Are changes in the dispersion of hours worked a cause of increased earnings inequality?[*]

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Abstract

Earnings are the product of wages and hours of work, hence the dispersion of hours can magnify or dampen a given distribution of wages. This paper examines how earnings inequality is affected by the dispersion of working hours using data for the US, the UK, Germany and France over the period 1989-2012. We find that hours dispersion can account for over a third of earnings inequality in some countries and that its contribution has been growing over time. We interpret the expansion in hours inequality in European countries as being the result of weaker union power that led to less successful bargaining concerning working hours.

JEL Classification: *D31, J22*
Key words: *Earnings inequality, working hours, inequality index decomposition.*

1 Introduction

A vast literature has examined the evolution of wage and earnings inequality over the past three decades and, despite substantial heterogeneity across countries, has identified a major increase in the dispersion of both in many industrial economies.[1] An orthogonal research agenda has focused on the evolution of working hours, and in particular on the divergence in working patterns between the US and Europe since the 1970s.[2] Given such differences across countries, it is conceivable that hours of work also differ in terms of their dispersion, raising the question of whether hours inequality has contributed to the increase in earnings inequality. Understanding the role and source of hours dispersion is crucial for the design of policies aimed at reducing inequality. On the one hand, policies that try to increase hours for those with the lowest skills and wages and reduce them for those at the top of the distribution can be alternatives to ex post redistribution. On the other, the source of the dispersion is important for policy as it could be due to imposed constraints or the result of certain groups, such as women with young children, choosing to spend less time at work. This paper represents a first step in trying to understand those questions.

We use data for the US, the UK, Germany and France to decompose earnings inequality and asses the roles played by the dispersion of wage and by inequality in hours in explaining cross-country differences and changes over time. By definition, an individual's earnings are the product of her hourly wage rate and her hours of work. Using as our inequality index the mean log deviation (MLD), an inequality index belonging to the general entropy family, we decompose earnings inequality into the dispersion of hourly wages and a component capturing the contribution of hours. This term has itself two elements, a measure of inequality of hours of work and a term capturing the correlation between hours and hourly wages. Hours of work can as a result magnify or dampen wage inequality depending on how dispersed hours are and of whether they are positively or negatively correlated with wages.

Our sample covers the period 1989 to 2012 and considers both aggregate behavior as well as that of subgroups defined by gender and skill category. When we look at the distribution of hours we find a surprising pattern.

Figure 1 plots the distribution of hours worked by employed individuals in our four sample countries. The left-hand panels depict the US and France, while the right-hand ones present the distributions in the UK and Germany. In order not to focus on a single, potentially un-

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[1]See, for instance, Juhn et al. (1993).

[2]See, for instance, Prescott (2004), Bell and Freeman (2001), Alesina et al. (2006), and Blundell, Bozio and Laroque (2013).

representative, year, the data cover two 5-year periods, 1995-2000 and 2007-2012. The US and France exhibit fairly concentrated distributions, with about 30% of individuals declaring to work around 40 hours a week in 1989-1994. For the latter period, this fraction falls slightly in the US, while France exhibits twin-peaks due to the introduction of the 35-hour week. In sharp contrast, Germany and the UK present fairly dispersed distributions, with much thicker tails at the bottom and, especially, at the top.

These differences in dispersion are reflected in the way in which wages and hours affect the distribution of earnings, as captured by our decomposition of the mean log deviation. Although our results indicate that in all countries the dispersion of working time is an unequalising factor that increases earnings inequality over and above that implied by wages, differences across countries are substantial. In the US and France the overall contribution of hours to earnings inequality is moderate, with wages accounting for at least two thirds of inequality in earnings. In contrast, hours play a crucial role in the UK and Germany, being responsible for between 28 and 40 percent of the dispersion in earnings.

We pay particular attention to the covariance between wages and hours, which exhibits very different patterns across countries and over time. Wages and hours move together in the Anglo-Saxon economies, while they are negatively correlated in France and Germany at the start of the sample period, implying that part of the dispersion in wages was offset by the fact that those with the lowest earning potential spend more hours at work, the effect being particularly strong in France. These countries exhibit, however, an increase in the covariance over time and by the end of the period, those with higher wages also work longer hours. In the case Germany, this change has accounted for half of the increase earnings inequality, in France it is the major culprit.

Although some of the differences are related to the skill and gender composition of employment, between group inequality in hours is only a small part of the story. Observed changes over time are largely due to the behavior of unskilled men and skilled women. Hours inequality has increased for the two groups, and both exhibit a marked increase in the covariance which has gone from being negative at the start of the period to null or positive. As a result, the equalizing force due to those with lower wages working longer hours seems to have been eroded over time.

Our paper contributes to two strands of literature. As mentioned before, there is a substantial literature on cross-country differences in working hours, and we add to this a new dimension by focusing on hours inequality. We also contribute to our understanding of what drives earnings

dispersion by focusing on the neglected role of hours. Our paper is closely related to the analysis by Gottschalk and Danzinger (2005) of the relationship between individual wage rate inequality and household income inequality in the US. They examine the various elements that determine household income inequality and emphasize, amongst other things, the importance of considering the distribution of hours. As in our results, they find an important role for changes in the hours worked by women. Our analysis has a very different focus as we provide an international comparison rather than the more detailed analysis of a single country that they consider.

Our analysis is also related to Bell and Freeman (2001) and Bowles and Park (2005) who argue that greater wage inequality is associated with higher average hours of work, implying that the increase in wage inequality that occurred over the last decades is likely to have spurred an increase in hours worked. We argue that the impact of this mechanism on overall inequality depends on two channels, how unequal the hours response is and on the correlation of hours worked and hourly wages.

The paper is organized as follows. Section 2 describes our empirical approach and presents the decomposition that we use, and is followed by a section describing the data. Section 4 presents our main findings, while we concludes in section 5.

2   Decomposing Earnings Inequality

A vast literature has examined the decomposition of inequality indices by factor components.[3] As is well known, the various inequality indices have different merits and drawbacks, and the choice of index is consequently not trivial for the results. Two common measures are the half squared coefficient of variation (CV), which is particularly tractable, and the Gini coefficient, with the latter providing a less tractable decomposition but being less sensitive to extreme observations than the former.[4] Moreover, recent work, such as Jenkins and van Kerm (2005), proposes density function decompositions which have the advantage of being independent of the choice of inequality index.

These approaches have focused on decompositions over additive terms and are hence easily applicable to income factors. In the case of earnings, we are interested in decomposing total earnings inequality into a term due to wage rate inequality and one capturing hours inequality. Defining total earnings of individual i as y_i, we have that they are the product of the hourly

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[3]See for example Fei et al. (1978), Bourguignon (1979), Pyatt et al. (1980), Shorrocks (1982), Lerman and Yitzhaki (1985), and Fournier (2001).

[4]See, for instance, Jenkins (1995) and García-Peñalosa and Orgiazzi (2013) for decompositions of the CV and Lerman and Yitzhaki (1985), Garner (1993) and Podder (1993) on Gini decompositions.

wage, w_i, and the number of hours worked, h_i. That is,

$$y_i = w_i h_i. \tag{1}$$

Our two terms of interest appear multiplicatively and as a result there are few inequality indices that can be satisfactorily decomposed. We have chosen to employ the mean log deviation (MLD), an index belonging to the general entropy (GE) family. The MLD, also called Theil's L index, is the general entropy index for $\alpha = 0$, and shares a number of desirable properties of this class of indices.[5] The parameter α in the GE class of indices captures the weight given to income differences at various parts of the income distribution. For lower values of α, such as $\alpha = 0$, GE is particularly sensitive to changes in the lower tail of the distribution.

The MLD is defined as the standard deviation of the logarithm of the variable of interest and has been shown by Esteban and Duro (1998) to be decomposable. Overall inequality in earnings can hence be expressed as the sum of three components: inequality in hourly wages, inequality in hours worked, and a component capturing the correlation between hours worked and hourly wages. Denote by I_y the MLD of earnings, which is defined as

$$I_y = \frac{1}{N} \sum_{i=1}^{N} \ln \frac{\bar{y}}{y_i}, \tag{2}$$

where N is the number of observations and $\bar{y}$ is average earnings. We can also define the index for hourly wages and hours worked, namely,

$$I_w = \frac{1}{N} \sum_{i=1}^{N} \ln \frac{\bar{w}}{w_i}, \tag{3}$$

$$I_h = \frac{1}{N} \sum_{i=1}^{N} \ln \frac{\bar{h}}{h_i}, \tag{4}$$

where $\bar{w}$ and $\bar{h}$ denote the average levels of the two variables.

Using the fact that the covariance between hourly wages and hours worked, cov, can be shown to be given by $cov = \bar{y} - \bar{w}\bar{h}$, equation (2) can be expressed as the sum of (3) and (4) plus a third term capturing the correlation between hours worked and hourly wages. That is,

$$I_y = I_w + I_h + \underbrace{\ln\left(1 + \frac{cov}{\bar{w}\bar{h}}\right)}_{\rho} \tag{5}$$

These three terms represent the absolute contributions to inequality of the various elements. The first two terms are simply inequality in hourly wages and hours worked, and both are positive.

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[5]See Atkinson (1983).

The third term, denoted ρ, captures the correlation between hours and wages. If the covariance is negative, this term will be negative too, reducing earnings dispersion. The total contribution of hours to overall inequality hence depends on the value of the sum of the dispersion in hours and the correlation term. Whenever this sum is equal to zero, then earnings inequality equals the dispersion in the hourly wage rate and hours play no role. If, instead, the sum is positive, then hours magnify the impact of wage inequality on earnings dispersion. When the correlation term is sufficiently negative, $I_h + \rho$ may be negative, implying that hours reduce overall inequality, and the more dispersed hours are, the more they will reduce inequality.

A convenient way of expressing equation (5) is to consider the relative contributions of the three terms, obtained when dividing equation (5) by I_y, that is

$$1 = \underbrace{\frac{I_w}{I_y}}_{RC_w} + \underbrace{\frac{I_h}{I_y}}_{RC_h} + \underbrace{\frac{\rho}{I_y}}_{RC_\rho} . \tag{6}$$

The terms RC_w, RC_h, and RC_ρ are the relative contribution of inequality in hourly wages, of the dispersion of hours, and of the correlation term to inequality in earnings, respectively. In other words, they measure the share of earnings dispersion due to each of the three components.

There are two key questions that we want to address that can be framed in terms of these contributions. The first one is how close RC_w is to 1. If the relative contribution of wages is close to 1, it would indicate that most of earnings inequality is due to differences in the hourly wage rates received by individuals and that hours play a small role. In contrast, a small value of RC_w would imply that differences in hours worked magnify the dispersion of wages. Second, note that a high RC_w does not imply that there is little inequality in hours. In fact, it may be due to hours exhibiting little dispersion or to hours being unequally distributed but negatively correlated with hourly wages. In the second case, individuals will be partly offsetting the impact of wage inequality by working more the less well-paid they are. It is in fact possible that, if the correlation is sufficiently negative, the term RC_ρ totally offsets RC_h, implying that hours inequality makes the distribution of earnings less unequal than that of wages.

The MLD index allows us to further decompose equation (5) into a term capturing within-group (W) and one measuring between-group (B) inequality. If the total population is divided into J exhaustive groups, with group $j \in \{1, ..., J\}$, then the inequality index for earnings takes the form

$$I_y = \underbrace{\sum_{j=1}^{J} p_j ln(\frac{\bar{y}}{\bar{y}_j})}_{B_y} + \underbrace{\sum_{j=1}^{J} p_j I_{yj}}_{W_y} . \tag{7}$$

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where $p_j = \frac{N_j}{N}$ denotes the proportion of individuals belonging to group j, $\bar{y}_j$ is the mean income of group j and I_{yj} refers to the inequality index computed over the members of group j.

This decomposition can be performed over earnings, wages and hours, therefore the correlation term ρ can also be written as a sum of within-group and between-group inequality. Equation (5) implies that both the within-group and the between-group terms of inequality in wages, of hours dispersion and of the correlation term, have to sum up to within and between inequality of earnings, implying that the within and between components of ρ can be calculated as $W_\rho = W_y - W_w - W_h$ and $B_\rho = B_y - B_w - B_h$, respectively. Combining equations (5) and (7) gives a nested decomposition of overall inequality, which takes the form

$$I_y = \underbrace{B_w + B_h + B_\rho}_{B_y} + \underbrace{W_w + W_h + W_\rho}_{W_y}. \tag{8}$$

Using a nested approach allows us to differentiate the contribution of inequality in wages, hours dispersion and the correlation term to inequality within and between each group.

3 The Data

3.1 Databases

The harmonized dataset constructed for this paper is based on different national surveys collected from national statistical institutes. We use household or labor surveys for the US, the UK, Germany and France, covering two decades starting around 1990. In particular, we use the *Current Population Survey* for the US, the *British Household Panel Survey* and, from 2009, *Understanding Society* for the UK, the *German Socio-Economic Panel* for Germany, and the *Enquete Emploi* for France (which becomes the *Enquete Emploi en temps continue* in 2003), all of them surveys that have been widely used in the empirical literature on inequality. For example, CPS data was used by Murphy and Welch (1992) in their seminal paper on wage inequality in the US, while GSOEP has been employed by Bell and Freeman (2001) and the other three surveys by Blundell, Bozio and Laroque (2013) to perform international comparisons of hours of work.

Although the design of the surveys changes over time and across countries, those datasets have a core set of questions that can be harmonized. They are, in fact, the primary source for several projects that provide harmonized data for a number of countries, such as the Luxemburg Income Study (LIS) and the Cross-National Equivalent File (CNEF) dataset.[6] We chose not

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[6] CNEF uses the SOEP and BHPS data but not the other two surveys, the reason being that the project is interested in providing comparable panel data which neither CPS nor the Enquete Emploi provide. For the US, CNEF uses PSID, while France is not in their sample.

to use the already harmonized data provided by these projects as they were not suitable for our purposes. The LIS data are available every five years only, and since for several countries they start only about 25 years ago, we would have had only 5 observations, making it harder to identify time trends. The CNEF dataset, instead, has annual observations, but covers a shorter time span than that available in the original date sources. For these reasons we resorted to using the original surveys.

For the US, we had the choice between two datasets, CPS and the Panel Study of Income Dynamics (PSID) data. A number of papers have used PSID to examine the evolution of earnings; see, for example, Gottschalk and Moffitt (1994), Moffitt and Gottschalk (2002), and Haider (2001). The PSID data is attractive because of its panel dimension, but its small sample size is a major drawback for our purposes, specially since we intend to examine time trends for disaggregated workers, implying that results for the subgroups may not be representative. A second reason to prefer CPS is that it asks the same question we find in the European surveys, namely '*how many hours do you usually work per week in your current job*'. PSID had traditionally not included such a question, focusing on annual hours, although the question was included in some recent surveys starting in 2003. Lastly, sample attrition in PSID may have affected its representativeness over time; see Fitzgerald, Gottschalk, and Moffitt (1998). We hence decided to use CPS data, although a comparison of inequality in hours between the two datasets is provided below.

3.2 Variable definitions

Our two key variables of interest are earnings and hours worked, from which we then compute the hourly wage. We focus on prime-age workers, i.e. those who are at least 25 years-old and at most 54, who are (dependent) employees in either the private or the public sector. As is well established, employment patterns for young and for mature workers differ substantially across countries, much more than for prime-age workers. Focusing on this age group allows us to abstract for differences in the education system and in retirement possibilities. Details on sample sizes by country and year are provided in the appendix.

Both variables are measured at a particular point in time, that is, we use questions referring to the current job of the individual. This contrasts with papers that use annual hours and earnings and compute wages from those. There are good reasons for not pursuing this path, since both unemployment rates and vacation patterns vary substantially across countries and would have a major impact on measured hours. Focusing on a snapshot of weekly hours/earnings implies greater comparability of the data.

3.2.1 Earnings

The measure of earnings that we employ is the usual gross income from labor that the individual receives over a week from the main current job. For employees this means contractual wages plus overtime pay. This variable is present in all the datasets, yet some important differences need to be highlighted. Our main concern is that income from self-employment is difficult to measure in household surveys, mostly because the self-employed tend to have high non-response and under-reporting rates; in addition, income from self-employment varies considerably over time. For these reasons, the self-employed are not asked about current usual earnings in the CPS, and in the BHPS over one fifth of self-employed respondents either refuse to give information or do not know how much they earn.[7] We therefore decided to remove the self-employed from our sample.[8]

A second concern is that three countries report gross earnings, while France only provides earnings net of social security contributions (but not of income taxes). However, since such contributions are roughly proportional to gross earnings, this difference should have little effect on measured inequality.[9]

Survey frequency and the period of time covered by the questions also varies across datasets. The US and France, for instance, collect data monthly and quarterly respectively and the questions concern current employment. Instead, the UK and Germany survey once a year, asking questions about current earnings and also about the employment situation during the previous year. Note that although there are differences in survey frequency (monthly, quarterly, and annual), we always use questions concerning the same reference period – current job – and not questions concerning earnings last year, available in some of the surveys. Therefore the periodicity over which the survey is conducted does not create comparability problems in terms of the variable we are using.

Our selection rule is to select the month of March or the first quarter of the year, and we do so for the US and for France. However, in the case of Germany such a choice implies a small number of observations. Since keeping the largest possible sample is crucial given our intention of decomposing the population by gender and educational groups, we use data for the entire year. For the UK, BHPS data was collected in October/November and thus we are forced to use this period. In all cases we checked that at the aggregate level (i.e. before dividing into

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[7]See Bardasi et al. (1999) for further discussion.

[8]The results including the self-employed can be obtained from the authors.

[9]The current social contributions stand at an average of 23% of the gross salary, and vary over a range of 20 to 26%, the main difference steming from complementary pensions. Inequality in earnings net of these contributions will hence be slightly lower than in gross earnings.

population subsamples) annual data and first-quarter/March data gave results that were not significantly different.

Finally, a more technical concern is the different policy of top-coding high incomes across countries. The US, for instance, top-codes systematically, with a top-coding value of 2,885$ per week for the most recent years. We decided to follow the recommendation of the LIS project and we top-code earnings at 10 times the weighted median of earnings. For those observations for which earnings were top-coded, the hourly wage was calculated after the top-coding was performed. Since we are interested in hourly wages, we also consider extreme values for this variable. Whenever hourly wages were above 10 times the weighted median of wages, we removed those observations.[10]

3.2.2 Hours worked

Hours worked can be measured in different ways, capturing contract hours, actual hours or usual hours. For most of the databases we use the question concerning "usual hours worked in the main current job". Some databases also ask about the number of hours actually worked during the previous week. Although this variable may have less measurement problems, we were concerned with seasonality and we hence decided against its use. [11]

The harmonization of this variable was not straightforward due to coding problems. First, we had to make sure that it included both contractual hours and overtime. Second, it is a variable that is often truncated. In particular, Germany truncates at 80 hours per week and the US at 99 hours. Given the issue we are interested in, this may be a concern as truncation affects the upper tail of the distribution of hours worked. Inspection of the data indicates that this is not the case since we did not find a concentration of observations at the truncation points. Nevertheless, we decided to drop extreme observations and consider only workers that spend between 2 and 90 hours a week working on their main job.

3.3 The United States: data sources and definitions

Before proceeding to examine the data for the four countries, we consider in detail data sources for the US. Figure 1 above presents the distribution of hours of work for the United States, with hours being highly concentrated around 40 and both the upper and lower tails being rather thin. This pattern did not match our expectations, our prior being that the US would exhibit a fat upper tail capturing the workaholic culture that we often find discussed in the popular press;

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[10]Robustness checks do not indicate sensitivity to this procedure.

[11]Actual hours was used to complement usual hours in the US if respondents answered that usual hours vary, since this option is not given in the other surveys.

see Schor (2008). Our results raise the question of whether the data we are using is the most suitable one, and if other variable definitions or data sources would yield a different picture.

In order to address this concern, we consider a number of additional measures. First, we consider the CPS data and our core variable of weekly hours but do not restrict our sample by age, and compute the distribution of hours for this group. Second, we consider PSID as an alternative dataset. In order to asses the accuracy of our chosen data, we compute measures of hours inequality for both CPS and PSID for the years 2003, 2005, and 2007. These are the only three years for which we have data for the question 'how many hours do you work per week in your current or most recent job' in PSID.[12] We use two measures of hours. The first are hours worked the previous week, i.e. the most comparable measure to the one in CPS, denoted $J1$ in the survey. We also use the variable *Hann* which are total annual hours worked during the previous year. We divide the data by 50 weeks (the modal working weeks in a year in the US) in order to get a measure comparable with the others.

Table 1: Comparing US data across surveys and definitions

	Variable	2003	2005	2007
CPS Selected	Mean	40.24	40.04	40.22
	Median	40.00	40.00	40.00
	s.d.	9.35	9.38	9.33
	Ih	0.04	0.04	0.04
CPS Entire	Mean	38.66	38.54	38.71
	Median	40.00	40.00	40.00
	s.d.	11.84	11.74	11.66
	Ih	0.07	0.07	0.07
PSID J1 Selected	Mean	41.61	41.66	41.64
	Median	40.00	40.00	40.00
	s.d.	10.66	10.94	11.20
	Ih	0.05	0.05	0.05
PSID Hann/50 Selected	Mean	40.19	40.59	40.23
	Median	40.64	40.80	40.80
	s.d.	13.43	13.31	13.55
	Ih	0.08	0.08	0.09

Table 1 reports key magnitudes of the resulting four measures for three years, while figure 2 depicts their distributions in 2007. The first panel of table 1 presents the CPS data that we will be using. Mean and median working hours are almost identical, roughly 40 hours per week, the standard deviation fluctuates around 9.35, and the mean log deviation is 0.04. When we consider the entire CPS sample we find the same median but the mean is almost two hours lower,

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[12]The question is also asked in 2009 and 2011 but the response rate is extremely low.

probably reflecting the fact that very young individuals work less. We find a substantially higher degree of inequality, as captured by the two measures of dispersion. In particular I_h goes from 0.04 to 0.07, probably due to the low working hours of young individuals (notably, students).

The top panel of figure 2 plots the two distributions. Two features are noteworthy. First, there is greater weight in the tails, at the bottom due to a number of very dense points, at the top because there are now individuals that work a very high number of hours, mainly the self-employed. Second, hours seem to concentrate more around certain numbers. The fraction of individuals working 40 hours is now very large, 40% of the sample, while observations seem to concentrate around certain focal values such as 20, 45, 50 and 60 hours.

The bottom two panels of table 1 present the results obtained with PSID, where in both cases the sample has been restricted to the 25-55 age group. For weekly hours, the results are extremely close to those obtained with the CPS sample: an identical median, the means and standard deviation are one hour higher, while I_h goes from 0.04 to 0.05. When we compare the distributions depicted in figure 2 we can see that, for weekly hours, the distributions implied by PSID and CPS are relatively similar, the latter being somewhat smoother and the former implying greater concentration around focal points (20, 40, 45, 50 ....). Clearly, the PSID data imply that American workers are highly concentrated around certain working hours, and the similarities between this pattern and that found for the CPS indicates that our sample choice is representative and well-suited to our purposes.

In contrast, a very different picture is obtained when we look at annual hours worked (the variable *Hann* divided by 50), which are reported in the bottom panel of table 1. A major problem of this measure is that individuals may have unemployment spells and/or may have had several jobs during the year, yet we have no information of how the hours were split between the various jobs. As a result, a low value of *Hann* can be due to a short working week for the whole year or to a long working week when employed and periods of unemployment. The bottom panel of figure 2 depicts the distribution of this variable, and we can see that is much more dispersed and much smoother than any of our other series. Mean working hours are somewhat lower than for weekly data (one and a half hours less) and the median is slightly higher, while dispersion is substantially increased. The standard deviation for 2007 is 13.54, compared to 11.20 and 9.33 for the weekly data from PSID and CPS, respectively. The MLD is almost twice as large as for weekly data.

These differences raise a fundamental question about which is the most suitable data to use. The US labor market implies much more frequent flows into and out of employment as well as

more job-to-job transitions than European ones; as a result, comparing annual working hours across countries implies allowing for the fact that some of the observed differences are due to distinct patterns of employment. This problem is particularly acute in our context since we are interested in inequality in hours worked, and the much larger dispersion of annual hours implies that if we were to use this measure we would be comparing differences in earnings inequality caused by unemployment spells rather than those due to different choices of regular working hours. We have hence chosen to employ the measure of hours based on reported weekly hours. This measure ignores a difference between the US and Europe, namely the fact that Europeans tend to take more weeks of paid holiday. Note, however, that weeks of holiday are paid at the same rate as weeks of work; consequently, if all workers are taking their mandatory holiday, this should affect the difference in mean hours worked across the continents but not their dispersion or that of earnings.

3.4 Key magnitudes

Table 2 presents the values of several inequality indices for earnings, hourly wages and hours worked. We report the index that we employ in our analysis, the mean log deviation, and some common inequality measures often used in the literature. The dispersion in earnings is often measured by the Gini coefficient, while for wage inequality we compute the standard deviation of the log of wages.[13] For hours, we compute for each year average hours and the MLD and report the highest and the lowest value of each for each country.

As is well-established, earnings inequality measured by the Gini index is highest in the US and the UK, followed by Germany and France. Interestingly, the range of the Gini coefficient for the period 1990-2012 is largest for the US and for Germany, indicating that both countries have experienced substantial changes during our period of study. The MLD gives a slightly different picture, with the UK exhibiting the greatest earnings inequality, and the US being somewhere in between the UK and Germany, while France lags well behind. Behind this pattern lies the fact that the MLD is particularly sensitive to inequality at the bottom of the distribution and less so to that at the top, and that a substantial fraction of inequality in the US has been driven by the behavior of top incomes.[14] In terms of hourly wages, the US and the UK are the most unequal countries, with the MLD ranging between 0.11 and 0.19, while France exhibits the lowest degree of wage dispersion, with a minimum of 0.08 and a maximum of 0.11.

We report average hours worked by country, which have been widely discussed in the litera-

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[13] A common measure of wage inequality is the standard deviation of log wages; see for example Juhn et al. (1993) and Lemieux (2008).

[14] See Piketty and Saez (2003) on top incomes in the US.

Table 2: Key magnitudes for earnings, wages and hours worked

| | Earnings | | | | Wages | | | | Hours | | | |
| | MLD | | Gini | | MLD | | SDlog | | MLD | | Mean | |
Country	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
US	0.169	0.247	0.305	0.367	0.108	0.188	0.465	0.666	0.033	0.045	38.565	40.595
	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.004)	(0.005)	(0.024)	(0.001)	(0.002)	(0.147)	(0.102)
UK	0.217	0.268	0.337	0.368	0.124	0.159	0.487	0.586	0.064	0.097	37.394	39.199
	(0.007)	(0.008)	(0.005)	(0.003)	(0.004)	(0.003)	(0.007)	(0.011)	(0.003)	(0.004)	(0.113)	(0.240)
DE	0.140	0.235	0.262	0.327	0.090	0.129	0.412	0.547	0.052	0.082	37.841	39.695
	(0.005)	(0.007)	(0.005)	(0.004)	(0.003)	(0.005)	(0.006)	(0.011)	(0.002)	(0.003)	(0.186)	(0.155)
FR	0.116	0.149	0.245	0.284	0.079	0.112	0.383	0.523	0.034	0.043	35.417	37.704
	(0.002)	(0.005)	(0.002)	(0.005)	(0.002)	(0.002)	(0.005)	(0.013)	(0.001)	(0.002)	(0.043)	(0.046)

Note: MLD stands for Mean Log Deviation, SDlog for the s.d. of the log of hourly wages, and Gini for the Gini Coefficient. All inequality measures are computed for each country, each year, and 'Min' and 'Max' report the lowest and highest values observed for each country over the sample period. Standard errors obtained through boot-strapping in brackets.

ture. North Americans work more than individuals in the other countries, and France exhibits the shortest working week, with the minimum and maximum being about 3 hours less than the figures for the US. Average hours have increased slightly in all countries, by about 2 hours per week. The dispersion of hours is lower than that of wages, as expected, with the MLD ranging between 0.03 and 0.10, roughly half of the dispersion we observe for wages. In France and the US, hours dispersion is low and relatively stable over the period, fluctuating between 0.03 and 0.04 in both countries. In contrast, hours inequality in Germany and the UK is substantially higher and has changed markedly over time, with the MLD of hours peaking at 0.082 and 0.94, respectively, figures that are comparable to the dispersion of hourly wages.

The evolution over the past decades of earnings and wage inequality are by now well-known. Figure 3 depicts the time trends of both average hours worked and hours inequality in the four countries, where both variables are an index relative to the country's value in 1991. Before we discuss these trends it is important to note that there have been important changes in some of the surveys over the period. Table A.1 in the appendix reports a number of descriptive statistics for each annual survey. For three of the countries, the US, the UK and France, there has been one substantial change that implied a major jump in sample size. In the UK this occurs between 2008 and 2009 (no data are available for 2009 as observations for 2009 were collected together with those for 2010), with the sample size going from around 3,000 individuals to over 16,000. Inspection of the data does not indicate any break in the time series. For France, sample sizes change between 2002 and 2003, with the sample size becoming about a quarter of the original one, although the sample remains large, between 7,000 and 10,000 individuals. Average hours worked increase by 1 hour, a change that is somewhat larger than any of the other year-to-year changes we observe, which are usually of the order of half an hour. The standard deviation also exhibits the largest year-to-year increase, although this is only slightly larger than the other substantial changes we observe during the period (0.58 of an hour, with the standard deviation increase by 0.36 of an hour the year after the change in sample size).[15]

In the case of the US, survey changes seem to have had a more substantial impact.[16] Between 1993 and 1994 the size of the sample doubles and, more importantly, the share of high-skilled workers in the sample rises substantially, from 41% of the sample to 57% (see figure A.1 in the appendix). This change seems to have had major implications for our variables of interest, with mean working time increasing by 2.3 hours per week and the standard deviation by almost 2

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[15]These results are consistent with the evidence that shows that the change in survey design had little impact on the data; see Guivord (2003).

[16]See Dipo et al (1994) and Van den Brakel et al. (2012).

hours. These changes are apparent in figure 3 where both average hours worked and the MLD of hours exhibit a jump. Unfortunately, there is no way to deal with this change in sample composition. In what follows we will report figures for the entire period for which we have data for the US, 1989 to 2012, but the reader should bear in mind that comparisons with the pre-1993 data are to be interpreted with great care.

4 Time Trends and Compositional Effects

4.1 General trends

To understand the broad patterns described above we consider in detail the evolution of the various magnitudes, as well as differences across groups defined by gender and skill. We start with the general time trends of hours worked and hours inequality in our sample period.

Going back to figure 3, we can see that over the last two decades average working hours have changed little, in a range of ±2% with respect to the beginning of the period (top panel). But almost constant means have been accompanied by significant changes in dispersion. The data show a distinctive pattern, contrasting the Anglo-Saxon countries against the experience of the continental economies. Inequality has declined in the US and the UK and, despite an increase in dispersion since 2007, hours inequality is below its value in the early 1990s. In contrast, France and Germany have witnessed a steady increase in the MLD of hours, with hour inequality index being about 20 and 40 percent higher in 2012 than in 1991, respectively. In the case of France this is the direct outcome of the forced reduction of weekly working hours introduced in 2000, as can be seen when comparing the top and bottom panels in figure 1,[17] however, for Germany the increased dispersion seems to be the result of a thickening of both tails of the distribution.

Turning to the decomposition of the Mean Log Deviation (MLD) of weekly earnings, figure 4 plots the evolution over time of earnings inequality as well as of its three components, while table 3 presents the corresponding figures for selected years.

The top left panel shows the evolution of the level of inequality in earnings, with high levels of overall inequality in the UK and the US (the MLD index ranges between 0.18 and 0.25), with Germany catching up and France lagging behind.[18] When considering the decomposition between wages and hours, the US and the UK behave differently: the US records the highest wage inequality, with a slightly increasing value of the MLD, around 0.17; on the contrary the UK remains constant at 0.15 for most of the period. As a consequence, in the US hourly wages

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[17]Askenazy (2013) argues that the 35-hours working week regulation opened up a thorough reform of working hours regimes in the country.

[18]Changes in sampling are clearly visible for the US in 1994, for Germany in 2003 and for France in 2008. See table A2 in the appendix and the earlier discussion.

Table 3: Decomposition of earnings dispersion: absolute and relative contributions

Year	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
1991	US	0.175	0.114	0.045	0.017	0.649	0.256	0.095
		(0.004)	(0.002)	(0.002)	(0.002)			
	UK	0.255	0.131	0.094	0.030	0.514	0.370	0.116
		(0.007)	(0.004)	(0.004)	(0.005)			
	DE	0.174	0.118	0.055	0.000	0.680	0.319	0.001
		(0.004)	(0.003)	(0.002)	(0.003)			
	FR	0.118	0.096	0.034	-0.013	0.818	0.292	-0.109
		(0.002)	(0.001)	(0.001)	(0.001)			
1995	US	0.225	0.165	0.039	0.021	0.734	0.174	0.092
		(0.004)	(0.003)	(0.001)	(0.002)			
	UK	0.260	0.136	0.091	0.033	0.524	0.350	0.126
		(0.009)	(0.005)	(0.004)	(0.005)			
	DE	0.147	0.103	0.060	-0.016	0.702	0.409	-0.111
		(0.004)	(0.004)	(0.002)	(0.004)			
	FR	0.133	0.101	0.040	-0.008	0.759	0.300	-0.060
		(0.002)	(0.001)	(0.001)	(0.001)			
2000	US	0.218	0.161	0.034	0.022	0.742	0.156	0.102
		(0.004)	(0.003)	(0.001)	(0.002)			
	UK	0.226	0.125	0.077	0.023	0.554	0.343	0.103
		(0.007)	(0.005)	(0.004)	(0.004)			
	DE	0.185	0.101	0.068	0.017	0.543	0.367	0.090
		(0.004)	(0.002)	(0.002)	(0.002)			
	FR	0.131	0.093	0.040	-0.001	0.707	0.302	-0.009
		(0.002)	(0.001)	(0.001)	(0.001)			
2007	US	0.223	0.173	0.033	0.017	0.778	0.147	0.075
		(0.004)	(0.004)	(0.001)	(0.002)			
	UK	0.227	0.134	0.064	0.029	0.592	0.282	0.126
		(0.009)	(0.006)	(0.003)	(0.004)			
	DE	0.230	0.123	0.082	0.025	0.535	0.358	0.107
		(0.006)	(0.003)	(0.003)	(0.003)			
	FR	0.119	0.079	0.041	-0.001	0.664	0.346	-0.010
		(0.003)	(0.002)	(0.002)	(0.003)			
2012	US	0.247	0.183	0.037	0.027	0.741	0.151	0.109
		(0.005)	(0.004)	(0.001)	(0.002)			
	UK	0.248	0.147	0.073	0.028	0.593	0.294	0.112
		(0.004)	(0.003)	(0.001)	(0.002)			
	DE	0.229	0.122	0.077	0.030	0.534	0.337	0.129
		(0.006)	(0.004)	(0.003)	(0.003)			
	FR	0.137	0.086	0.042	0.010	0.626	0.303	0.071
		(0.004)	(0.002)	(0.001)	(0.002)			

Note: Inequality in earnings, wages and hours is measured by the MLD and denoted by Iy, Iw, and Ih respectively. ρ denotes the correlation term, while RC_i is the relative distribution of wages, hours and the correlation term.

explain a large fraction of inequality in earnings, reaching 75%, while in the UK it only represents half of it. Germany exhibits an upward trend in wage inequality, although the increase is smaller than that observed for earnings inequality. France is the least unequal country, its dispersion in hourly wages falls and reaches values below 0.10, with the corresponding contribution to earnings inequality falling from 75% to 60%.

The middle graphs of figure 4 depict the absolute contribution of the dispersion of hours worked and of the correlation between hours and hourly wages, respectively. Hours inequality increase markedly in both France and Germany. Concerning the contribution to earnings inequality of the correlation between hours and wages, we identify two different patterns: the Anglo-Saxon countries exhibit a mildly positive correlation, constant over time, explaining 10% of overall inequality in those countries; Germany and France both exhibit negative/nil values in the 90's and positive values after the year 2000. The bottom panels, included as a robustness check, report hours inequality as measured by the Gini coefficient and the covariance between hours and wages. We can see that the Gini delivers the same evolution of hours that we obtained with the MLD, and that the coefficient of correlation for France and Germany exhibits sharp changes, which in turn are the main effect behind changes in ρ.

The overall evolution of these four countries is summarized in figure 5, where we report inequality in wages and inequality in hours for the years reported in table 3. It can be clearly seen that each country follows a specific pattern: the UK with the highest inequality in hours vis a vis the US with the highest inequality in wages, France with the lowest inequality along both dimensions, and Germany moving from the French "model" of labor market to the British one over the two decades.

4.2 Differences in hours worked across skill and gender groups

The different dynamics that we observe in the four countries may reflect compositional effects. For example, if part-time employment is a major source of hours dispersion and if this type of employment concerns mainly women, then observed cross-country differences could be the result of differences in the proportions of working women. Similarly, long-working weeks may concern only high-skilled males (the workaholic trader we find in the popular press) and consequently the share of skilled employment may be an important determinant of hours dispersion. To address these issues we decompose earnings inequality for four population subgroups, dividing the sample by gender and educational levels, low-skilled and high-skilled, the threshold being having at least some university education. In all countries but the US the share of low-skilled men declines and the share of high-skilled women is on the rise during our sample period. For

France and Germany the former group remains the largest (reaching a slightly less than 40% at the end of the sample period), while neither of the two groups of high-skilled groups do pass the threshold of 20% each (see figure A.1 in the Appendix).

Figure 6 depicts inequality in earnings computed for each subgroup, while figures 7 to 9 repeat the exercise for wages, hours and the wage-hour covariance (the corresponding figures for selected years are reported in tables A.3 to A.9 in the appendix). It is interesting to observe that US inequality is pulled by the male component, while in the UK is women that exhibit the highest dispersion. Note also that the rise of inequality in Germany is mainly attributable to low-skilled workers, with inequality among high-skilled men remaining constant and that among high-skilled women exhibiting an inverse U-shaped pattern. Lastly, for all countries and for both skill levels the female component is characterized by higher inequality when compared to its male counterpart.

Figure 7 suggests that inequality in wages remains rather constant in each subgroup over the two decades, with the exception of high-skilled workers in US, who experienced a rising trend in the returns to education.[19]

Our main interest lies in figures 8 and 9, depicting the evolution of inequality in hours and of the covariance term. Figure 8 highlights gender differences in working hours: while male groups experience constant patterns of hours, likely centered on full time employment, female working hours are much more dispersed, especially in the UK and gradually also in Germany.

The picture is completed by figure 9 reporting the covariance contribution to earnings inequality. Various comments are in order. There are striking differences between the high- and the low-skilled, with the latter exhibiting a smaller covariance term. In some groups (low-skilled men in the US and France) hours are likely to be fixed and therefore independent from wages. When deviating from zero, the covariance between hours and wages of the low-skilled tends to be negative for males and positive for females, although for low-skilled males, both the UK and Germany exhibit a substantial negative correlation at the start of our sample period that disappears over time. The changes for the high-skilled are striking: in both gender groups we find a move from highly negative covariance terms to nil or positive ones, with the exception of the US where the term is positive throughout the period. Concerning high-skilled males in the UK and France, a highly negative term reaches the same (positive) level as in the US by the end of the period. This implies that the equalising effect stemming from the fact that those with lower wages worked more hours has been eroded over the past two decades.

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[19]This is a well documented fact which is discussed, amongst others, by Acemoglu and Autor (2011).

The case of Germany is particularly interesting, with the transition from low to high earnings inequality being in part driven by low-skilled workers: the equalising negative correlation that used to be apparent for men disappears while women become more and more responsive to labor market, moving from a zero covariance to a positive one, i.e. working more hours for higher wages. Skilled individuals experienced also a substantial change in the covariance term that was particularly marked for women.

Table 4: Within- and between-group decomposition

Year	Country	Between				Within			
		Y	W	H	ρ	Y	W	H	ρ
1991	US	15.20	9.28	1.61	4.30	84.80	55.66	23.97	5.17
	UK	34.69	15.16	8.34	11.19	65.31	36.22	28.69	0.40
	DE	25.25	13.44	3.58	8.23	74.75	54.55	28.33	-8.12
	FR	21.68	21.11	1.82	-1.25	78.32	60.64	27.37	-9.69
1995	US	19.28	12.50	1.28	5.50	80.72	60.88	16.14	3.70
	UK	26.83	10.62	6.98	9.24	73.17	41.82	28.03	3.32
	DE	20.47	8.94	4.64	6.88	79.53	61.27	36.23	-17.97
	FR	23.18	20.07	2.10	1.01	76.82	55.83	27.95	-6.96
2000	US	19.21	12.53	1.15	5.53	80.79	61.63	14.49	4.67
	UK	26.56	10.91	6.40	9.25	73.44	44.54	27.88	1.01
	DE	23.40	8.89	5.08	9.44	76.60	45.40	31.64	-0.44
	FR	20.73	15.09	2.03	3.61	79.27	55.60	28.18	-4.52
2007	US	16.44	11.97	0.85	3.62	83.56	65.87	13.84	3.85
	UK	22.27	11.48	3.99	6.80	77.73	47.67	24.23	5.82
	DE	21.00	7.69	5.34	7.97	79.00	45.84	30.43	2.73
	FR	20.96	9.76	2.72	8.48	79.04	56.63	31.88	-9.48
2012	US	17.68	12.95	0.72	4.01	82.32	61.11	14.34	6.88
	UK	23.26	11.04	4.51	7.71	76.74	48.30	24.93	3.51
	DE	20.29	8.57	3.97	7.75	79.71	44.82	29.75	5.14
	FR	24.91	11.93	2.48	10.50	75.09	50.63	27.83	-3.38

Note: The within-between index decomposition for each component is reported as a percentage of inequality in earnings.

These observations are confirmed by table 4 where we propose a standard between-within decomposition of each variable under analysis (earnings, wages, hours and covariance among the last twos). Equation (8) is divided by the inequality index, which yields the relative contributions of the within-group and between-group components that are reported in the table. The table hence has a double reading. The between-group and within-group components of earnings inequality add up to one, while the between-group (within-group) components of wages, hours and the covariance reported add up to the between-group (within-group) components of earn-

ings. Not surprisingly, the largest share of earnings inequality is attributable to within-group differences, with the between-group component ranging between 15 and 27%. Note, also, that as far as hours are concerned, between-group inequality is particularly small, accounting for only around 10% of overall inequality in hours. This indicates that attributing the dispersion of hours to, say, female part-time employment ignores most of the sources of variation. When we consider the covariance term, its between-group component exhibits different patterns across countries, increasing substantially in France, falling in the UK, and fluctuating slightly in the US and Germany, while the within-group component is substantially larger at the end than at the start of the period for all four countries.

4.3   Discussion

Our results indicate that the overall contribution of hours worked to earnings inequality can be substantial, accounting for over a third of overall dispersion in some instances. Moreover, if we consider together the dispersion of hours worked and the covariance between wages and hours, they are responsible, in some countries, for half of the overall earnings dispersion. Inequality in hours of work seems to be largely driven by the female component of employment, possibly by part-time working regimes. In the two countries with the highest inequality, the UK and Germany, women account for at least 40% of employment and both countries are characterized by substantial part-time employment. Nevertheless, our within-between group decomposition indicates that this is only part of the story, with those two countries also exhibiting very substantial inequality in hours within groups.

The changing position of Germany in cross-country comparisons of earnings inequality points to the importance of changes in the covariance between hours and wages. From a labor supply point of view, it can be read as an increasing elasticity of hours to wages (which would be consistent with a higher share of women in employment), from a labor demand point of view, it may represent a prevailing intensive margin over the extensive margin. The overall result was that some countries went from a situation in which the least-paid workers had the longest working hours, to one where the best-paid also work hardest.[20]

The immediate question that arises from our analysis is to what extent the observed time patterns are correlated with institutional changes within each country. Consider union density as a global measure of the institutionalization of the labour market.[21] Figure 10 plots union

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[20]This is consistent with the arguments in Bell and Freeman (2001).

[21]Data from https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN. Alternative institutional measures such as the employment protection legislation index could be used, although they display limited time variation.

density against our measure of the covariance term, and indicates the well-established gradual weakening of labour standards over the past few decades which has been largely driven by the increased labour market participation of women and the up-skilling of the labour force.

The figure indicates that this weakening has affected differently continental Europe (France and Germany) and the Anglo-Saxon countries (UK and US). When unions were strong, the dominant membership of unions consisted of full-time low-skilled male workers, and this was associated with limited variation in hours and reduced inequality in wages. In the UK and US, weaker unions led to an increase in wage inequality, while in the other two European countries they seem to have resulted in a change in the role of hours inequality, captured by the dynamics of the correlation between hours and wages. As we can see in figure 10, this term is negatively correlated with union density for France and Germany but does not display a clear association in the case of UK and US.

One way to rationalise this evidence is the distinction between intensive and extensive margins. When unions are strong, they typically oppose the use (and abuse) of intensive margins by employers, on the expectation of expanding employment opportunities (extensive margins) and increasing their bargaining power. This compresses the distribution of hours around the contractual/legal duration and leaves wages to do the adjustment to excess demand/supply. As unions strength declines, employers become free to choose which margin they prefer to adjust, a decision that will depend on the relative adjustment costs per hour and per head, as well as on their expectations concerning demand. As a consequence, hours become more dispersed, the labour supply elasticity becomes positive and the residual correlation moves from nil to positive. Although more rigorous statistical tests would be required to prove our interpretation, our hypothesis implies that earnings inequality could be attenuated by union presence which would tend to reduce both wage inequality and the positive correlation between hours and wages.

The decline of unions and more generally of labour standards could represent only part of the story.The main drivers of the changes we have described consists of increased female participation and upskilling of the labour force, both taking place at different speeds and points of time in different countries. Unions in particular have not always been able to accomodate a demand for more flexible hours arrangements, which are often expressed by the marginal segment of the labour force. We are agnostic on whether the countries under analysis have achieved "excessive" flexibility in hours, especially because we do not have information on whether the increased covariance is voluntary accepted or imposed onto them. More careful analysis of individual answers on suervy questions about perception of working regimes could help us in

A second question raised by our analysis concerns the population we examine, in particular when non-employment increases, as is the case during the great recession. Lower inequality amongst the employed can be the result of labour shedding at the bottom of the distribution, and hence be associated with greater inequality in earnings when we consider the entire population, i.e. including those with zero earnings. We have examined the evolution of earnings and hours inequality for the entire population, and report in figure 11 the evolution of earnings, wage and hours inequality as well as the share of non-employed for France and Germany. In the case of France, earnings and hours dispersion behave in a similar way as when we consider only those who are employed. For example, between 2000 and 2012, earnings inequality amongst the employed went from 0.131 to 0.137 and from 0.551 to 0.533 for the entire population. Similarly, we found little difference for the US and the UK (not reported in figure 11). In contrast, Germany exhibits a particular feature: earnings dispersion increased amongst the employed (from 0.185 to 0.229 over the period 2000-12) but fell for the population as a whole (from 0.474 to 0.469). These patterns are clearly the result of the mini-jobs that implied an increase in inequality amongst the employed but, since they substantially reduced in the share of non-employed individuals (from 0.25 to 0.21 over 2000-2012), they led to lower earnings inequality amongst the population as a whole. This example illustrates the difficulty of designing policies aimed at reducing inequality as they are likely to be very sensitive to the question 'inequality of what amongst whom?'.

5   Conclusions

Our paper contributes to the literature on earnings inequality by considering the role of hours worked and not only that of hourly wages, in order to address the question of whether for a given distribution of wages, the dispersion of working time tends to dampen or magnify initial inequalities. To do so, we decompose our inequality index to quantify the contribution of inequality in hourly wages and the dispersion in hours worked to overall inequality in earnings. Hours dispersion affects overall inequality through two mechanisms, inequality in hours and the correlation between hours worked and hourly wages. As a result, if the latter term is negative (i.e. if poorly-paid workers are those that work most), hours inequality may have a substantial equalizing impact.

Our results uncover a number of surprising patterns. First, we find that hours inequality is moderate in the US and France and much larger in the UK and Germany, with the distributions presenting fat tails both at the bottom (probably associated with female part-time and 'mini-

jobs') and at the top. Second, the contribution of hours to inequality is always positive but varies substantially across countries and over time. In 2012, it accounted for only 15% of earnings inequality in the US, 29% in the UK, 30% in France, and 34% in Germany.

In the three European countries we find that there is a substantial change in the covariance between wages and hours and in some case, notably Germany, this has been a major force behind the change in the overall contribution of hours. For several groups, mainly low-skilled males and high-skilled females, the covariance was negative at the start of the period and becomes zero or positive over time. In the case of the UK, a similar pattern is observed for high-skilled males. As a result, an important equalizing force, the longer hours worked by those with the lowest pay, seems to have disappeared, with important implications for earnings inequality. The US presents a rather stable contribution of wages, hours and the covariance, while Germany has witnessed major changes. Between 1991 and 2012, earnings inequality moved from being par to that of France to being close to the one observed in the US, and this was driven by a change in the contribution of hours and, especially, of the covariance which increased by 13 percentage points.

Our paper indicates that the so-far neglected question of hours inequality can help us understand the evolution of earnings dispersion in certain countries. At the same time, it raises as many questions as it answers. First, we need to understand what drives the broad cross-country patterns that we have uncovered. The fact that the US shares a distribution similar to that of France indicates that institutional features are unlikely to be the answer. Second, it is important to examine what lies behind the erosion of the negative covariance of hours and wages. Is it the result of individual choices, with rising income levels changing the relative sizes of income and substitution effects in labor supply decisions? Has the erosion of union power unions played a role? Or are we witnessing a change in the types of jobs proposed to certain individuals, notably the least skilled, that forces them to accept both low wages and low hours? These questions constitute, in our view, an important research agenda.

Appendix

Table A.1: Descriptive statistics

year	country	Y mean	sd	W mean	sd	H mean	sd	Nobs
1991	US	384.14	222.98	9.75	4.95	38.75	9.85	5837
		(3.47)	(4.35)	(0.08)	(0.11)	(0.14)	(0.18)	
	UK	244.87	164.78	6.20	3.49	38.35	13.72	3583
		(2.77)	(5.15)	(0.06)	(0.14)	(0.24)	(0.19)	
	DE	374.23	214.60	9.51	4.87	39.34	10.95	7032
		(3.16)	(5.93)	(0.07)	(0.15)	(0.17)	(0.17)	
	FR	255.05	137.91	6.85	3.66	37.70	8.26	33152
		(0.76)	(2.47)	(0.02)	(0.06)	(0.05)	(0.06)	
1995	US	556.17	367.36	13.56	8.11	40.18	9.71	10380
		(4.11)	(4.31)	(0.09)	(0.14)	(0.11)	(0.12)	
	UK	290.83	211.36	7.25	4.29	38.81	13.86	3314
		(4.03)	(10.74)	(0.08)	(0.19)	(0.26)	(0.21)	
	DE	470.98	241.72	12.17	6.45	39.32	11.13	8436
		(3.84)	(6.19)	(0.10)	(0.31)	(0.16)	(0.15)	
	FR	281.37	162.20	7.61	4.21	37.28	8.81	42934
		(0.83)	(2.61)	(0.02)	(0.07)	(0.04)	(0.05)	
2000	US	678.70	465.66	16.35	9.93	40.60	9.23	9632
		(5.26)	(6.96)	(0.11)	(0.14)	(0.10)	(0.13)	
	UK	356.85	235.56	8.89	4.96	39.20	12.84	5636
		(4.48)	(7.21)	(0.10)	(0.20)	(0.24)	(0.21)	
	DE	516.47	301.72	13.08	6.19	38.84	11.63	12924
		(3.81)	(8.04)	(0.08)	(0.14)	(0.13)	(0.12)	
	FR	296.43	168.94	8.20	4.26	36.20	8.55	41356
		(0.89)	(2.84)	(0.02)	(0.07)	(0.04)	(0.05)	
2007	US	830.46	561.06	20.24	12.57	40.35	9.12	9788
		(6.24)	(6.87)	(0.14)	(0.19)	(0.10)	(0.13)	
	UK	472.62	338.68	11.95	7.17	38.42	11.69	5038
		(6.77)	(17.00)	(0.15)	(0.37)	(0.23)	(0.20)	
	DE	546.31	334.58	13.82	6.88	38.58	12.44	12611
		(4.26)	(5.69)	(0.09)	(0.20)	(0.17)	(0.15)	
	FR	384.61	207.75	10.51	4.96	36.63	9.22	8292
		(2.65)	(6.12)	(0.06)	(0.17)	(0.12)	(0.15)	
2012	US	898.47	629.36	22.07	13.96	39.63	9.44	8997
		(7.80)	(7.40)	(0.17)	(0.20)	(0.11)	(0.14)	
	UK	495.20	365.06	12.81	7.92	37.59	12.27	15886
		(3.43)	(6.74)	(0.07)	(0.16)	(0.12)	(0.09)	
	DE	600.69	373.17	15.26	7.77	38.23	11.86	10893
		(5.06)	(7.64)	(0.11)	(0.32)	(0.16)	(0.15)	
	FR	441.56	267.26	11.81	5.80	37.01	9.23	11670
		(3.11)	(9.73)	(0.06)	(0.17)	(0.10)	(0.11)	

Table A.2: Descriptive statistics

	US			UK			DE			FR		
year	H mean	H sd	Nobs	H mean	H sd	Nobs	H mean	H sd	Nobs	H mean	H sd	Nobs
1989	39.03	9.86	5337									
1990	39.06	9.63	5838							37.65	8.12	33982
1991	38.75	9.85	5837	38.35	13.72	3583	39.34	10.95	7032	37.70	8.26	33152
1992	38.79	9.71	5776	38.16	13.65	3415	39.61	10.44	7189	37.56	8.33	35726
1993	38.57	9.83	5769	38.36	13.94	3284	39.26	10.61	7368	37.41	8.58	40796
1994	39.93	9.85	10472	38.52	14.15	3348	39.10	10.39	7830	37.36	8.73	43022
1995	40.18	9.71	10380	38.81	13.86	3314	39.32	11.13	8436	37.28	8.81	42934
1996	40.27	10.06	9036	38.77	13.48	3492	39.20	10.75	8558	37.18	8.82	43130
1997	40.13	9.54	9257	39.08	13.25	4038	39.69	10.86	8653	36.97	8.80	42004
1998	40.22	9.26	9434	38.85	13.34	4027	39.24	11.14	9032	36.86	8.89	42006
1999	40.36	9.40	9649	38.80	13.09	5626	38.95	11.37	9458	36.77	8.71	41262
2000	40.60	9.23	9632	39.20	12.84	5636	38.84	11.63	12924	36.20	8.55	41356
2001	40.50	9.30	9275	38.76	13.18	6640	38.64	11.71	12578	35.85	8.30	40981
2002	40.24	9.35	10947	38.47	12.54	5839	38.27	11.79	13108	35.42	8.25	41088
2003	39.96	9.34	10837	38.09	12.63	5670	38.10	11.90	12684	36.44	9.05	8137
2004	40.04	9.38	10518	38.26	12.48	5470	38.16	11.77	12597	36.38	9.18	8453
2005	39.99	9.35	10092	38.35	11.88	5327	38.10	12.02	12429	36.53	9.22	8022
2006	40.22	9.33	9889	38.24	11.93	5221	38.42	11.82	12717	36.63	9.19	8039
2007	40.35	9.12	9788	38.42	11.69	5038	38.58	12.44	12611	36.63	9.22	8292
2008	39.95	9.04	9764	37.88	11.92	4818	38.44	11.94	12114	36.73	9.20	8311
2009	39.59	9.63	9283				38.64	11.93	11838	36.88	9.02	10149
2010	39.43	9.66	9183	38.18	12.57	16510	37.84	12.13	10784	36.69	8.96	9529
2011	39.47	9.45	9133	37.39	12.41	17685	38.52	12.05	11255	36.85	9.19	11435
2012	39.63	9.44	8997	37.59	12.27	15886	38.23	11.86	10893	37.01	9.23	11670

Table A.3: Decomposition of earnings dispersion by skill-gender groups: absolute and relative contributions, 1991

Group	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
Low-Skilled Males	US	0.119	0.097	0.016	0.006	0.815	0.135	0.050
		(0.005)	(0.003)	(0.002)	(0.002)			
	UK	0.090	0.085	0.020	-0.015	0.943	0.220	-0.163
		(0.005)	(0.004)	(0.001)	(0.003)			
	DE	0.103	0.094	0.028	-0.018	0.908	0.266	-0.175
		(0.004)	(0.004)	(0.003)	(0.003)			
	FR	0.070	0.065	0.010	-0.004	0.921	0.140	-0.061
		(0.002)	(0.002)	(0.000)	(0.001)			
High-Skilled Males	US	0.144	0.104	0.027	0.014	0.719	0.184	0.097
		(0.008)	(0.006)	(0.003)	(0.004)			
	UK	0.104	0.110	0.040	-0.047	1.059	0.389	-0.449
		(0.010)	(0.010)	(0.009)	(0.013)			
	DE	0.094	0.081	0.018	-0.005	0.859	0.195	-0.054
		(0.008)	(0.007)	(0.002)	(0.004)			
	FR	0.113	0.110	0.043	-0.039	0.973	0.377	-0.349
		(0.005)	(0.005)	(0.002)	(0.004)			
Low-Skilled Females	US	0.156	0.086	0.057	0.012	0.554	0.368	0.078
		(0.008)	(0.005)	(0.005)	(0.005)			
	UK	0.257	0.089	0.131	0.037	0.346	0.511	0.143
		(0.010)	(0.005)	(0.006)	(0.006)			
	DE	0.173	0.097	0.081	-0.005	0.561	0.469	-0.030
		(0.006)	(0.004)	(0.004)	(0.004)			
	FR	0.119	0.066	0.053	0.000	0.551	0.448	0.001
		(0.002)	(0.002)	(0.002)	(0.001)			
High-Skilled Females	US	0.188	0.109	0.074	0.005	0.581	0.394	0.025
		(0.009)	(0.005)	(0.005)	(0.006)			
	UK	0.209	0.098	0.101	0.010	0.469	0.484	0.047
		(0.015)	(0.007)	(0.009)	(0.008)			
	DE	0.152	0.121	0.094	-0.063	0.795	0.621	-0.415
		(0.023)	(0.018)	(0.010)	(0.016)			
	FR	0.078	0.092	0.050	-0.065	1.183	0.647	-0.829
		(0.003)	(0.003)	(0.002)	(0.004)			

Table A.4: Decomposition of earnings dispersion by skill-gender groups: absolute and relative contributions, 1995

Group	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
Low-Skilled Males	US	0.168 (0.009)	0.145 (0.008)	0.021 (0.002)	0.002 (0.003)	0.864	0.126	0.010
	UK	0.114 (0.012)	0.110 (0.011)	0.027 (0.003)	-0.022 (0.011)	0.961	0.234	-0.195
	DE	0.070 (0.003)	0.075 (0.004)	0.025 (0.002)	-0.030 (0.004)	1.071	0.356	-0.428
	FR	0.074 (0.002)	0.064 (0.002)	0.013 (0.000)	-0.002 (0.001)	0.861	0.172	-0.033
High-Skilled Males	US	0.170 (0.006)	0.139 (0.005)	0.027 (0.002)	0.003 (0.003)	0.821	0.160	0.019
	UK	0.126 (0.010)	0.104 (0.006)	0.035 (0.006)	-0.014 (0.006)	0.830	0.278	-0.109
	DE	0.105 (0.008)	0.100 (0.012)	0.025 (0.004)	-0.020 (0.011)	0.951	0.241	-0.192
	FR	0.126 (0.005)	0.117 (0.004)	0.042 (0.002)	-0.034 (0.004)	0.931	0.337	-0.268
Low-Skilled Females	US	0.169 (0.007)	0.123 (0.007)	0.043 (0.003)	0.003 (0.007)	0.728	0.252	0.020
	UK	0.266 (0.012)	0.100 (0.008)	0.122 (0.007)	0.044 (0.007)	0.377	0.459	0.164
	DE	0.178 (0.008)	0.100 (0.007)	0.096 (0.005)	-0.017 (0.009)	0.561	0.537	-0.098
	FR	0.132 (0.003)	0.068 (0.002)	0.059 (0.001)	0.005 (0.001)	0.518	0.447	0.035
High-Skilled Females	US	0.215 (0.007)	0.138 (0.005)	0.055 (0.003)	0.023 (0.003)	0.641	0.254	0.105
	UK	0.244 (0.021)	0.127 (0.012)	0.099 (0.009)	0.019 (0.010)	0.518	0.405	0.077
	DE	0.153 (0.019)	0.125 (0.015)	0.086 (0.009)	-0.058 (0.013)	0.816	0.562	-0.378
	FR	0.097 (0.003)	0.096 (0.003)	0.056 (0.002)	-0.055 (0.003)	0.984	0.579	-0.562

Table A.5: Decomposition of earnings dispersion by skill-gender groups: absolute and relative contributions, 2000

Group	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
Low-Skilled Males	US	0.147	0.126	0.016	0.005	0.858	0.111	0.031
		(0.007)	(0.006)	(0.001)	(0.003)			
	UK	0.098	0.087	0.022	-0.011	0.893	0.221	-0.114
		(0.006)	(0.006)	(0.002)	(0.003)			
	DE	0.093	0.076	0.025	-0.007	0.809	0.268	-0.078
		(0.004)	(0.003)	(0.002)	(0.002)			
	FR	0.076	0.065	0.014	-0.002	0.851	0.181	-0.032
		(0.003)	(0.002)	(0.000)	(0.001)			
High-Skilled Males	US	0.169	0.139	0.021	0.008	0.824	0.127	0.049
		(0.005)	(0.004)	(0.001)	(0.002)			
	UK	0.122	0.108	0.027	-0.013	0.885	0.218	-0.103
		(0.009)	(0.008)	(0.005)	(0.005)			
	DE	0.119	0.090	0.024	0.005	0.755	0.200	0.045
		(0.011)	(0.007)	(0.003)	(0.005)			
	FR	0.120	0.106	0.034	-0.021	0.887	0.285	-0.172
		(0.005)	(0.004)	(0.001)	(0.003)			
Low-Skilled Females	US	0.176	0.124	0.041	0.010	0.707	0.235	0.058
		(0.014)	(0.013)	(0.003)	(0.003)			
	UK	0.247	0.108	0.113	0.025	0.439	0.459	0.102
		(0.013)	(0.010)	(0.007)	(0.012)			
	DE	0.212	0.093	0.110	0.010	0.437	0.517	0.047
		(0.006)	(0.004)	(0.004)	(0.005)			
	FR	0.131	0.065	0.061	0.005	0.494	0.465	0.041
		(0.003)	(0.002)	(0.001)	(0.001)			
High-Skilled Females	US	0.203	0.141	0.047	0.016	0.692	0.229	0.079
		(0.007)	(0.005)	(0.003)	(0.003)			
	UK	0.191	0.099	0.088	0.004	0.518	0.460	0.022
		(0.014)	(0.010)	(0.009)	(0.013)			
	DE	0.157	0.086	0.087	-0.016	0.549	0.551	-0.100
		(0.012)	(0.007)	(0.007)	(0.008)			
	FR	0.107	0.090	0.048	-0.032	0.848	0.454	-0.302
		(0.003)	(0.002)	(0.002)	(0.003)			

Table A.6: Decomposition of earnings dispersion by skill-gender groups: absolute and relative contributions, 2007

Group	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
Low-Skilled Males	US	0.152	0.127	0.019	0.006	0.837	0.123	0.039
		(0.006)	(0.005)	(0.002)	(0.004)			
	UK	0.125	0.109	0.024	-0.008	0.869	0.195	-0.064
		(0.013)	(0.013)	(0.004)	(0.008)			
	DE	0.138	0.109	0.030	-0.002	0.793	0.218	-0.011
		(0.008)	(0.005)	(0.002)	(0.003)			
	FR	0.072	0.060	0.019	-0.006	0.830	0.260	-0.089
		(0.004)	(0.004)	(0.002)	(0.003)			
High-Skilled Males	US	0.187	0.163	0.024	0.001	0.867	0.130	0.003
		(0.008)	(0.008)	(0.002)	(0.003)			
	UK	0.160	0.127	0.026	0.007	0.792	0.163	0.046
		(0.015)	(0.012)	(0.004)	(0.007)			
	DE	0.104	0.079	0.026	-0.000	0.760	0.245	-0.004
		(0.008)	(0.006)	(0.003)	(0.006)			
	FR	0.121	0.086	0.037	-0.002	0.709	0.303	-0.013
		(0.008)	(0.005)	(0.003)	(0.006)			
Low-Skilled Females	US	0.173	0.116	0.041	0.016	0.670	0.235	0.094
		(0.008)	(0.005)	(0.003)	(0.003)			
	UK	0.207	0.084	0.088	0.035	0.407	0.426	0.167
		(0.016)	(0.008)	(0.006)	(0.008)			
	DE	0.253	0.112	0.124	0.017	0.442	0.489	0.069
		(0.008)	(0.007)	(0.006)	(0.008)			
	FR	0.107	0.066	0.057	-0.016	0.617	0.530	-0.147
		(0.005)	(0.005)	(0.003)	(0.006)			
High-Skilled Females	US	0.215	0.161	0.040	0.014	0.748	0.187	0.065
		(0.008)	(0.007)	(0.002)	(0.003)			
	UK	0.219	0.118	0.082	0.020	0.538	0.372	0.090
		(0.015)	(0.008)	(0.007)	(0.008)			
	DE	0.196	0.098	0.092	0.006	0.499	0.471	0.031
		(0.015)	(0.007)	(0.010)	(0.008)			
	FR	0.098	0.073	0.046	-0.021	0.746	0.472	-0.218
		(0.007)	(0.005)	(0.004)	(0.006)			

Table A.7: Decomposition of earnings dispersion by skill-gender groups: absolute and relative contributions, 2012

Group	Country	Iy	Iw	Ih	ρ	RCw	RCh	RCρ
Low-Skilled Males	US	0.180	0.135	0.027	0.018	0.754	0.148	0.098
		(0.012)	(0.011)	(0.002)	(0.003)			
	UK	0.151	0.117	0.032	0.001	0.777	0.214	0.009
		(0.006)	(0.005)	(0.002)	(0.003)			
	DE	0.146	0.107	0.040	-0.001	0.734	0.273	-0.007
		(0.008)	(0.007)	(0.004)	(0.006)			
	FR	0.078	0.061	0.022	-0.005	0.782	0.278	-0.060
		(0.004)	(0.003)	(0.001)	(0.003)			
High-Skilled Males	US	0.198	0.156	0.028	0.014	0.790	0.141	0.068
		(0.006)	(0.005)	(0.002)	(0.003)			
	UK	0.175	0.143	0.028	0.004	0.815	0.161	0.023
		(0.007)	(0.006)	(0.001)	(0.003)			
	DE	0.117	0.082	0.028	0.008	0.699	0.235	0.067
		(0.008)	(0.005)	(0.004)	(0.003)			
	FR	0.130	0.098	0.025	0.006	0.754	0.197	0.049
		(0.008)	(0.006)	(0.002)	(0.004)			
Low-Skilled Females	US	0.194	0.122	0.048	0.025	0.627	0.246	0.127
		(0.014)	(0.012)	(0.004)	(0.004)			
	UK	0.222	0.096	0.102	0.024	0.433	0.458	0.109
		(0.006)	(0.004)	(0.003)	(0.004)			
	DE	0.253	0.111	0.113	0.029	0.438	0.446	0.116
		(0.008)	(0.004)	(0.004)	(0.004)			
	FR	0.112	0.059	0.063	-0.011	0.531	0.563	-0.094
		(0.004)	0.003	(0.003)	(0.003)			
High-Skilled Females	US	0.228	0.169	0.043	0.017	0.740	0.187	0.073
		(0.010)	(0.009)	(0.002)	(0.003)			
	UK	0.212	0.127	0.080	0.004	0.602	0.378	0.020
		(0.007)	(0.005)	(0.003)	(0.005)			
	DE	0.153	0.086	0.064	0.003	0.563	0.415	0.022
		(0.011)	(0.006)	(0.005)	(0.005)			
	FR	0.108	0.074	0.040	-0.005	0.680	0.368	-0.048
		(0.005)	(0.003)	(0.002)	(0.003)			