A NOTE ON DATA REVISIONS OF AGGREGATE HOURS WORKED SERIES:

IMPLICATIONS FOR THE EUROPE-US HOURS GAP*

Alexander Bick
Arizona State University

Bettina Brüggemann
McMaster University

Nicola Fuchs-Schündeln
Goethe University Frankfurt,
CEPR and CFS

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Abstract

In this note we document that the OECD and the Conference Board's Total Economy Database substantially revised their measures of hours worked over time. Relying on the data used by Rogerson (2006) and Ohanian et al. (2008), we find a Europe-US hours per person gap of -18% for the year 2003. Using the 2016 releases of the same data yields for the year 2003 a gap that is 40% smaller, namely a gap of only -11%. Using labor force survey data, which are less subject to data revisions, we find a Europe-US hours gap of -19%.

* Email: alexander.bick@asu.edu, brueggeb@mcmaster.ca and fuchs@wiwi.uni-frankfurt.de. We thank Valerie Ramey for helpful comments and encouraging us to write this note. The authors gratefully acknowledge financial support from the Cluster of Excellence "Formation of Normative Orders" at Goethe University and the European Research Council under Starting Grant No. 262116. All errors are ours.

1 Introduction

Rogerson (2006) documents large differences in hours worked per person among OECD countries for the early 2000s. Specifically, based on data from the OECD and the Total Economy Database (TED), he finds that hours worked per person in the 16 European countries in his sample are substantially lower than in the US. In this note, we show that using the 2016 releases of the same data yields a Europe-US hours worked per person gap that is about 40% smaller than the one he found. Since the data used by Rogerson (2006) were not published along with his study, we replicate his results using the data from his companion paper with Ohanian and Raffo (Ohanian et al., 2008) available on the website of the *Journal of Monetary Economics*. The implied Europe-US hours worked per person gap is -17.6% for the year 2003, the latest available year in their data set. Using the 2016 release of the same data yields for the year 2003 a gap of only -11.0%, thus 37.5% lower. We document that these drastically different results mainly originate from revisions of the hours worked per employed series used in the calculation of hours worked per person. Next to Rogerson (2006) and Ohanian et al. (2008), the implied Europe-US hours per person gaps in Prescott (2004) and McDaniel (2011) are also subject to such revisions[1]. Using labor force survey data, which are less subject to data revisions, we find a Europe-US hours gap of -19%. We further show that the different formulas used to calculate hours worked per person in these papers only have negligible effects on the estimated Europe-US hours per person gap.

2 Literature Overview

In this section we provide a brief overview of how hours worked per person have been calculated in the literature and which data sources have been used. The upper panel of Table 1a lists the main papers explaining hours worked differences between a large set of European countries and the US. Column 2 states the formula used in each paper to calculate hours worked per person, while column 3 lists the respective time period covered. The first four papers calculate hours worked per person by multiplying average hours worked per employed with various measures of the civilian employment to population ratio. The first three papers calculate the latter as civilian employment without an age limit over the population aged 15 to 64, with Prescott (2004) also including non-civilian employment. Ragan (2013) restricts the employment to population ratio to the age group 25 to 64. Henceforth, we use the term employment rate interchangeably for these employment to population ratios. McDaniel (2011) differs from these papers by directly dividing total hours worked by the population aged 15 to 64. We exclude Alesina et al. (2005), and Faggio and Nickell (2007) from Table 1 because their measure of hours worked per employed are based on data published in a special section of the OECD's Economic Outlook 2004. These data are not part of the OECD's general database and

[1] Ragan (2013) is an exception. While the underlying data used by her were subject to non-negligible revisions on the country level, the average Europe-US hours gap is nearly left unchanged.

Table 1: Overview of the Macro Literature on Cross-Country Differences in Hours Worked per Person

(a) Hours Worked per Person Formulas and Time Period Covered

Reference	Hours worked per person	Period
Prescott (2004)	Avg. Hours per Employed $\times \frac{Civilian + Non-civilian\ Empl.}{Population\ 15-64}$	Avg. 1970-73 & 1993-96
Rogerson (2006)	Avg. Hours per Employed $\times \frac{Civilian\ Employment}{Population\ 15-64}$	2003
Ohanian et al. (2008)	Avg. Hours per Employed $\times \frac{Civilian\ Employment}{Population\ 15-64}$	1956-2004
Ragan (2013)	Avg. Hours per Employed $\times \frac{Civilian\ Employment\ 25-64}{Population\ 25-64}$	Avg. 1998-2003
McDaniel (2011)	$\frac{Total\ Hours}{Population\ 15-64}$	1960-2004
Bick et al. (2018)		
NIPA	$\frac{Total\ Hours}{Total\ Employment} \times \frac{Total\ Employment}{Population\ 15-64}$	1983-2015
LFS	$\frac{Civilian\ Hours}{Civilian\ Employment} \times \frac{Civilian\ Employment}{Civilian\ Population\ 15-64}$	

(b) Data Sources

Reference	Hours	Employment	Population
Prescott (2004)	OECD Labour Database – Labour Force Statistics		
Rogerson (2006)	TED	OECD Labour Market Database Statistics	
Ohanian et al. (2008)	TED [2008]	Various issues of the OECD's Economic Outlook and Main Economic Indicators	
Ragan (2013)	OECD Labor Market Statistics		
McDaniel (2011)	TED [2007]		OECD
Bick et al. (2018)			
NIPA (OECD)	OECD NA Database* [2016]		OECD *ALFS*† [2016]
NIPA (TED)	TED [2016]		OECD *ALFS*† [2016]
LFS	National Labor Force Surveys [2016]		

* OECD National Accounts Database; † OECD Labour Database - Labour Force Statistics - Annual Labour Force Statistics

are as such not subject to their usual maintenance and revisions. Moreover, their measure of hours worked per employed was obtained from labor force surveys, which are usually not subject to larger revisions.

In Bick et al. (2018) we construct internationally comparable hours worked measures for the US and 18 European countries on a more disaggregate level, e.g. by gender and education,

using national labor force surveys (LFS). Such detailed measures of hours worked have not been available so far. In Bick et al. (2018) we discuss in detail the strategy how we achieve comparability of hours worked across countries and over time, a task far from trivial.[2] We also contrast the aggregate hours implied by the LFS data with those from the National Income and Product Accounts (NIPA). For both types of data sources, we use conceptually the same formula, see the lower panel of Table 1a. Here, we intentionally use the product formulation, i.e. hours per employed times the respective employment to population ratio, because it highlights that in our calculation employment cancels out, as in McDaniel (2011). For the first four studies listed in Table 1a this is not necessarily the case. We do not know whether the denominator in average hours per employed referred to total or civilian employment in older releases of the data. Thus, it may or may not be equal to the numerator in the respective employment to population ratio. We elaborate on this further below.

The upper panel of Table 1b states the data sources exactly as specified in each of the five papers. Numbers in parentheses refer to the year of the publication of each paper, whereas numbers in brackets refer to the year of the data release if provided by the authors in the respective paper. Employment and population figures are always taken from the OECD, while average hours worked per employed are either from the OECD or from different releases of the Total Economy Database (TED), which in earlier years was maintained jointly by the Conference Board and the Groningen Growth and Development Centre.

The lower panel of Table 1b states the data sources used in Bick et al. (2018). We report here two NIPA measures, which only differ in their source for hours per employed. We take total hours and total employment either from the OECD's "National Accounts Database", downloaded in March 2016, or from the May 2016 TED release. We denote both measures by NIPA because for most years and countries both data sources report exactly the same numbers. We normalize both NIPA measures with the population aged 15 to 64 from the OECD's "Annual Labor Force Statistics", downloaded as well in August 2016. The calculation of our LFS measure of hours worked per person uses for hours worked, employment, and the population only information from the national labor force surveys.[3] We downloaded CPS data for the US in August 2016 from the NBER's web page and use the ELFS as provided to us by Eurostat in 2014. The LFS also undergo revisions, but these are minor revisions concentrated on certain quarters and countries, and only for a few variables at a time.[4]

Both the OECD and TED also report average hours worked per employed as a separate

[2] Hours per employed and weeks worked in the OECD Economic Outlook 2004, which is used by Alesina et al. (2005), and Faggio and Nickell (2007) are constructed in a similar way as those in Bick et al. (2018). Both approaches are based on national labor force surveys and use external data sources for annual leave and public holidays to estimate weeks worked per year. The key difference lies in the treatment of weekly hours lost (relative to usual hours worked) for reasons other than annual leave and public holidays. In our approach these reduce weekly hours worked per employed but do not affect weeks worked per year, whereas in the OECD Economic Outlook 2004 it is the other way around.

[3] To ensure the comparability across countries and over time, we need to make an adjustment using external data sources for public holidays and annual leave to overcome differences in the sets of weeks sampled across countries and over time. For details, we refer the reader to Bick et al. (2018).

[4] The first draft of this note was written in August 2016. Since then both the OECD and TED have updated their data. There were no major revisions in those releases relative to the data available in August 2016.

variable, which are used in the papers by Prescott (2004), Rogerson (2006), Ohanian et al. (2008), and Ragan (2013). For the TED, this is simply total hours worked divided by total employment from the TED. The OECD's average annual hours worked per employed series can be found in the OECD's "Labour Database" under the category "Labour Force Statistics". Similarly to the TED, this estimate is equal to total hours worked divided by total employment from the OECD's "National Account Database", although there are small differences for few countries in some years. We are not entirely sure whether in earlier releases of the data hours worked per employed were similarly calculated as total hours divided by total employment; in the September 2006 release of the TED hours worked per employed are defined as "total hours divided by persons engaged".

In our analysis of the effects of data revisions, we draw for civilian employment on data from the OECD's "Labour" database under the section "Labour Force Statistics". Two data series are available: one under the category "LFS by sex and age" (*LFSsa*) and one under the category "Annual Labour Force Statistics" (*ALFS*). As we show further below, the differences between *LFSsa* and *ALFS* employment are small for most countries. The difference with total employment from NIPA data is however non-negligible for both series. Hence at least for the 2016 release of the data, employment does not cancel out in the formulas used by the first four papers in Table 1a. We come to this conclusion because average hours worked per employed directly available from the OECD and TED are largely based on total hours and total employment, as discussed above. If we add non-civilian employment, which is available for a subset of countries in the "Annual Labour Force Statistics", to civilian employment from *LFSsa* or *ALFS*, we do not arrive at total employment from NIPA, such that for the formula used by Prescott (2004) employment does not cancel out either.

3 Evaluating Differences in Labor Supply Measures Originating from Different Data Releases

In this section, we evaluate the role of revisions between different data releases for the measurement of hours worked based on OECD and TED data. Since the data used by Rogerson (2006) for the year 2003 were not published along with his study, we conduct our comparison based on the data used in his companion paper with Ohanian and Raffo (Ohanian et al. (2008)). These are available on the website of the *Journal of Monetary Economics*. Note that Ohanian et al. (2008) focus only on the cross-country comparisons of trends. Therefore, in principle our study relates to the paper by Rogerson (2006), but we use the data from Ohanian et al. (2008) for the analysis.[5] We restrict our attention to the US and the set of 15 European countries which are part of the Ohanian et al. (2008) and part of the Bick et al. (2018) sample.[6] We report all

[5] Using the data from Ohanian et al. (2008) for the year 2003 yields the same results as presented in Table 1 in Rogerson (2006).
[6] We drop Finland from the Ohanian et al. (2008) sample, and the Czech Republic, Hungary and Poland from the Bick et al. (2018) sample.

Table 2: Employment Rate and Avg. Annual Hours per Employed Differences for the Year 2003

Country	Employment Rate			Avg. Hours per Employed				
	e_{ORR}	$\Delta_{ALFS,2016\ Rel.}$	$\Delta_{LFSsa,2016\ Rel.}$	H^E_{ORR}	$\Delta_{2006\ Rel.}$	$\Delta_{2011\ Rel.}$	$\Delta_{2013\ Rel.}$	$\Delta_{2016\ Rel.}$
Austria	68.7	−0.4	−0.1	1498.5	1.1	15.3	18.5	19.0
Belgium	58.6	2.1	2.1	1618.9	0.0	−2.7	−2.7	−2.5
Denmark	74.6	1.4	1.5	1519.0	2.1	2.2	2.2	−2.5
France	62.5	3.3	0.8	1428.6	0.2	7.3	3.1	3.9
Germany	63.2	2.4	3.0	1441.4	−0.2	−0.2	−0.4	−1.2
Greece	59.7	−1.1	−1.4	1929.0	0.0	9.0	9.0	8.4
Ireland	66.0	0.5	0.9	1652.7	0.0	14.5	14.2	14.2
Italy	56.3	0.9	2.4	1608.7	0.0	13.5	13.5	12.9
Netherlands	73.2	1.1	−2.0	1352.1	4.1	3.6	3.6	5.5
Norway	75.5	0.0	0.8	1336.3	0.1	4.6	4.8	5.1
Portugal	71.2	1.4	2.0	1702.2	0.0	13.6	13.6	10.8
Sweden	72.8	0.0	2.0	1553.4	0.6	1.8	1.8	1.8
Spain	57.8	3.9	4.4	1798.5	0.0	−5.2	−4.4	−2.4
Switzerland	83.9	−0.2	−5.0	1537.0	0.0	6.7	5.8	5.9
UK	72.3	0.0	0.4	1623.9	0.0	3.3	3.3	2.8
Mean Absolute	*67.7*	*1.2*	*1.9*	*1573.3*	*0.6*	*6.9*	*6.7*	*6.6*
US	70.9	0.4	0.4	1817.1	−1.2	−5.9	−5.9	−1.9

$\Delta_{ALFS,2016\ Rel.}$ and $\Delta_{LFSsa,2016\ Rel.}$ are the percentage deviation of the *ALFS* and *LFSsa* employment rates (each taken from the 2016 data release) from the ORR employment rate for the year 2003. The employment rate is measured as civilian employment over the population 15 to 64.
$\Delta_{Y\ Rel.}$ is the percentage deviation of average hours per employed from the TED release in year *Y* from the *ORR* average hours per employed (TED release 2008) for the year 2003.

results for 2003, the latest year available in the Ohanian et al. (2008) data set with information for all variables. In our conclusion, we briefly discuss the remaining papers in Table 1.

Rogerson (2006) and Ohanian et al. (2008) calculate hours worked per person as the product of hours worked per employed from the TED and the employment rate from the OECD. In a first step, we investigate the effect of different data releases on each component separately. Then, we look at how hours worked per person are affected by the different releases and how important each margin is in shaping such potential differences. We want to stress again that in all these comparisons, the numbers are reported for the year 2003 but are based on data released in different years.

3.1 Employment Rates and Hours Worked per Employed

The first column of Table 2 lists the employment rate (e_{ORR}) using the Ohanian et al. (2008) data. The next two columns show the percentage difference between the employment rates based on civilian employment from the OECD's *ALFS* and *LFSsa*, respectively, and the *ORR* employment rate. In each case the employment rate is given by civilian employment over the population 15 to 64 for the year 2003 as available in August 2016 from the OECD's website. For example, in Spain, the country with the largest differences, the *ALFS* employment rate is

3.9% (2.3 percentage points) higher than the *ORR* employment, whereas the *LFSsa* employment rate is 4.4% (2.6 percentage points) higher than the *ORR* employment rate. On average in the European countries the absolute difference between the *ALFS* or *LFSsa* employment rate and the ORR employment rate is 1.2% or 1.9% in Europe and 0.4% in the US for both OECD series. While the differences with the *ORR* employment rate are already not that large on average, the differences between the *ALFS* and *LFSsa* employment rates are even smaller as can be indirectly inferred from comparing columns 2 and 3 (Switzerland is the only exception.)

The fourth column of Table 2 lists the average annual hours worked per employed using the Ohanian et al. (2008) data, which come from the 2008 release of the TED. While for civilian employment from the OECD we only have access to the 2016 release of the data, we have several data releases from the TED available. Columns 5 to 8 show the percentage difference between average hours worked per employed from these different releases of the TED, each time compared to the 2008 release. While the 2011 release of the TED and all subsequent releases are available on the Conference Board's website, the September 2006 release was shared with us by Cara McDaniel. For many countries there are no differences at all between the 2006 release of the TED and the 2008 release of the TED, i.e. the data available from Ohanian et al. (2008). The mean absolute difference is only 0.6%, and the largest difference is present for the Netherlands: average hours worked per employed in the 2006 release exceed those from the 2008 release by 4.1%. This changes drastically when we compare the 2011 release with the 2008 release. More than half of the countries have (absolute) differences that are larger than 4.1% (the largest difference between the 2006 and 2008 release). Austria, Ireland, Italy and Portugal display double-digit percentage differences. The mean absolute average amounts to 6.9% for the European countries, with most countries having a positive difference. In contrast, the average hours per employed for the US from the 2011 release are 5.9% lower than those from the 2008 release. The large differences with the 2008 release persist for the European countries for the 2013 and 2016 releases, even though there are some substantial changes between those more recent releases (e.g., for France between 2011 and 2013, or Denmark between 2013 and 2016). For the US the 2016 release is much closer to the 2008 release than the 2011 and 2013 releases are. These results already make clear that data revisions affect the measurement of hours worked per employed substantially, but the measurement of the employment rate only to a small degree. We will back this up more formally further below.

3.2 Hours Worked per Person

We now use the formula in Rogerson (2006) and Ohanian et al. (2008) to calculate hours per person for the year 2003. We compare the hours per person directly obtained from Ohanian et al. (2008), labeled as H_{ORR}, to those using the 2016 data releases, labeled as $H_{2016\ Rel.}$. Specifically, we calculate the latter by multiplying average hours worked per employed from

Table 3: Hours Worked per Person Differences for the Year 2003

Country	H_{ORR}	$H_{2016\ Rel.}$	$\Delta_{2016\ Rel.}$	% of Dev. Explained by Δ_e	% of Dev. Explained by Δ_{H^E}
Austria	1028.8	1220.0	18.6	−2.1	102.1
Belgium	948.2	943.7	−0.5	−444.4	544.4
Denmark	1133.6	1121.2	−1.1	−128.0	228.0
France	892.5	957.8	7.3	44.9	55.1
Germany	910.7	921.6	1.2	198.6	−98.6
Greece	1152.3	1235.5	7.2	−15.4	115.4
Ireland	1090.8	1251.4	14.7	3.3	96.7
Italy	905.4	1031.3	13.9	6.6	93.4
Netherlands	989.9	1056.0	6.7	16.6	83.4
Norway	1008.9	1060.2	5.1	0.0	100.0
Portugal	1211.2	1360.6	12.3	11.0	89.0
Sweden	1131.0	1151.5	1.8	−0.2	100.2
Spain	1039.0	1054.0	1.4	270.0	−170.0
Switzerland	1289.7	1363.0	5.7	−2.9	102.9
UK	1174.0	1206.4	2.8	−1.1	101.1
Mean	*1060.4*	*1129.0*	*6.5*		
US	1287.5	1268.2	−1.5	−26.7	126.7

$\Delta_{2016\ Rel.}$ is the percentage deviation of $H_{2016\ Rel.}$ from H_{ORR}, i.e. $\frac{H_{2016\ Rel.} - H_{ORR}}{H_{ORR}}$. The decomposition in columns 4 and 5 is constructed as follows:

$$H_{2016\ Rel.} - H_{ORR} = e_{ALFS} \times H^E_{2016\ Rel.} - e_{ORR} \times H^E_{ORR}$$

$$H_{2016\ Rel.} - H_{ORR} = e_{ALFS}(H^E_{2016\ Rel.} - H^E_{ORR}) + H^E_{ORR}(e_{ALFS} - e_{ORR})$$

$$1 = \underbrace{\frac{e_{ALFS}(H^E_{2016\ Rel.} - H^E_{ORR})}{H_{2016\ Rel.} - H_{ORR}}}_{=\Delta_{H^E}\ (Col.5)} + \underbrace{\frac{H^E_{ORR}(e_{ALFS} - e_{ORR})}{H_{2016\ Rel.} - H_{ORR}}}_{=\Delta_e\ (Col.4)}$$

Δ_e is the fraction of $H_{2016\ Rel.} - H_{ORR}$ accounted for by differences between the *ALFS* and *ORR* employment rate. Δ_{H^E} is the fraction of $H_{2016\ Rel.} - H_{ORR}$ accounted for by differences between hours per employed from the 2016 TED release and the 2008 TED release. Note that this decomposition is not unique. We weight the hours per employed difference by e_{ALFS} and the employment rate difference by H^E_{ORR}. Using as weights e_{ORR} and $H^E_{2016\ Rel.}$ leaves the results virtually unchanged.

the May 2016 TED release with the ALFS employment rate (downloaded in August 2016 from the OECD's website).[7]

As a reminder, we report the hours for the year 2003, based on data released in different years. The first column of Table 3 shows H_{ORR}, the second columns shows $H_{2016\ Rel.}$, and the third column shows the percentage deviation of $H_{2016\ Rel.}$ from H_{ORR}. For the European countries, hours per person using data available in 2016 are on average 6.5% larger than using the data from Ohanian et al. (2008), while for the US hours worked per person are 1.5% lower in the 2016 data. The last two columns show what fraction of the hours per person difference is accounted for by differences in the employment rate and by differences in hours per employed. Equation (1) Table 3 states the formula for these calculations.

[7] We use the ALFS employment rate rather than the *LFSsa* employment rate because the former shows a smaller mean absolute difference with the employment rate used by Ohanian et al. (2008).

Table 4: Hours Worked per Person Relative to the US for the Year 2003

Country	*ORR*	2016 Rel.	NIPA (TED)	NIPA (OECD)	LFS
Austria	−20.1	−3.8	−4.9	−3.5	−17.0
Belgium	−26.4	−25.6	−25.3	−24.3	−30.5
Denmark	−12.0	−11.6	−12.2	−10.9	−14.5
France	−30.7	−24.5	−23.2	−22.1	−27.2
Germany	−29.3	−27.3	−21.4	−20.2	−25.9
Greece	−10.5	−2.6	−1.4	0.0	−15.3
Ireland	−15.3	−1.3	−2.1	−0.7	−17.0
Italy	−29.7	−18.7	−11.3	−10.0	−31.9
Netherlands	−23.1	−16.7	−15.5	−14.3	−23.0
Norway	−21.6	−16.4	−15.6	−14.4	−19.5
Portugal	−5.9	7.3	6.3	7.9	−8.2
Sweden	−12.2	−9.2	−7.9	−6.6	−17.1
Spain	−19.3	−16.9	−14.1	−12.8	−23.8
Switzerland	0.2	7.5	5.7	7.2	−4.1
UK	−8.8	−4.9	−5.8	−4.5	−14.6
Mean	−17.6	−11.0	−9.9	−8.6	−19.3

For Belgium, Denmark, Germany, Sweden, and Spain, this decomposition is less informative because the (weighted) differences in hours worked per employed and employment rates are divided by the small difference in hours worked per person (less than 2% in absolute value). We therefore do not show the mean over all European countries. For the remaining countries, the hours per employed differences account for 55% in France, and at least 83% (Netherlands) in the other countries of the hours per person difference for the year 2003 between the *ORR* data based on the 2008 TED release and those using the release from 2016.

4 The Europe-US Hours per Person Gap: The Effect of Different Data Releases and Formulas

In this section, we analyze the role of the use of different data releases and of different formulas for the measurement of the Europe-US hours gap for the year. In addition, we contrast those findings with the Europe-US hours gap constructed with the LFS by Bick et al. (2018).

Table 4 shows in the first two columns the hours per person gap relative to the US for H_{ORR} (using the original Ohanian et al. (2008) data, i.e. column 1 in Table 3) and for $H_{2016\ Rel.}$ (using the 2016 release of the same data sources used by Ohanian et al. (2008), i.e. column 2 in Table 3) for the year 2003. Constructing hours per person as in Rogerson (2006) and Ohanian et al. (2008) but using the 2016 release yields a much smaller gap of -11.0% between Europe and the US, compared to -17.6% based on the original *ORR* data. As shown in Table 3, this is mostly driven by major revisions of the hours per employed data from the TED between the 2008 release and later releases. Column 3 in turn shows hours worked per person using the

NIPA formula (McDaniel (2011) and Bick et al. (2018)) and the TED data. This implies that employment refers to total employment in hours per employed and the employment rate. Hence, the only difference between columns 2 and 3 is that the employment figures cancel out in column 3 but not in 2. This has only a small effect on the Europe-US hours gap of on average 1.1 percentage points. Germany and Italy stand out with large differences. Column 4 shows our calculations if we use the OECD hours rather than the TED hours. The Europe-US hours gaps differ only by 1.3 percentage points, which is mostly driven by a higher estimate of hours per person in the US in the TED. As the last column of Table 4 shows, it turns out that the Europe-US hours gap in the original Ohanian et al. (2008) data set is quite similar to the one we find in LFS data.

In Bick et al. (2018) we provide a detailed discussion of the potential forces behind the different NIPA and LFS estimates using the 2016 OECD release. LFS and NIPA data differ conceptually along two dimensions. First, LFS data cover only civilian, non-institutionalized residents aged 15 and older, while the NIPA does not impose these restrictions to ensure that the labor inputs are consistent with the measurement of gross domestic output (GDP). Second, the NIPA estimates are usually constructed in country-specific ways from multiple data sources (administrative data, social security data, employer surveys, labor force surveys, census data, etc.). We show suggestive evidence that the differences in population coverage are not very important. For the US, Abraham et al. (2013) investigate which features of the underlying data sources drive the differences between NIPA and LFS employment estimate, and Eldridge et al. (2004) and Frazis and Stewart (2010) do the same for hours works per employed. While the details are specific to the US, these papers highlight advantages and disadvantages of household survey data used in the LFS estimates vs. administrative data used in the NIPA estimates. The combination of multiple data sources might deliver more accurate estimates of employment and hours worked for a given country. The downside is that the cross-country comparability suffers, despite the efforts to harmonize measurement through the Systems of National Accounts, see Fleck (2009). In fact, the OECD remarks on its website that "The [hours worked] data are intended for comparisons of trends over time; they are unsuitable for comparisons of the level of average annual hours of work for a given year, because of differences in their sources" and recommends using employment rates based on labor force surveys for cross-country comparisons: "National Labor Force Surveys are the best way to capture unemployment and employment according to the ILO guidelines that define the criteria for a person to be considered as unemployed or employed... While data from LFS make international comparisons easier compared to a mixture of survey and registration data, there are some differences across countries in coverage, survey timing, etc, that may affect international comparisons of labour market outcomes."[8] The approach in Bick et al. (2018) deals with one of the main differences in the cross-country comparability of the LFS, namely the survey timing.[9]

[8] Both quotes we retrieved from the OECD's website on August 29, 2018: http: //stats.oecd.org/Index.aspx?DataSetCode=ANHRS and http://www.oecd.org/els/emp/ basicstatisticalconceptsemploymentunemploymentandactivityinlabourforcesurveys.htm.

[9] Other reasons impeding the comparability across time and countries of the LFS, which we cannot adjust for, are the revision of population figures used for population adjustment on the basis of new population censuses, as well

If one is interested in hours worked for different demographic subgroups, the LFS is the only option. For aggregate applications only, researchers should be aware of the differences between the LFS and NIPA data on the one hand and the potential for major revisions of the latter over time.

5 Conclusion

In this note we compare the effect of different formulas used in the macro literature for calculating hours worked per person and the effect of different data releases on the hours estimates. In doing so, we focus on the data provided by Ohanian et al. (2008). We show that the revisions of hours worked per employed in the TED have a large impact on the conclusions drawn. Put differently, if Rogerson (2006) would have had 2016 release of the data, he would have found an about 40% lower Europe-US hours gap (-11.0%) than what he found with the data available in the mid 2000s (-17.6%). Using labor force survey data, which are less subject to data revisions, we find a Europe-US hours gap of -19%.

Since McDaniel (2011) uses the 2007 release of the TED data, the facts in her paper are affected by revisions in a similar way as those in Rogerson (2006) and Ohanian et al. (2008). Ragan (2013) in turn uses average hours per employed from the OECD and is thus not affected by any revisions of the TED data. However, the OECD average hours worked per employed also underwent revisions. For the (smaller) set of European countries in her data, the average absolute difference in hours worked per employed between the release used by her and the 2016 release of the same data is 3.8%, see Table A.2 in the Online Appendix. This is a smaller difference than between the different releases of the TED, but still substantial. Moreover, the revisions by the OECD are not due to a change of the guidelines in the System of National Accounts (SNA 93 vs. SNA 2008). The OECD provides on its website NIPA employment and NIPA hours under both guidelines. For the 2016 release, the differences are small for most countries with the exception of the Netherlands, Portugal, and Spain, see Table A.3 in the Online Appendix. Finally, like Ragan (2013), Prescott (2004) uses hours per employed directly from the OECD. Using the same set of countries (US, France, Italy, Germany, and the UK) and time period (1993-96) as he does, we qualitatively reconfirm our finding from the comparison with Rogerson (2006) and Ohanian et al. (2008) for the year 2003; for a detailed discussion, see the Online Appendix. Relying on the 2016 data releases from the OECD or TED yields a smaller Europe-US hours gap than when using data from the same sources available to researchers in the early 2000s.

Finally, as we show in Online Appendix B, the data revisions also affect the measurement of time trends in hours worked per person. While the secular decrease in European hours worked per person between 1956 and 2003 is present both in the data by Ohanian et al. (2008)

as changes in the sampling design, and content or order of the questionnaire. For details, see http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_labour_force_survey (retrieved on March 10, 2017).

and using the 2016 release of the same data, the decline in the sample of European countries is 6.1 percentage points, or 27% in relative terms, smaller in the 2016 release. In the US in turn, hours worked per person increase by 3.6% using the 2016 release of the data, and only by 0.4% in the data used by Ohanian et al. (2008).

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