171442 | 399728 | 146444 | 64049 | 53874 | 260936 | . | 100490 | 69884 |

Table A.3: Final Sample Size, individuals aged 15-64, part 2

| | AT | NO | SE | HU | CH | CZ | PL |
|---|---|---|---|---|---|---|---|
| **1995** | 40193 | 19687 | 15739 | . | . | . | . |
| **1996** | 40047 | 18860 | 14673 | 43489 | 12536 | . | . |
| **1997** | 39760 | 18923 | 14497 | 42709 | 12538 | 48286 | 44719 |
| **1998** | 41358 | 18399 | 14234 | 57007 | 12589 | 47805 | 45815 |
| **1999** | 41005 | 18529 | 16305 | 58616 | 13619 | 46817 | 44374 |
| **2000** | 39502 | 18846 | 15824 | 56627 | 13604 | 44717 | 38378 |
| **2001** | 39819 | 18070 | 48005 | 56361 | 14121 | 44195 | 39226 |
| **2002** | 39438 | 18772 | 53146 | 55331 | 30451 | 42772 | 39878 |
| **2003** | 37920 | 18846 | 53499 | 59285 | 44451 | 41728 | 39735 |
| **2004** | 30144 | 19183 | 48922 | 55590 | 41599 | 43216 | 39305 |
| **2005** | 136572 | 76989 | 138313 | 209830 | 39248 | 171815 | 154607 |
| **2006** | 133522 | 18571 | 196331 | 209593 | 36435 | 174527 | 148977 |
| **2007** | 134016 | 18623 | 193607 | 204599 | 36634 | 172614 | 142281 |
| **2008** | 129481 | 17919 | 190039 | 193973 | 35526 | 164990 | 142666 |
| **2009** | 124005 | 18000 | 183925 | 192955 | 36195 | 159491 | 146366 |
| **2010** | 121121 | 17520 | 240485 | 189002 | 48288 | 157048 | 286657 |
| **2011** | 120696 | 17252 | 232441 | 188869 | 51354 | 30259 | 291083 |

## A.2 Capping of Hours

In the ELFS, the largest possible value for usual or actual hours worked per week in the main job is 80, with the possibility of another maximum of 80 actual hours of work in additional jobs. In the CPS, the largest possible value for actual hours worked in all jobs is 99 hours per week. We harmonize the different capping procedures implemented by ELFS and CPS by introducing a common cap. To achieve maximum consistency across countries, we cap the possible number of actual and usual hours worked per week in all jobs at 80.

For the European countries, the difference between capped and uncapped hours worked per employed only exceeds 0.1% in one case (Norway, where it amounts to 0.11%) and only 0.07% of observations are affected on average. Capping US hours worked reduces annual hours per employed slightly more, with an average of 0.19%. As a caveat, the table only shows the effect of the additional capping that we implement; we cannot gauge the size of the effect of the initial capping implemented by the surveys, but it is likely to be very small. The fraction of observations at the highest allowed value for hours actually worked in the main job is 0.7% for the ELFS, 0.2% for the CPS and 0.03% for the Microcensus.

Table A.4: The effect of capping on hours worked per employed (all years, in %)

| **Country** | Hours Worked without capping | Hours Worked with capping | Difference | Difference in % |
|---|---|---|---|---|
| Denmark | 1557.92 | 1556.72 | −1.20 | −0.08 |
| Norway | 1475.85 | 1474.25 | −1.60 | −0.11 |
| Sweden | 1565.86 | 1565.03 | −0.82 | −0.05 |
| *Mean* | *1533.21* | *1532.00* | *-1.21* | *-0.08* |
| Austria | 1683.42 | 1682.12 | −1.30 | −0.08 |
| Belgium | 1703.42 | 1702.89 | −0.52 | −0.03 |
| Switzerland | 1693.32 | 1692.29 | −1.04 | −0.06 |
| France | 1652.39 | 1651.84 | −0.55 | −0.03 |
| Ireland | 1798.28 | 1797.48 | −0.80 | −0.05 |
| Germany | 1613.28 | 1612.20 | −1.08 | −0.07 |
| Netherlands | 1485.24 | 1484.98 | −0.26 | −0.02 |
| United Kingdom | 1672.55 | 1672.12 | −0.43 | −0.03 |
| *Mean* | *1662.74* | *1661.99* | *-0.75* | *-0.05* |
| Czech Republic | 1865.28 | 1864.93 | −0.35 | −0.02 |
| Hungary | 1873.75 | 1873.38 | −0.38 | −0.02 |
| Poland | 1892.50 | 1891.27 | −1.23 | −0.06 |
| *Mean* | *1877.18* | *1876.53* | *-0.65* | *-0.03* |
| Spain | 1757.48 | 1757.38 | −0.10 | −0.01 |
| Greece | 1922.41 | 1921.19 | −1.22 | −0.06 |
| Italy | 1665.28 | 1665.21 | −0.08 | 0.00 |
| Portugal | 1827.16 | 1826.13 | −1.03 | −0.06 |
| *Mean* | *1793.08* | *1792.48* | *-0.61* | *-0.03* |
| US | 1880.23 | 1875.70 | −3.59 | −0.19 |

### A.3 Differences in the Survey Question on Hours Worked

For the construction of our hours measure it is important to mention that the CPS questionnaire provides less information than the ELFS/Microcensus. First, actual hours worked are only available for all jobs. Second, employed respondents who report positive actual hours but less than usual (in the main job) were only asked why they worked less if their usual hours were at most 33 hours (up to 1993) or their actual hours were at most 34 hours (from 1994 onwards). For those who were employed but did not work at all in the reference week the CPS asks for the same information as the ELFS/Microcensus. These differences in the survey design hardly affect our annual hours worked per employed measure. We recompute hours for the ELFS/Microcensus assuming that we would have exactly the same information set as in the CPS. The difference between the average annual hours per employed based on the full and restricted information (as in the CPS) is at most 0.51% and on average 0.35% from the year 1994 onwards. This estimate is in fact an upper bound for the years 1993 and before. Although the documentation of the CPS states that up to 1993 only respondents with usual hours not exceeding 33 hours were asked for the reason of having worked less, many individuals with usual hours greater than 33 hours in fact also answered this question. Thus, by extending the set of respondents who answer the question any potential bias will be smaller than under the strict cut-off rule.

### A.4 Public Holidays and Annual Leave for the Self-Employed

To check in how far our estimates of our hours measure are affected by applying this assumption also to self-employed individuals, we conduct the following comparison: Table A.5 shows in the first column the fraction of self-employed individuals, and in the last column the percentage difference between aggregate hours worked per employed under the assumption that all self-employed individuals take the average days of public holidays and annual leave and the alternative extreme assumption that self-employed individuals do not take any days off but rather work all 52 weeks of a year. The smallest difference is observed for the US, which has the least number of public holidays and vacation days and the fifth lowest fraction of self-employed among all countries, and amounts to 15 hours per year (0.8%). The largest difference in turn of the magnitude of 103 hours (5.3%) is observed for Greece, which has the highest share of self-employed (18%) and about median public holidays and days of annual leave.

Table A.5: Average hours worked per employed (all years): Different vacation assumptions for self-employed

| | | HWE | | | |
|---|---|---|---|---|---|
| **Country** | Fraction self-employed | Baseline | Self-employed work 52 weeks | Difference | Difference in % |
| **Scandinavia** | **6.2** | **1532.0** | **1557.8** | **25.8** | **1.7** |
| Denmark | 6.0 | 1556.7 | 1583.7 | 27.0 | 1.7 |
| Norway | 5.4 | 1474.3 | 1494.6 | 20.4 | 1.4 |
| Sweden | 7.1 | 1565.0 | 1595.0 | 30.0 | 1.9 |
| **Eastern Europe** | **9.5** | **1876.5** | **1922.9** | **46.4** | **2.5** |
| Czech Republic | 9.8 | 1864.9 | 1916.2 | 51.3 | 2.8 |
| Hungary | 7.4 | 1873.4 | 1907.3 | 33.9 | 1.8 |
| Poland | 11.4 | 1891.3 | 1945.2 | 54.0 | 2.8 |
| **Western Europe** | **8.0** | **1662.0** | **1701.1** | **39.1** | **2.3** |
| Austria | 7.6 | 1682.1 | 1722.3 | 40.2 | 2.4 |
| Belgium | 7.1 | 1702.9 | 1745.9 | 43.1 | 2.5 |
| France | 6.8 | 1651.8 | 1694.3 | 42.5 | 2.6 |
| Germany | 6.3 | 1612.2 | 1651.2 | 39.0 | 2.4 |
| Ireland | 10.2 | 1797.5 | 1851.6 | 54.1 | 3.0 |
| Netherlands | 7.2 | 1485.0 | 1511.2 | 26.2 | 1.8 |
| Switzerland | 10.3 | 1692.3 | 1729.8 | 37.5 | 2.2 |
| United Kingdom | 8.3 | 1672.1 | 1702.7 | 30.6 | 1.8 |
| **Southern Europe** | **13.6** | **1792.5** | **1869.1** | **76.6** | **4.3** |
| Greece | 18.0 | 1921.2 | 2023.8 | 102.6 | 5.3 |
| Italy | 12.7 | 1665.2 | 1745.2 | 80.0 | 4.8 |
| Portugal | 14.1 | 1826.1 | 1890.7 | 64.6 | 3.5 |
| Spain | 9.8 | 1757.4 | 1816.5 | 59.1 | 3.4 |
| **US** | **7.3** | **1876.6** | **1891.8** | **15.2** | **0.8** |

## A.5 External Data for Public Holidays and Days of Annual Leave: Country Details

For some countries (Denmark, France, Germany, Netherlands, Switzerland, United Kingdom, United States), we obtain statistics on average numbers of public holidays and days of annual leave covering the entire sample period from the national statistical offices and other public institutions, detailed in Appendix A.6. For the remaining countries, average days of annual leave and public holidays are obtained from the European Industrial Relations Observatory (EIRO), which provides data on days of annual leave and public holidays for the years 2002 to 2011. For the years prior to 2002, we use two different strategies. For some countries (Austria, Belgium, Portugal, and Sweden), we were able to obtain from the International Labor Organization ILO the number of days of national bank holidays (subtracting those falling on a Sunday) as well as the number of days of annual leave, both as indicated by national laws (i.e. ILO refers to labor laws rather than actual collected statistics as sources of these numbers). For the remaining countries (Czech Republic, Greece, Hungary, Ireland, Italy, Norway, Poland, and Spain), we use the EIRO mean over the years 2002 to 2011 to extend the series backwards. The Web Appendix W.3 contains detailed graphs displaying the time-series of public holidays and annual leave days for all countries, in addition to a comparison to the EIRO data for the group of countries for which we have data from both national statistical offices and EIRO.

## A.6 External Data for Public Holidays and Days of Annual Leave: Country Details

- **Denmark**
  - Public Holidays
    - 1983-2008: From the Confederation of Danish Employers (DA) we obtain data on three variables: Agreed weekly hours (AWH), agreed annual hours (AAH, net of days of annual leave and public holidays) and the number of days of annual leave (daleave). Assuming that a regular working week comprises 5 working days, the number of public holidays (dpublic) can be calculated as follows:
      1. Obtain agreed daily hours (ADH) from agreed weekly hours (ADH=AWH/5).
      2. Calculate the number of annual hours worked including public holidays but excluding days of annual leave: $AWH * (52 - daleave/5)$.
      3. Subtract the number of agreed annual hours AAH (where both days of annual leave and public holidays have already been subtracted). This yields the number of annual hours lost due to public holidays.
      4. Divide this by the agreed daily hours (ADH) in order to obtain the number of public holidays, pubhol.

      $\rightarrow$ Public holidays $= \frac{AWH*(52-daleave/5)-AAH}{ADH}$.
    - The Agreed Annual Hours are only available every five years. In order to obtain the number of holidays in the years without AAH we fit a 8th-order polynomial through the years where we have observations. Note that we exclude the year 1985 from this exercise but rather interpolate it as well because of the exceptional high value (14 public holidays as opposed to on average 7.5 days) for which we don't have a plausible explanation. Since the non-interpolated holidays are always integers (with

exception of the first two observations 1960 and 1965), we use the respective integer value of the interpolated series. The resulting numbers of public holidays are lower than the EIRO levels and exhibit less variation.

  - 2009-2011: The interpolation employed in the previous years predicts a sharp increase in public holidays, exceeding even the EIRO numbers, so that we instead use those for these years.

- Annual Leave
  - 1983-2008: Directly given by the Confederation of Danish Employers (DA).

- **France**
  - Public Holidays
    - 2002-2011: EIRO.
    - 1983-2000: "Direction de l'animation de la recherche, des tudes et des statistiques" (DARES), published in the study "Comparaisons internationales de dure et de productivit" by Chagny & Bruyre (2002).
  - Annual Leave
    - 1983-2011: "Direction de l'animation de la recherche, des tudes et des statistiques" (DARES), published in the study "Comparaisons internationales de dure et de productivit" by Chagny & Bruyre (2002). We use the value from 1999 to fill in the missing values for the years 2000-2008.

- **Germany**
  - The Institute for Employment Research (Institut f́ur Arbeitsmarkt- und Berufsforschung) provides data on the average number of public holidays, average number of days of annual leave (agreed regular days of annual leave plus additional leave) in its "Arbeitszeitrechnung". As the IAB provides data for all three variables for the entire sampling period, we use this data rather than the data obtained from EIRO.

- **Netherlands**
  - Public Holidays
    - 1983-2008: Central Planning Bureau (CPB) provide numbers of public holidays without Saturdays and Sundays.
  - Annual Leave
    - 1980-1992: Statistics Netherlands ("Centraal Bureau voor de Statitiek", CBS) provides numbers for vacation days including public holidays, from which we subtract the number of public holidays from the CPB.
    - 1995-2005: Numbers are taken directly from the "Enquete werkgelegenheid en lonen" (EWL) provided by the CBS.

- **Switzerland**
  - Public Holidays

    - 1997-2011: The number of public holidays varies strongly between the 26 cantons. The minimum number of public holidays in every canton is 8, which is what we took to control for the number of public holidays.
  - Annual Leave
    - The Swiss Statistical Office provides number on Swiss employees' average number of weeks of annual leave. Multiplying this number by 5 (days per week) yields the number of days of annual leave between 1996 and 2011.

- **United Kingdom**
  - Public Holidays
    - 1983-2008: The UK government's digital service (http://www.direct.gov.uk/) provides the number of public holidays in England, Wales, Scotland and Northern Ireland. These are weighted by the employment shares (obtained from the Office of National Statistics) to calculate the average number of public holidays in the UK. Numbers are available from 1993 onwards, previous years are imputed using the mean.
  - Annual Leave
    - 1983-2008: UK Labor Force Survey asks employees about their entitlement to paid holidays. These numbers are used to calculate the average number of days of annual leave for full-time employees.

- **United States**
  - Public Holidays
    - 1979-1998: Employee Benefit Survey (EBS), conducted by the Bureau of Labor Statistics (BLS).
    - 1999-2008: National Compensation Survey (NCS), also conducted by the BLS.
    - Average number of holidays is based on the product of two data series: the fraction of workers with paid holidays and the average number of public holidays of those with paid holidays.
  - Annual Leave
    - Same sources as for public holidays.
    - When calculating the average number of days of annual leave, we have to take into account the tenure distribution. For details, see "external_data.pdf".

- **Denmark**
  - Public Holidays
    - 1983-2008: From the Confederation of Danish Employers (DA) we obtain data on three variables: Agreed weekly hours (AWH), agreed annual hours (AAH, net of days of annual leave and public holidays) and the number of days of annual leave (daleave). Assuming that a regular working week comprises 5 working days, the number of public holidays (dpublic) can be calculated as follows:

Table A.6: Average number of public holidays and days of annual leave for average over first 5 and last 5 years

| | Public holidays | | Annual leave | | Public holidays + Annual leave | |
|---|---|---|---|---|---|---|
| **Country** | Start | End | Start | End | Start | End |
| **Germany** | 11.6 | 10.1 | 30.0 | 30.9 | 41.6 | 41.0 |
| **Italy** | 12.0 | 11.4 | 28.0 | 28.0 | 40.0 | 39.4 |
| **France** | 8.6 | 10.8 | 29.5 | 29.5 | 38.1 | 40.3 |
| **Austria** | 11.6 | 11.6 | 25.0 | 25.0 | 36.6 | 36.6 |
| **Spain** | 13.1 | 12.8 | 22.0 | 22.0 | 35.1 | 34.8 |
| **Sweden** | 9.8 | 10.4 | 25.0 | 25.0 | 34.8 | 35.4 |
| **Czech Republic** | 9.5 | 8.9 | 25.0 | 25.0 | 34.5 | 33.9 |
| **Norway** | 9.1 | 9.0 | 25.0 | 25.0 | 34.1 | 34.0 |
| **Greece** | 11.0 | 10.6 | 23.0 | 23.0 | 34.0 | 33.6 |
| **Belgium** | 8.8 | 9.6 | 24.0 | 20.8 | 32.8 | 30.4 |
| **Portugal** | 10.6 | 11.2 | 22.0 | 24.5 | 32.6 | 35.7 |
| **Switzerland** | 8.0 | 8.0 | 23.7 | 24.3 | 31.7 | 32.3 |
| **Denmark** | 7.9 | 7.3 | 22.5 | 30.0 | 30.4 | 37.3 |
| **Netherlands** | 7.0 | 6.8 | 22.8 | 21.0 | 29.8 | 27.8 |
| **United Kingdom** | 8.1 | 8.1 | 21.5 | 24.3 | 29.6 | 32.4 |
| **Poland** | 9.4 | 9.6 | 20.0 | 20.0 | 29.4 | 29.6 |
| **Ireland** | 9.0 | 9.0 | 20.0 | 20.0 | 29.0 | 29.0 |
| **Hungary** | 8.9 | 8.6 | 20.0 | 20.0 | 28.9 | 28.6 |
| **US** | 9.7 | 7.1 | 10.8 | 10.1 | 20.5 | 17.2 |

1. Obtain agreed daily hours (ADH) from agreed weekly hours (ADH=AWH/5).
2. Calculate the number of annual hours worked including public holidays but excluding days of annual leave: $AWH * (52 - daleave/5)$.
3. Subtract the number of agreed annual hours AAH (where both days of annual leave and public holidays have already been subtracted). This yields the number of annual hours lost due to public holidays.
4. Divide this by the agreed daily hours (ADH) in order to obtain the number of public holidays, pubhol.

$\rightarrow$ Public holidays $= \frac{AWH*(52-daleave/5)-AAH}{ADH}$.

$*$ The Agreed Annual Hours are only available every five years. In order to obtain the number of holidays in the years without AAH we fit a 8th-order polynomial through the years where we have observations. Note that we exclude the year 1985 from this exercise but rather interpolate it as well because of the exceptional high value (14 public holidays as opposed to on average 7.5 days) for which we don't have a plausible explanation. Since the non-interpolated holidays are always integers (with exception of the first two observations 1960 and 1965), we use the respective integer value of the interpolated series. The resulting numbers of public holidays are lower than the EIRO levels and exhibit less variation.

$*$ 2009-2011: The interpolation employed in the previous years predicts a sharp increase in public holidays, exceeding even the EIRO numbers, so that we instead use

those for these years.

  - Annual Leave
    * 1983-2008: Directly given by the Confederation of Danish Employers (DA).

- **France**
  - Public Holidays
    * 2002-2011: EIRO.
    * 1983-2000: "Direction de l'animation de la recherche, des tudes et des statistiques" (DARES), published in the study "Comparaisons internationales de dure et de productivit" by Chagny & Bruyre (2002).
  - Annual Leave
    * 1983-2011: "Direction de l'animation de la recherche, des tudes et des statistiques" (DARES), published in the study "Comparaisons internationales de dure et de productivit" by Chagny & Bruyre (2002). We use the value from 1999 to fill in the missing values for the years 2000-2008.

- **Germany**
  - The Institute for Employment Research (Institut f́ur Arbeitsmarkt- und Berufsforschung) provides data on the average number of public holidays, average number of days of annual leave (agreed regular days of annual leave plus additional leave) in its "Arbeitszeitrechnung". As the IAB provides data for all three variables for the entire sampling period, we use this data rather than the data obtained from EIRO.

- **Netherlands**
  - Public Holidays
    * 1983-2008: Central Planning Bureau (CPB) provide numbers of public holidays without Saturdays and Sundays.
  - Annual Leave
    * 1980-1992: Statistics Netherlands ("Centraal Bureau voor de Statitiek", CBS) provides numbers for vacation days including public holidays, from which we subtract the number of public holidays from the CPB.
    * 1995-2005: Numbers are taken directly from the "Enquete werkgelegenheid en lonen" (EWL) provided by the CBS.

- **Switzerland**
  - Public Holidays
    * 1997-2011: The number of public holidays varies strongly between the 26 cantons. The minimum number of public holidays in every canton is 8, which is what we took to control for the number of public holidays.
  - Annual Leave

    - The Swiss Statistical Office provides number on Swiss employees' average number of weeks of annual leave. Multiplying this number by 5 (days per week) yields the number of days of annual leave between 1996 and 2011.

- **United Kingdom**
  - Public Holidays
    - 1983-2008: The UK government's digital service (http://www.direct.gov.uk/) provides the number of public holidays in England, Wales, Scotland and Northern Ireland. These are weighted by the employment shares (obtained from the Office of National Statistics) to calculate the average number of public holidays in the UK. Numbers are available from 1993 onwards, previous years are imputed using the mean.
  - Annual Leave
    - 1983-2008: UK Labor Force Survey asks employees about their entitlement to paid holidays. These numbers are used to calculate the average number of days of annual leave for full-time employees.

- **United States**
  - Public Holidays
    - 1979-1998: Employee Benefit Survey (EBS), conducted by the Bureau of Labor Statistics (BLS).
    - 1999-2008: National Compensation Survey (NCS), also conducted by the BLS.
    - Average number of holidays is based on the product of two data series: the fraction of workers with paid holidays and the average number of public holidays of those with paid holidays.
  - Annual Leave
    - Same sources as for public holidays.
    - When calculating the average number of days of annual leave, we have to take into account the tenure distribution. For details, see "external_data.pdf".

## A.7 Vacation in Micro Data vs. External Data

The first two columns of Table A.8 compare the number of weeks lost due to vacation/public holidays based on self-reports in the micro data to weeks lost due to vacation and public holidays from our external data sources for the years 2005 to 2011. For the self-reports, we assign for each individual who has worked at least as much as usual in the main job or less because of another reason than public holidays or annual leave a zero. For those having worked less than usual because of public holidays or annual leave, we divide the difference between usual and actual hours by usual hours. The latter measures the fraction of the usual work week lost to accommodate part-time workers smaller usual hours in a usual work week. Similar to the calculation of hours worked, we multiply this number by 52 weeks to get an annualized value and then take the mean across all employed individuals. This yields the average number of weeks lost because of annual leave and

Table A.7: Average number of public holidays and days of annual leave for average over first 5 and last 5 years

| | Public holidays | | Annual leave | | Public holidays + Annual leave | |
|---|---|---|---|---|---|---|
| **Country** | Start | End | Start | End | Start | End |
| **Germany** | 11.6 | 10.1 | 30.0 | 30.9 | 41.6 | 41.0 |
| **Italy** | 12.0 | 11.4 | 28.0 | 28.0 | 40.0 | 39.4 |
| **France** | 8.6 | 10.8 | 29.5 | 29.5 | 38.1 | 40.3 |
| **Austria** | 11.6 | 11.6 | 25.0 | 25.0 | 36.6 | 36.6 |
| **Spain** | 13.1 | 12.8 | 22.0 | 22.0 | 35.1 | 34.8 |
| **Sweden** | 9.8 | 10.4 | 25.0 | 25.0 | 34.8 | 35.4 |
| **Czech Republic** | 9.5 | 8.9 | 25.0 | 25.0 | 34.5 | 33.9 |
| **Norway** | 9.1 | 9.0 | 25.0 | 25.0 | 34.1 | 34.0 |
| **Greece** | 11.0 | 10.6 | 23.0 | 23.0 | 34.0 | 33.6 |
| **Belgium** | 8.8 | 9.6 | 24.0 | 20.8 | 32.8 | 30.4 |
| **Portugal** | 10.6 | 11.2 | 22.0 | 24.5 | 32.6 | 35.7 |
| **Switzerland** | 8.0 | 8.0 | 23.7 | 24.3 | 31.7 | 32.3 |
| **Denmark** | 7.9 | 7.3 | 22.5 | 30.0 | 30.4 | 37.3 |
| **Netherlands** | 7.0 | 6.8 | 22.8 | 21.0 | 29.8 | 27.8 |
| **United Kingdom** | 8.1 | 8.1 | 21.5 | 24.3 | 29.6 | 32.4 |
| **Poland** | 9.4 | 9.6 | 20.0 | 20.0 | 29.4 | 29.6 |
| **Ireland** | 9.0 | 9.0 | 20.0 | 20.0 | 29.0 | 29.0 |
| **Hungary** | 8.9 | 8.6 | 20.0 | 20.0 | 28.9 | 28.6 |
| **US** | 9.7 | 7.1 | 10.8 | 10.1 | 20.5 | 17.2 |

public holidays. On average the self-reported vacation amount to 3.3 weeks in Europe whereas the external data suggest a number of 6.8 weeks. In 5 of the 19 countries, self-reported public holidays and annual leave days amount to less than 2 weeks. Overall, given that public holidays alone in many countries sum up to 1.5 weeks, the self-reported number of the sum of days of annual leave and public holidays seems too small.

Analyzing the Microcensus data further, there could be several reasons for underreporting of vacation days. While we do not observe reference weeks in the Microcensus, the Statistical Office does have this information and analyzed the issue of the distribution of reference weeks.[13] First, the Microcensus always takes the week before the interview as reference week (i.e. it does not give fixed dates for the reference week, but refers in questions to the previous week, whenever the interview is carried out). The interview is generally carried out personally, and if a household is not encountered by the interviewer in the intended week, the interviewer comes back to the household later on. Therefore, the de facto distribution of reference weeks over the year is not uniform, but more importantly the sample of respondents in a given week is not representative. Specifically, it could be that due to this procedure, households that were on vacation the week before are missed more frequently than others and are in fact interviewed later when they have been back from vacation for some time. The number of observations is indeed on average smaller in the reference weeks that fall into typical vacation periods, especially the late summer weeks and the two weeks after Christmas, see Figure A.1. Moreover, the self-reported employment rate is underproportional

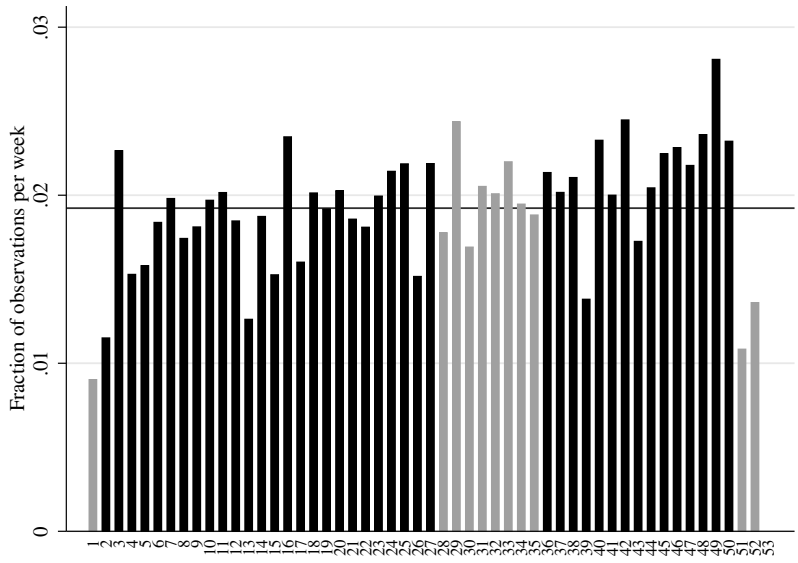
[13] The following information comes from Thomas Körner at the Statistical Office Germany.

Table A.8: Annual Weeks Lost due to Public Holidays and Annual Leave(2005-2011)

| Country | Weeks lost to public holidays and vacation self-reported | Weeks lost to public holidays and vacation external data | Fraction of sample on leave |
|---|---|---|---|
| Denmark | 5.0 | 7.6 | 14.9 |
| Norway | 4.6 | 6.8 | 13.3 |
| Sweden | 5.1 | 6.9 | 17.9 |
| *Mean* | *4.9* | *7.1* | *15.4* |
| Austria | 3.8 | 7.3 | 15.4 |
| Belgium | 4.1 | 5.9 | 14.1 |
| Switzerland | 4.0 | 6.5 | 11.1 |
| France | 5.6 | 8.0 | 16.1 |
| Ireland | 1.9 | 6.2 | 11.4 |
| Germany | 2.7 | 8.2 | 8.0 |
| Netherlands | 4.8 | 5.5 | 14.7 |
| United Kingdom | 3.5 | 6.5 | 13.5 |
| *Mean* | *3.8* | *6.8* | *13.0* |
| Czech Republic | 2.6 | 6.9 | 12.3 |
| Hungary | 1.4 | 5.7 | 6.9 |
| Poland | 1.2 | 5.9 | 8.1 |
| *Mean* | *1.7* | *6.2* | *9.1* |
| Spain | 3.2 | 7.1 | 13.0 |
| Greece | 1.5 | 6.6 | 10.9 |
| Italy | 2.9 | 7.7 | 10.1 |
| Portugal | 2.2 | 7.1 | 13.8 |
| *Mean* | *2.4* | *7.1* | *11.9* |
| US | 1.4 | 3.5 | 4.6 |

in these weeks, indicating that especially employed people might not be interviewed for these weeks (unless this reflects true seasonality in the employment rate). Second, respondents might dislike to use a vacation week as a reference week, either because they are too busy the first week after a vacation to fill out the questionnaire, or because they perceive it as "inappropriate" to use a vacation week when in fact they are generally hard working. One indication that goes into this direction is that people who decline to be interviewed in person but fill out the survey by paper and pencil later by themselves are less likely to indicate days of annual leave. Regarding public holidays, the number of full-time employees reporting having worked less hours than usual due to public holidays is not exceeding 30% in weeks with nationwide bank holidays in 2010 which is clearly too low. However, due to the much lower number of public holidays than days of annual leave this underrepresentation is of less importance than the underrepresentation of days of annual

Figure A.1: Distribution of Reference Weeks for Germany in the ELFS - Average years 2005 to 2011




leave.

## A.8 Data sources of OECD and Conference Board (CB)

| Country | OECD | CB |
|---|---|---|
| Austria | OECD National Accounts questionnaire. | National Accounts (obtained from NIESR database and Eurostat). |
| Belgium | Secretariat estimates annual hours worked for the total economy based on the ELFS. Estimates take into account the number of public holidays and annual leave shown in the EIRO. Also, a correction is made to account for an estimated 50 per cent underreporting of hours lost due to illness and maternity leave. | OECD Economic Outlook (based on ELFS) until 1990, then national accounts obtained from Eurostat. |
| Czech Republic | Czech Statistical Office based on Labor Force Sample Survey. Meal breaks are excluded from 2001 onwards. | National Accounts (Eurostat) from 1995 onwards. |
| Denmark | National Accounts. National estimates of annual hours worked are according to paid hours and do not include neither unpaid overtime nor unpaid absences for different reasons. | National Accounts (Eurostat). |
| France | National Accounts. Series take into account overtime and second jobs. | National Accounts (Eurostat). |
| Germany | IAB: establishment survey estimates of weekly hours worked by full-time workers whose hours are not affected by absence. Extended to annual estimates by including public holidays & sickness absences, overtime, short-time, weather, etc. Part-time covered from 1991 onwards. | National Accounts (Eurostat) starting with 1991. |
| Greece | OECD National Accounts questionnaire. | OECD Economic Outlook (ELFS) until 1994, then national accounts (Eurostat). |
| Hungary | National Accounts, estimates based on an establishment survey for manufacturing covering five or more employees. | OECD Economic Outlook (ELFS) until 1994, then national accounts (Eurostat). |
| Ireland | ELFS (see Belgium for more information). | OECD Economic Outlook (ELFS) until 1990, then national accounts (Eurostat). |
| Italy | OECD National Accounts questionnaire | National Accounts (Eurostat). |

| Country | OECD | CB |
|---|---|---|
| Netherlands | Statistics Netherlands Labor Accounts. Contractual hours minus hours leave, reduced working hours and holidays. Plus paid and unpaid overtime. | National Accounts (Eurostat) from 1995, data extrapolated (backwards) until 1970 using trends on contractual hours from the CBS. |
| Norway | Statistics Norway, based on national accounts and estimated from a number of different data sources, e.g. establishment surveys, LFS and public sector accounts. | National Accounts (Eurostat). |
| Poland | Central Statistical Office of Poland, derived from LFS. Total weekly hours worked are divided by average number of people, then multiplied by 52. Break in 1999 due to switch to continuous quarterly survey. | OECD National Accounts 2000-2006. Extrapolated to 1989 using trend from Hungary. 2007 ff. extrapolated from OECD Economic Outlook. |
| Portugal | ELFS (see Belgium for more information). | National Accounts (Eurostat) from 1990 onwards, 1986-1989 extrapolated with trend from OECD Economic Outlook. |
| Spain | OECD National Accounts questionnaire | OECD Economic Outlook (ELFS) until 1994, then national accounts (Eurostat). |
| Sweden | Statistics Sweden, national account concepts estimated using LFS and establishment surveys. | National Accounts (Eurostat). |
| Switzerland | OECD National Accounts questionnaire, calculations based on Swiss LFS. | National Accounts (Eurostat) (1991-2007), previous years have been extrapolated from 1991. |
| United Kingdom | Office of National Statistics: weekly hours worked from LFS multiplied by 52. | National Accounts, first from NIESR (until 1990), then Eurostat. |
| United States | Bureau of Labor Statistics, Office of Productivity and Technology. Upward revised estimates of the annual hour per worker series. These are derived from the CES for production and non-supervisory workers in private sector jobs, imputed for non-production and supervisory workers, and taken from the CPS for proprietors and unpaid family workers. | Hours: unpublished BLS series for total economy. Employment data: 1950-1989: BLS CPS in combination with BEA numbers on military personnel. 1990-2007: BLS CES combined with BEA numbers on military personnel. |

### A.9 Further Figures and Tables

Table A.9: Decomposition Analysis - Hours Worked per Person Relative to the US

| Country | HWP Difference Relative to the US | Fraction of HWP Difference Relative to the US Explained by US | | | |
|---|---|---|---|---|---|
| | | Weights | Weeks | ER | Weekly Hours |
| **Scandinavia** | **−0.16** | **0.27** | **0.46** | **−0.48** | **0.74** |
| Denmark | −0.13 | 0.33 | 0.59 | −0.64 | 0.72 |
| | | (0.08) | (0.05) | (0.05) | (0.07) |
| Norway | −0.18 | 0.14 | 0.35 | −0.34 | 0.85 |
| | | (0.02) | (0.03) | (0.04) | (0.04) |
| Sweden | −0.16 | 0.36 | 0.43 | −0.44 | 0.65 |
| | | (0.08) | (0.04) | (0.04) | (0.05) |
| **Eastern Europe** | **−0.19** | **0.41** | **0.34** | **0.49** | **−0.24** |
| Czech Republic | −0.11 | 0.53 | 0.64 | 0.30 | −0.47 |
| | | (0.03) | (0.02) | (0.05) | (0.07) |
| Hungary | −0.21 | 0.41 | 0.20 | 0.52 | −0.13 |
| | | (0.05) | (0.02) | (0.07) | (0.04) |
| Poland | −0.25 | 0.28 | 0.18 | 0.65 | −0.12 |
| | | (0.06) | (0.02) | (0.06) | (0.04) |
| **Western Europe w/o CH** | **−0.20** | **0.40** | **0.32** | **−0.09** | **0.37** |
| **Western Europe** | **−0.18** | **0.48** | **0.50** | **−0.43** | **0.45** |
| Austria | −0.14 | 0.42 | 0.55 | −0.09 | 0.12 |
| | | (0.03) | (0.02) | (0.03) | (0.01) |
| Belgium | −0.27 | 0.28 | 0.18 | 0.29 | 0.25 |
| | | (0.02) | (0.02) | (0.01) | (0.01) |
| France | −0.26 | 0.26 | 0.33 | 0.13 | 0.28 |
| | | (0.04) | (0.03) | (0.03) | (0.02) |
| Germany | −0.23 | 0.36 | 0.37 | −0.01 | 0.29 |
| | | (0.04) | (0.06) | (0.03) | (0.04) |
| Ireland | −0.16 | 0.56 | 0.25 | −0.11 | 0.30 |
| | | (0.12) | (0.08) | (0.06) | (0.12) |
| Netherlands | −0.21 | 0.29 | 0.18 | −0.32 | 0.86 |
| | | (0.06) | (0.03) | (0.03) | (0.05) |
| Switzerland | −0.04 | 1.03 | 1.74 | −2.81 | 1.04 |
| | | (0.15) | (0.09) | (0.14) | (0.05) |
| United Kingdom | −0.15 | 0.66 | 0.36 | −0.49 | 0.47 |
| | | (0.10) | (0.08) | (0.04) | (0.09) |
| **Southern Europe** | **−0.19** | **0.56** | **0.41** | **0.12** | **−0.09** |
| Greece | −0.15 | 0.40 | 0.43 | 0.55 | −0.38 |
| | | (0.23) | (0.03) | (0.16) | (0.10) |
| Italy | −0.30 | 0.34 | 0.27 | 0.25 | 0.14 |
| | | (0.09) | (0.03) | (0.04) | (0.07) |
| Portugal | −0.12 | 1.06 | 0.62 | −0.49 | −0.19 |
| | | (0.65) | (0.05) | (0.53) | (0.19) |
| Spain | −0.20 | 0.43 | 0.33 | 0.18 | 0.07 |
| | | (0.14) | (0.02) | (0.11) | (0.05) |

# *Web Appendix*

Labor Supply Along the Extensive and Intensive Margin:
Cross-Country Facts and Time Trends by Gender

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February 12, 2015

## W Online Appendix

### W.1 Distribution of Reference Weeks

Table W.1 reflects the distribution of reference weeks for the ELFS countries at three different points in time: The year before the actual change to continuous surveying took place, the year of that change, and the year in which the actual change was implemented into the ELFS micro data. In most countries this happened in 2005 and for the in-between period the weeks for the second quarter are available. There are however several exceptions to these rules, which we list in the next pargraph.

When **Austria** changed to continuous surveying in 2004, the ELFS did not cover the second, but the first quarter of the year. In the **Czech Republic**, the change to continuous reference weeks officially took place in 1992. We have only data starting from 1997, with reference weeks covering the second quarter until 2005. Mostly this means that weeks 14 to 26 are covered, while in the Czech LFS of 1997 and 1998, the data covers the 12 weeks starting from week 10. Similar to Austria, the ELFS for **France** covers the first quarter instead of the second one after the actual change in reference weeks in 2003. This was also the year where the change occurred in **Hungary**, where observations then start to cover the late second quarter (starting in week 16 instead of 14), with observations being very unequally distributed over the weeks. ELFS documentation says that **Ireland** went through the change in reference weeks in 1997, but the reference weeks in the ELFS do not reflect this shift: they only cover the second quarter of the year up until and including 2008. In **Poland**, the switch from one reference week to continuous coverage occurred in the fourth quarter of 1999, and is therefore only visible from 2000 onwards, with reference weeks then covering the second quarter of the calendar year. The same quarter was covered in **Sweden** starting from 2001. In the two years before that (starting with the year of the actual change to continuous reference weeks, 1999), reference weeks also cover a quarter, but an earlier one. The **Swiss** labor force survey covers the second quarter of the year up until 2009, and switches to the whole year in 2010. In the **UK**, the labor force survey covers a period of one quarter of the year already before the change in reference weeks takes place in 1992. The ELFS keeps the same weeks until 2008, when it switches to continuous coverage also for the UK.

| Country | Distribution | Year before change | Year of change | Year of visible change |
|---|---|---|---|---|

| | **of ref. weeks** | **to cont. surveying** | **to cont. surveying** | **in the data set** |
|---|---|---|---|---|
| Austria | Year | 2003 | 2004 | 2005 |
| | Minimum | 9 | 1 | 1 |
| | 10th Percentile | 10 | 2 | 6 |
| | Median | 11 | 7 | 26 |
| | 90th Percentile | 12 | 12 | 47 |
| | Maximum | 14 | 13 | 52 |
| Belgium | Year | 1998 | 1999 | 2005 |
| | Minimum | 17 | 14 | 1 |
| | 10th Percentile | 17 | 15 | 6 |
| | Median | 17 | 20 | 26 |
| | 90th Percentile | 17 | 25 | 47 |
| | Maximum | 17 | 26 | 52 |
| Czech Repbulic | Year | | 1997 | 2005 |
| | Minimum | | 10 | 1 |
| | 10th Percentile | | 11 | 6 |
| | Median | | 16 | 26 |
| | 90th Percentile | | 21 | 47 |
| | Maximum | | 22 | 52 |
| Denmark | Year | 1993 | 1994 | 2005 |
| | Minimum | 5 | 14 | 1 |
| | 10th Percentile | 5 | 15 | 6 |
| | Median | 11 | 20 | 26 |
| | 90th Percentile | 22 | 25 | 47 |
| | Maximum | 23 | 26 | 52 |
| France | Year | 2002 | 2003 | 2005 |
| | Minimum | 9 | 1 | 1 |
| | 10th Percentile | 9 | 2 | 5 |
| | Median | 10 | 7 | 26 |
| | 90th Percentile | 12 | 12 | 47 |
| | Maximum | 14 | 13 | 52 |
| Greece | Year | 1997 | 1998 | 2005 |
| | Minimum | 13 | 14 | 1 |
| | 10th Percentile | 15 | 15 | 6 |
| | Median | 20 | 20 | 26 |
| | 90th Percentile | 26 | 25 | 47 |
| | Maximum | 28 | 26 | 52 |
| Hungary | Year | 2002 | 2003 | 2005 |
| | Minimum | 15 | 16 | 2 |
| | 10th Percentile | 15 | 16 | 7 |
| | Median | 19 | 21 | 28 |
| | 90th Percentile | 24 | 25 | 47 |
| | Maximum | 24 | 26 | 52 |
| Ireland | Year | 1996 | 1997 | |

| | | | | |
|---|---|---|---|---|
| | Minimum | 16 | 14 | |
| | 10th Percentile | 16 | 14 | |
| | Median | 17 | 15 | |
| | 90th Percentile | 19 | 16 | |
| | Maximum | 24 | 21 | |
| Italy | Year | 2003 | 2004 | 2005 |
| | Minimum | 13 | 14 | 1 |
| | 10th Percentile | 13 | 15 | 5 |
| | Median | 13 | 20 | 26 |
| | 90th Percentile | 13 | 25 | 47 |
| | Maximum | 13 | 26 | 52 |
| Netherlands | Year | 1999 | 2000 | 2005 |
| | Minimum | 1 | 14 | 1 |
| | 10th Percentile | 2 | 15 | 6 |
| | Median | 10 | 20 | 26 |
| | 90th Percentile | 19 | 25 | 47 |
| | Maximum | 22 | 26 | 52 |
| Norway | Year | 1995 | 1996 | 2005 |
| | Minimum | 16 | 14 | 1 |
| | 10th Percentile | 16 | 15 | 6 |
| | Median | 19 | 20 | 27 |
| | 90th Percentile | 22 | 25 | 47 |
| | Maximum | 22 | 26 | 52 |
| Poland | Year | 1999 | 2000 | 2005 |
| | Minimum | 7 | 14 | 1 |
| | 10th Percentile | 7 | 15 | 6 |
| | Median | 7 | 20 | 26 |
| | 90th Percentile | 7 | 25 | 47 |
| | Maximum | 7 | 26 | 52 |
| Portugal | Year | 1997 | 1998 | 2005 |
| | Minimum | 16 | 14 | 1 |
| | 10th Percentile | 18 | 15 | 5 |
| | Median | 20 | 20 | 26 |
| | 90th Percentile | 22 | 25 | 47 |
| | Maximum | 25 | 26 | 52 |
| Spain | Year | 1998 | 1999 | 2005 |
| | Minimum | 13 | 14 | 1 |
| | 10th Percentile | 14 | 15 | 6 |
| | Median | 18 | 20 | 26 |
| | 90th Percentile | 23 | 25 | 47 |
| | Maximum | 24 | 26 | 52 |
| Sweden | Year | 1999 | 2000 | 2005 |
| | Minimum | 5 | 5 | 1 |
| | 10th Percentile | 6 | 6 | 12 |

| | | | | |
|---|---|---|---|---|
| | Median | 11 | 12 | 31 |
| | 90th Percentile | 16 | 16 | 48 |
| | Maximum | 17 | 17 | 53 |
| Switzerland | Year | 2009 | 2010 | 2010 |
| | Minimum | 13 | 1 | 1 |
| | 10th Percentile | 13 | 5 | 5 |
| | Median | 17 | 27 | 27 |
| | 90th Percentile | 21 | 47 | 47 |
| | Maximum | 26 | 51 | 51 |
| United Kingdom | Year | 1991 | 1992 | 2008 |
| | Minimum | 8 | 10 | 1 |
| | 10th Percentile | 9 | 11 | 10 |
| | Median | 15 | 16 | 21 |
| | 90th Percentile | 20 | 21 | 43 |
| | Maximum | 20 | 22 | 52 |
| | | | | |

## W.2 Calculation of Employment Rate

In this section, we provide four different alternative measures of the employment rate. The first three alternative measures set the employment status equal to one if an individual reports positive hours worked, but vary which hours measure they rely on. They are reported in Table W.2. Using positive usual hours worked (column 1) leaves the employment rate virtually unchanged. This is reassuring as anyone reporting to be employed should usually work positive hours. While we think that the next two definitions are at odds with the intention to measure both employment and hours worked per employed, we nevertheless report them for completeness: using a measure of actual hours worked, namely either from the Raw Micro Data (column 2) or from the Adjusted Micro Data (column 3), decreases employment. This is not surprising, as some employed people should report zero actual hours in the reference week due to sickness or vacation. Table W.3

Finally, our fourth measure of the employment rate regards a knife edge case, namely how one handles parental leave policies, which are mostly relevant for women. The surveys give the option to report being employed while working zero hours in the reference week because of maternity leave. A brief leave immediately surrounding birth is certainly comparable to a sick leave in the context of the construction of our measures of labor supply. However, in countries with very generous maternity leave policies and long average maternity leaves,[14] it is less clear whether a mother on maternity leave should be counted as employed and contributing zero hours worked to hours worked per employed. Unfortunately, we do not observe how long a woman has already been on maternity leave or how long she intends do stay on leave. Therefore, in our baseline analysis we treat anyone who self-reports being employed but works zero hours because of maternity leave as being employed and contributing zero hours to our estimate of hours worked per employed (see the "baseline" columns in Table W.4). In an alternative approach, we treat all of these women as not being employed and thus not contributing to hours worked per employed (see the "Maternal leave = not employed" columns in Table W.4). This measure therefore provides a lower bound of the employment rate. As Table W.4 shows, these two different definitions only have a very modest impact on the female employment rates, with a maximum difference of 2.8 percentage points in Norway and a minimum difference of 0.2 percentage points in the US. These differences, while largest in country groups with generous maternal leave policies, namely Western Europe and Scandinavia, are hence too small to drive international differences in female employment rates.

[14] E.g. German mothers may stay out of their job for up to three years and then in principle return to their previous employer at the same pay and position held prior to birth.

Table W.2: Cross-country comparison of different employment rates relative to self-reported employment rate (all years)

| Country | Positive usual hours | Adjusted Micro > 0 | Raw Micro > 0 |
|---|---|---|---|
| Denmark | 0.0 | −4.2 | −8.1 |
| Norway | −1.0 | −7.7 | −11.9 |
| Sweden | 0.0 | −5.5 | −9.3 |
| *Mean* | *-0.4* | *-5.8* | *-9.7* |
| Austria | 0.0 | −3.7 | −6.3 |
| Belgium | −0.1 | −1.9 | −3.4 |
| Switzerland | 0.0 | −2.5 | −6.8 |
| France | 0.0 | −2.8 | −6.4 |
| Ireland | 0.0 | −1.9 | −3.0 |
| Germany | 0.0 | −2.4 | −3.9 |
| Netherlands | −0.1 | −3.3 | −6.0 |
| United Kingdom | 0.0 | −2.6 | −5.8 |
| *Mean* | *0.0* | *-2.6* | *-5.2* |
| Czech Republic | −0.3 | −2.4 | −4.0 |
| Hungary | 0.0 | −1.1 | −2.0 |
| Poland | −0.4 | −1.4 | −2.2 |
| *Mean* | *-0.2* | *-1.6* | *-2.7* |
| Spain | 0.1 | −1.4 | −2.7 |
| Greece | 0.0 | −0.7 | −1.5 |
| Italy | 0.0 | −1.9 | −2.8 |
| Portugal | 0.0 | −1.9 | −2.9 |
| *Mean* | *0.0* | *-1.5* | *-2.5* |
| US | 0.0 | −1.1 | −2.6 |

Table W.3: Cross-country comparison of hours worked per employed based on different definitions of employment, relative to hours worked per employed based on self-reported employment status (all years)

| **Country** | Positive usual hours | Weekly Hours $> 0$ | Actual Hours $> 0$ |
|---|---|---|---|
| Denmark | 0.0 | 5.9 | 17.3 |
| Norway | 1.5 | 11.4 | 23.8 |
| Sweden | 0.0 | 8.3 | 19.2 |
| *Mean* | *0.5* | *8.5* | *20.1* |
| Austria | 0.0 | 5.7 | 21.4 |
| Belgium | 0.1 | 3.5 | 16.3 |
| Switzerland | 0.0 | 3.3 | 16.1 |
| France | 0.1 | 4.7 | 22.3 |
| Ireland | 0.0 | 3.3 | 14.6 |
| Germany | 0.0 | 3.7 | 22.9 |
| Netherlands | 0.1 | 5.2 | 14.7 |
| United Kingdom | 0.1 | 4.0 | 13.7 |
| *Mean* | *0.0* | *4.2* | *17.8* |
| Spain | 0.1 | 2.9 | 14.7 |
| Greece | 0.0 | 1.3 | 14.4 |
| Italy | 0.0 | 3.6 | 21.4 |
| Portugal | 0.0 | 3.1 | 16.1 |
| *Mean* | *0.0* | *2.7* | *16.6* |
| Czech Republic | 0.4 | 3.8 | 17.7 |
| Hungary | 0.0 | 2.1 | 13.5 |
| Poland | 0.6 | 2.5 | 14.2 |
| *Mean* | *0.3* | *2.8* | *15.1* |
| US | 0.0 | 1.7 | 8.4 |

Table W.4: Female employment rate and hours worked per employed (all years): Different treatment of maternity leave

| | ER | | HWE | |
|---|---|---|---|---|
| **Country** | Baseline | Maternal leave = not employed | Baseline | Maternal leave = not employed |
| **Scandinavia** | **71.0** | **−2.7** | **1338.6** | **3.6** |
| Denmark | 70.3 | −1.9 | 1368.9 | 2.7 |
| Norway | 72.4 | −2.9 | 1258.8 | 3.9 |
| Sweden | 70.3 | −3.3 | 1388.1 | 4.2 |
| **Eastern Europe** | **52.1** | **−0.4** | **1751.9** | **0.8** |
| Czech Republic | 57.1 | −0.6 | 1724.3 | 1.1 |
| Hungary | 49.4 | −0.2 | 1790.6 | 0.5 |
| Poland | 49.8 | −0.4 | 1740.7 | 0.8 |
| **Western Europe** | **56.7** | **−0.9** | **1386.1** | **1.6** |
| Austria | 61.9 | −2.0 | 1432.6 | 3.4 |
| Belgium | 46.4 | −0.5 | 1488.4 | 1.1 |
| France | 54.1 | −0.9 | 1475.9 | 1.7 |
| Germany | 57.6 | −1.4 | 1365.8 | 2.3 |
| Ireland | 45.5 | −0.8 | 1491.2 | 1.6 |
| Netherlands | 57.1 | −0.6 | 1135.4 | 0.8 |
| Switzerland | 70.0 | −0.5 | 1350.3 | 0.7 |
| United Kingdom | 61.3 | −0.8 | 1348.9 | 1.2 |
| **Southern Europe** | **44.0** | **−0.4** | **1640.3** | **0.8** |
| Greece | 40.7 | −0.2 | 1769.0 | 0.5 |
| Italy | 39.3 | −0.6 | 1477.6 | 1.3 |
| Portugal | 57.3 | −0.4 | 1708.6 | 0.7 |
| Spain | 38.8 | −0.3 | 1606.0 | 0.7 |
| **US** | **64.0** | **−0.2** | **1713.3** | **0.3** |

## W.3 Public Holidays and Days of Annual Leave

Figure W.1: Austria

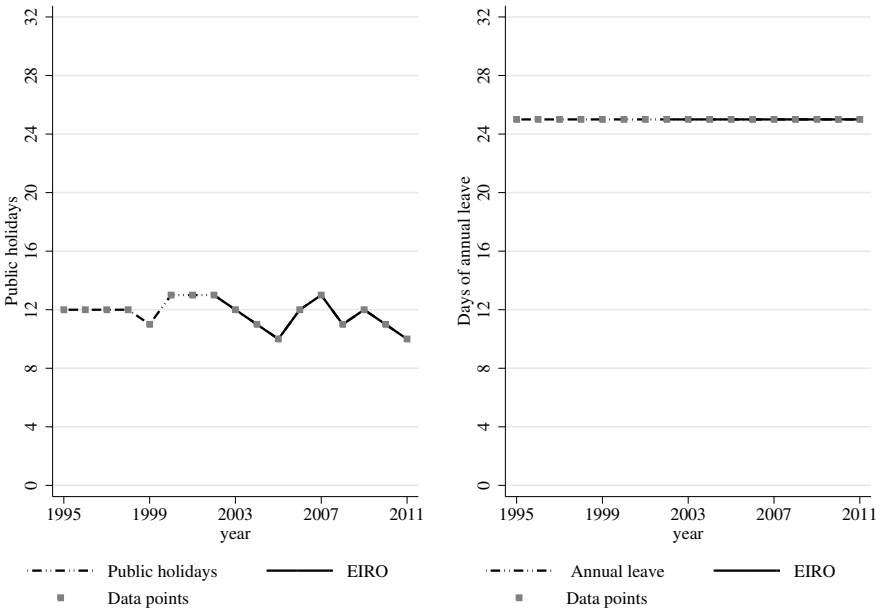



Figure W.2: Belgium

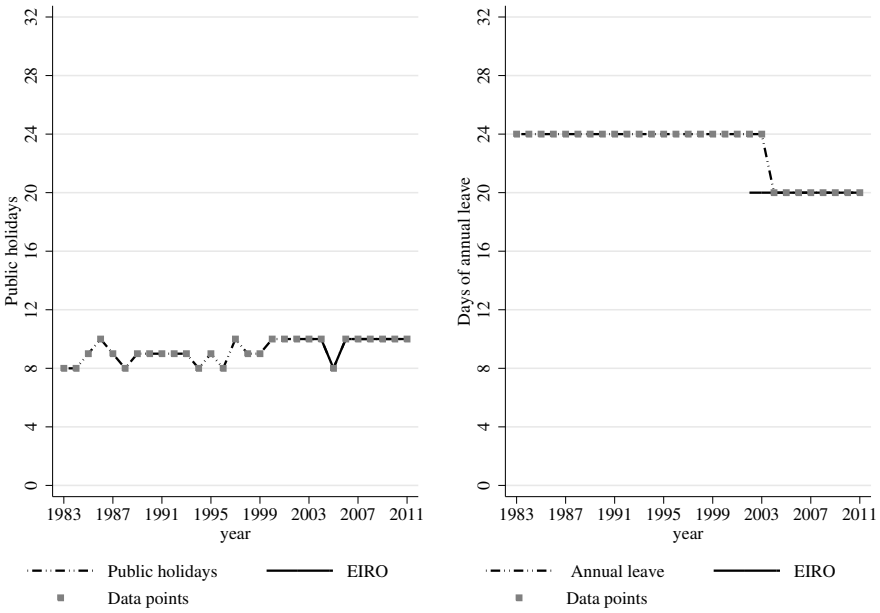


Figure W.3: Czech Republic

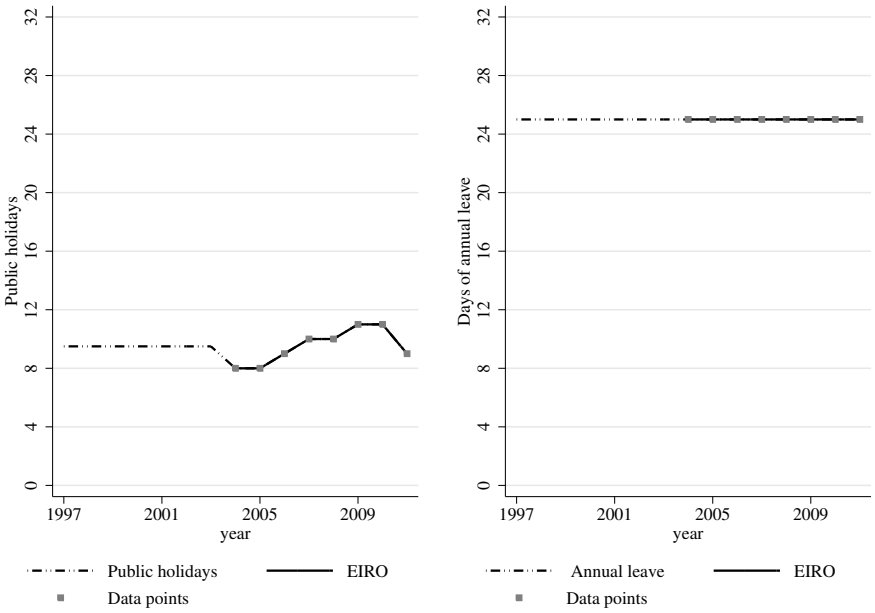



Figure W.4: Denmark

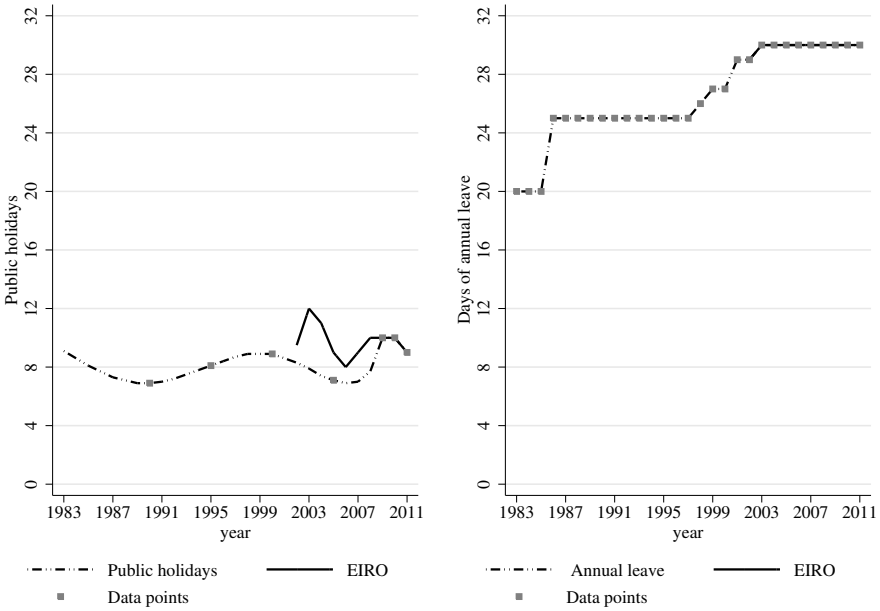


Figure W.5: France

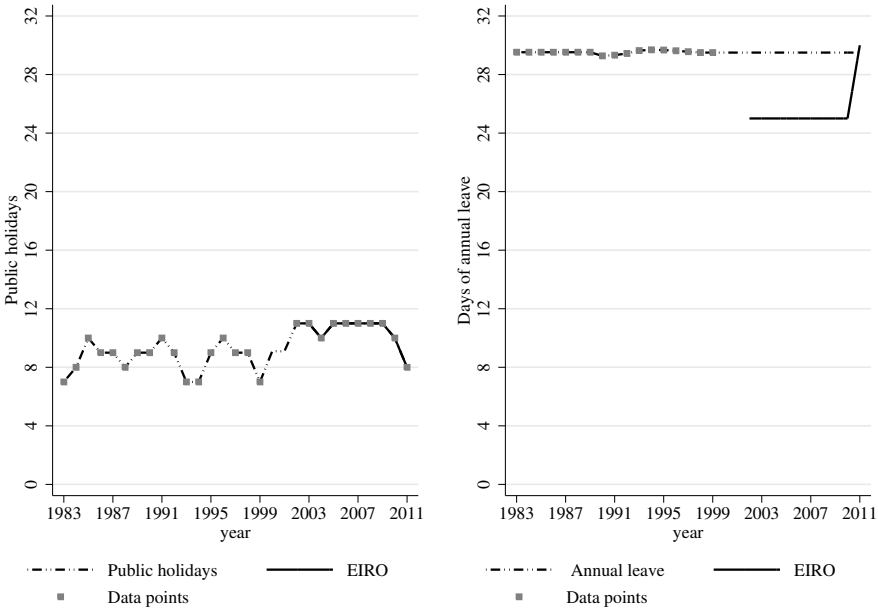



Figure W.6: Germany

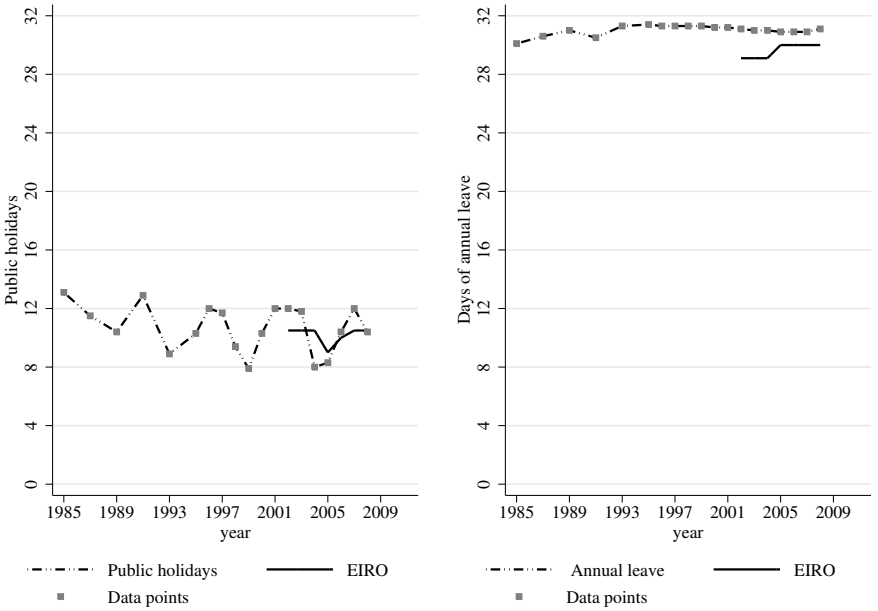


Figure W.7: Greece

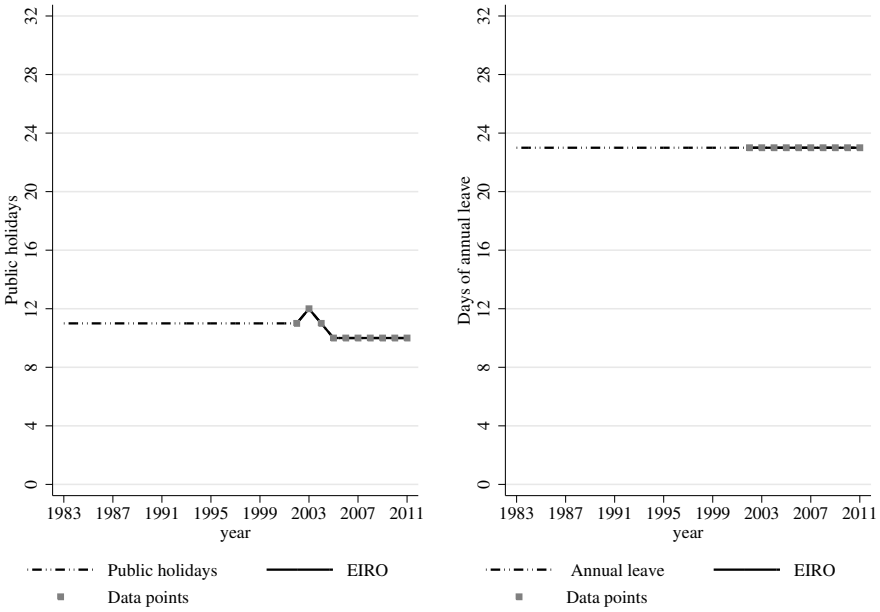



Figure W.8: Hungary

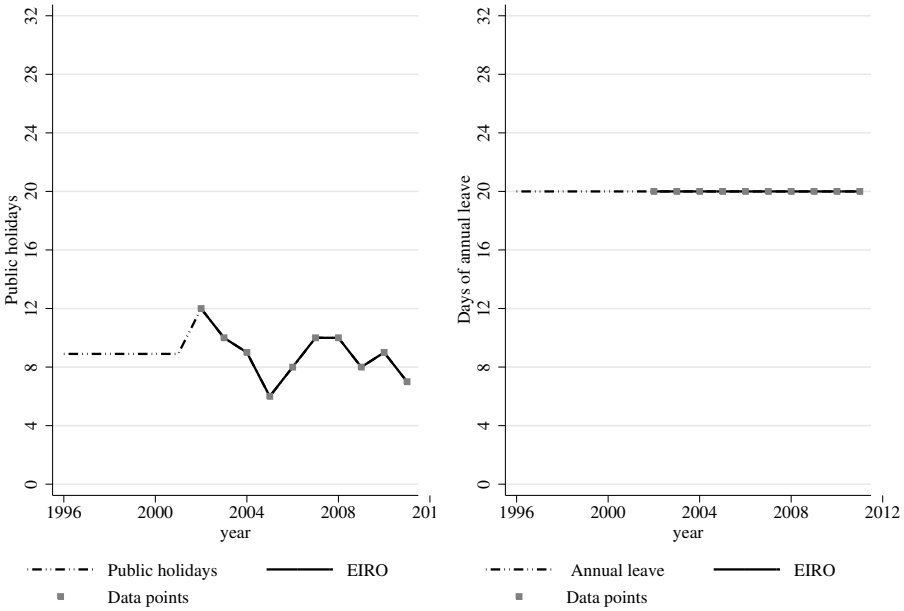


Figure W.9: Ireland

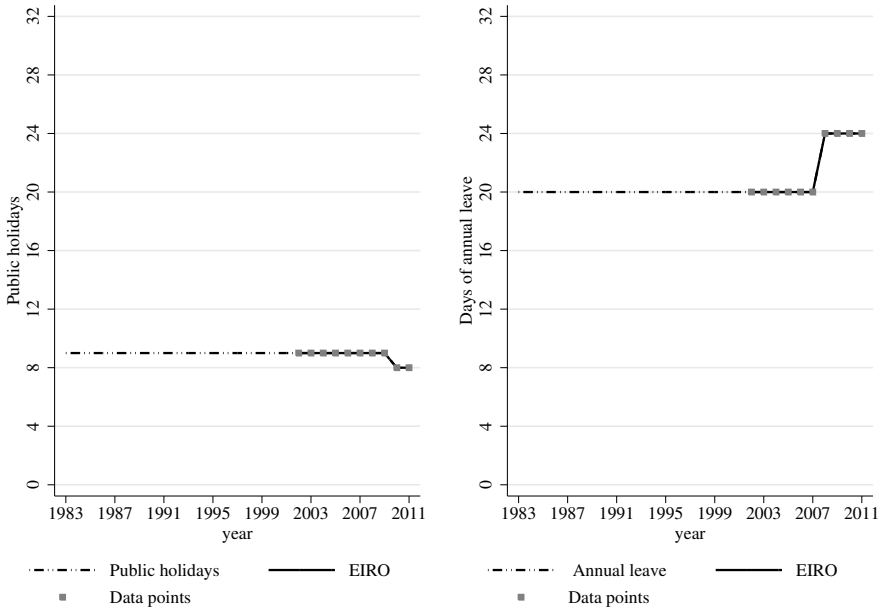


Figure W.10: Italy

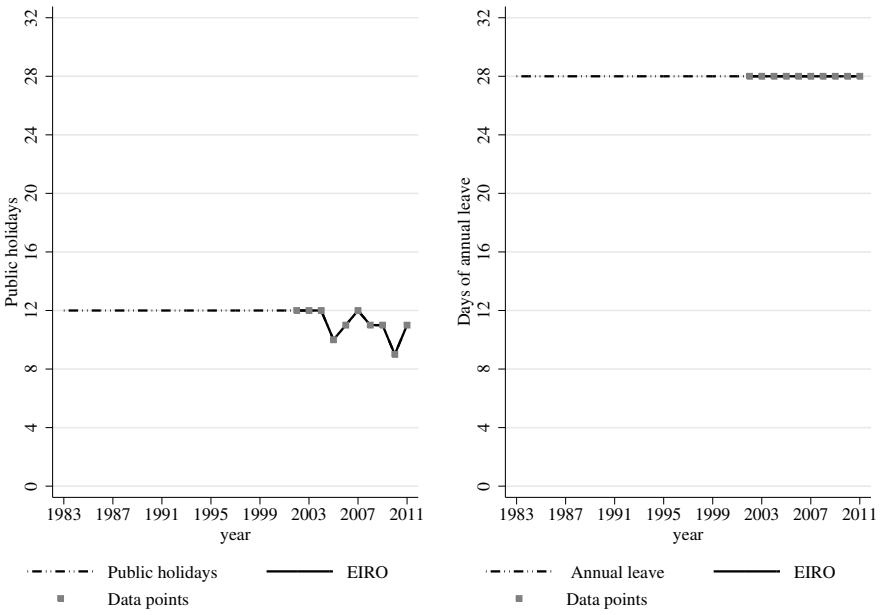



Figure W.11: Netherlands

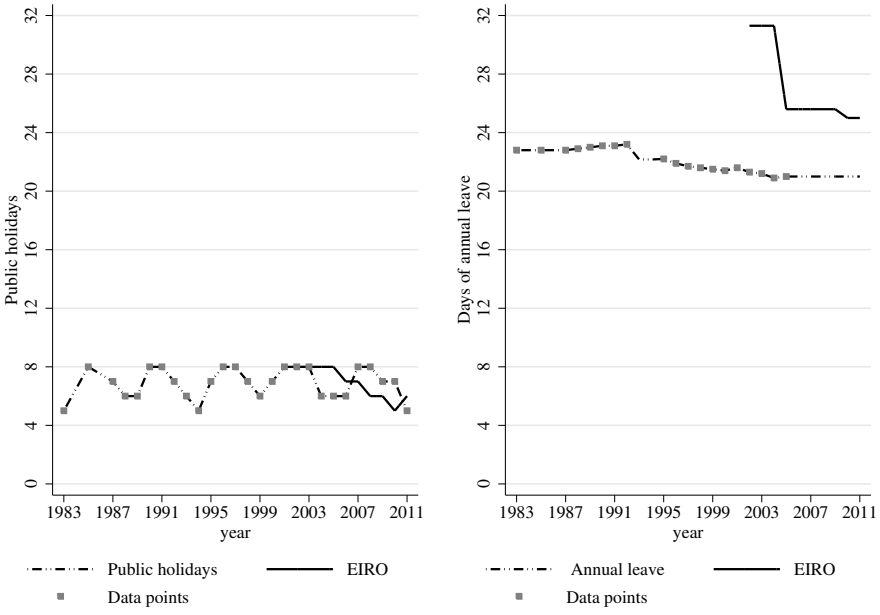


Figure W.12: Norway

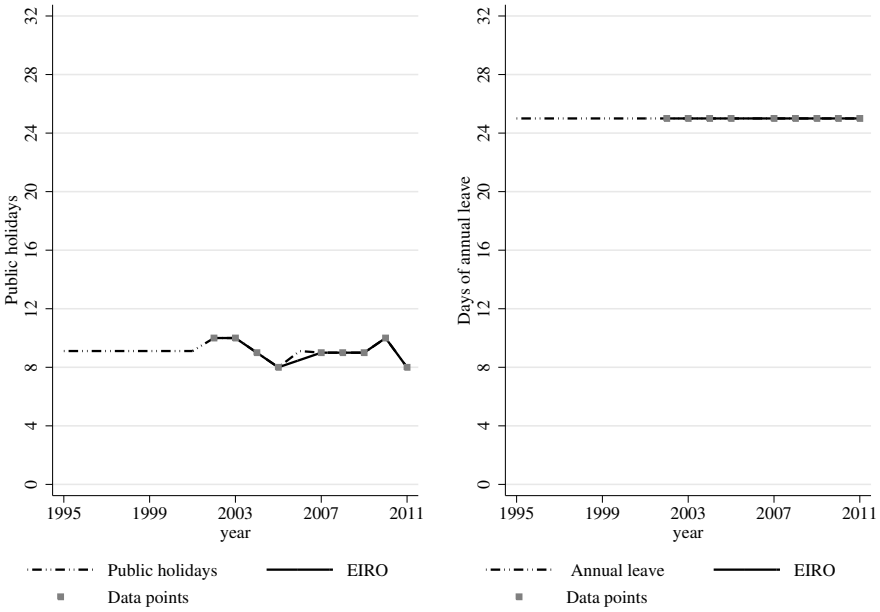



Figure W.13: Poland

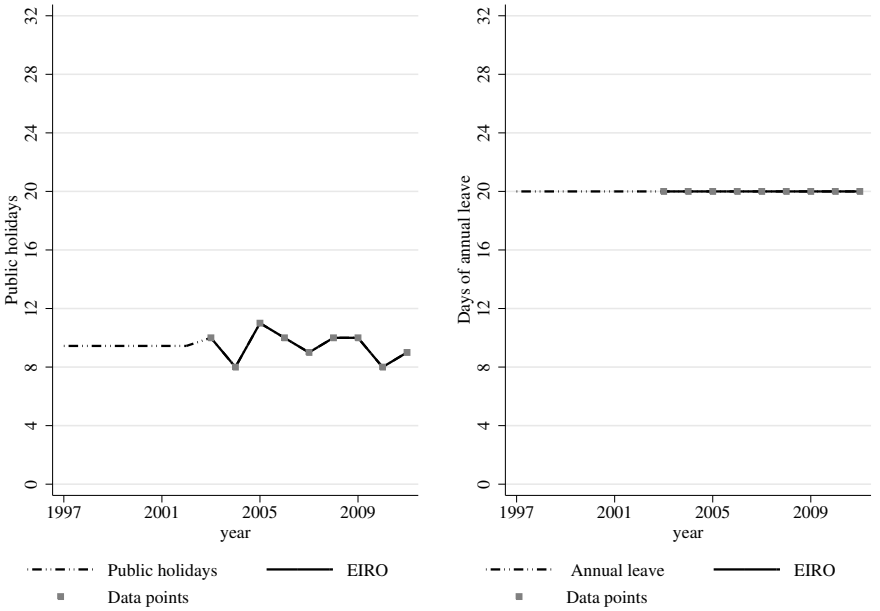


Figure W.14: Portugal

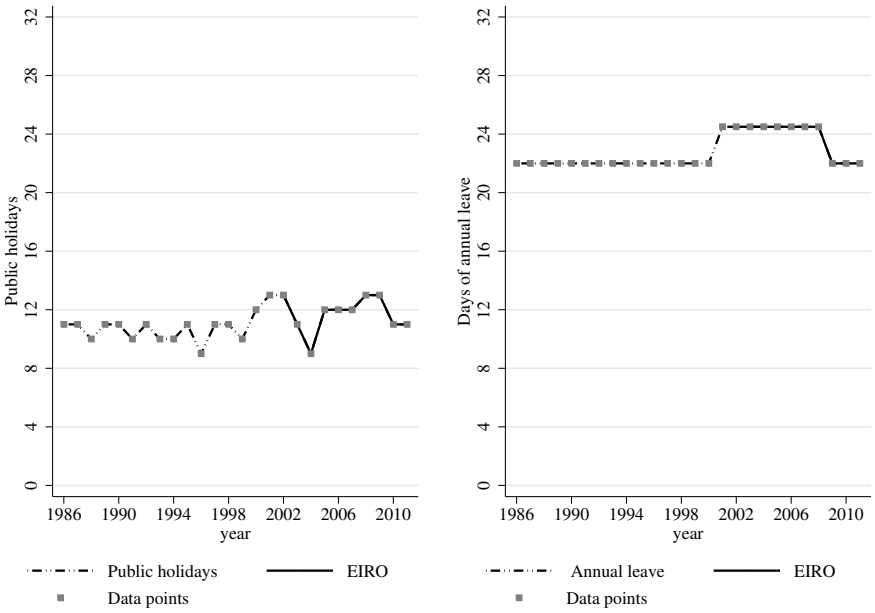



Figure W.15: Spain

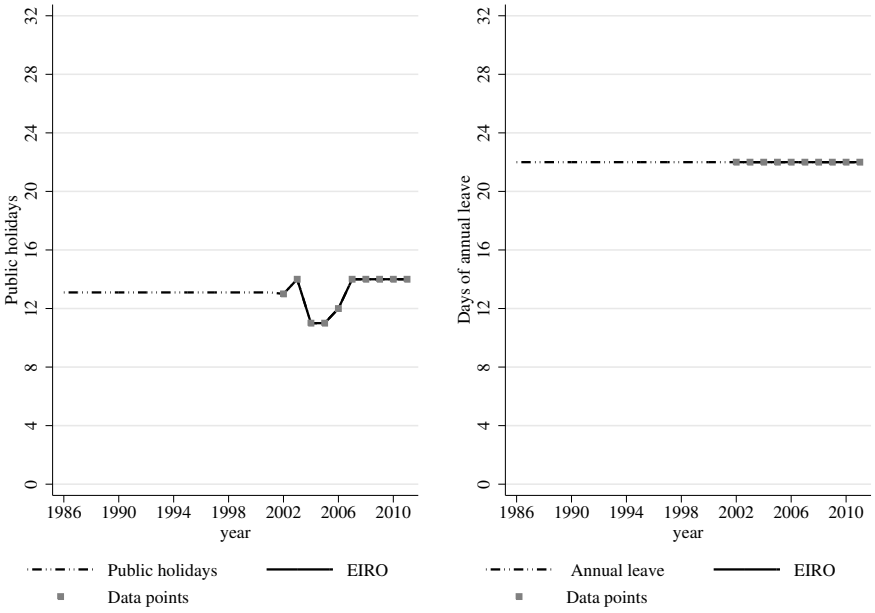


Figure W.16: Sweden

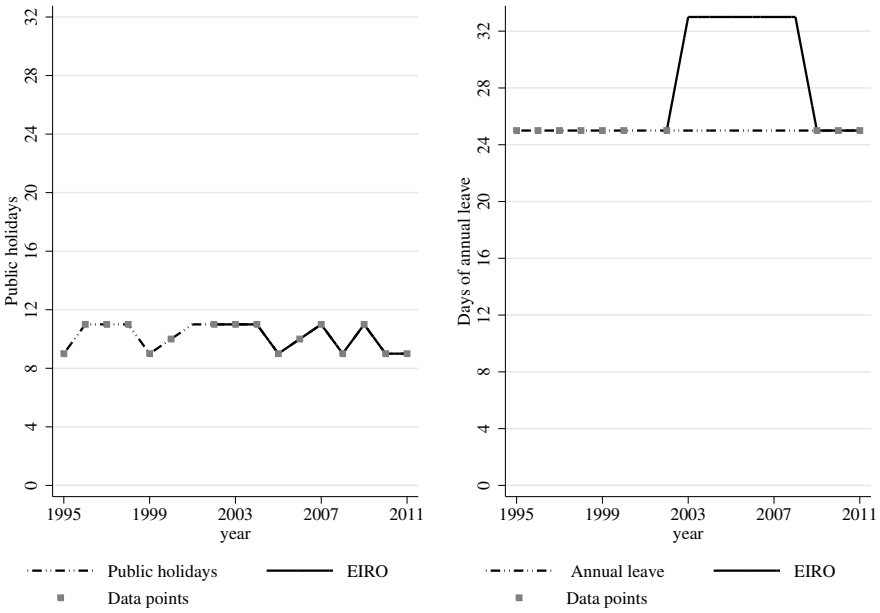



Figure W.17: Switzerland

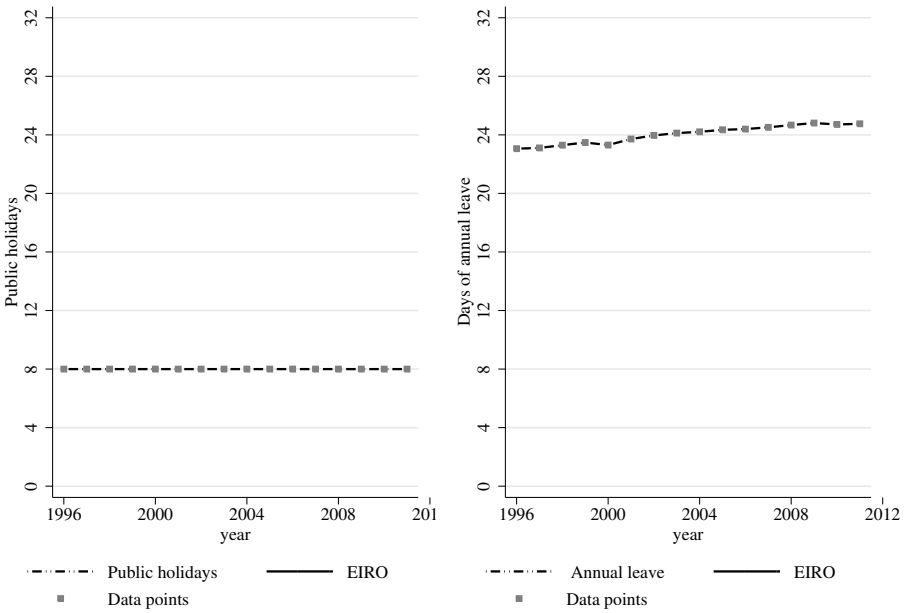


Figure W.18: United Kingdom

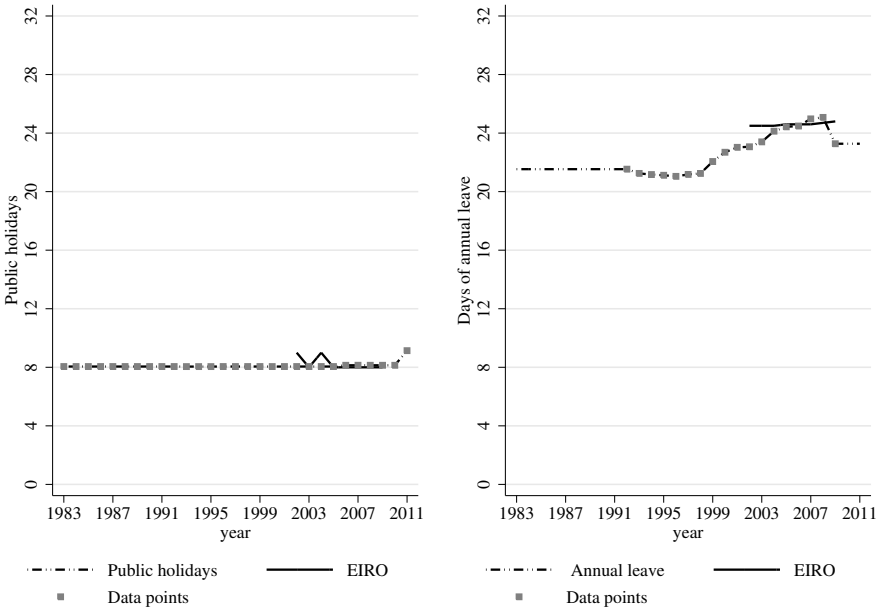
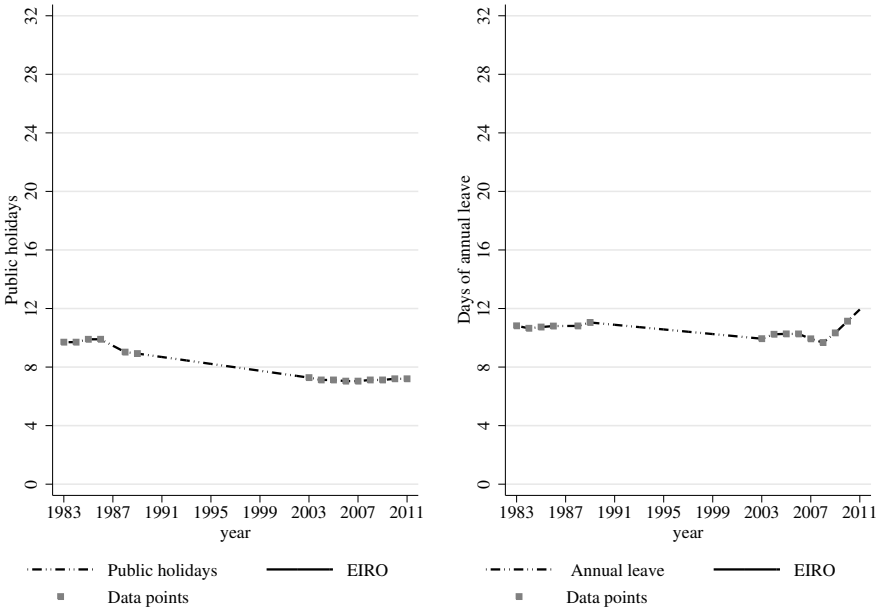



Figure W.19: United States



## W.4 Comparison to OECD and Conference Board: Trends

Table W.5: Trends in hours worked per person for different data sources (in %, all years)

| **Country** | BBF | OECD | difference | CB | difference | difference OECD-CB |
|---|---|---|---|---|---|---|
| US | −1.0 | −4.0 | 3.0 | −3.7 | 2.7 | −0.3 |
| *Mean* | *-1.0* | *-4.0* | *3.0* | *-3.7* | *2.7* | *-0.3* |
| Czech Republic | −5.7 | −8.3 | 2.7 | −6.8 | 1.2 | −1.5 |
| Hungary | 2.0 | 2.3 | −0.2 | 1.3 | 0.7 | 0.9 |
| Poland | 10.2 | 11.3 | −1.1 | 11.8 | −1.6 | −0.4 |
| *Mean* | *2.2* | *1.7* | *0.4* | *2.1* | *0.1* | *-0.3* |
| Denmark | −7.9 | −5.0 | −2.9 | −5.4 | −2.5 | 0.4 |
| Norway | 0.0 | −4.0 | 4.0 | −4.0 | 4.1 | 0.1 |
| Sweden | 7.1 | 0.3 | 6.8 | 0.3 | 6.8 | 0.0 |
| *Mean* | *-0.2* | *-2.9* | *2.6* | *-3.0* | *2.8* | *0.1* |
| Austria | 2.4 | −2.9 | 5.3 | −2.7 | 5.2 | −0.2 |
| Belgium | 8.2 | 8.1 | 0.1 | 8.1 | 0.1 | 0.0 |
| Switzerland | −0.3 | −0.7 | 0.4 | −0.5 | 0.2 | −0.1 |
| France | −4.4 | −8.4 | 3.9 | −8.4 | 3.9 | 0.0 |
| Ireland | −5.3 | −7.0 | 1.7 | −0.4 | −5.0 | −6.6 |
| Germany | −0.8 | −2.8 | 2.0 | −2.8 | 2.0 | 0.0 |
| Netherlands | 23.9 | 30.6 | −6.8 | 24.4 | −0.5 | 6.2 |
| United Kingdom | 1.8 | −0.7 | 2.5 | −3.1 | 4.9 | 2.4 |
| *Mean* | *3.2* | *2.0* | *1.1* | *1.8* | *1.4* | *0.2* |
| Spain | 16.8 | 15.7 | 1.1 | 15.5 | 1.3 | 0.2 |
| Greece | 3.4 | −0.5 | 3.9 | −5.2 | 8.6 | 4.7 |
| Italy | 2.9 | 5.4 | −2.5 | 5.4 | −2.5 | 0.0 |
| Portugal | −5.6 | −9.0 | 3.4 | 10.5 | −16.0 | −19.5 |

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Table W.6: Trends in the employment rates for different data sources (in %, all years)

| **Country** | BBF | OECD | difference |
|---|---|---|---|
| US | −0.8 | −1.1 | 0.3 |
| *Mean* | *-0.8* | *-1.1* | *0.3* |
| Czech Republic | −2.0 | −2.9 | 0.9 |
| Hungary | 6.0 | 4.7 | 1.3 |
| Poland | 13.7 | 13.5 | 0.2 |
| *Mean* | *5.9* | *5.1* | *0.8* |
| Denmark | 0.4 | −0.2 | 0.7 |
| Norway | 2.3 | 0.6 | 1.7 |
| Sweden | 5.0 | 1.6 | 3.4 |
| *Mean* | *2.6* | *0.7* | *1.9* |
| Austria | 6.2 | 5.4 | 0.8 |
| Belgium | 16.1 | 17.0 | −0.9 |
| Switzerland | 2.0 | 2.2 | −0.1 |
| France | 3.6 | 3.7 | −0.1 |
| Ireland | 18.5 | 18.8 | −0.3 |
| Germany | 6.7 | 6.5 | 0.3 |
| Netherlands | 40.1 | 41.3 | −1.2 |
| United Kingdom | 7.4 | 5.8 | 1.6 |
| *Mean* | *12.6* | *12.6* | *0.0* |
| Spain | 25.5 | 20.6 | 4.9 |
| Greece | 6.9 | 6.9 | 0.0 |
| Italy | 6.9 | 11.1 | −4.2 |
| Portugal | 4.0 | 3.8 | 0.2 |

Table W.7: Trends in hours worked per employed for different data sources (in %, all years)

| **Country** | BBF | OECD | difference | CB | difference | difference OECD-CB |
|---|---|---|---|---|---|---|
| US | −0.2 | −2.9 | 2.7 | −2.7 | 2.5 | −0.3 |
| *Mean* | *-0.2* | *-2.9* | *2.7* | *-2.7* | *2.5* | *-0.3* |
| Czech Republic | −3.7 | −5.6 | 1.8 | −4.0 | 0.3 | −1.5 |
| Hungary | −3.8 | −2.4 | −1.4 | −3.3 | −0.5 | 0.9 |
| Poland | −3.1 | −1.9 | −1.2 | −1.5 | −1.6 | −0.4 |
| *Mean* | *-3.5* | *-3.3* | *-0.3* | *-2.9* | *-0.6* | *-0.3* |
| Denmark | −8.3 | −4.8 | −3.5 | −5.1 | −3.1 | 0.3 |
| Norway | −2.2 | −4.5 | 2.3 | −4.6 | 2.4 | 0.1 |
| Sweden | 1.9 | −1.3 | 3.2 | −1.3 | 3.2 | 0.0 |
| *Mean* | *-2.8* | *-3.5* | *0.7* | *-3.7* | *0.8* | *0.1* |
| Austria | −3.6 | −7.9 | 4.3 | −7.7 | 4.2 | −0.2 |
| Belgium | −6.8 | −7.6 | 0.8 | −7.6 | 0.9 | 0.0 |
| Switzerland | −2.6 | −2.8 | 0.2 | −2.7 | 0.1 | −0.1 |
| France | −7.7 | −11.6 | 3.9 | −11.6 | 3.9 | 0.0 |
| Ireland | −20.1 | −21.7 | 1.6 | −16.2 | −4.0 | −5.6 |
| Germany | −7.1 | −8.7 | 1.6 | −8.7 | 1.6 | 0.0 |
| Netherlands | −11.9 | −7.6 | −4.2 | −12.0 | 0.2 | 4.4 |
| United Kingdom | −5.5 | −5.2 | −0.3 | −8.6 | 3.2 | 3.4 |
| *Mean* | *-8.1* | *-9.2* | *1.0* | *-9.4* | *1.3* | *0.2* |
| Spain | −7.0 | −4.0 | −2.9 | −4.2 | −2.8 | 0.2 |
| Greece | −3.4 | −6.9 | 3.6 | −11.4 | 8.0 | 4.4 |
| Italy | −3.7 | −5.1 | 1.3 | −5.1 | 1.3 | 0.0 |
| Portugal | −9.2 | −12.3 | 3.1 | 6.4 | −15.6 | −18.7 |

Figure W.20: Austria

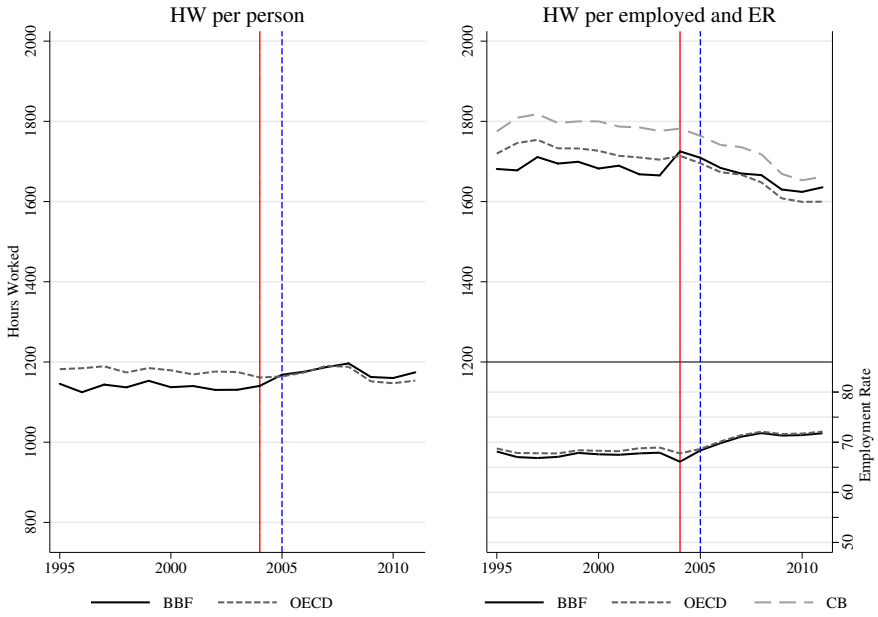


Figure W.21: Belgium

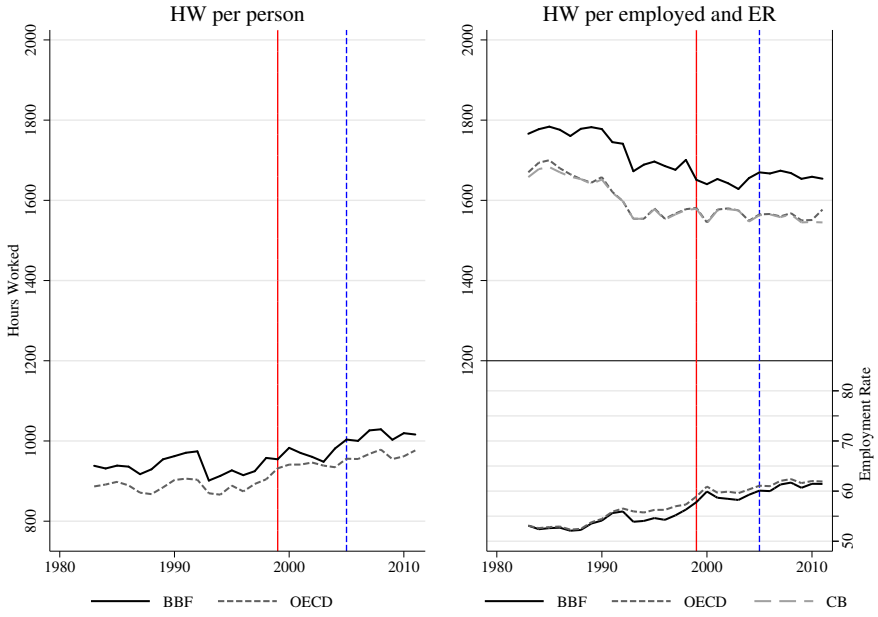

Figure W.22: Czech Republic

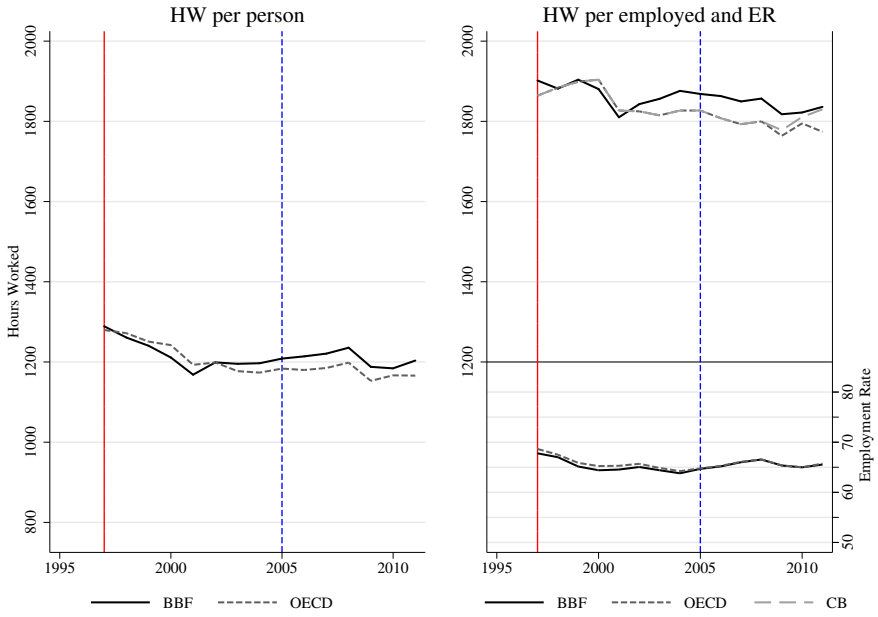


Figure W.23: Denmark

Figure W.24: France


Figure W.25: Germany

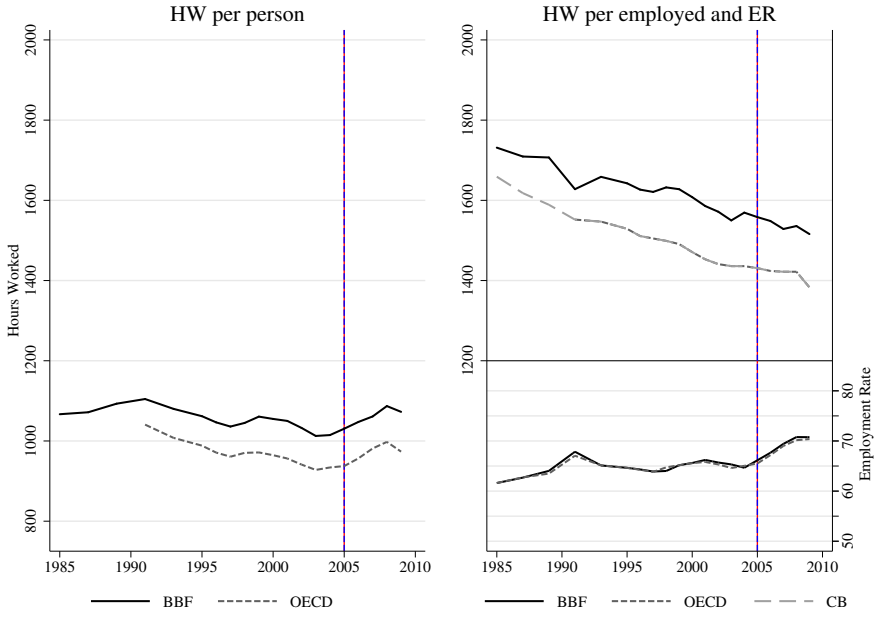

Figure W.26: Greece

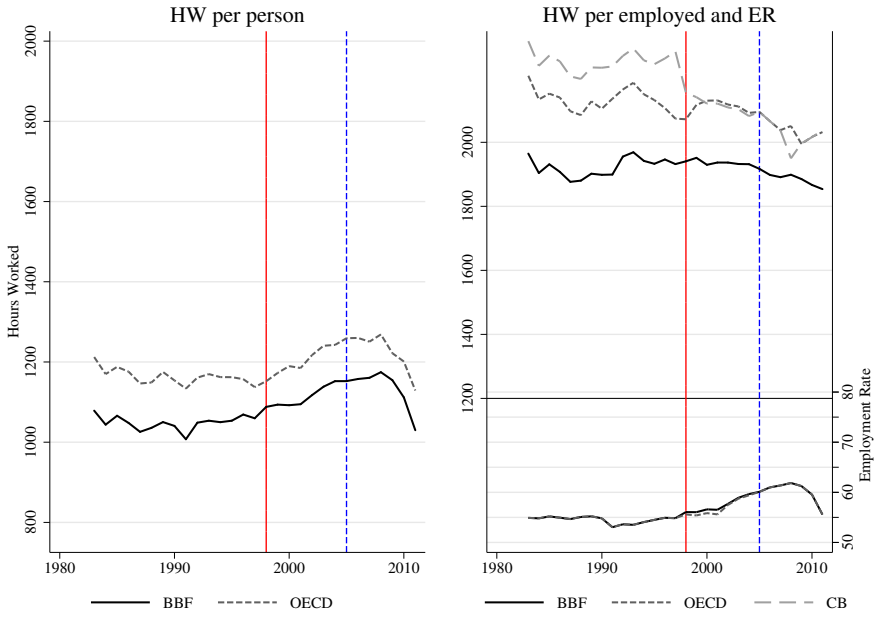


Figure W.27: Hungary

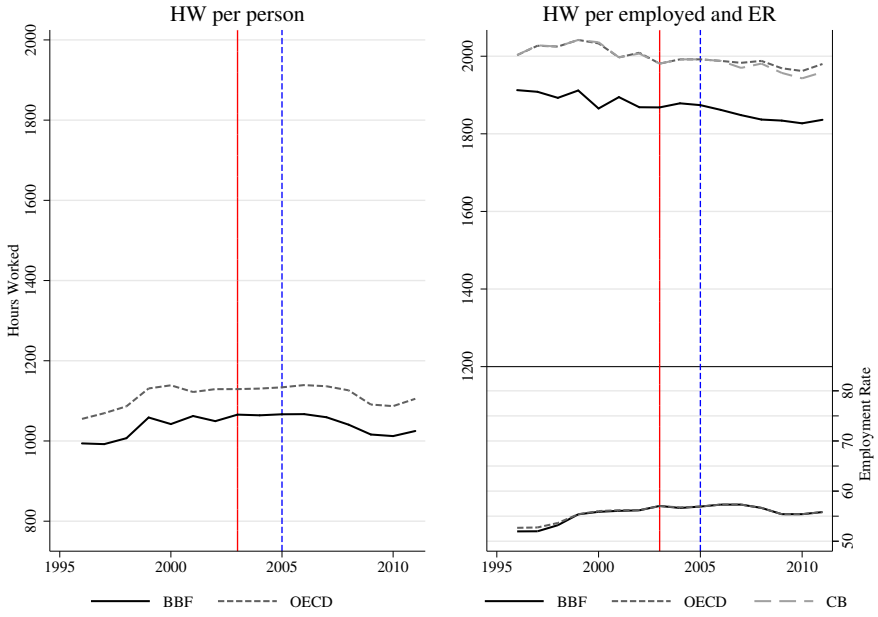

Figure W.28: Ireland

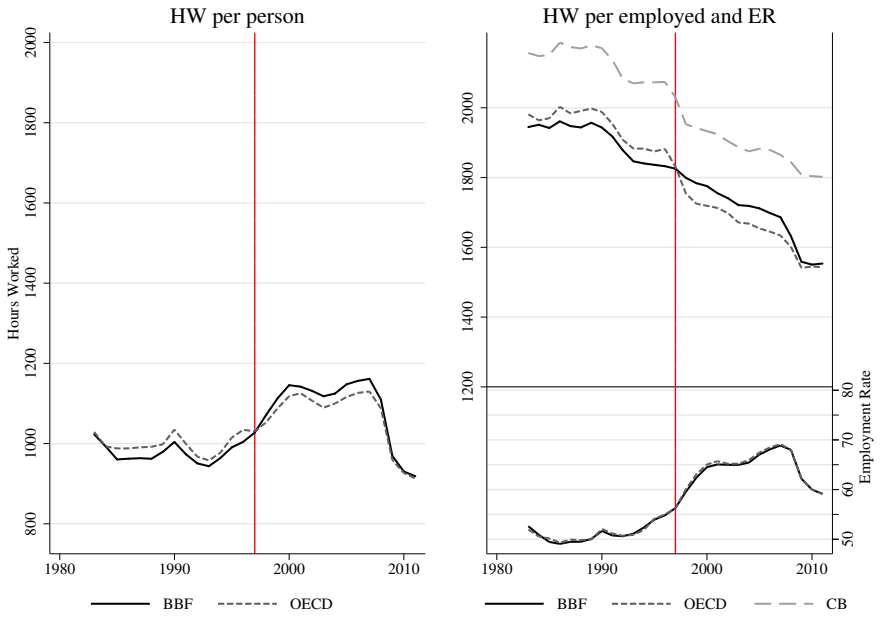

Figure W.29: Italy

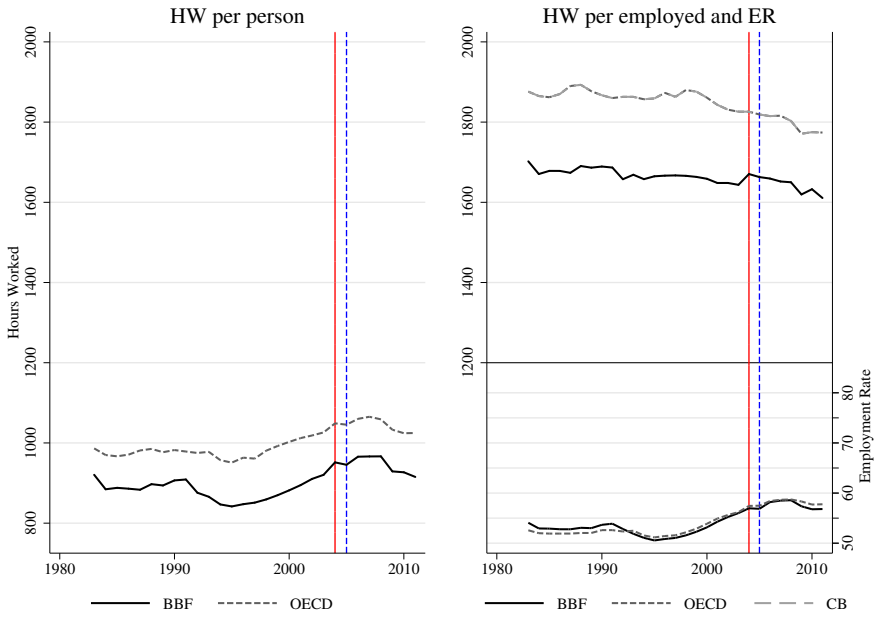


Figure W.30: Netherlands

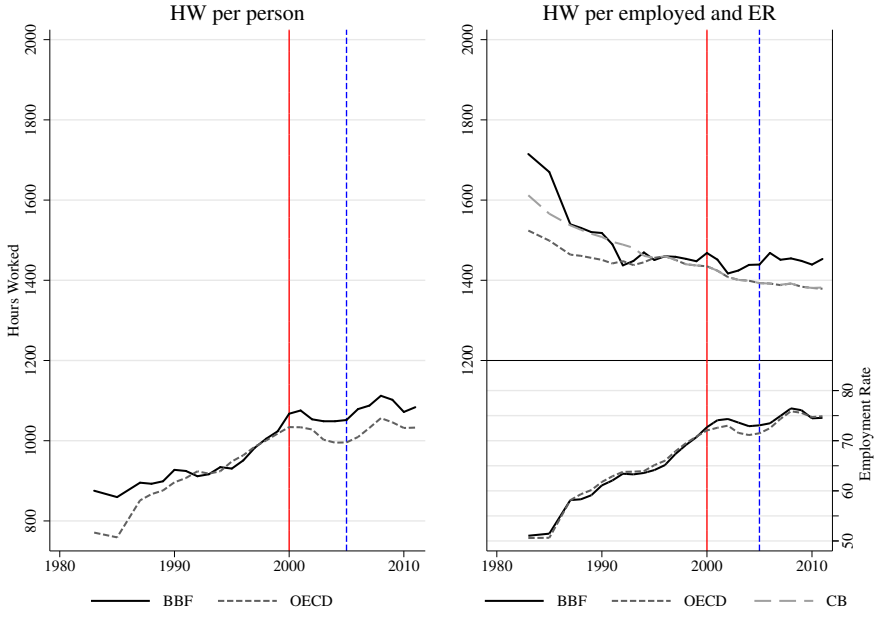

Figure W.31: Norway

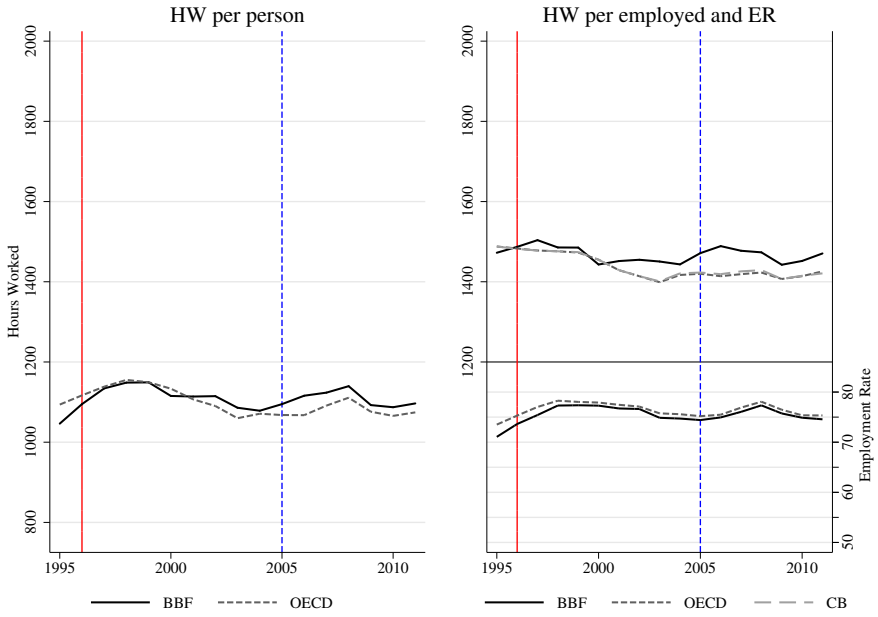


Figure W.32: Poland

Figure W.33: Portugal

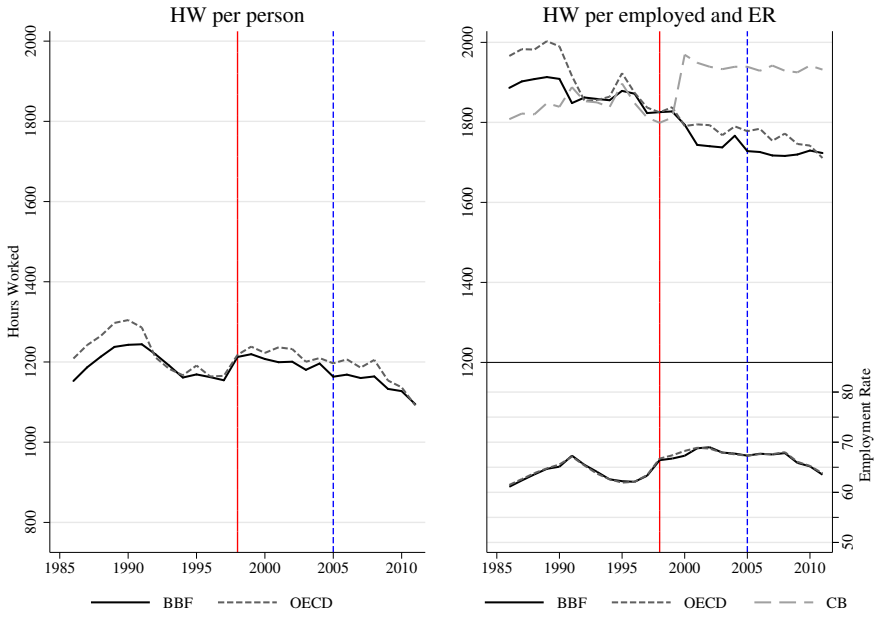


Figure W.34: Spain

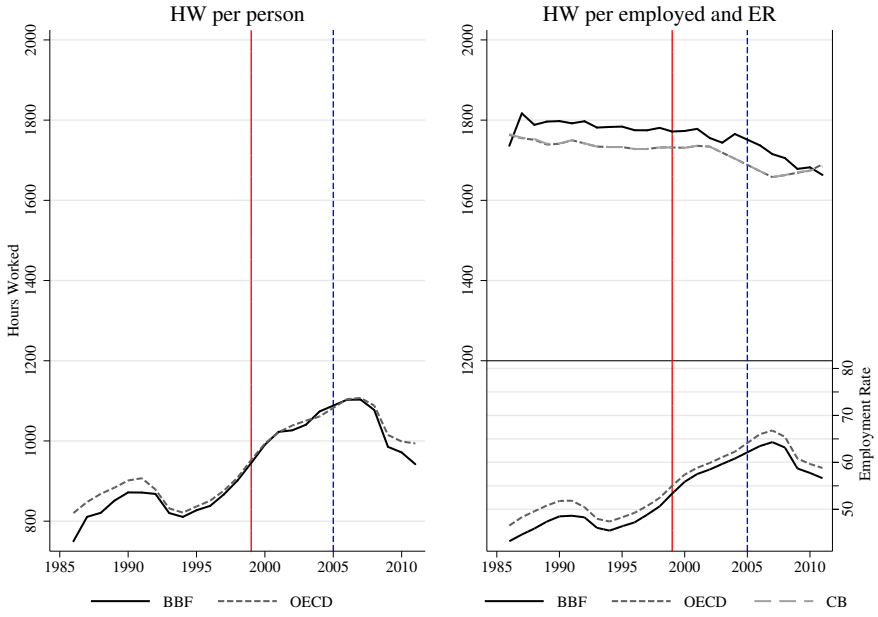

Figure W.35: Sweden


Figure W.36: Switzerland

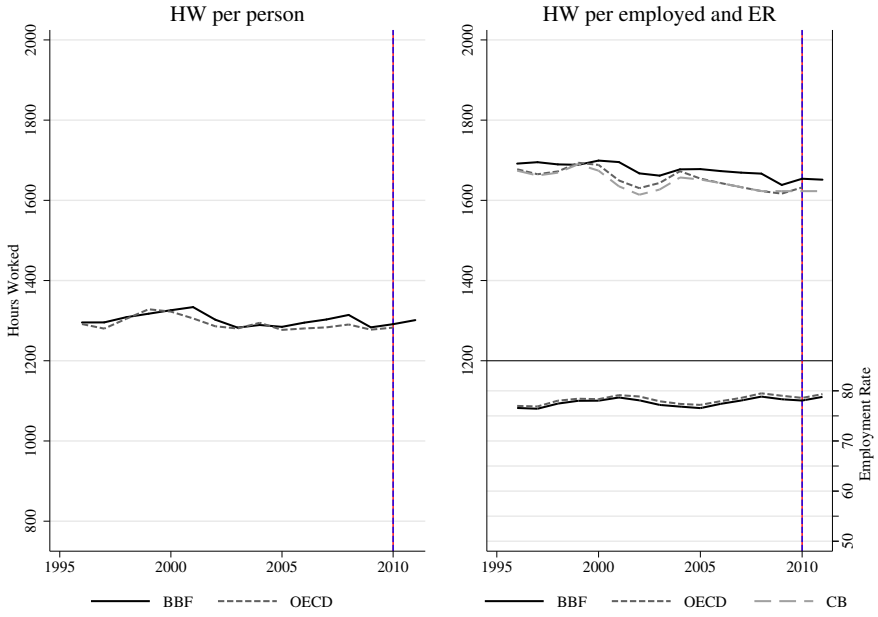

Figure W.37: United Kingdom


Figure W.38: United States