Online Appendix

Hours Worked in Europe and the US: New Data, New Answers

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A Data and Measurement Appendix

A.1 Construction of Hours Data from Labor Force Surveys

A.1.1 Dropped Observations

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 to calculate hours worked, see subsection 2.4 for 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.

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, the fraction of people reporting having worked less than usual due to compensation leave is with 3.4 percent extraordinarily high compared to 2004 and 2006 (less than 0.03 percent in both years). As a result 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. We found this change so

Table A.1: Average Fraction of Observations Dropped Because of Missings in Usual or Actual Hours Worked (in %, all years)

Country	$h_{act} = .$ **and set to zero**	$h_{act} = .$ **and dropped**	$h_{usu} = .$ **and dropped**
Denmark	0.00	0.53	0.00
Norway	0.92	0.83	0.03
Sweden	0.00	0.08	0.00
Mean	*0.31*	*0.48*	*0.01*
Austria	0.24	0.00	0.00
Belgium	0.00	1.38	0.04
France	0.00	0.05	0.01
Germany	0.00	0.00	0.00
Ireland	0.00	0.29	0.00
Netherlands	0.00	0.54	0.00
Switzerland	0.00	2.04	0.00
United Kingdom	0.00	0.91	0.01
Mean	*0.03*	*0.65*	*0.01*
Czech Republic	0.00	0.16	0.00
Hungary	0.00	0.02	0.00
Poland	0.00	0.10	0.09
Mean	*0.00*	*0.09*	*0.03*
Greece	0.00	0.01	0.00
Italy	0.01	0.16	0.00
Portugal	0.00	0.55	0.01
Spain	0.00	0.74	0.01
Mean	*0.00*	*0.36*	*0.01*
US	1.86	0.29	0.28

Note: Full population (aged 15 and over), all years.

unusual that we decided to drop 2005 for Spain.

Tables A.2 and A.3 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 observations with an average of 115,000 observations. For some countries there are large changes in sample sizes over the years: In 2006, Germany's sample size decreases from 300,000 in 2005 to 32,000 in 2006. Similar drops occur in France in 2003 (110,000 to 55,000) or Spain in 2006 (120,000 to 70,000). For most countries, we see an increase in sample size that coincides with the switch to continuous surveying.

Table A.2: Final Sample Size, Individuals Aged 15-64, Part 1

Year	Belgium	Denmark	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	United Kingdom	US
1983	71106	–	104800	213638	80661	84597	222945	110693	–	–	137949	293223
1984	29413	19415	106242	154110	91681	89464	230151	–	–	–	105106	289019
1985	60804	19821	106487	151131	91867	90676	223136	107118	–	–	106409	288542
1986	54186	18591	105463	149792	92171	89780	222753	–	59098	128768	106717	282810
1987	49152	18407	106881	150018	93192	91013	237109	35103	57850	120401	104823	281228
1988	51087	17793	107535	149882	94192	89977	238476	52160	57351	128927	106626	266234
1989	48450	18691	108020	147207	93048	90527	258153	54459	54678	130375	106607	269559
1990	48009	18853	105893	160768	93271	90202	258764	52877	54546	132278	102994	283563
1991	49854	19279	105914	198688	92380	90235	130290	52309	55271	131593	101466	280001
1992	50111	17953	107691	214192	90788	93697	137370	53592	32222	130074	100113	275042
1993	51357	19576	112283	217855	112590	92749	136621	51610	32636	126612	101991	270768
1994	51432	11480	115299	214495	110089	92408	135404	57438	31845	127268	98985	263369
1995	50545	11225	115257	215716	108555	92832	138114	61021	29699	129209	96051	260273
1996	51419	11146	114278	214983	108795	91637	136776	54693	29533	129376	95019	230148
1997	50465	11002	112160	218210	107759	94167	136315	62782	29534	128514	91624	232887
1998	50831	10972	112808	219735	56220	72439	136325	39115	32749	128966	89468	233029
1999	17212	10639	113230	217612	55238	72205	135308	36429	30812	132046	88718	235273
2000	17062	10763	113621	216631	53669	70129	134892	48178	29594	121626	85849	236168
2001	16056	10509	111631	214998	52735	69923	131656	64988	29743	116583	–	252663
2002	18140	10582	109689	212827	50305	70378	129271	69641	29405	115254	84286	274879
2003	18082	10001	55761	213758	47349	67712	127244	69411	30027	117254	80871	273909
2004	18593	10024	56289	210703	52268	57276	110413	82160	33109	116925	77417	269087
2005	73692	37864	219383	304568	200842	60590	448246	343516	123711	–	76367	268752
2006	76889	36787	216427	31650	192420	56970	434234	77719	116170	68048	74700	266688
2007	76217	73656	224295	31366	186256	212030	426063	76256	110960	69017	74170	264106
2008	72462	70657	222326	30283	184897	184213	420881	78729	107887	70328	119280	262758
2009	71063	73216	264813	31538	188855	179531	409672	68640	104944	72958	58743	265326
2010	70520	84449	315206	29818	192444	160114	409654	59932	103056	72978	56983	264798
2011	65855	89419	325751	30437	171442	146444	399728	64049	100490	69884	53874	260936
2012	65664	92338	322373	305358	150834	148706	368447	59268	99725	71553	51700	257095
2013	65044	91131	296167	302677	152184	133455	369877	60528	98766	69728	50178	254880
2014	68933	91369	323250	302485	146484	133924	361566	55754	104127	69107	51613	254199
2015	64959	89418	321559	305767	141904	121910	354161	53334	103253	68761	48726	250614

Note: Final sample size of population aged 15-64 for each country-year combination in our sample.

Table A.3: Final Sample Size, Individuals Aged 15-64, Part 2

Year	Austria	Norway	Sweden	Hungary	Switzerland	Czech Republic	Poland
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	240483	189002	48288	157048	286657
2011	120696	17252	232441	188869	51354	30259	291083
2012	121142	16624	228399	180795	52611	29119	287480
2013	121225	16225	221116	167946	50487	27641	265205
2014	117567	16339	207344	164356	50212	26613	243242
2015	114937	16546	193408	155610	50847	26223	225736

Note: Final sample size of population aged 15-64 for each country-year combination in our sample.

Table A.4: Reference Weeks in EU LFS

	Non-Continuous Surveying		Continuous Surveying of Reference Weeks		
			Only Subset Available		All Weeks Available
Country	Years	Weeks*	Years	Weeks†	Since
Austria	1995-2003	9-14	2004	1-13	2005
Belgium	1983-1998	17	1999-2004	14-26	2005
Czech Repbulic			1997-2004	10-22	2005
Denmark	1983-1993	5-23	1994-2004	14-26	2005
France	1983-2002	9-14	2003-2004	1-13	2005
Germany	1985-2004	13			2005
Greece	1983-1997	13-28	1998-2004	14-26	2005
Hungary	1996-2002	15-24	2003-2004	16-26	2005
Ireland	1983-1997	14-21	1998-2008	10-22	2009
Italy	1983-2003	13	2004	14-26	2005
Netherlands	1983-1999	1-22	2000-2004	14-26	2005
Norway	1995-1995	16-22	1996-2004	14-26	2005
Poland	1997-1999	7	2000-2004	14-26	2005
Portugal	1986-1997	16-25	1998-2004	14-26	2005
Spain	1986-1998	13-24	1999-2004	14-26	2005
Sweden	1995-1999	5-17	2000-2004	5-17	2005
Switzerland	1996-2009	13-26			2010
United Kingdom	1983-1991	8-20	1992-2007	10-22	2008

Note: * Weeks refer to last years under non-continuous surveying; † Weeks refer to first years under continuous surveying.

A.1.2 Distribution of Reference Weeks

Table A.4 shows for each country

- the years in which only a subset of weeks was sampled along with the weeks sampled (non-continuous surveying)
- the years in which all weeks were sampled but Eurostat makes only a subset of weeks available, and which weeks those are
- from which year onwards all weeks are available.

In most countries, all weeks are available from 2005 onwards, and for the in-between period usually the weeks of the second quarter are available. There are however several exceptions to these rules, which we list in the next paragraph.

When **Austria** changed to continuous surveying in 2004, the EU LFS did not cover the second, but the first quarter of the year. In the **Czech Republic**, the change to continuous reference weeks

Table A.5: Absolute %-Deviations: Second Quarter vs. All 52 Weeks of the Year

	Mean	75th	90th	95th	99th	Max
$H^{E,raw}$	2.7	3.9	4.9	5.9	7.5	7.7
H^{E}	0.6	0.8	1.2	1.5	1.9	2.0
e	0.4	0.5	0.7	0.9	1.3	1.6
H^{raw}	2.7	3.9	5.2	5.9	7.4	7.8
H	1.0	1.3	1.8	2.7	3.6	4.1

Note: For $H^{E,raw}$, H^{raw}, H^{E} and H we report deviations in percent, whereas for e we use percentage points. All three measures refer to the population 15-64 and are calculated for all available European country-year pairs from 2005 to 2015 (in total 175 observations).

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 EU LFS 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. EU LFS documentation says that **Ireland** switched to a continuous survey in 1998, but the reference weeks in the EU LFS up until and including 2008 only cover the second quarter of the year and shift to covering all weeks in 2009. 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 EU LFS kept the same weeks until 2008, when it switches to continuous coverage also for the UK.

Table A.5 shows the deviations if only the weeks from the interim time period are used (i.e. mostly the second quarter) than when all weeks of the year are used as reference weeks for the raw measure of hours worked per employed in the first row, the employment rate in the second row, and our final measure of hours worked per employed in the third row, corresponding to Table 1 in Section 2. We use all available country-year pairs from 2005 to 2015, which are in total 175 observations (for 14 of our 18 European countries we can do the comparison in all years, for the UK only from 2008 to 2015, for Ireland 2009 to 2015, for Switzerland for 2010 to 2015; Germany is excluded because the switch was directly from one week to all weeks in 2005). The first row shows that the mean deviation of the raw measure of hours worked per employed is 2.7% if only

the second quarter is sampled, compared to the entire year. At the 90th percentile, the deviation amounts to 4.9%, and the maximum deviation is 7.7% in France (2012). Thus, deviations are still substantial, but somewhat smaller than if only the initially sampled survey weeks are used. The second row confirms the low seasonality of the employment rate already documented if only the initially sampled weeks are used.

Finally, the third row confirms that our measure of annual hours worked per employed overcomes the problem of seasonality: the mean absolute percentage deviation is with 0.6% substantially smaller than for the raw measure of hours worked per employed in the first row. The maximum percent deviation from sampling all weeks amounts to only 2% if the second quarter is sampled.

A.1.3 Calculation of Employment Rate

In this section, we provide two different alternative measures of the employment rate. The first alternative measure sets the employment status equal to one if an individual reports positive usual hours worked. This is reported in Table A.6. Using positive usual hours worked leaves the employment rate virtually unchanged. This is reassuring as anyone reporting to be employed should usually work positive hours.

Our next 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,[25] 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 A.7). 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 A.7). This measure therefore provides a lower bound of the employment rate. As Table A.7 shows, these two different definitions only have a very modest impact on the female employment rates, with a maximum difference of 3.4 percentage points in Sweden and a minimum difference of 0.2 percentage points in the US, Hungary, and Greece. 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.

[25] 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 A.6: Average %-point difference on alternative employment rate based on positive usual hours relative to self-reported employment rate (all years)

Country	**Positive usual hours**
Denmark	0.0
Norway	−0.8
Sweden	0.0
Mean	*-0.3*
Austria	0.0
Belgium	−0.1
France	0.0
Germany	0.0
Ireland	0.0
Netherlands	0.0
Switzerland	0.0
United Kingdom	0.0
Mean	*0.0*
Czech Republic	−0.2
Hungary	0.0
Poland	−0.3
Mean	*-0.2*
Greece	0.0
Italy	0.0
Portugal	0.0
Spain	0.0
Mean	*0.0*
US	0.0

Note: Population aged 15 to 64, all available years.

Table A.7: Female employment rate and hours worked per employed (all years): Different treatment of maternity leave

	ER			HWE		
		Maternal leave			Maternal leave	
Country	Baseline	= not employed	%p-difference	Baseline	= not employed	%-difference
Denmark	70.3	68.4	−1.9	1366.5	1403.2	2.7
Norway	72.5	69.7	−2.8	1266.0	1313.8	3.8
Sweden	70.7	67.3	−3.4	1398.8	1458.2	4.2
Mean	*71.2*	*68.5*	*-2.7*	*1343.8*	*1391.7*	*3.6*
Austria	62.5	60.7	−1.7	1414.9	1457.6	3.0
Belgium	47.7	47.2	−0.5	1486.2	1501.8	1.1
France	54.9	53.9	−0.9	1469.6	1494.0	1.7
Germany	57.8	57.0	−0.8	1375.5	1394.8	1.4
Ireland	46.8	45.9	−0.9	1472.8	1498.5	1.8
Netherlands	58.5	57.9	−0.7	1139.1	1148.4	0.8
Switzerland	70.8	70.3	−0.6	1352.5	1363.0	0.8
United Kingdom	61.9	61.0	−0.9	1352.6	1371.9	1.4
Mean	*57.6*	*56.7*	*-0.9*	*1382.9*	*1403.7*	*1.5*
Czech Republic	57.8	57.0	−0.7	1716.5	1738.4	1.3
Hungary	50.3	50.1	−0.2	1787.6	1795.5	0.4
Poland	50.7	50.2	−0.6	1732.5	1751.0	1.1
Mean	*52.9*	*52.4*	*-0.5*	*1745.5*	*1761.6*	*0.9*
Greece	40.8	40.5	−0.2	1760.7	1769.7	0.5
Italy	40.2	39.6	−0.6	1468.2	1487.4	1.3
Portugal	57.4	56.9	−0.5	1705.8	1718.5	0.8
Spain	40.7	40.3	−0.3	1593.7	1604.8	0.7
Mean	*44.8*	*44.4*	*-0.4*	*1632.1*	*1645.1*	*0.8*
US	63.8	63.6	−0.2	1715.1	1719.9	0.3

Note: Population aged 15 to 64, all available years.

A.1.4 Differences in the Survey Questions on Hours Worked

The construction of our measure of hours worked requires knowing individual's actual hours worked as well as the reason why people worked less hours than usual. Actual hours worked are available for the main job and second job(s) in the EU LFS, and for all jobs in the CPS. For individuals who are employed but did not work at all in the reference week, the CPS asks for the same information as the EU LFS. For individuals who worked positive actual hours but less than usual, the EU LFS asks for the reason why that is the case. However, in the CPS only employed respondents with positive actual hours and whose usual hours worked are at most 33 hours (up to 1993) or whose actual hours worked are at most 34 hours (from 1994 onwards) are asked for the reason why they worked less than 35 hours last week. Hence, for this set of employed respondents we can identify whether the respondent worked less than usual because of annual leave or public holiday. Up to 1993, for someone working usually more than 33 hours per week, but working less than usual (but positive hours) in the reference week, we cannot infer the reason. The same applies from 1994 onwards to someone who actually worked 35 hours or more, but still less than usual. Recomputing hours for the EU LFS assuming that we would have exactly the same information set as in the CPS, we find that differences in the survey design up to 1993 would yield an on average -1.7% lower and at most 3.9% lower average hours per employed estimate for the European countries using the restricted information as in the CPS. These differences constitute however an upper bound (in absolute terms) for the years 1993 and before because many individuals with usual hours greater than 33 hours in fact also answered the question for the reason of having worked less than 35 hours. From 1994 onwards the differences in the survey design hardly affect our annual hours worked per employed measure: the difference between the average annual hours worked per employed based on the full and restricted information (as in the CPS) is at most 0.65% and on average 0.32%.

Capping of Hours In the EU LFS, 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 EU LFS 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.

As Table A.8 shows, for the European countries the maximum difference between capped and uncapped hours worked per employed is 0.10% in Norway. Only 0.12% of observations are affected on average. Capping US hours worked reduces annual hours per employed slightly more, with an average of 0.15%. 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 EU LFS, and 0.2% for the CPS.

Table A.8: The Effect of Capping on Hours Worked per Employed (all years, in %)

Country	H^E **without capping**	H^E **with capping**	**Difference in %**
Denmark	1550.15	1548.91	−0.08
Norway	1474.23	1472.76	−0.10
Sweden	1569.03	1568.11	−0.06
Mean	*1531.14*	*1529.93*	*-0.08*
Austria	1665.58	1664.38	−0.07
Belgium	1700.55	1700.01	−0.03
France	1642.61	1642.05	−0.03
Germany	1611.84	1611.62	−0.01
Ireland	1770.94	1770.14	−0.05
Netherlands	1481.67	1481.38	−0.02
Switzerland	1685.28	1684.26	−0.06
United Kingdom	1665.87	1665.44	−0.03
Mean	*1653.04*	*1652.41*	*-0.04*
Czech Republic	1853.91	1853.61	−0.02
Hungary	1864.58	1864.17	−0.02
Poland	1883.42	1882.01	−0.08
Mean	*1867.31*	*1866.59*	*-0.04*
Greece	1911.64	1910.51	−0.06
Italy	1656.71	1656.64	0.00
Portugal	1820.50	1819.51	−0.05
Spain	1744.43	1744.30	−0.01
Mean	*1783.32*	*1782.74*	*-0.03*
US	1877.13	1874.38	−0.15

Note: Population aged 15 to 64, all available years.

A.2 Public Holidays and Days of Annual Leave

A.2.1 External Data for Public Holidays and Days of Annual Leave

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 at least parts of the sample period from the national statistical offices and other public institutions detailed below. 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 2014. 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 2014 to extend the series backwards. For 2015, we extrapolate the value for 2014. Table A.9 provides the details on the data sources for each country. Table A.10 shows the average number of public holidays and days of annual leave for each country in the first three survey years and the last three survey years. Online Appendix C.1 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.

Table A.9: Source of Country-Specific Information on Public Holidays and Annual Leave

Country	Public Holidays	Annual Leave
Denmark	• 1983-2014: From the Confederation of Danish Employers (DA) we obtain data on three variables: Agreed weekly hours ($h_{ag,DA}$), agreed annual hours ($H^E_{ag,DA}$, 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: $$dpublic = \frac{h_{ag,DA} * (52 - daleave/5) - H^E_{ag,DA}}{h_{ag,DA}/5}$$ • The term in the numerator calculates the number of annual hours lost due to public holidays (agreed weekly hours $h_{ag,DA}$ times the number of non-vacation weeks minus the number of agreed annual hours $H^E_{ag,DA}$), the term in the denominator calculates average daily hours. Dividing one by the other yields the number of days lost due to public holidays. • The Agreed Annual Hours $H^E_{ag,DA}$ are only available every five years. In order to obtain the number of holidays in the years without $H^E_{ag,DA}$ 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. • 2015: The last available number of holidays in 2014 coincides with the value in EIRO, so we use the available EIRO data for 2015.	• 1983-2015: Directly given by the Confederation of Danish Employers (DA).
France	• 2002-2015: EIR4. • 1983-2000: "Direction de l'animation de la recherche, des études et des statistiques" (DARES), published in the study "Comparaisons internationales de durée et de productivité" by Chagny & Bruyère (2002). • Missing values are filled in using the mean across all years.	• 1983-2011: "Direction de l'animation de la recherche, des études et des statistiques" (DARES), published in the study "Comparaisons internationales de durée et de productivité" by Chagny & Bruyère (2002). We use the value from 1999 to extrapolate the missing values for the years 2000-2015.

Germany	• 1983-2015: The Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung, IAB) provides data on the average number of public holidays in its "Arbeitszeitrechnung".	• 1983-2015: The IAB also provides data on the average number of days of annual leave (agreed regular days of annual leave plus additional leave) in its "Arbeitszeitrechnung".
Netherlands	• 1983-2011: Central Planning Bureau (CPB) provides numbers of public holidays without Saturdays and Sundays. • 2012-2015: Values are extrapolated using the value for 2011.	• 1980-1992: Statistics Netherlands (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. • 2006-2011: Values extrapolated using value for 2005. • 2012-2015: Values extrapolated using mean until 2005.
Switzerland	• 1996-2015: 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 adopt as the number of public holidays.	• 1996-2015: 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	• 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.	• 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. Numbers are available from 1993 onwards, previous years are imputed using the mean.

United States	• 1979-1998: Employee Benefit Survey (EBS), conducted by the Bureau of Labor Statistics (BLS). • 1999-2015: 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.	• Also based on EBS (1979-1998) and NCS (1999-2015), which provide time series on the fraction of all workers with days of paid annual leave and on the average number of days of paid annual leave for those with paid annual leave. The latter is only available by firm-specific tenure intervals, so we have to combine this data with data on the firm-specific tenure distribution, obtained from the BLS (but based on the CPS), to calculate the average number of days of annual leave. • The data refers to private firms and full-time employees only. • Mostly, there is perfect overlap between EBS/NCS leave data and BLS/CPS tenure data. Exceptions: (1) From 1980-1996, the EBS/NCS data distinguishes between tenure of 25-29 years, and 30+ years, while the BLS/CPS data only has a category 25+. We use the average of the two EBS/NCS groups to align the two data sets. (2) From 1980-1991, the BLS/CPS data only provides worker shares for 7-23 months of tenure, while the EBS/NCS data provides the average leave data for 7-12 months of tenure. We impute the share of workers with 7-12 months tenure using the relative shares of workers with 7-12 months and 1-2 years from the BLS/CPS data in 1996. (3) After 1989, there is no information on paid annual leave for workers with less than 1 year tenure. We assume that these workers have as many days of annual leave as they had in 1984.

Table A.10: Average Number of Public Holidays and Days of Annual Leave over First 3 and Last 3 Survey Years

	Public holidays		**Annual leave**		**Public holidays + Annual leave**	
Country	Start	End	Start	End	Start	End
Germany	11.3	11.0	29.7	31.3	41.0	42.3
France	8.3	10.1	29.5	29.5	37.9	39.6
Denmark	8.6	9.4	20.0	30.0	28.6	39.4
Austria	12.0	11.7	25.0	25.0	37.0	36.7
Italy	12.0	10.3	28.0	26.0	40.0	36.3
Sweden	10.3	11.0	25.0	25.0	35.3	36.0
Spain	13.2	13.7	22.0	22.0	35.2	35.7
Czech Republic	9.7	10.2	25.0	25.0	34.7	35.2
Norway	9.2	9.7	25.0	25.0	34.2	34.7
Greece	11.0	11.7	23.0	23.0	34.0	34.7
Switzerland	8.0	8.0	23.2	25.5	31.2	33.5
Ireland	9.0	8.7	20.0	24.0	29.0	32.7
United Kingdom	8.1	9.1	21.5	23.3	29.6	32.4
Portugal	10.7	8.0	22.0	22.0	32.7	30.0
Poland	9.5	9.8	20.0	20.0	29.5	29.8
Hungary	9.1	9.7	20.0	20.0	29.1	29.7
Belgium	8.3	9.0	24.0	20.0	32.3	29.0
Netherlands	6.7	5.0	22.8	22.2	29.5	27.2
US	9.8	7.2	10.7	12.3	20.5	19.5

A.2.2 Vacation in Micro Data vs. External Data

Table A.11: Annual Weeks Lost due to Public Holidays and Annual Leave (2005-2015)

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	7.7	14.5
Norway	4.7	6.8	13.5
Sweden	5.1	7.0	18.3
Mean	*4.9*	*7.2*	*15.5*
Austria	4.0	7.3	16.1
Belgium	4.0	5.9	13.9
France	5.6	7.9	17.1
Germany	3.1	8.2	9.2
Ireland	2.4	6.3	11.1
Netherlands	4.9	5.5	14.8
Switzerland	4.6	6.6	12.1
United Kingdom	3.4	6.5	12.3
Mean	*4.0*	*6.8*	*13.3*
Czech Republic	2.5	7.0	13.2
Hungary	1.4	5.7	9.6
Poland	1.3	5.9	9.2
Mean	*1.8*	*6.2*	*10.7*
Greece	1.4	6.7	9.7
Italy	2.9	7.6	10.3
Portugal	2.4	6.7	13.6
Spain	3.1	7.1	12.4
Mean	*2.4*	*7.0*	*11.5*
US	1.3	3.7	4.5

Note: Population aged 15 to 64, years 2005 to 2015.

The first two columns of Table A.11 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 2015. 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

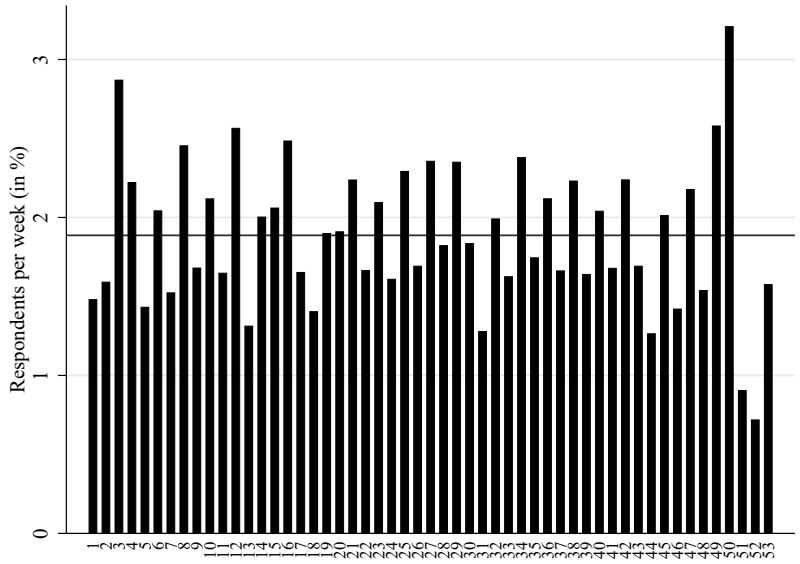
usual hours. The latter measures the fraction of the usual work week lost to accommodate part-time workers' smaller usual hours in a usual work week. We multiply this number by 52 weeks to get an annualized value and then take the mean across all employed individuals. This yields the average number of weeks lost because of annual leave and public holidays. On average the self-reported vacation amount to 3.4 weeks in Europe whereas the external data suggest a number of 6.8 weeks. In 4 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.

There could be several reasons for underreporting of vacation days. We looked at this issue a bit more closely for Germany. The German data in the EU LFS is based on the German Microcensus, for which the German Statistical Office (Destatis) analyzed the issue of the distribution of reference weeks.[26] 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. Figure A.1 shows for the year 2015 for Germany the quite uneven distribution of reference weeks.

Second, respondents might dislike using 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 leave.

[26]The following information comes from Thomas Körner at Destatis.

Figure A.1: Distribution of Reference Weeks for Germany in the EU LFS in 2015



Note: Each bar represents the fraction of observations (in %) sampled in each of the reference weeks in 2015.

A.2.3 Heterogeneity in Public Holidays and Annual Leave

In the benchmark analysis, we assume that the number of vacation days are the same for each individual. However, in the micro data, we can estimate the number of vacation days for different groups. Define $\bar{v}$ as the average vacation weeks in the external data for a given country and year. In the labor force surveys, we can estimate $\hat{v} = \sum_j \frac{N_j^e}{N^e} v_j$ as the average vacation weeks, with N^e being the number of all employed individuals in the micro data, N_j^e the number of all employed individuals in group j, $\frac{N_j^e}{N^e}$ the employment share of group j, and v_j the average vacation weeks for group j from the micro data. Since we document substantial underreporting of vacation days in the labor force surveys, we impose consistency between the external vacation weeks and vacation weeks in the micro data by scaling vacation weeks of all groups up proportionally with a scaling factor x:

$$\bar{v} = (1+x)\hat{v} \Leftrightarrow 1+x = \frac{\bar{v}}{\hat{v}}$$

Our robustness measure of hours worked that allows for heterogeneity in the number of vacation days taken by different groups then amounts to

$$\hat{H} = \sum_j f_j e_j \sum_k [52 - v_{j,k}(1+x)] s_{j,k} h_{j,k} = \sum_j f_j e_j \sum_k [52 - \bar{v} \times \frac{v_{j,k}}{\hat{v}}] s_{j,k} h_{j,k}$$

This measure is different from the baseline measure if there is heterogeneity in the number of vacation days for different subgroups. We calculate this measure relying on the same subgroups used in Section 4, namely subgroups built on gender, three age groups (15-24, 25-54, 55-64), three education groups (low, medium, high), and the three sectors services, manufacturing, and agriculture.

Table A.12 compares our baseline measure of hours worked per person built on assuming homogeneous vacation weeks within a country with the alternative measure allowing for within-country-year variation of vacation weeks by demographic group. Differences between both measures are negligible, with a maximum difference of 5.4 annual hours for Greece. Note that by scaling up vacation weeks by a common multiplicative factor, rather than a common additive factor, and by allowing for variation in vacation weeks, and not weeks worked, we bias our alternative measure towards finding the largest possible differences to the measure relying on homogeneous weeks. We can therefore confidently conclude that assuming homogeneous vacation weeks rather than allowing variation of vacation weeks for different demographic groups has no effect on the measure of aggregate hours worked per person.

Table A.12: H with heterogeneous vacation weeks

Country	**Constant Weeks**	**Heterogeneous Weeks**	**%-difference**
Denmark	1088.3	1087.4	−0.1
Norway	1092.3	1090.4	−0.2
Sweden	1183.9	1181.4	−0.2
Mean	*1121.5*	*1119.7*	*-0.2*
Austria	1130.0	1130.8	0.1
Belgium	1039.3	1039.2	0.0
France	1000.8	1000.1	−0.1
Germany	1102.4	1101.4	−0.1
Ireland	980.0	983.0	0.3
Netherlands	1069.2	1067.6	−0.1
Switzerland	1310.2	1312.5	0.2
United Kingdom	1156.5	1158.3	0.2
Mean	*1098.5*	*1099.1*	*0.0*
Czech Republic	1252.0	1253.0	0.1
Hungary	1119.6	1120.0	0.0
Poland	1135.0	1137.7	0.2
Mean	*1168.9*	*1170.2*	*0.1*
Greece	912.1	917.5	0.6
Italy	890.1	891.8	0.2
Portugal	1093.3	1091.8	−0.1
Spain	913.4	913.3	0.0
Mean	*952.2*	*953.6*	*0.2*
US	1261.7	1261.0	−0.1

Note: Population aged 15 to 64, average over years 2013 to 2015.

A.3 Reasons for Working More or Less than Usual

Table A.13 displays the average hours lost for our 186 available country-year pairs from 2005 to 2015 under the initially sampled reference weeks in the first row and all reference weeks in the second row. 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 1.17 hours more for annual leave and 0.13 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 in order to achieve consistency over time. Regarding the question of systematic over- or underreporting of other categories of hours lost in the labor force surveys, we collect some suggestive evidence for sick days for a subset of countries and years. Comparing sick days from external data sources to the reported sick days in our data, we find that the self-reported number of sick days are smaller than sick days from external data sources, a similar finding as the one for vacation days, but the discrepancy is on average smaller than for vacation days and public holidays (see Table A.14). It amounts on average to 0.8 weeks in Scandinavia, 1.8 weeks in Eastern Europe, 1.2 weeks in Western Europe, 0.5 weeks in Southern Europe, and 0.3 weeks in the US. Also similar to vacation days, the discrepancy is lower in the US than on average in Europe, and thus correcting for sick days from external data sources would make the observed Europe-US hours difference that we document later larger.

Table A.13: Reasons for Working More or Less than Usual – Mean Weekly Hours

	Weekly hours lost due to					Extra hours due to
Period	Annual L.	Pub. Holidays	Sick L.	Maternity L.	Other	Add. Jobs+Overtime
Initial Weeks	1.25	0.61	0.79	0.31	0.95	1.96
All Weeks	2.42	0.48	0.78	0.32	0.99	1.93

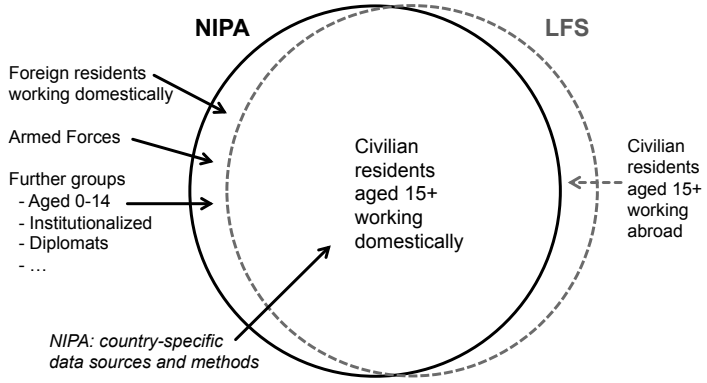
Note: Measures refer to the population 15-64 and are calculated for all available European country-year pairs from 2005 to 2015 (in total 186 observations).

Table A.14: Annual Weeks Lost due to Sickness for Years with External Data on Sick Leave

	Weeks lost due to illness		
Country	**self-reported**	**external data**	**Available Years**
Denmark	1.1	1.7	1984-2015
Norway	2.3	3.5	2001-2014
Sweden	2.0	2.6	1995-2014
Mean	*1.8*	*2.6*	
Austria	1.1	2.3	1995-2014
Belgium	1.1	1.9	2006-2008
France	1.3	1.6	1983-2015
Germany	0.9	3.4	1983-2015
Ireland	0.7	3.4	2010-2010
Netherlands	2.0	2.7	1983-2015
Switzerland	0.9	1.6	1997-2012
United Kingdom	1.2	1.5	1983-2015
Mean	*1.1*	*2.3*	
Czech Republic	1.3	3.9	1997-2014
Hungary	0.6	2.5	1996-2014
Poland	0.5	1.3	2009-2009
Mean	*0.8*	*2.6*	
Greece	0.1	0.7	1998-2008
Italy	0.6	–	-
Portugal	1.1	1.3	1986-2015
Spain	1.0	1.7	1986-2015
Mean	*0.7*	*1.2*	
US	0.6	0.9	1983-2015

Note: External data on sick days are obtained from the OECD for all countries except Germany, where the data until 2008 is obtained from the German Statistical Yearbook 2010. Population aged 15 to 64.

Figure A.2: Conceptual Differences between NIPA and LFS



A.4 Comparison with NIPA Hours

A.4.1 Conceptual Differences between NIPA and LFS

Figure A.2 illustrates how LFS and NIPA data differ conceptually.

Covered population: LFS data cover civilian, non-institutionalized residents of a country aged 15 and older. Employment and hours estimates in NIPA are based on the domestic concept and constructed such that the labor inputs are consistent with the measurement of gross domestic output (GDP), while LFS follow the national concept based on residence of the worker. Thus, NIPA exclude employment and hours worked of civilian, non-institutionalized residents who work in a foreign country (e.g., from the German perspective a resident of Germany working in Switzerland). On the other hand, NIPA data include domestic employment and hours worked even if they originate from individuals residing in a foreign country (e.g., from the German perspective also hours worked by residents of Switzerland working in Germany). In addition, NIPA data do not restrict the covered population to the non-institutionalized civilians aged 15 and older, but include employment and hours worked from all individuals contributing to GDP: non-civilians (members of the armed forces) and further groups, including individuals younger than 15, institutionalized individuals (e.g., prisoners), and others as e.g., diplomats (e.g., from the German perspective the German ambassador in the US) or students abroad.

Country-specific data sources and methods: Next to these differences related to the covered population, LFS and NIPA data on hours worked and employment can differ for the same covered population (i.e. civilian, non-institutionalized residents of a country aged 15 and older that do not work in a foreign country; the intersection in Figure A.2). The following table lists the very different country-specific data sources and methods used by the national statistical agencies in the construction of NIPA data.

Country	Employment	Hours
Austria	Employment is calculated based on several sources, e.g. social insurance statistics, the Structural Business Survey (SBS), the non-agricultural business survey, the Microcensus, and the Labor Force Survey. Since 2004 calculations have been mainly based on the LFS.	For total hours, working hours per job are calculated based on the short-term production survey and the Microcensus and are then multiplied by employment. Since 2004 calculations have been mainly based on the LFS.
Belgium	Administrative sources (social security institutions) are mainly used to calculate employment. Surveys (e.g. the Labor Force Survey) serve as secondary sources.	The main sources are administrative data from social security institutions. The data are adjusted for holidays and sick leave, but not for other absences or overtime (status quo in 2006). Self-employed are not included.
Czech Republic	Business statistics are used in combination with administrative data to calculate employment.	Average hours are calculated based on average weekly hours worked in the labor force survey, excluding hours lost due to sickness and annual leave, and then multiplied by employment.
Denmark	Statistics Denmark produces a "Working Time Account" (WTA), which serves as basis for the National Accounts. The WTA mainly uses three data sources: The Register of Employment Statistics (RAS), the Yearly Statistics on Earnings, and the LFS, where the RAS is the main source.	Hours worked are calculated based on the Yearly Statistics on Earnings in combination with the number of jobs obtained from the RAS.
France	Administrative sources are used to calculate government employment, while non-governmental employment is based on the Census in combination with administrative sources. The Labor Activity and Employment Conditions (ACEMO) Survey delivers information on part-time employment.	Also based Census, administrative data, and ACEMO. The LFS is an important secondary source that delivers additional information for corrections.
Germany	The German data on employment is based on a large number of different sources, covering administrative sources as well as the Microcensus (LFS), business reports, and a monthly telephone survey.	Hours worked are based on the IAB establishment survey and are estimated for full-time workers whose hours are not affected by absence. Annual estimates take into account public holidays & sickness absences, overtime, short-time, weather, etc., information on which is obtained from a large number of different sources. Hours worked by part-time employees, self-employed, or unpaid family workers are calculated using the Microcensus.
Greece	The main data source is the LFS, but for some sectors and industries more specific surveys are used because they are assumed to be more accurate (e.g. the Survey of the Structure of Crop and Livestock Holdings, the Annual Sea Fishery Survey, or the Annual Statistical Survey on Mines, Quarries and Salterns).	Hours worked are based on the LFS.
Hungary	Employment data is solely based on the LFS, adjusting only to agree with the domestic concept.	Hours worked are calculated based on actual hours worked in the LFS.
Ireland	Employment numbers are based on the Quarterly National Household Survey (QNHS).	Hours worked estimates are based on the QNHS.
Italy	Employment numbers are based on very complex estimation method that draws on a lot of different data sources, the most important ones being the Census of Industry, Services and Institutions, the Population Census, and the LFS.	Whenever possible, hours worked are based on business surveys and labor cost statistics; otherwise LFS data are used.
Netherlands	Statistics Netherlands produces labor accounts (including statistics on employment) using different sources: LFS, establishment surveys, administrative registers, and the Social Statistical Database.	Hours worked by employees are also part of the labor accounts and use the same sources, whereas hours for self-employed are based on the LFS.
Norway	Statistics Norway estimates employment numbers from a number of different data sources, e.g. establishment surveys, labor force survey and public sector accounts.	For employees, hours are based on a range of sources like wage statistics, the LFS, or employee registers. Hours for self-employed are based solely on the LFS.
Poland	The Central Statistical Office of Poland computes employment numbers based on several enterprise surveys.	Hours data for employees come from the annual survey on employment, earnings, and hours worked (business survey).
Portugal	The main source for Portuguese employment is the LFS.	Hours worked are mainly based on the LFS.

Spain	Employment numbers are based on several different sources, the main ones being the Structural Business Surveys (SBS) and the LFS.	The SBS and the Economically Active Population Survey (EPA) are the main source for the calculation of hours worked, but are combined with other surveys for adjustments.
Sweden	The main source for employment is the LFS in combination with Structural Business Statistics (SBS) and the Business Register.	The LFS and SBS are the main sources for hours, but Labor Statistics based on administrative sources are used as secondary sources.
Switzerland	Employment numbers are calculated using the LFS, the Central Aliens Register, and Job Statistics (business survey).	Total hours worked are based on LFS, taking into account absences, overtime and additional jobs. Some adjustments are based on other sources (e.g., the Swiss health survey for sick leave).
United Kingdom	The main sources for employment are the LFS, business surveys, and some administrative sources.	Hours worked are compiled using LFS data on hours worked in first and second jobs by employees and the self-employed, which are combined with business survey data on the allocation of jobs.
United States	The main source for employment data is the BLS Quarterly Census of Employment and Wages (QCEW), which counts all employees covered by UI laws (adjustments are made for other employees).	Upward revised estimates obtained of the annual hour per worker series by the BLS. 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.

Description of sources is based on the joint OECD/Eurostat questionnaire for National Accounts employment and hours worked.
http://ec.europa.eu/eurostat/web/national-accounts/methodology/member-states-accounts/employment-questionnaires

A.4.2 Differences in Population Coverage and the Employment Rate

The NIPA employment rate estimate from the OECD exceeds the LFS estimate in 16 out of 19 countries (on average by 4.1%, or 2.7 percentage points), although only in the US, Hungary, and Poland the NIPA estimate is lower in an economically significant way. While Figure 3b uses same unit (percent) for the employment rate as for hours worked per employed to facilitate the comparison between the two variables, Figure A.3 shows the percentage point differences as this facilitates the decomposition exercise we conduct in this section. The wide white bars show for each country the percentage point difference between the NIPA and LFS employment rate differences.

The OECD provides additional information that allows to investigate at least partially the sources of the differences between NIPA and LFS employment rate estimates. Specifically, the OECD's "Annual Labor Force Statistics" (*ALFS*) report employment in the Armed Forces (*AF*), i.e. non-civilian employment. The OECD's "National Accounts Database" (*NA*) also reports employment according to the national concept (*NC*). Relative to NIPA employment, which is based on the domestic concept, this excludes any foreign residents working domestically but includes all residents working abroad. We decompose the percentage point difference between the NIPA and

LFS employment rate estimates as follows:

$$
\begin{aligned}
\frac{Emp^{NIPA}}{Pop^{ALFS}_{15-64}} - \frac{Emp^{LFS}}{Pop^{LFS}_{15-64}} = & \underbrace{\frac{Emp^{LFS}+Emp^{ALFS}_{AF}}{Pop^{LFS}_{15-64}+Emp^{ALFS}_{AF}} - \frac{Emp^{LFS}}{Pop^{LFS}_{15-64}}}_{=\Delta 1} \\
& + \underbrace{\frac{Emp^{LFS}+Emp^{ALFS}_{AF}}{Pop^{ALFS}_{15-64}} - \frac{Emp^{LFS}+Emp^{ALFS}_{AF}}{Pop^{LFS}_{15-64}+Emp^{ALFS}_{AF}}}_{=\Delta 2} \\
& + \underbrace{\frac{Emp^{NA}_{NC}}{Pop^{ALFS}_{15-64}} - \frac{Emp^{LFS}+Emp^{ALFS}_{AF}}{Pop^{ALFS}_{15-64}}}_{=\Delta 3} \\
& + \underbrace{\frac{Emp^{NIPA}}{Pop^{ALFS}_{15-64}} - \frac{Emp^{NA}_{NC}}{Pop^{ALFS}_{15-64}}}_{=\Delta 4}
\end{aligned}
\tag{A.1}
$$

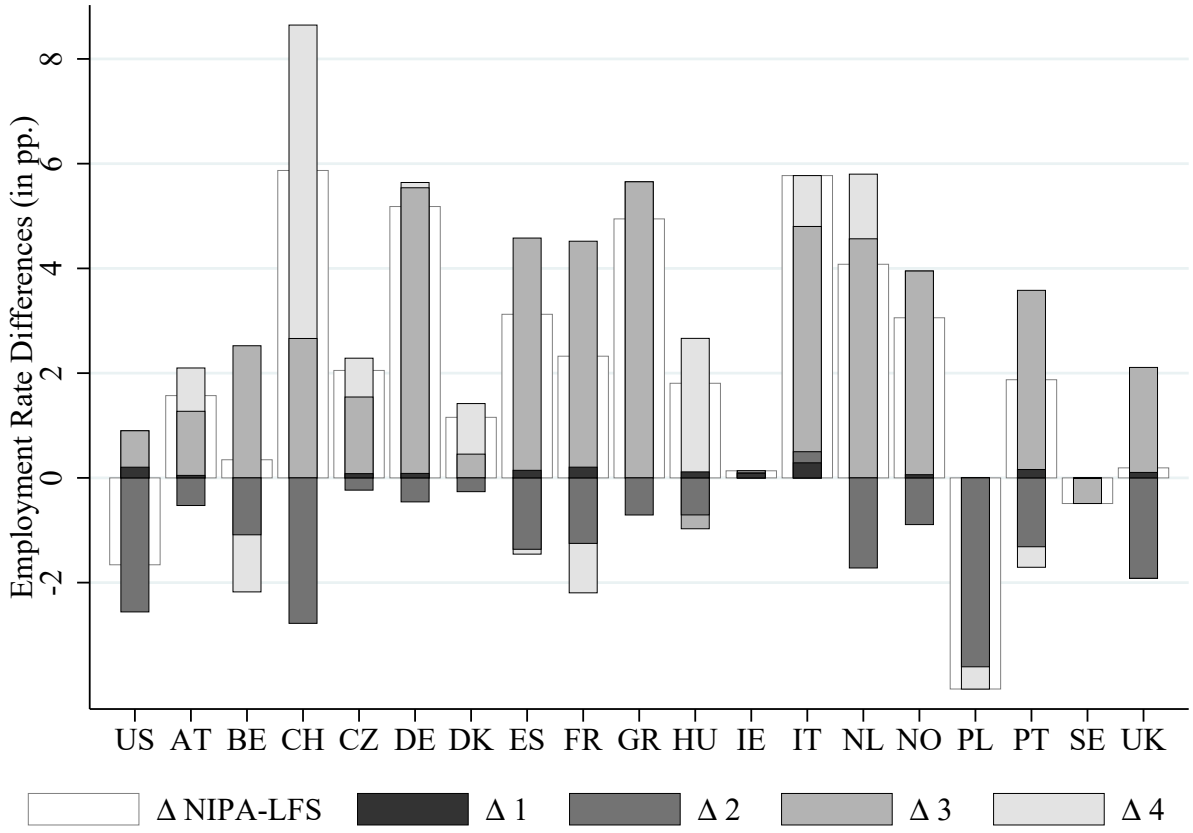
In each row of Equation (A.1) the first summand expands the concept of the employment rate, and is then again subtracted in the next row.

$\Delta 1$ quantifies how much of the difference between NIPA and LFS employment rate estimates is due to the lack of data on Armed Forces in the LFS. For 7 out of 19 countries there is no information on employment in the Armed Forces (AF) in the $ALFS$ for 2012 (Belgium, Switzerland, Denmark, Greece, Netherlands, Poland, and Sweden), but Figure A.3 shows that in the remaining countries including the Armed Forces generates negligible differences in the employment rate. This can be best seen from the comparison with the white, wider bars labeled "Δ NIPA-LFS" in the background which represent the overall percentage point differences.

$\Delta 2$ reflects the additional contribution of the larger population in the NIPA data compared to the LFS plus AF population. Recall that for the LFS data, we divide LFS hours by the population aged 15 to 64 directly taken from the LFS, i.e. by the civilian, non-institutionalized population aged 15 to 64, whereas we divide the NIPA hours by total population aged 15 to 64. The latter is obviously larger because of the "further groups" in the age group 15 to 64 in Figure A.2. Therefore, we should see negative value of $\Delta 2$ for all countries. This is however not the case for Italy, suggesting some inaccuracies between the $ALFS$ and LFS population figures. In the remaining countries the difference ranges from virtually zero percentage points in the Ireland and Sweden to over 2 percentage points in the US, Switzerland, and Poland.

$\Delta 3$ quantifies the difference between employment in the NA using the national concept (NC) and employment in the LFS plus AF (expressed relative to the total population aged 15-64), i.e. in principle this should be the employment of the "further groups" that were added to the population in $\Delta 2$. We should thus see a positive difference. However, there are again 2 countries for which this is not the case (Hungary and Sweden), although these negative differences are generally small. For Poland, the difference is virtually zero, and for Denmark, the difference is with less than 0.5

Figure A.3: Percentage Point Deviation of Employment Rate in NIPA from LFS



Note: The white bars in the background show the average percentage point deviation between NIPA employment rates (total employment divided by population aged 15-64) and LFS employment rates (employment 15 plus divided by population aged 15-64) in 2012. The black bars (Δ1) show the fraction of that difference that is due to the lack of data on Armed Forces in the LFS. The bars labeled Δ2 represent the fraction that can be accounted for by the larger population in the NIPA data than in the LFS plus Armed Forces. The bars labeled Δ3 show the fraction of the difference that is due to the difference between employment in the National Accounts using the "national concept" and employment in the LFS plus Armed Forces. Δ4 then reflects the share accounted for by differences in employment based on location, i.e. the difference between the "national" and "domestic" concept.

percentage points small as well. In most of the remaining countries, Δ3 is the largest among the different components. In Germany, Spain, France, Greece, Italy, and the Netherlands the differences are quite large amounting to more than 4 percentage points. At first glance, this seems surprising, given the comparatively small size of the population in the "further groups", as can be at least partially indirectly inferred from Δ2. Focusing on Germany, the German Statistical Office (Destatis), see Körner and Marder-Puch (2015), reports that this population barely contributes to the observed difference for Germany. The difference is rather generated by employment of the same covered

population (i.e. civilian, non-institutionalized residents of a country aged 15 and older that do not work in a foreign country; the intersection in Figure A.2). While the LFS is a key input into the calculation of NIPA employment by Destatis, in total 60 data sets are used. These comprise administrative sets and estimates for marginal employment (even though these are explicitly asked for in the labor force survey) and employment in the shadow economy (even though there is no explicit question about the legal status of a job in the labor force survey). It seems reasonable to assume that the remaining countries with large differences between *NA* employment under to the national concept and LFS employment follow similar adjustments. Some countries, e.g. Austria and Sweden, seem to abstain from implementing any kind of adjustment to LFS data, while in other countries it is substantial.

Finally, $\Delta 4$ reflects the differences in employment solely based on the location of employment by comparing NIPA employment under the domestic concept and *NA* employment under the national concept. Only for Switzerland and Hungary this is qualitatively important in absolute terms.

Overall, the difference between *NA* employment under the national concept and LFS employment plus employment in the Armed Forces is with a few exceptions the most important contributor to differences between the NIPA and LFS employment rate estimates. Unfortunately, for hours worked per employed we cannot conduct such a comparison, since the OECD does not provide hours for the armed forces or the total population using the national concept. While explaining the exact sources for the differences between *NA* employment according to the national concept and LFS employment is beyond the scope of this paper, in the next subsection we discuss the case of the U.S. to give some concrete examples.

A.4.3 A Detailed Comparison for the U.S.

For the U.S. differences between the NIPA figures and those based on the LFS (Current Population Survey) have been well researched. In the following, we provide a brief summary of three related papers. These give some concrete example for how administrative and household surveys can lead to different numbers even though the same population is covered.

Employment Rate

Abraham et al. (2013) link individual CPS records to unemployment insurance (UI) wage records from employer-reported administrative data for 16 states. Since their analysis focuses on a selected set of wage workers (wage and salary workers in the private sector [excluding agriculture and private household jobs] and state and local government employees [excluding federal government employees]) rather than overall employment, we refrain here from restating any of their quantitative findings. We rather provide a few examples discussed by Abraham et al. (2013) for why the information about jobs held by an individual according to the household survey (CPS) may not agree with the information about jobs held by the same person contained in data based on reports from employers.

People who hold jobs but do not view employment as their main activity might be less likely to report such jobs in the household survey. This might be a high school senior working a few hours in a grocery store who does identify herself as a student, or older individuals who may have

concluded long careers and identify themselves as retirees, even if they continue to do some work for pay. In addition, the CPS records only jobs in progress as of the survey reference week whereas the UI data record all jobs of an individual in a month.

Reasons for a worker's job not to appear in an employer's records are being paid off the books, being hired as an independent contractor, or being incorrectly treated as an independent contractor.

Hours Worked per Employed

The NIPA estimate of hours worked is based on the Current Employment Statistics (CES) by the BLS as a main data source. Through 2005, the CES data cover only hours for production workers in goods-producing industries, and non-supervisory workers in services-providing industries, both within the private non-agricultural sector. These groups tend to have lower hours than the non-covered groups. For non-production and supervisory workers, hours are imputed based on data from 1978 assuming the same trends as for the covered groups, though data based on the CPS are not supporting the common trend assumption, see Eldridge et al. (2004). Only from 2006 onwards, all employees are covered. For all years, the NIPA estimate is supplemented by hours of self-employed and unpaid family workers from the CPS. Our data from the CPS in turn always cover all employees, next to the self-employed and unpaid family workers. Another difference is that the CES measure hours per job, while the CPS measures hours per person in all jobs. In the presence of multiple job holders (about 5 to 6% of the population), the CES estimate will therefore be downward biased. Next, the CES measure hours paid, which are adjusted for paid vacations but not off-the-clock work, whereas the CPS measures hours worked. Last, there are differences in the reference period. The CES report hours for the pay period that includes the 12th of a month and can be weekly, biweekly or monthly, whereas the CPS reports hours for the week which includes the 12th of a month. Frazis and Stewart (2010) conclude that these differences can largely account for the level differences between CPS and NIPA hours estimates. They further document that hours in the CPS line up well with those from the American Time Use Survey, disproving an often mentioned criticism that hours in labor force surveys are overreported.

A.4.4 Data Revisions in OECD and TED and the Europe-US Hours Gap

In Bick et al. (2017), we document that the estimates of hours worked published by the OECD and the Conference Board's TED were subject to substantial revisions over time. To give a concrete example, the most current release by the TED implies a Europe-US gap for the year 2003 slightly less than half the gap based on the 2008 release, which is the earliest release still publicly available. The secular decline in European hours worked between 1956 and 2003 based on the most current release is only two thirds of the decline based on the 2008 release. Revisions of such magnitudes naturally have important implications for quantitative studies like Prescott (2004), Rogerson (2006), Ohanian et al. (2008), or McDaniel (2011), which analyze the driving forces behind the Europe-US hours gap and the time-trends.

B Decomposition Appendix

B.1 Aggregate Decomposition

In the aggregate decomposition, we quantify by how much each of the different components, i.e. the employment rate (e), weekly hours worked per employed in a non-vacation week (h), and weeks worked (w), contribute to the cross-country differences in aggregate hours worked per person (H) in country c:

$$H^c = e^c \times h^c \times w^c. \tag{B.1}$$

Specifically, we want to measure the contribution of each margin to the difference of the country-specific hours 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 measuring the incremental fraction of the aggregate hours worked per person difference relative to the US accounted for by this margin $\Delta^i,\ i = w,e,h$. To give a concrete example, consider the following ordering:

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

$$\sum_{i=w,e,h} \Delta^i = 1. \tag{B.3}$$

Δ^w measures what fraction of the hours worked per person difference relative to the US can be accounted for by differences in the work weeks. Δ^e measures what fraction of the hours worked per person difference relative to the US can be accounted for by differences in the employment rates, conditional on having already accounted for differences in the work weeks. Last, Δ^h measures what fraction of the overall difference can be accounted for 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 possible orderings, 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. Therefore, we do not report results from one specific ordering, like e.g. the one shown in Equation (B.2), but rather the mean over all six possible orderings in Table B.1 and the minimum and maximum among the six orderings in Table B.2. [27]

Table B.1 reports in column 1 the hours worked per person difference relative to the US, i.e. $(\frac{H^c - H^{US}}{H^{US}}) \times 100$. In column 2 we report what fraction of the hours worked per person relative to the US can be accounted for by differences in the employment rates. Columns 3 and 4 report the same statistics for weekly hours worked and weeks worked, respectively. The three last columns add up to 1. A positive value indicates that a factor positively accounts for the (negative) difference, while

[27] Alesina et al. (2005) perform a similar calculation, but do not consider the different orderings and change only one component at a time.

Table B.1: Aggregate Decomposition - Hours Worked per Person Relative to the US (in %)

Country	$\frac{H^c - H^{US}}{H^{US}}$	Δ^w	Δ^e	Δ^h
Sweden	−6.2	112.3	−156.3	144.0
Norway	−13.4	45.9	−65.5	119.6
Denmark	−13.7	58.5	−48.6	90.1
Mean	*-11.1*	*72.2*	*-90.1*	*117.9*
Mean w/o SE	*-13.6*	*52.2*	*-57.1*	*104.8*
Switzerland	3.8	−163.6	426.9	−163.3
United Kingdom	−8.3	63.6	−56.6	93.0
Austria	−10.4	68.7	−42.7	73.9
Germany	−12.6	74.0	−61.7	87.7
Netherlands	−15.3	19.6	−46.5	126.9
Belgium	−17.6	20.8	49.6	29.6
France	−20.7	37.6	26.6	35.7
Ireland	−22.3	22.3	37.4	40.3
Mean	*-12.9*	*17.9*	*41.6*	*40.5*
Mean w/o CH	*-15.3*	*43.8*	*-13.4*	*69.6*
Czech Republic	−0.8	−535.6	287.6	348.1
Poland	−10.0	41.6	92.8	−34.3
Hungary	−11.3	37.9	87.0	−24.9
Mean	*-7.4*	*-152.0*	*155.8*	*96.3*
Mean w/o CZ	*-10.7*	*39.7*	*89.9*	*-29.6*
Portugal	−13.4	31.3	71.9	−3.2
Spain	−27.6	21.6	64.4	13.9
Greece	−27.7	20.2	96.4	−16.5
Italy	−29.5	20.8	57.2	22.0
Mean	*-24.5*	*23.5*	*72.5*	*4.1*
Mean w/o PT	*-28.3*	*20.9*	*72.7*	*6.5*

Note: Columns 2 to 4 indicate what fraction (in %) of the hours worked per person difference to the US in column 1 is accounted for by the corresponding factor given in the column header. Columns 2 to 4 sum up to 100 for each country. All values refer to the population aged 15 to 64 for the years 2013 to 2015.

a negative value means that the respective factor does not contribute to the (negative) difference, but would in fact indicate higher hours in the respective European country than in the US. Table B.2 gives an idea of how much the ordering matters for the decomposition results. It reports in column 1 the same hours worked per person difference relative to the US as in the previous table,

Table B.2: Bounds on Aggregate Decomposition - Hours Worked per Person Relative to the US (in %)

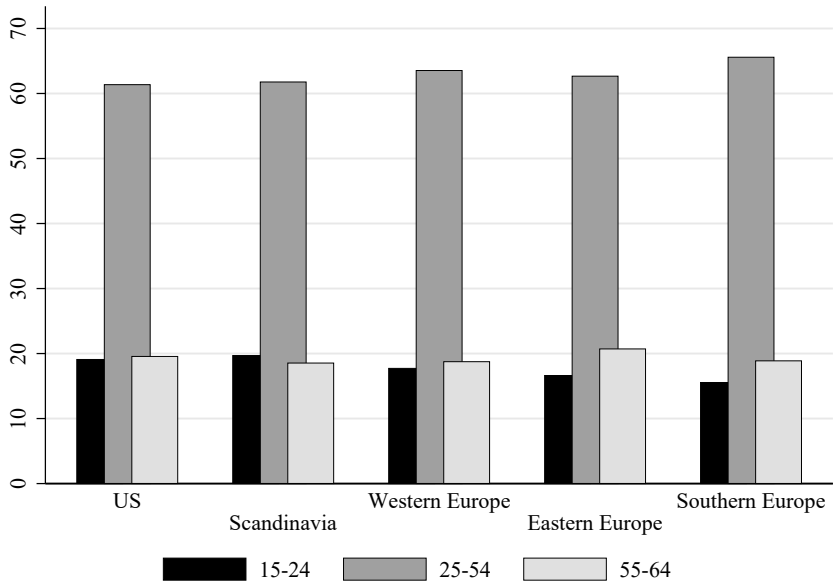
		Δ^w		Δ^e		Δ^h	
Country	$\frac{H^c - H^{US}}{H^{US}}$	Min	Max	Min	Max	Min	Max
Sweden	−6.2	102.0	123.3	−169.1	−143.8	132.1	156.6
Norway	−13.4	40.1	52.2	−73.3	−57.9	110.4	129.3
Denmark	−13.7	52.7	64.7	−54.0	−43.4	83.2	97.4
Switzerland	3.8	−181.7	−146.5	401.7	452.5	−181.4	−146.2
United Kingdom	−8.3	59.6	67.8	−60.4	−52.8	88.2	97.9
Austria	−10.4	64.5	73.1	−45.9	−39.5	69.6	78.4
Germany	−12.6	66.8	81.7	−68.5	−55.1	79.9	95.9
Netherlands	−15.3	16.9	22.5	−52.1	−40.9	120.1	133.9
Belgium	−17.6	19.2	22.4	47.2	52.0	27.6	31.7
France	−20.7	35.0	40.4	24.4	28.9	33.1	38.4
Ireland	−22.3	20.2	24.5	34.5	40.4	37.3	43.4
Czech Republic	−0.8	−555.6	−515.9	272.8	302.8	331.7	364.9
Poland	−10.0	38.8	44.4	89.1	96.5	−36.8	−31.9
Hungary	−11.3	35.5	40.4	83.9	90.2	−26.7	−23.2
Portugal	−13.4	29.6	33.0	70.1	73.7	−3.4	−2.9
Spain	−27.6	18.9	24.4	60.8	68.2	12.1	15.9
Greece	−27.7	16.6	24.0	90.8	102.2	−19.7	−13.5
Italy	−29.5	18.0	23.7	53.0	61.5	19.1	25.0

Note: Columns 2 to 7 indicate the minimum and maximum fraction (in %) among the six different orderings of the hours worked per person difference to the US in column 1 is accounted for by the corresponding factor given in the column header. All values refer to the population aged 15 to 64 for the years 2013 to 2015.

but in the following columns we now report the bounds on what fraction of hours worked per person relative to the US can be accounted for by the different components across the six different orderings.

B.2 Demographic Structure: Age Composition

Figure B.1: Age Composition



Note: Each bar represents the average share of the population aged 15-64 falling into the 3 age groups young (15-24), core aged (25-54), and old (55-64), for the years 2013-2015.

B.3 Dissaggregate Decomposition: Country Details

The full disaggregate decomposition results are shown in Table B.3. Again, the values here are the mean values across all 120 possible orderings. The minimum and maximum values across all orderings are reported in Table B.4. It reports in column 1 the hours worked per person difference relative to the US, i.e. $(\frac{H^c - H^{US}}{H^{US}}) \times 100$. In column 2 we report what fraction of the difference in hours worked per person with the US can be accounted for by differences in the number of non-vacation weeks w. Columns 3 to 6 report the same statistic for the demographic composition f, employment rates e, weekly hours worked h, and the sectoral composition s, respectively. The five last columns add up to 1. A positive value indicates that a factor positively accounts for the (negative) difference, while a negative value means that the respective factor does not contribute to the (negative) difference, but would in fact indicate higher hours in the respective European country than in the US. As an example, Norwegians work on average 13% lower hours worked per person than US Americans. 109% of this difference can be accounted for by lower weekly hours worked, 46% by a lower number of weeks worked, and 35% by the demographic structure. At the same time, employment rates are larger in Scandinavia than in the US (see Figure 5a). This is not entirely accounted for by the demographic structure, and hence the differences in the employment rate cannot account for why hours worked per person are lower in Scandinavia than in the US, and that causes a negative entry in the table. Scandinavian hours worked per person would actually be 11% (-0.13×-0.88) larger than US hours based on the employment rate differences after controlling for the demographic structure, rather than 13% lower.

Weeks worked w and the demographic structure f almost uniformly predict lower hours in Europe than in the US (the only outliers are Switzerland and the Czech Republic with very low overall differences to the US). Weeks worked account on average over the European regions for one quarter to one half of the lower hours, and the demographic structure for another one quarter to one half. Differences in the sectoral composition s play no significant role in explaining hours differences to the US in any of the European countries. After controlling for the demographic and sectoral compositions in this decomposition exercise, we still observe marked patterns in the relative importance of employment rates and weekly hours: in Scandinavia and Western Europe, weekly hours worked are the main driver of lower hours per person compared to the US, explaining a share of 87 and 63 percent, respectively, with the employment rate going substantially in the opposite direction by 83 percent in Scandinavia and 43 percent in Western Europe. Note that the averages for Scandinavia, Western, and Eastern Europe each exclude the country with the smallest hours worked difference to the US, i.e. Sweden, Switzerland, and the Czech Republic, respectively. We do this when discussing the results because these countries features very high values in the decomposition table because of their small difference in hours worked per person to the US. We also exclude Portugal when discussing the Southern European average because it features very different patterns than the other Southern European countries.

While weekly hours nearly universally point to lower hours in all Scandinavian and Western European countries (with the exception of special case Switzerland), though by varying degree, the employment rates do not universally indicate higher hours, with Belgium and Ireland being exceptions to this rule. In contrast to Scandinavia and Western Europe, employment rates indicate lower hours worked per person in Eastern and Southern Europe except Portugal, explaining on

Table B.3: Disaggregate Decomposition

Country	$\frac{H^c - H^{US}}{H^{US}}$	Δ^w	Δ^f	Δ^e	Δ^h	Δ^s
Sweden	−6.2	111.7	62.6	−213.2	138.4	0.6
Norway	−13.4	45.7	35.2	−88.2	109.1	−1.7
Denmark	−13.7	55.5	62.3	−78.4	64.4	−3.7
Mean	*-11.1*	*70.9*	*53.3*	*-126.6*	*104.0*	*-1.6*
Mean w/o SE	*-13.6*	*50.6*	*48.7*	*-83.3*	*86.8*	*-2.7*
Switzerland	3.8	−161.8	−31.6	410.8	−116.8	−0.7
United Kingdom	−8.3	58.1	56.4	−93.7	83.2	−4.0
Austria	−10.4	68.6	39.8	−68.3	68.2	−8.2
Germany	−12.6	73.9	40.5	−87.9	78.0	−4.5
Netherlands	−15.3	18.5	50.6	−70.4	92.9	8.5
Belgium	−17.6	20.8	38.1	6.5	35.4	−0.9
France	−20.7	37.6	30.7	−2.3	34.9	−1.0
Ireland	−22.3	19.9	21.5	18.6	45.3	−5.3
Mean	*-12.9*	*16.9*	*30.8*	*14.2*	*40.1*	*-2.0*
Mean w/o CH	*-15.3*	*42.5*	*39.7*	*-42.5*	*62.6*	*-2.2*
Czech Republic	−0.8	−533.2	−66.6	527.0	149.2	23.6
Poland	−10.0	41.7	44.4	36.1	−16.4	−5.9
Hungary	−11.3	38.0	61.9	17.0	−11.5	−5.4
Mean	*-7.4*	*-151.2*	*13.2*	*193.4*	*40.4*	*4.1*
Mean w/o CZ	*-10.7*	*39.9*	*53.1*	*26.6*	*-13.9*	*-5.6*
Portugal	−13.4	31.0	99.9	−17.9	−11.2	−1.8
Spain	−27.6	21.5	24.8	37.0	17.8	−1.0
Greece	−27.7	20.0	15.9	75.3	−10.2	−1.0
Italy	−29.5	20.7	32.8	21.0	26.7	−1.1
Mean	*-24.5*	*23.3*	*43.3*	*28.8*	*5.8*	*-1.2*
Mean w/o PT	*-28.3*	*20.7*	*24.5*	*44.4*	*11.5*	*-1.1*

Note: Columns 2 to 6 indicate what fraction (in %) of the hours worked per person difference to the US in column 1 is accounted for by the corresponding factor given in the column header. Columns 2 to 6 sum up to 100 for each country. All values refer to the population aged 15 to 64 for the years 2013 to 2015.

average 27 and 44 percent of the hours difference to the US, respectively. Portugal is the stark exception here, with employment rates indicating higher hours than in the US. Weekly hours go in the opposite direction in Eastern and Southern Europe, indicating higher hours than in the US, with the exception of Spain, Italy and special case the Czech Republic. For Spain and Italy, weekly

Table B.4: Disaggregate Decomposition

		Δ^w		Δ^f		Δ^e		Δ^h		Δ^s	
Country	$\frac{H^c - H^{US}}{H^{US}}$	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Sweden	−6.2	97.9	127.5	55.8	71.1	−230.4	−196.2	121.5	158.1	−2.8	3.1
Norway	−13.4	38.7	54.1	28.8	42.8	−102.6	−73.8	95.9	124.1	−3.8	−0.4
Denmark	−13.7	43.3	67.2	45.7	72.2	−86.9	−66.3	53.8	78.5	−14.3	−0.5
Switzerland	3.8	−180.0	−146.0	−43.6	−18.6	378.8	443.2	−148.4	−91.8	−14.4	16.7
UK	−8.3	37.1	69.7	31.2	68.5	−106.7	−81.5	62.1	99.1	−22.3	2.0
Austria	−10.4	61.5	75.1	30.9	48.9	−82.7	−56.0	60.6	76.3	−11.1	−6.0
Germany	−12.6	63.9	84.8	34.5	46.4	−99.6	−77.2	66.4	92.6	−5.6	−3.2
Netherlands	−15.3	13.2	23.3	43.2	56.4	−81.1	−60.3	76.2	112.1	−1.0	17.4
Belgium	−17.6	19.2	22.4	33.0	43.3	3.0	10.3	32.9	38.0	−1.9	−0.1
France	−20.7	34.6	40.6	27.8	34.0	−5.6	0.2	30.5	39.1	−2.0	0.0
Ireland	−22.3	9.2	24.6	10.4	26.6	8.1	23.2	30.7	53.7	−15.1	−1.4
Czech Rep.	−0.8	−559.1	−501.3	−245.9	133.5	375.4	696.3	43.2	292.4	−57.9	100.8
Poland	−10.0	39.3	43.8	31.8	56.3	24.6	48.7	−35.2	−0.5	−14.1	1.6
Hungary	−11.3	35.9	40.0	58.3	65.4	12.4	21.9	−20.0	−3.9	−8.6	−2.6
Portugal	−13.4	27.3	33.3	73.9	126.1	−40.5	4.2	−15.0	−8.2	−3.6	−0.9
Spain	−27.6	18.8	24.4	19.0	31.0	31.9	42.3	13.8	22.2	−2.0	−0.4
Greece	−27.7	16.8	23.5	4.3	28.3	61.1	90.3	−17.8	−3.9	−2.7	−0.1
Italy	−29.5	17.9	23.8	24.3	41.6	17.3	24.9	20.3	33.5	−2.0	−0.5

Note: Columns 2 to 11 indicate the minimum and maximum fraction (in %) among the 120 different orderings of the hours worked per person difference to the US in column 1 is accounted for by the corresponding factor given in the column header. All values refer to the population aged 15 to 64 for the years 2013 to 2015.

hours and employment rates are both roughly equally important in explaining the hours gap to the US. In Portugal, lower hours are entirely driven by a lower number of work weeks and the demographic composition. Overall, the results in Table B.3 make clear that the negative cross-country correlation of the two components employment rates and weekly hours is not primarily driven by differences in the demographic or sectoral compositions, but by some more fundamental factors that apply to all groups in the labor market.

By definition, the importance of work weeks is not affected by the demographic or sectoral decomposition, as we impose the same number of work weeks for all subgroups within a country. Table B.5 shows the results when we relax this assumption and allow for heterogeneity in weeks worked as described in Appendix Section A.2.3 by scaling the reported vacation weeks in the LFS data of each gender × age × education × sector group up by a common multiplicative factor such that the average vacation weeks match the ones from external data sources. This procedure (rather than assuming a common additive factor, or scaling up weeks worked rather than vacation weeks)

maximizes the degree of heterogeneity. While the results are almost unchanged for Scandinavia and Western Europe, allowing for heterogeneity in weeks worked by demographic group reduces the importance of the demographic composition in Eastern and Southern Europe by 5 and 12 percentage points, respectively, which is nearly completely offset by a corresponding increase in the importance of weeks worked.

Table B.5: Disaggregate Decomposition, Heterogeneous Weeks Worked

Country	$\frac{H^c - H^{US}}{H^{US}}$	Δ^w	Δ^f	Δ^e	Δ^h	Δ^s
Sweden	−6.3	116.9	55.7	−207.5	134.4	0.5
Norway	−13.5	48.0	33.6	−87.7	108.0	−1.9
Denmark	−13.8	59.7	59.5	−78.9	64.0	−4.3
Mean	*-11.2*	*74.9*	*49.6*	*-124.7*	*102.1*	*-1.9*
Mean w/o SE	*-13.6*	*53.8*	*46.5*	*-83.3*	*86.0*	*-3.1*
Switzerland	4.1	−160.9	−25.6	389.4	−105.9	3.0
United Kingdom	−8.1	64.3	53.1	−96.7	83.3	−4.0
Austria	−10.3	80.7	32.4	−70.5	68.0	−10.6
Germany	−12.7	79.8	35.7	−88.2	77.5	−4.8
Netherlands	−15.3	23.2	48.1	−70.7	91.7	7.7
Belgium	−17.6	22.3	36.1	7.2	35.2	−0.7
France	−20.7	40.8	28.1	−2.0	34.7	−1.7
Ireland	−22.1	21.2	20.8	19.5	45.0	−6.4
Mean	*-12.8*	*21.4*	*28.6*	*11.0*	*41.2*	*-2.2*
Mean w/o CH	*-15.3*	*47.5*	*36.3*	*-43.1*	*62.2*	*-2.9*
Czech Republic	−0.6	−228.3	73.2	193.6	45.9	15.7
Poland	−9.8	57.9	33.8	39.6	−18.5	−12.8
Hungary	−11.2	50.9	49.1	18.1	−11.7	−6.4
Mean	*-7.2*	*-39.8*	*52.0*	*83.7*	*5.2*	*-1.2*
Mean w/o CZ	*-10.5*	*54.4*	*41.4*	*28.8*	*-15.1*	*-9.6*
Portugal	−13.4	43.5	87.2	−17.8	−11.1	−1.7
Greece	−27.2	27.5	8.8	77.0	−11.5	−1.8
Spain	−27.6	24.2	21.9	37.7	17.5	−1.4
Italy	−29.3	25.5	27.4	21.8	26.4	−1.2
Mean	*-24.4*	*30.2*	*36.3*	*29.7*	*5.3*	*-1.5*
Mean w/o PT	*-28.0*	*25.7*	*19.4*	*45.5*	*10.8*	*-1.4*

Note: Columns 2 to 6 indicate what fraction (in %) of the hours worked per person difference to the US in column 1 is accounted for by the corresponding factor given in the column header. Columns 2 to 6 sum up to 100 for each country. All values refer to the population aged 15 to 64 for the years 2013 to 2015.

B.4 Residual Differences in Employment Rates and Weekly Hours Worked

Table B.6: Residual Differences by Region

(a) Scandinavia

	$e^c - e^{US}$		$\frac{h^c - h^{US}}{h^{US}}$	
	Men	Women	Men	Women
Young				
Still Enrolled	5.5	7.3	−19.5	−34.6
Low Educ.	11.6	14.0	1.9	0.9
Medium Educ.	8.6	16.1	−3.7	−8.2
High Educ.	−1.8	0.5	−6.6	−8.4
Middle				
Low Educ.	−1.4	14.8	−4.4	−11.7
Medium Educ.	9.1	16.8	−7.3	−12.7
High Educ.	0.9	9.8	−11.4	−14.2
Old				
Low Educ.	13.4	19.0	−5.6	−12.5
Medium Educ.	10.1	12.7	−9.1	−11.9
High Educ.	8.1	12.8	−8.7	−7.7

(b) Western Europe

	$e^c - e^{US}$		$\frac{h^c - h^{US}}{h^{US}}$	
	Men	Women	Men	Women
Young				
Still Enrolled	1.9	−3.9	9.5	−1.6
Low Educ.	1.4	2.4	2.6	3.0
Medium Educ.	5.3	10.0	2.1	−2.7
High Educ.	−4.5	0.5	−4.8	−6.0
Middle				
Low Educ.	−0.6	11.8	−2.1	−21.6
Medium Educ.	6.6	11.4	−2.7	−19.6
High Educ.	1.7	7.0	−2.8	−14.1
Old				
Low Educ.	1.8	6.0	−4.2	−26.1
Medium Educ.	−0.3	−1.3	−6.4	−22.6
High Educ.	−1.8	−1.8	−4.5	−14.8

(c) Eastern Europe

	$e^c - e^{US}$		$\frac{h^c - h^{US}}{h^{US}}$	
	Men	Women	Men	Women
Young				
Still Enrolled	−22.3	−27.2	28.3	33.7
Low Educ.	1.7	−14.2	19.3	30.6
Medium Educ.	6.6	−0.8	11.4	12.6
High Educ.	−6.6	−7.7	1.3	2.4
Middle				
Low Educ.	−12.7	2.6	4.3	8.8
Medium Educ.	7.7	8.5	1.9	5.3
High Educ.	3.4	3.2	−2.3	−1.2
Old				
Low Educ.	−11.9	−9.2	1.4	3.3
Medium Educ.	−7.2	−15.7	−1.7	3.5
High Educ.	−1.4	−3.1	−2.6	0.9

(d) Southern Europe w/o PT

	$e^c - e^{US}$		$\frac{h^c - h^{US}}{h^{US}}$	
	Men	Women	Men	Women
Young				
Still Enrolled	−24.5	−29.3	15.1	16.6
Low Educ.	−6.4	−10.3	13.8	24.2
Medium Educ.	−27.6	−26.0	2.8	3.2
High Educ.	−33.2	−38.3	−8.3	−10.9
Middle				
Low Educ.	−5.8	0.0	3.9	−2.1
Medium Educ.	−3.5	−6.8	−0.9	−4.5
High Educ.	−9.1	−6.1	−6.8	−10.6
Old				
Low Educ.	−4.5	−5.7	5.1	−1.9
Medium Educ.	−9.3	−14.6	−0.4	−0.7
High Educ.	−8.6	−9.7	−6.7	−7.9

Note: The table shows the average employment rate differences (in %-points) and weekly hours per employed differences (in %) between the European regions and the US, broken down by gender, age, and education. All values refer to the population aged 15 to 64 for the years 2013 to 2015. Southern Europe excludes Portugal.

Table B.7: Regression Coefficients

(a) Scandinavia	$e^c - e^{US}$	$\frac{h^c - h^{US}}{h^{US}}$
Constant	7.631^{***}	-9.504^{***}
Female	6.430^{***}	-3.492^{**}
Young	-0.185	6.271^{***}
Old	4.342^{**}	1.020
Low Education	-0.322	3.602^{**}
High Eduction	-7.174^{***}	-0.681
R^2	0.476	0.410
Obs.	54	54

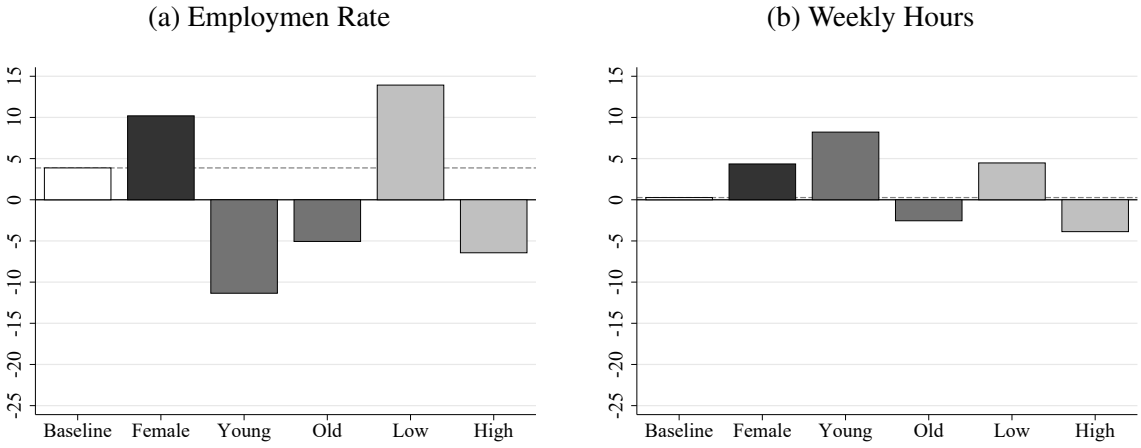
(b) Western Europe	$e^c - e^{US}$	$\frac{h^c - h^{US}}{h^{US}}$
Constant	6.473^{***}	-5.310^{***}
Female	4.040^{***}	-11.275^{***}
Young	-3.789^{**}	9.533^{***}
Old	-5.853^{***}	-2.608^{*}
Low Education	-1.498	0.577
High Eduction	-5.087^{***}	0.811
R^2	0.168	0.523
Obs.	144	144

(c) Eastern Europe	$e^c - e^{US}$	$\frac{h^c - h^{US}}{h^{US}}$
Constant	6.034^{**}	0.965
Female	-1.779	3.690^{**}
Young	-5.625^{**}	10.126^{***}
Old	-10.205^{***}	-2.009
Low Education	-7.152^{***}	5.773^{***}
High Eduction	-1.894	-5.770^{***}
R^2	0.337	0.642
Obs.	54	54

(d) Southern Europe w/o PT	$e^c - e^{US}$	$\frac{h^c - h^{US}}{h^{US}}$
Constant	-6.804^{**}	-2.318
Female	-1.067	-1.537
Young	-18.403^{***}	7.614^{**}
Old	-3.498	1.426
Low Education	9.189^{***}	7.248^{**}
High Eduction	-2.837	-8.466^{***}
R^2	0.565	0.444
Obs.	54	54

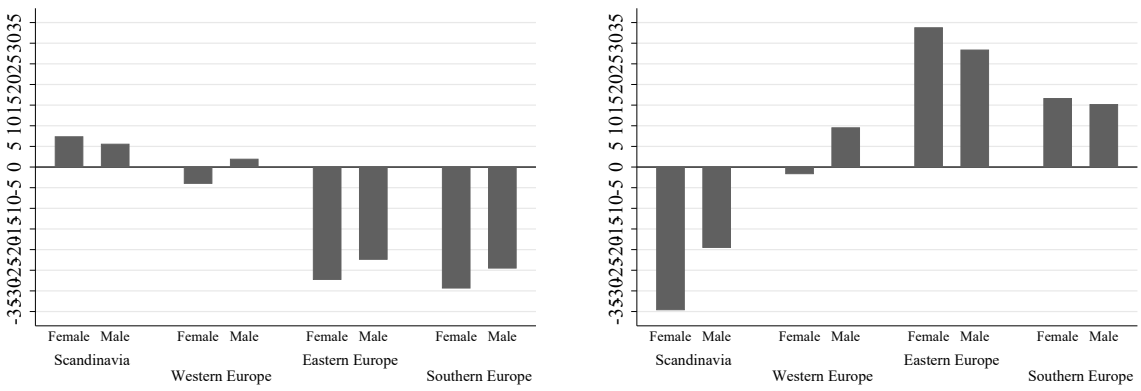
Note: The table shows results from a regression of employment rate differences (in %-points) and weekly hours worked differences (in %) between different Europe and the US, broken down by gender, age, and education, on a female dummy, dummies for young (15-24 years) and old (55-64 years), and dummies for low and high education. The regressions are run separately by region, and Portugal and the educational category "Still Enrolled" are excluded. The baseline category are men aged 25-54 with medium education. *,**,*** indicate significance at the 10, 5, and 1 percent levels. All values are refer to the years 2013 to 2015.

Figure B.2: Differences between Europe and the US by Demographic Group for Portugal



Note: The graphs show results from a regression of employment rate differences (left panel) and weekly hours worked differences between Portugal and the US (right panel), broken down by gender, age, and education, on a female dummy, dummies for young (15-24 years) and old (55-64 years), and dummies for low and high education. The educational category "Still Enrolled" is excluded. The white bars and gray dashed lines show the estimated constant, representing the average difference for men aged 25-54 with medium education. The other graphs reflect the sum of the constant and the coefficients for the different dummies. All values refer to the years 2013 to 2015.

Figure B.3: Regression Coefficients for Still Enrolled



Note: The graphs show results from a regression of employment rate differences (left panel) and weekly hours worked differences between different European regions and the US (right panel) for the educational category "Still Enrolled", on gender dummies. The bars indicate the coefficients for the female and male dummies. All values refer to the years 2013 to 2015.

C Country Figures Appendix

C.1 Public Holidays and Annual Leave by Country

The following figures indicate the time series of public holidays (left panel) and days of annual leave obtained from external sources. The squares indicate actual data points, the solid line indicates the data provided by the European Industrial Relations Observatory, EIRO, and the dashed-dotted line shows the final time series (sometimes imputed) used for the calculation of our measures of hours worked.

Figure C.1: Austria

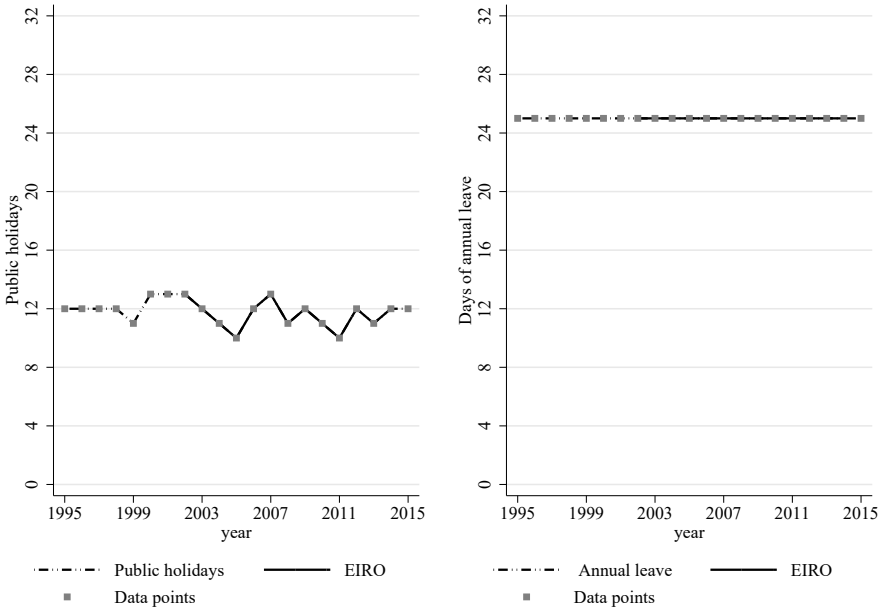


Figure C.2: Belgium

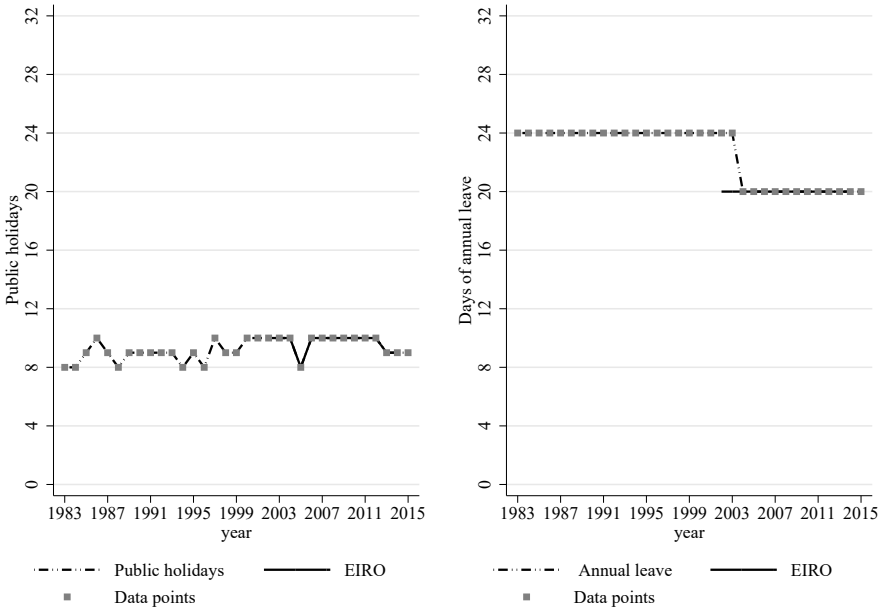


Figure C.3: Czech Republic

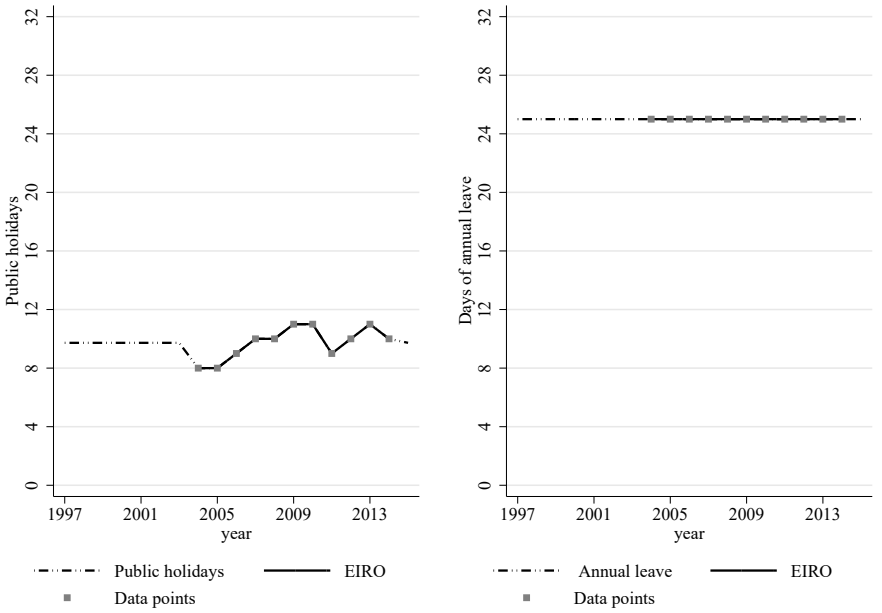


Figure C.4: Denmark

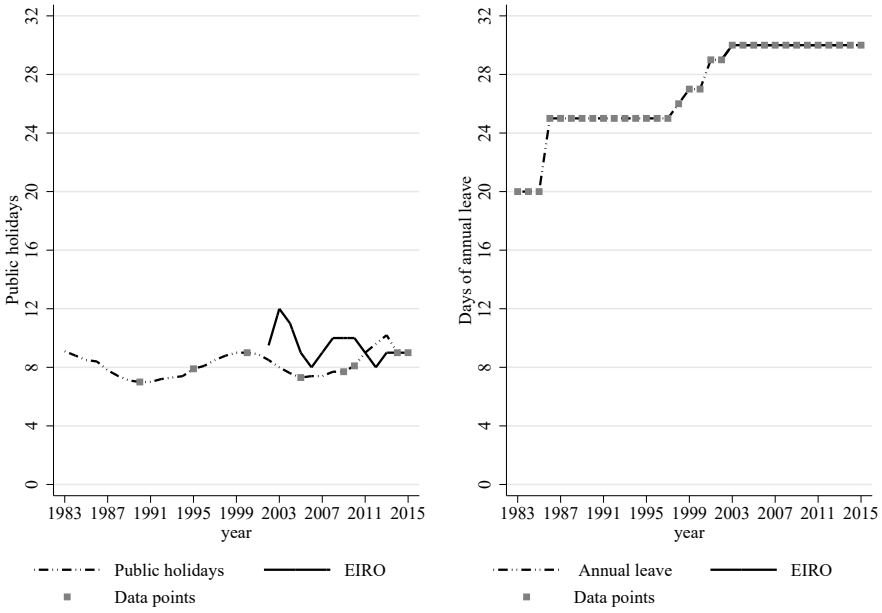


Figure C.5: France

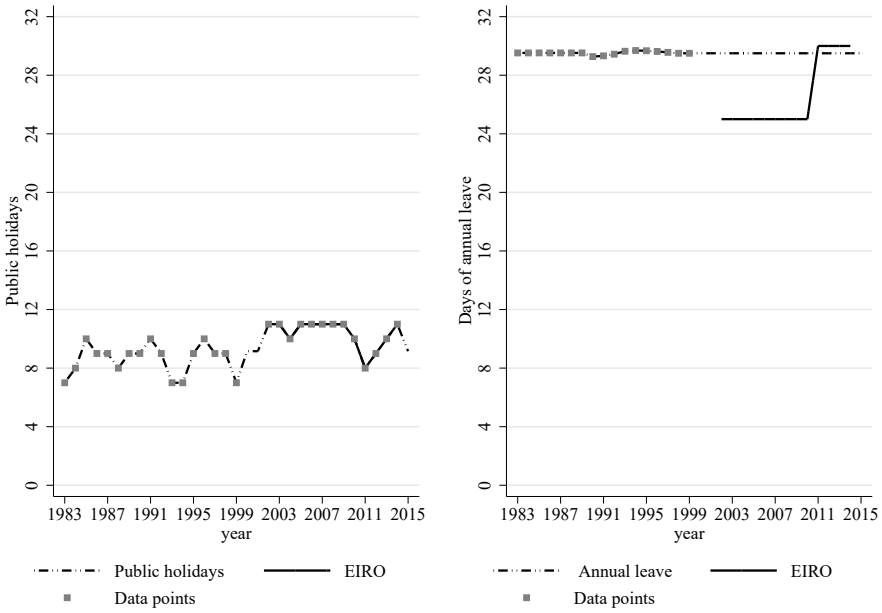


Figure C.6: Germany

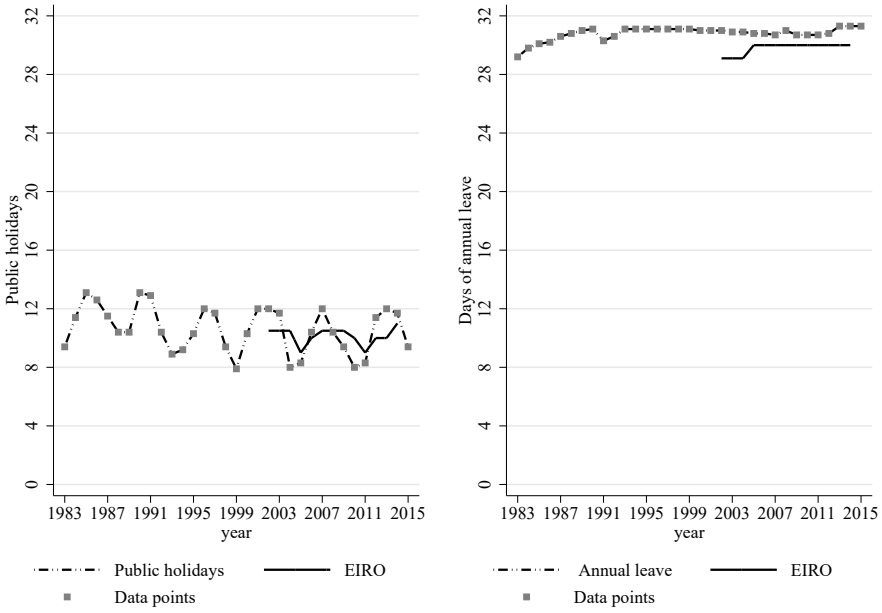


Figure C.7: Greece

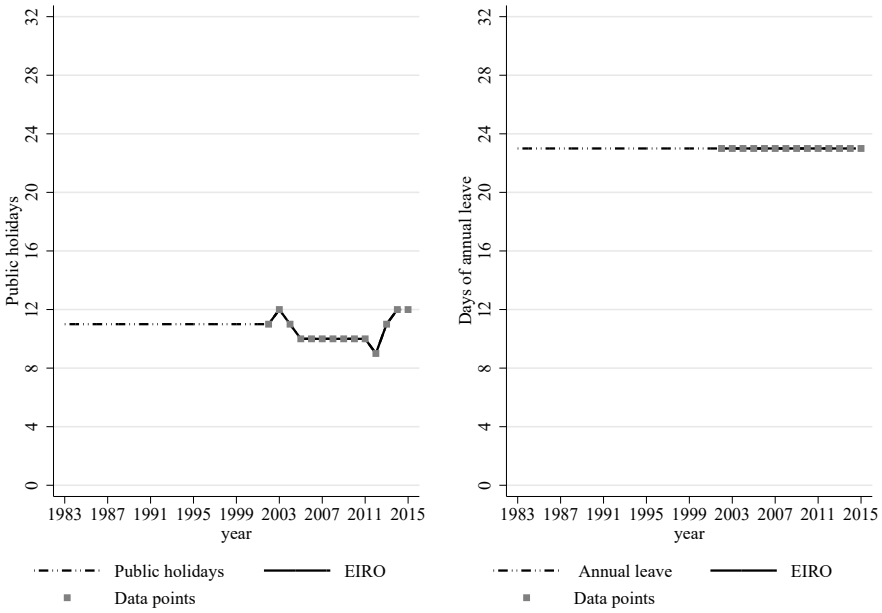


Figure C.8: Hungary

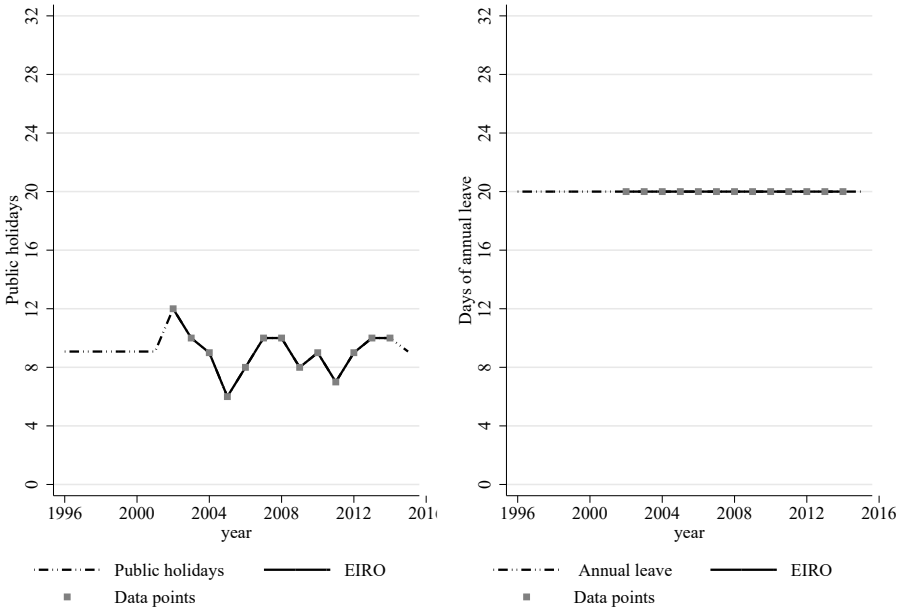


Figure C.9: Ireland

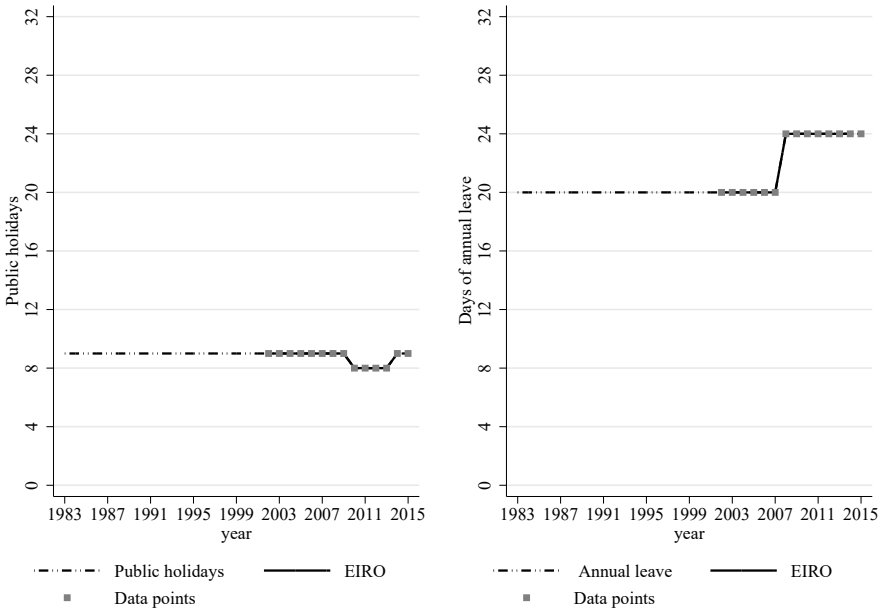


Figure C.10: Italy

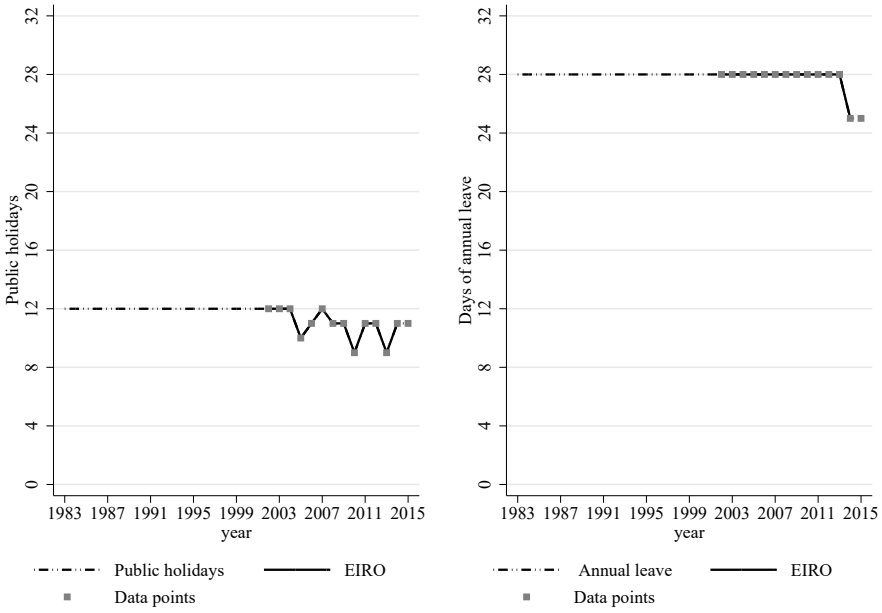


Figure C.11: Netherlands

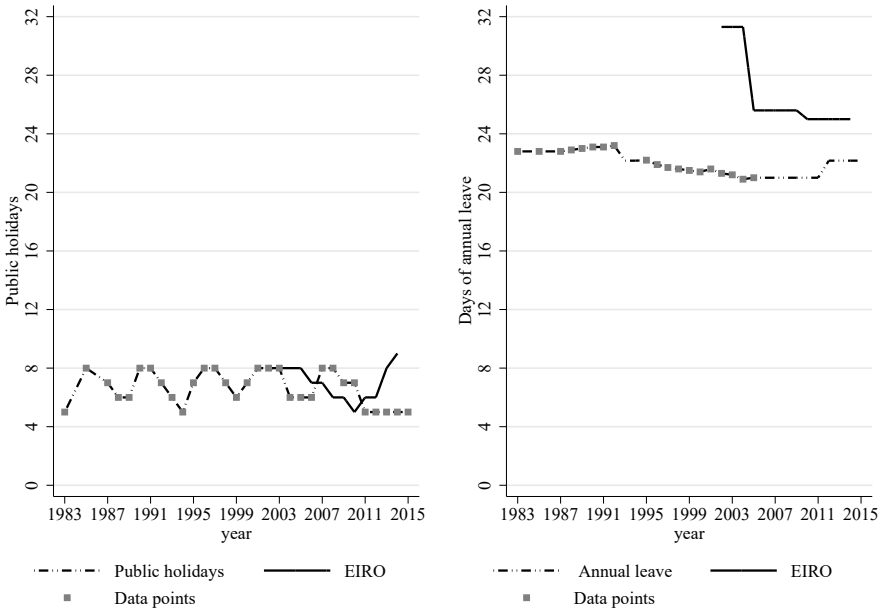


Figure C.12: Norway

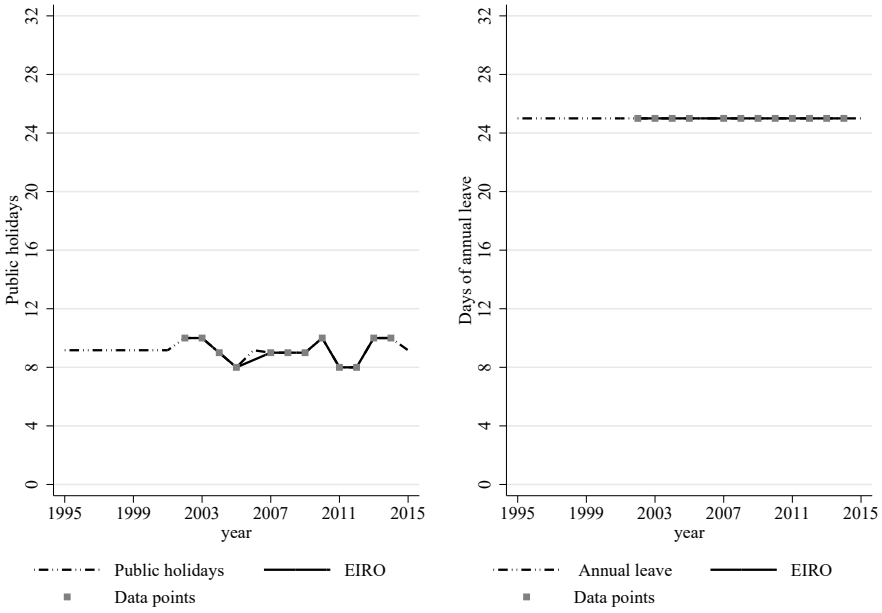


Figure C.13: Poland

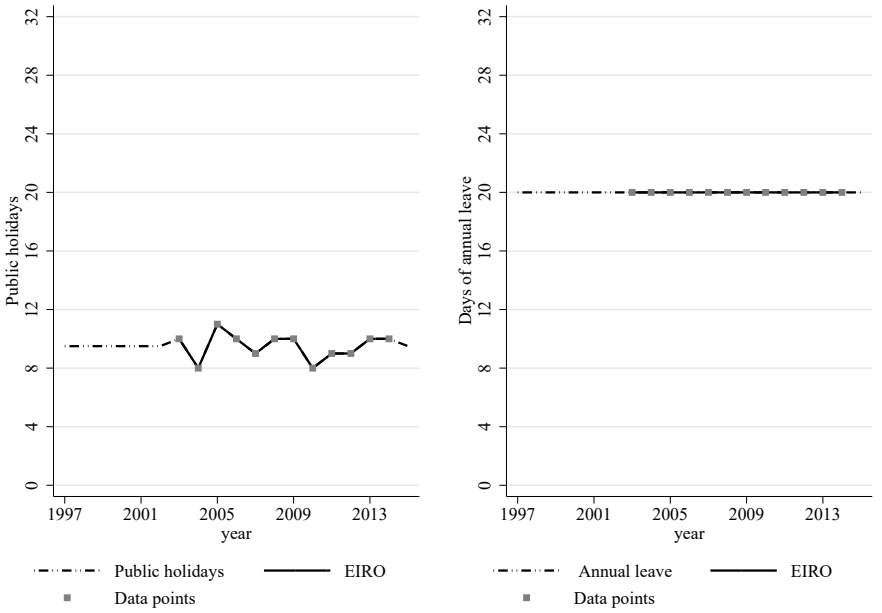


Figure C.14: Portugal

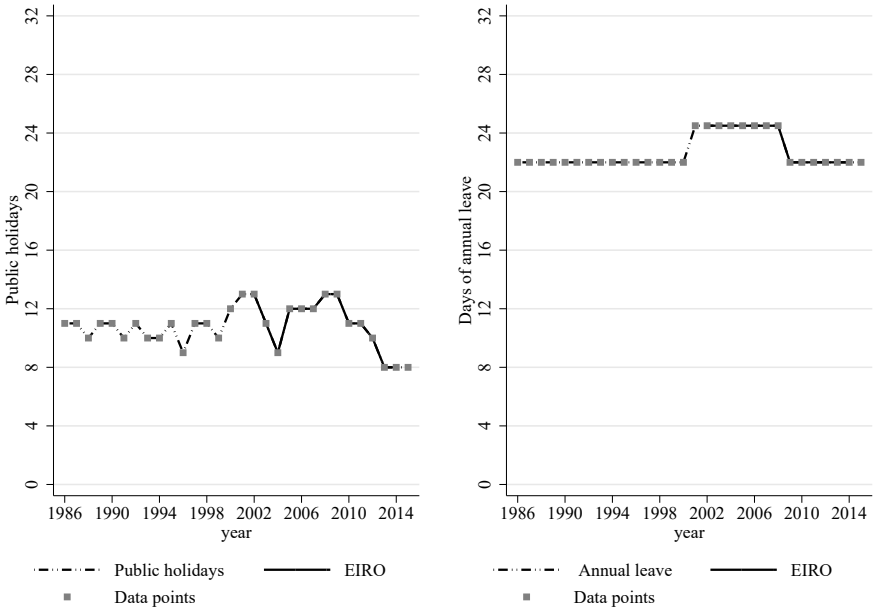


Figure C.15: Spain

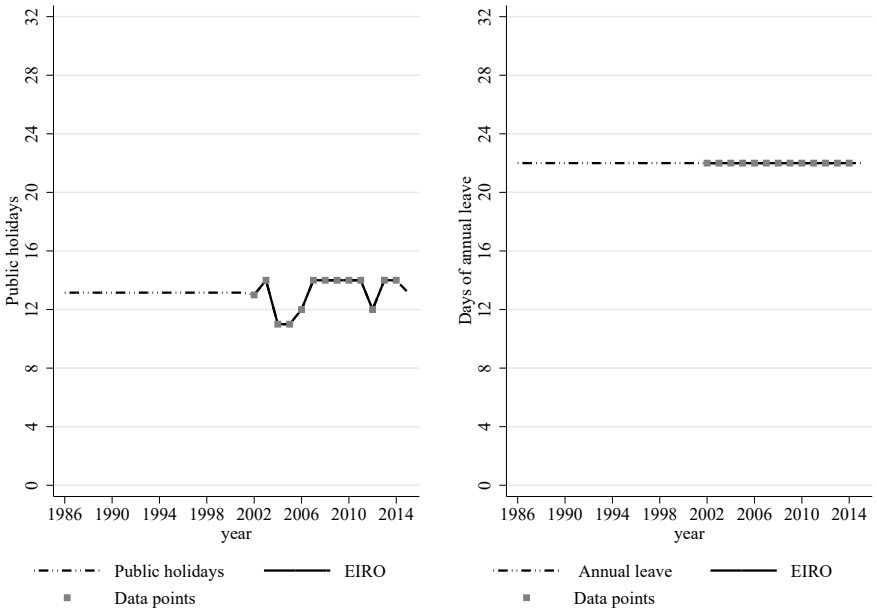


Figure C.16: Sweden

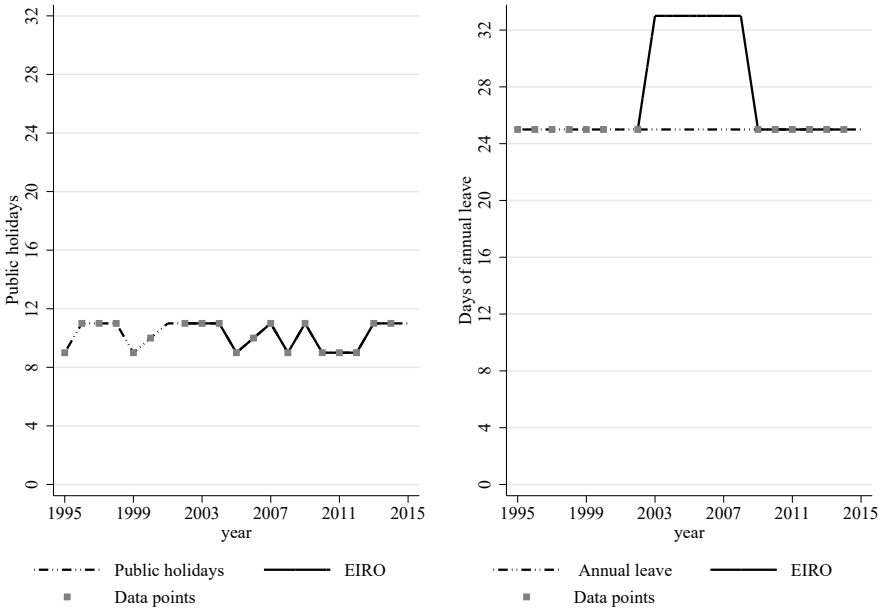


Figure C.17: Switzerland

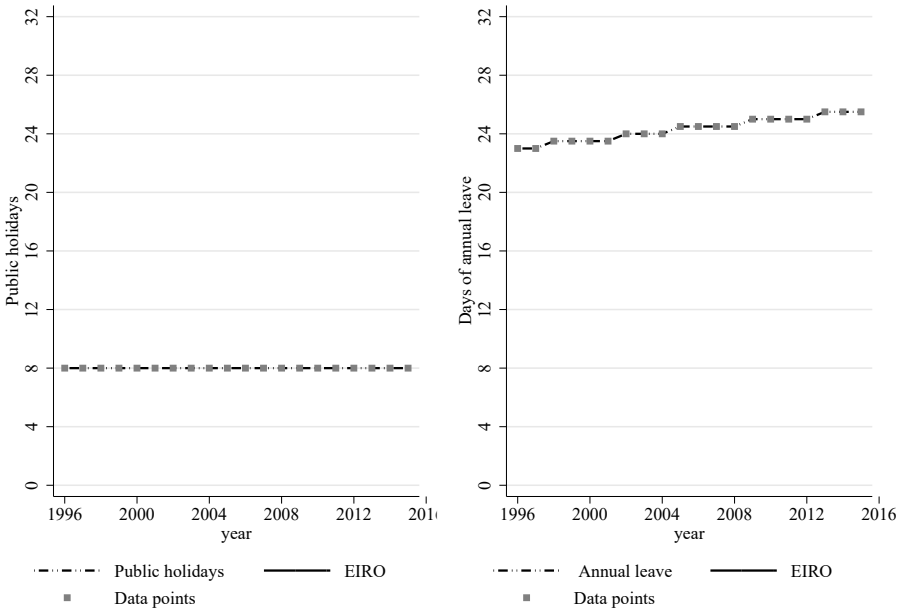


Figure C.18: United Kingdom

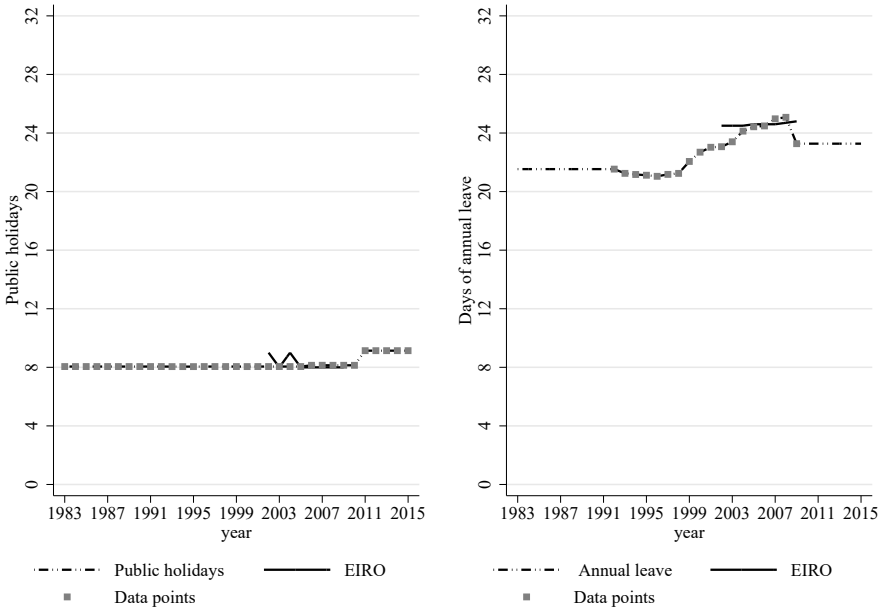
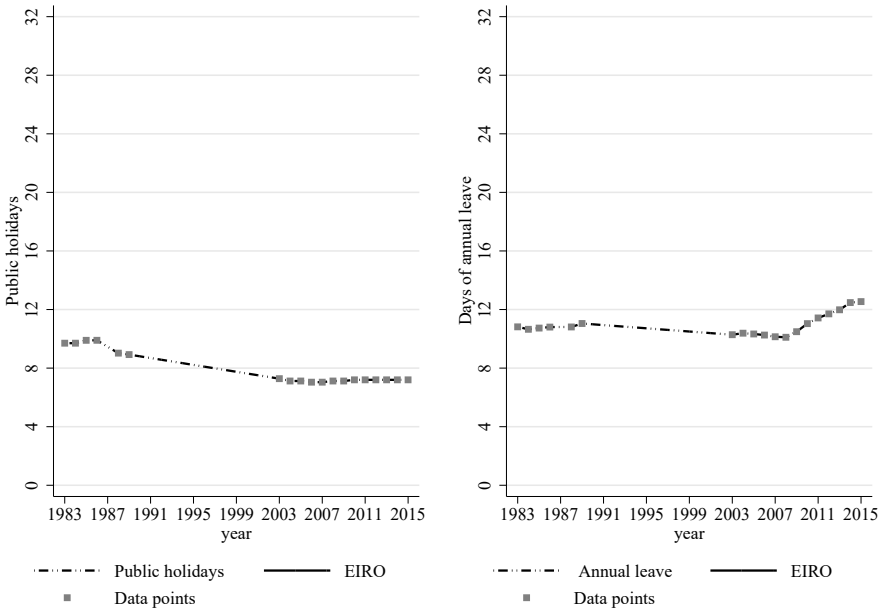


Figure C.19: United States

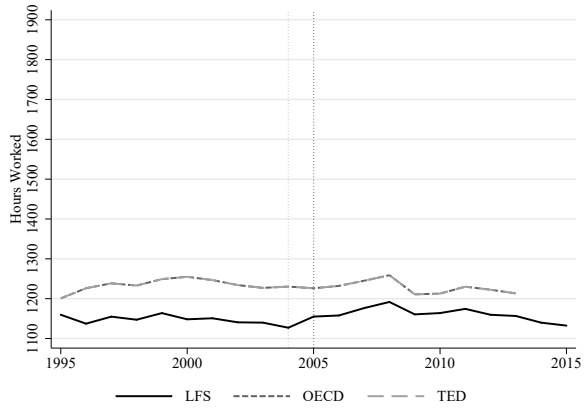


C.2 Time Series for Hours Worked and Employment Rates from Labor Forces Surveys and NIPA

For each country we show the time-series of hours per person, employment rates and hours per employed based on LFS and NIPA data from the OECD, and in addition from TED. As mentioned before, for most years and countries, the OECD and TED data series coincide, while the TED data usually go further back in time than the OECD data (and the LFS data). We calculate our NIPA measure of hours worked per person by dividing NIPA total hours by the population aged 15 to 64 obtained from the OECD's "Annual Labour Force Statistics". For the LFS data, we divide total LFS hours (rather than only those by the population aged 15 to 64 as in the previous subsections) by the population aged 15 to 64 directly taken from the LFS. NIPA employment rates are calculated as NIPA total employment from the OECD National Accounts database (domestic concept) divided by the population 15 to 64, while for LFS data we divide total employment (aged 15 and older) by the population aged 15 to 64. The vertical lines indicate in which years the different countries switched to continuous surveying (gray dotted line) and in which the EU LFS switched to covering all weeks of the year (black dotted line).

Figure C.20: Austria

(a) H



(b) H^E and e

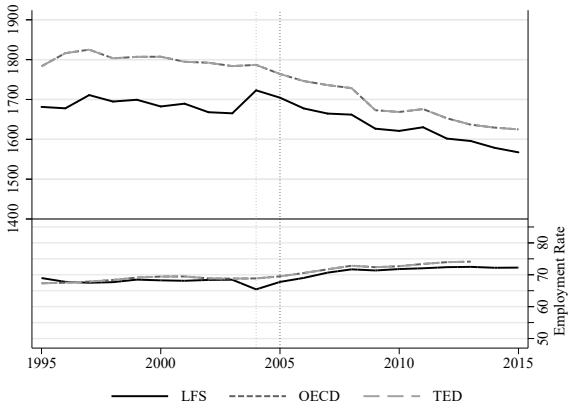
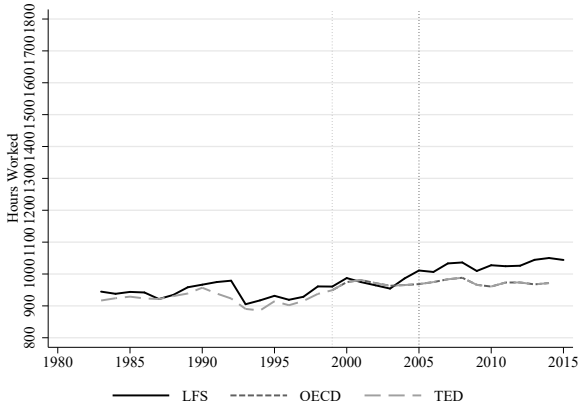


Figure C.21: Belgium

(a) H



(b) H^E and e

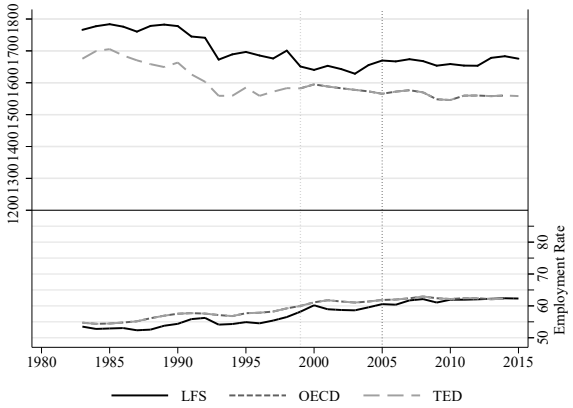
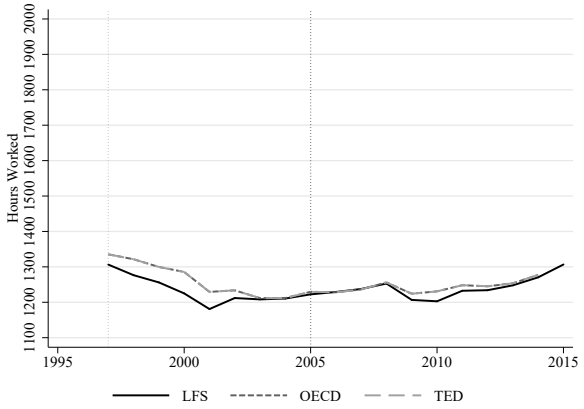


Figure C.22: Czech Republic

(a) H



(b) H^E and e

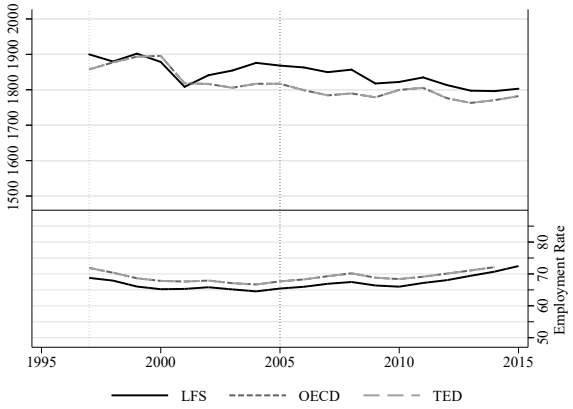
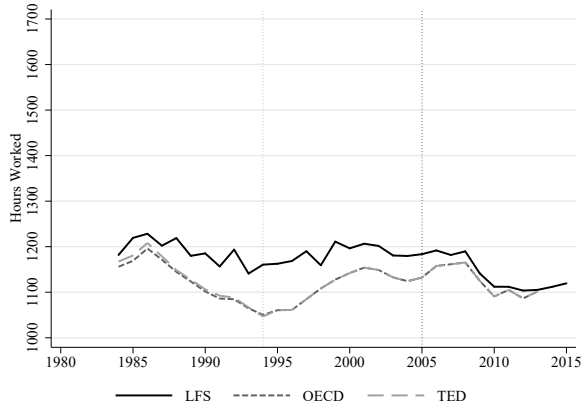


Figure C.23: Denmark

(a) H



(b) H^E and e

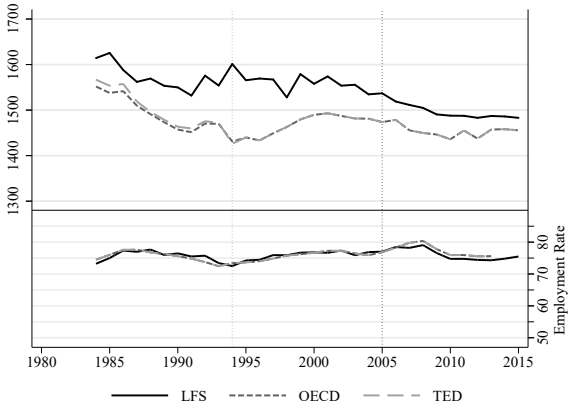
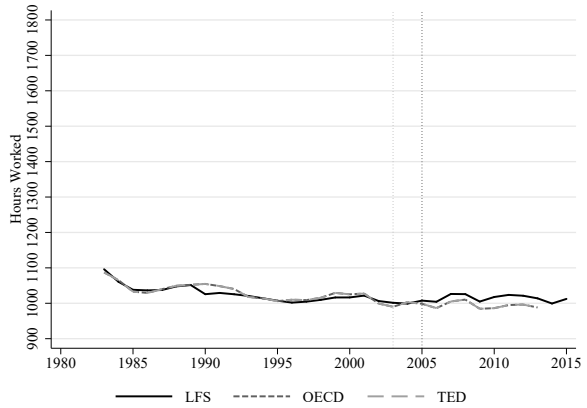


Figure C.24: France

(a) H



(b) H^E and e

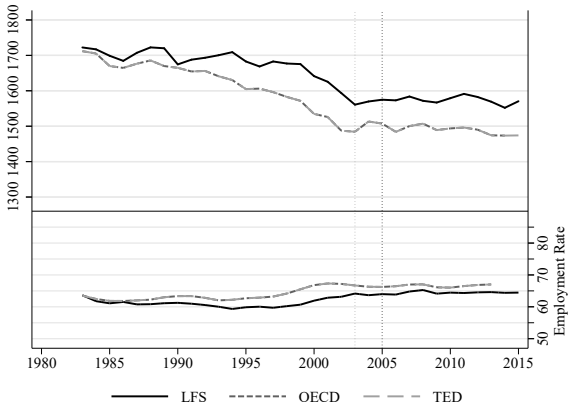
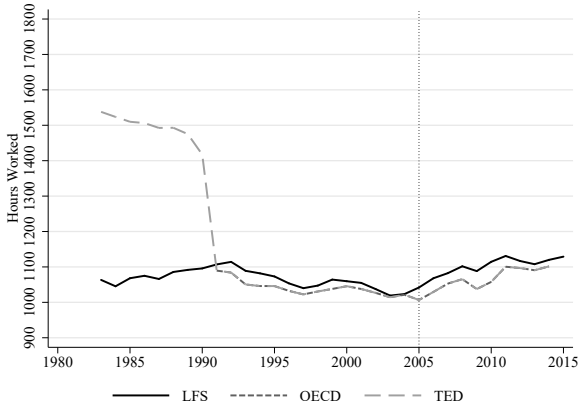


Figure C.25: Germany

(a) H



(b) H^E and e

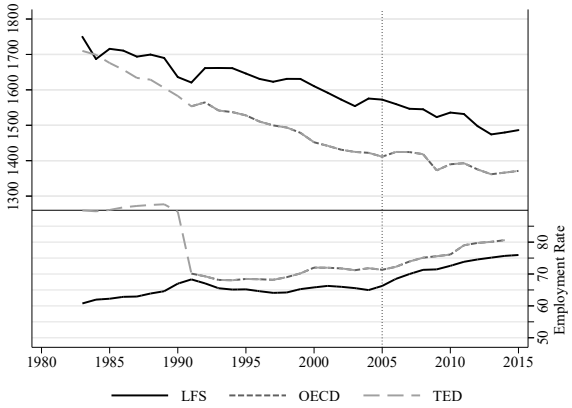
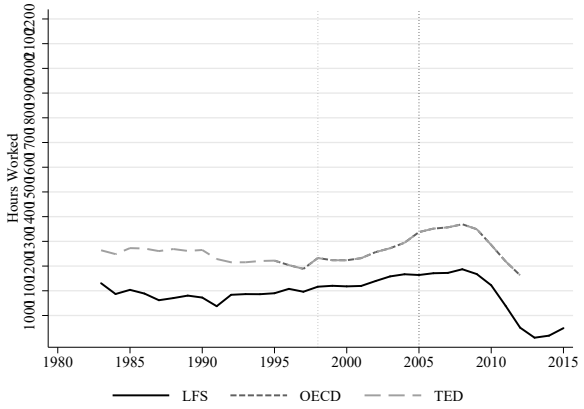


Figure C.26: Greece

(a) H



(b) H^E and e

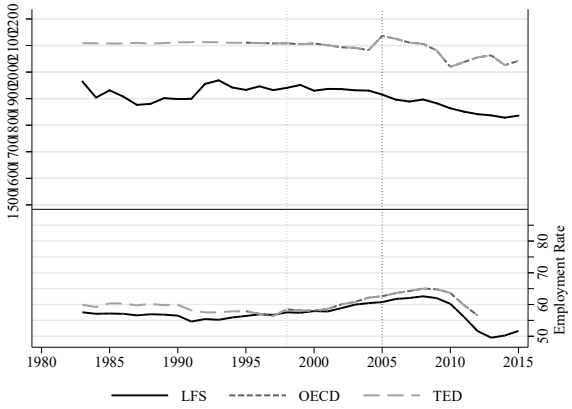
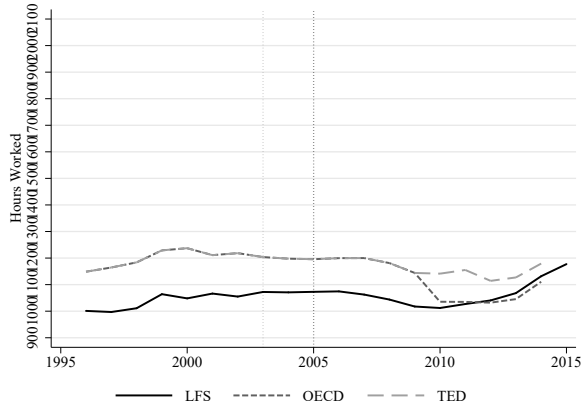


Figure C.27: Hungary

(a) H



(b) H^E and e

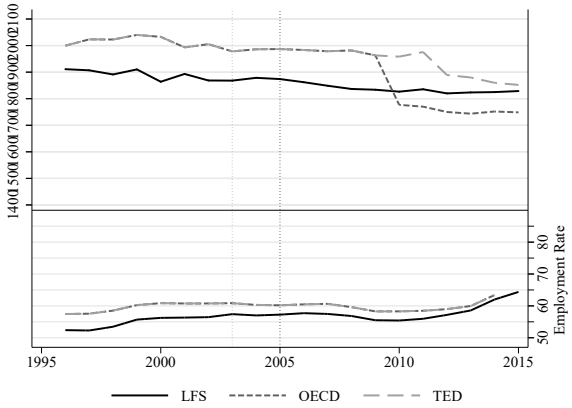
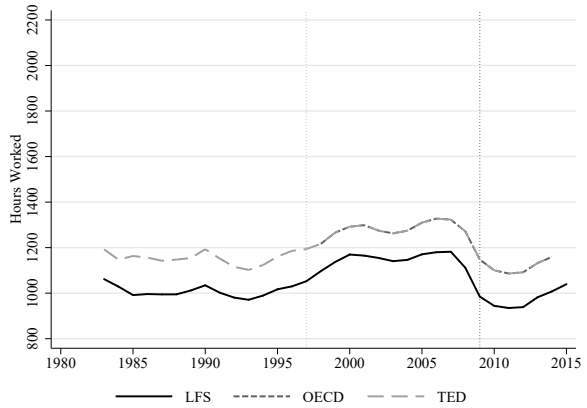


Figure C.28: Ireland

(a) H



(b) H^E and e

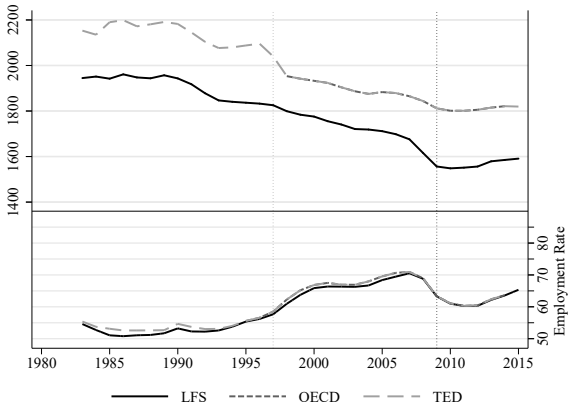
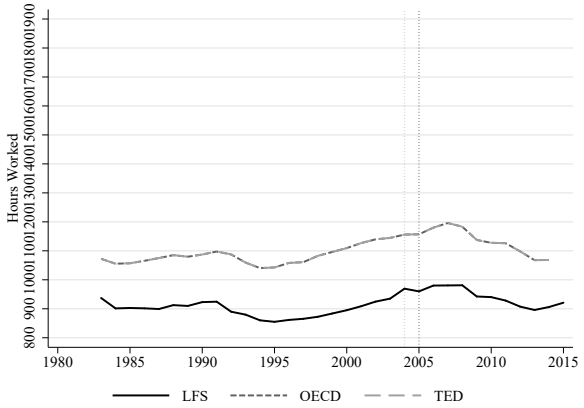


Figure C.29: Italy

(a) H



(b) H^E and e

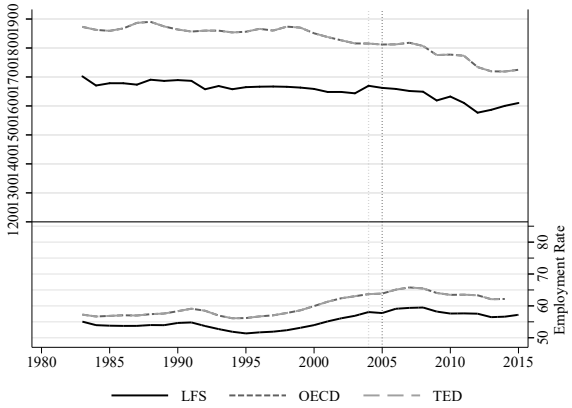
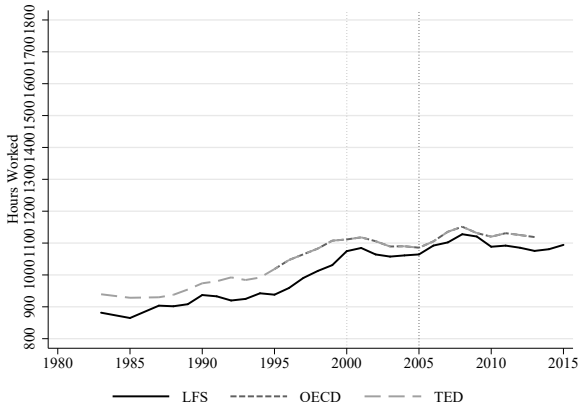


Figure C.30: Netherlands

(a) H



(b) H^E and e

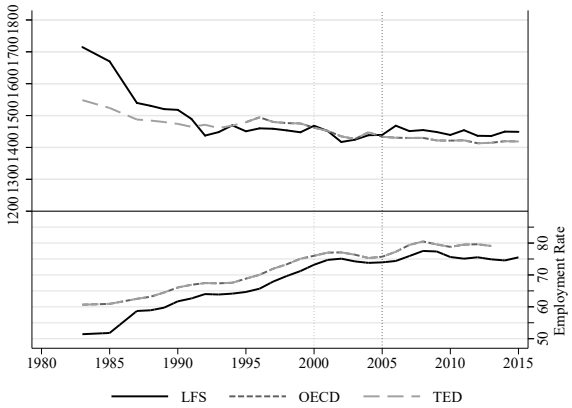


Figure C.31: Norway

(a) H (b) H^E and e

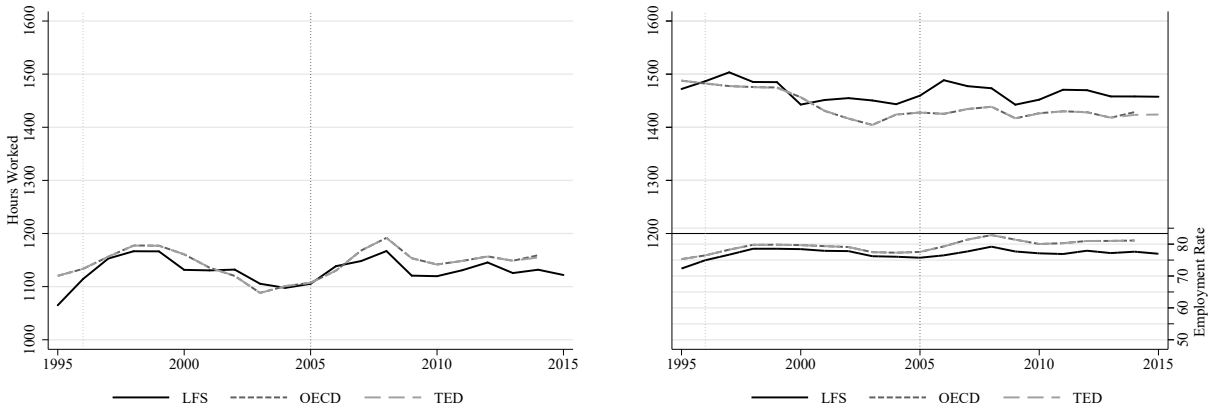


Figure C.32: Poland

(a) H (b) H^E and e

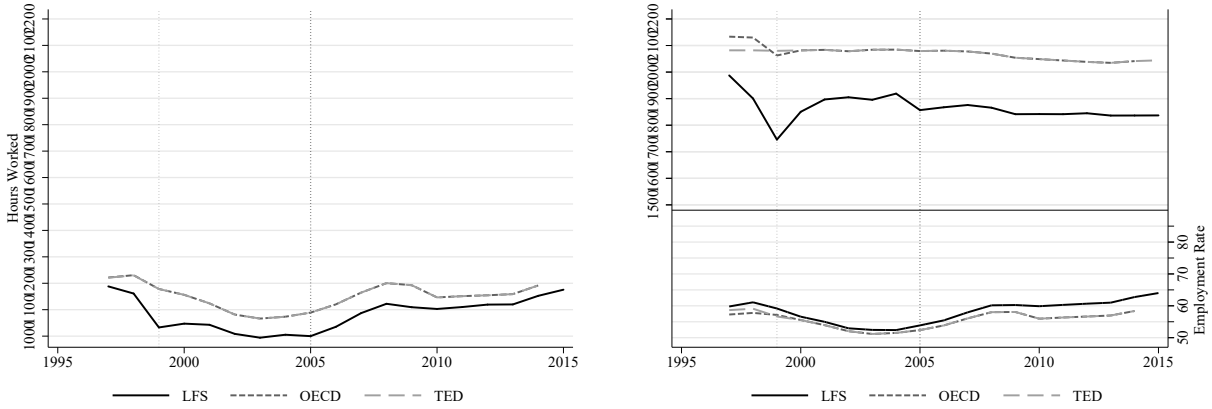


Figure C.33: Portugal

(a) H (b) H^E and e

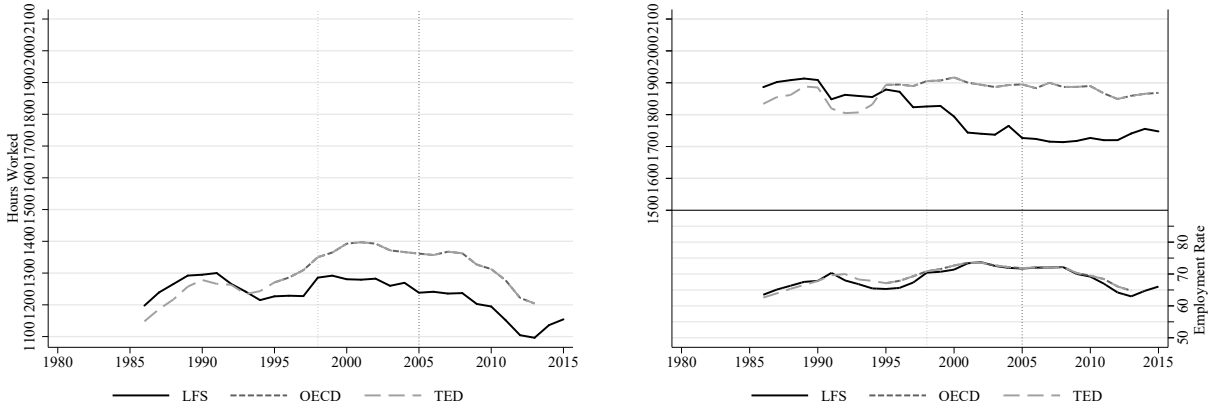


Figure C.34: Spain

(a) H (b) H^E and e

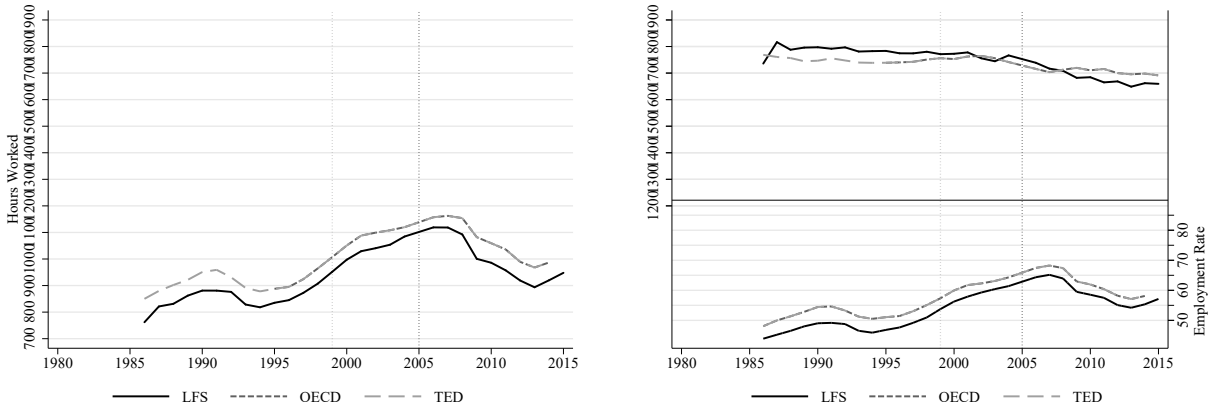
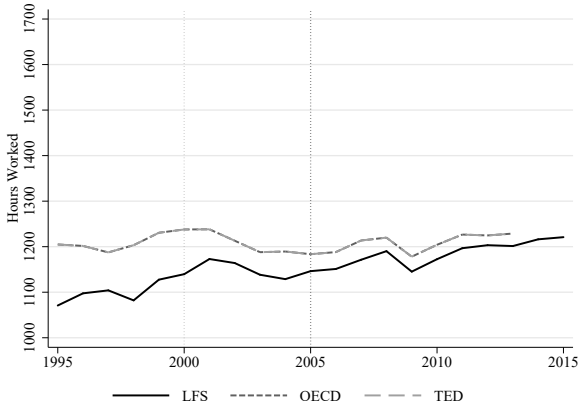


Figure C.35: Sweden

(a) H



(b) H^E and e

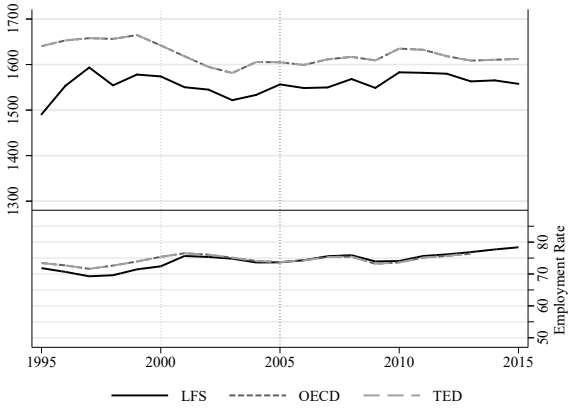
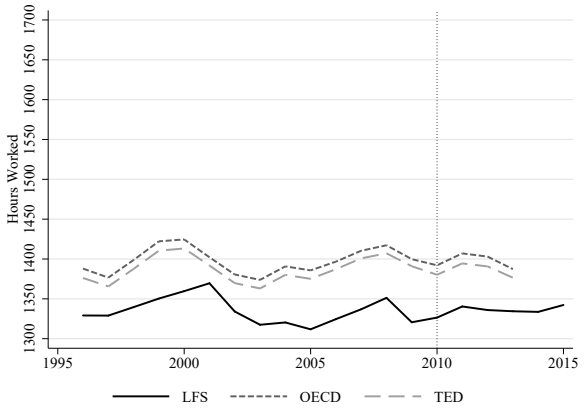


Figure C.36: Switzerland

(a) H



(b) H^E and e

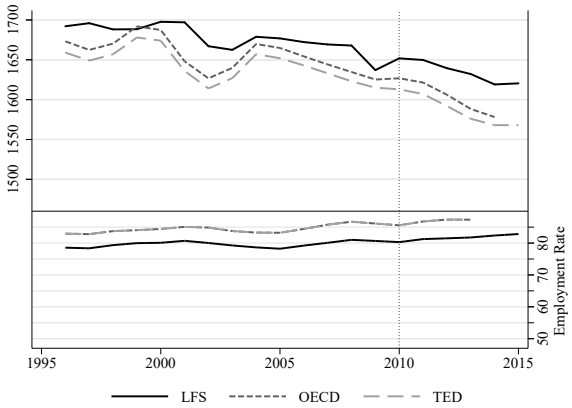
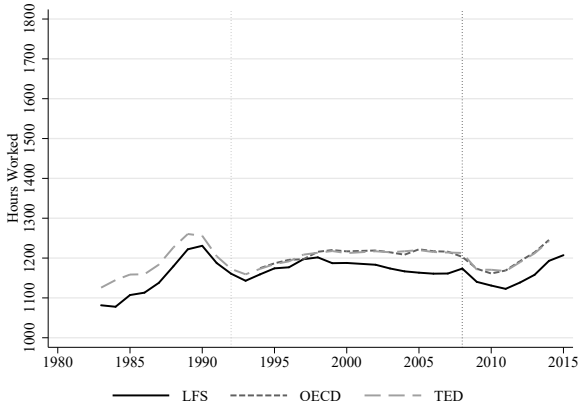


Figure C.37: United Kingdom

(a) H



(b) H^E and e

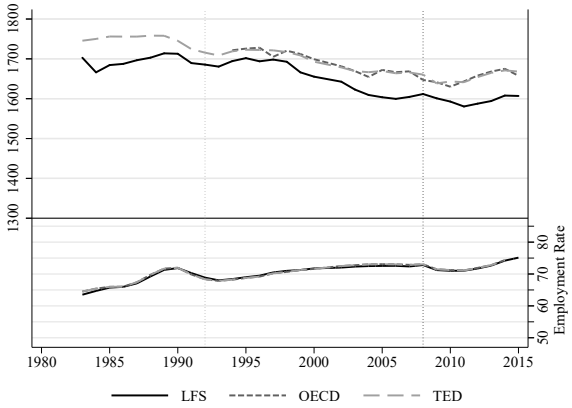
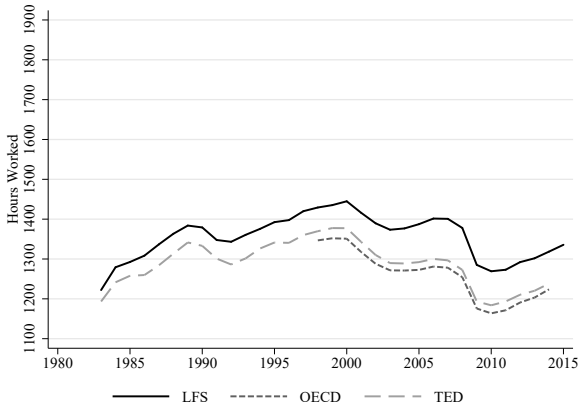
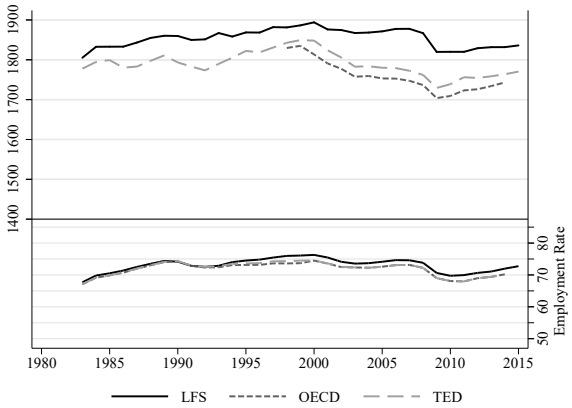


Figure C.38: United States

(a) H



(b) H^E and e



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