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The 24/7 economy and work during unsocial hours in Europe

Examining the influence of labor market dualization, regulation and collective bargaining

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Abstract

We examine the individual- and country-level factors that contribute to the risk of working unsocial hours in 30 European countries. Using the EU labor force survey data, we test for the influence of labor market dualization, product- and labor market regulation, and collective bargaining on the individual risk of working unsocial hours. The risks of working unsocial hours are strongly dualized in all countries, but the size of the risk gap between low-skilled outsiders and high-skilled insiders varies. In countries where collective bargaining plays a greater role in regulating work hours the gap between low- and high-skilled workers is smaller.

Keywords

24/7 economy, nonstandard work schedules, unsocial work hours, labor market dualization, deregulation, collective bargaining

Introduction

Due to economic, demographic and technological changes, some have argued that we currently live in a 24/7 economy and society (Presser, 2003; Anttila and Oinas, 2018). In times of deindustrialization and in an increasingly globally interconnected economy and digital “always-on” society, there is pressure to continue activity in production, communication, consumption, trade and business around the clock (Ojala and Pyöriä, 2015). One consequence of the 24/7 economy is that there is an increasing demand for work performed at nonstandard times. Instead of working according to so-called standard work schedules, that is, from Monday to Friday between nine and five, people increasingly need to work in shifts, on evenings and nights, and during weekend days. Given the difficulties of combining work with nonstandard hours with social interactions in other spheres of life, including with family and friends, the term *unsocial* work hours is commonly used.

There has been extensive research on the potential negative consequences of working unsocial hours. The first type of research focuses on the effects of work at unsocial hours on personal health and well-being. Studies on shift work in particular have found it associated with disturbance of sleep patterns, leading to increased risks of, among others, cardiovascular disease, gastrointestinal disease, breast cancer, mental health problems and accidents on the job (Härmä and Kecklund, 2010; Harrington, 1994; Pickering, 2006). A second stream of research focuses on the effects on families and children. Working unsocial hours is related to marital tensions, divorce, children’s poor well-being and behavioral problems, and a whole range of related emotional and mental problems among family members (Davis et al., 2008; Joshi and Bogen, 2007; Mills and Täht, 2010; Stradzins et al., 2006; Wight, Raley and Bianchi, 2008). Therefore, if unsocial work hours are becoming more widespread and considering that the consequences for health and families are so dire, there is a strong case for social and labor market policies to address this issue.

However, relatively little is known about who is affected by work at unsocial hours in Europe in recent years. Much of the literature focuses on specific sectors and occupations where nonstandard work schedules have been traditionally more common, such as in social and healthcare, and hotels and restaurants (Henly, Shaefer and Waxman, 2006; Presser, 2003; Presser, Gornick and Parashar, 2008). There are also sectors where the emergence of the 24/7 economy has had a particularly strong impact. The manufacturing and transportation sectors have increasingly become part of global supply chains, and international competition might

necessitate a reduction in the costs of maintaining inventory, resulting in the need to keep production going around the clock (Berg, Bosch and Charest, 2014). The liberalization of opening hours has led to more work during evenings and weekends in the retail and trade sectors. Nevertheless, within these sectors there might also be large differences. A manager or bookkeeper in a hospital, hotel, factory or supermarket is probably more likely to work standard hours than a nurse, receptionist, machine operator or cashier within the same work organization.

In this article, we investigate what individual and structural factors explain why some work at unsocial hours and others do not. We approach this issue, first of all, from the perspective of labor market dualization theories (Chung, 2018; Emmenegger et al., 2012; Schwander and Häusermann, 2013). We investigate whether unsocial work hours can be considered a feature of “bad jobs” (Goos and Manning, 2007; Kalleberg, Reskin and Hudson, 2000) and affect mainly the “outsiders” in the labor market, while “insiders” are in a position to protect their nine-to-five jobs. Or, is the impact of the 24/7 economy so far-reaching that insiders are affected equally?

Moreover, whereas previous studies usually focused on single countries only, we look at how cross-national institutional differences might explain the likelihood of working unsocial hours in European countries. National regulations and institutions can limit or promote nonstandard work hours. At the same time, they can enhance or reduce divisions between groups in the labor market. In this article, we focus on the impact of product and labor market regulation, as well as collective bargaining. We expect that deregulation of national product markets leads to greater incidence of unsocial work hours. On the other hand, stronger regulation of the labor market, and of working-time in particular, should lead to lower incidence of unsocial work hours and simultaneously reduce inequalities between insiders and outsiders. Yet, we hypothesize that not only the strictness of regulation matters, but also the extent to which employers and especially employees are involved in decision-making and rule implementation.

Theory

Work in the 24/7 society

Working nonstandard hours appears to be a widespread phenomenon in the US and Europe. In a study on the US in the early 2000s, Presser (2003) found that 40% of employed Americans work a majority of hours outside standard daytime hours. In European countries, based on 2005 labor force survey data, between 15% and 30% of wage earners indicated they usually work at night, in the evening or in shifts, while between 20% and 35% of respondents usually worked on Saturdays and Sundays (Presser, Gornick and Parashar, 2008). Anttila and Oinas (2018), based on 2010 working conditions survey data, found that in most European countries more than 50% of workers worked on the weekend at least once a month, between 40% and 60% worked in the evening and less than 25% worked at night .

Nevertheless, there is little evidence that these figures are part of an increasing trend in the number of unsocial hours worked across the working population and across countries. Hamermesh (1999) argued that evening and night work actually decreased in the US, but that the increase in “nonstandard schedules” was due to small shifts in the traditional nine-to-five work day. A Eurofound (2015) study indicated that work on Saturdays remained almost unchanged over a decade, while Sunday work increased slightly from 13.5% to 14.6% between 2004 and 2014. The same report showed that overall in Europe, the incidence of shift work changed little over time. In addition, little change was observed in evening and night work, where the proportion of those who *usually* work evening and night hours declined, while there was only a slight increase in those who *sometimes* worked those hours (Eurofound, 2015). Country studies on Belgium (Glorieux, Mestdag and Minnen, 2008) and Finland (Anttila and Oinas, 2018; Ojala and Pyöriä, 2015) using detailed time-use survey data over longer periods of time also found no trend toward a 24/7 society in those countries. However, these studies also indicate that (a) there are substantial differences between countries and (b) there are differences between groups in the working population regarding their susceptibility to working unsocial hours.

Who works unsocial hours?

To start by answering the question of who in the working population is more at risk of working unsocial hours, literature is relatively scarce, and studies are often inconclusive. First, the rise

of the 24/7 society and increases in unsocial work hours have often been linked to the growth of the services sector. In a study in the US, Presser (2003) found that the top five occupations in which nonstandard work schedules were most common were cashiers, truck drivers, sales workers, waiters and waitresses, and cooks. In Europe as well, work at unsocial hours is more common in the services sector than in the industrial sector, although the differences are small (Presser, Gornick and Parashar, 2008). Yet, Glorieux, Mestdag and Minnen (2008) found in Belgium that growth in service jobs between 1966 and 1999 cannot account for changes in work during nonsocial hours in the overall working population and that unsocial work has increased only in certain subsectors.

Second, given that the growth of service jobs has coincided with feminization of the workforce, it can be expected that women are more likely to work unsocial hours. In the US, however, Presser and Ward (2011) found almost no differences between men and women. In most European countries in 2005, the differences were also small (Presser, Gornick and Parashar, 2008). Men were found more likely to work evenings, nights and shifts (except in the Nordic countries), while women were more likely to work weekends (except in the UK and Ireland). This picture remained largely unchanged when controlling for the employment sector. Glorieux, Mestdag and Minnen (2008) concluded that the increase in women's participation in the labor market did not lead to a massive increase in nonstandard work schedules between 1966 and 1999 and that women continue to be more likely than men to work from nine to five. However, the impact of working unsocial hours is likely to be more negative for women, due to their greater burden of household labor and childcare (Presser, 2003).

Third, also due to the negative impact on family life, the likelihood of working unsocial hours can be expected to change across the life course. Nonstandard work hours are more common among younger people and tend to decline with age (Presser, 2003; Presser and Ward, 2011). This is not surprising as students often work part-time jobs in evenings and weekends. Being married possibly decreases the likelihood of working unsocial hours, while being a parent has been shown across countries to decrease the likelihood of working unsocial hours among women but increase that likelihood among men (Presser, 2003; Presser, Gornick and Parashar, 2008).

Finally, studies have shown that unsocial hours are most common among low-level service and laborer jobs (Henly, Shaefer and Waxman, 2006; Presser, 2003), indicating that unsocial hours are related to education and socioeconomic class. In the US, lower-educated workers were

found to be more likely to end up in jobs with unsocial hours (Presser and Ward 2011). In contrast, in a Belgian study, Glorieux, Mestdag and Minnen (2008) found only small and statistically insignificant differences between education levels. However, the authors did find that types of jobs had some relation to changes in working unsocial hours: The time skilled and semi-skilled manual workers as well as clerical workers work outside standard hours has increased. Ojala and Pyöriä (2015) found only small differences in Finland between blue- and white-collar workers in the incidence of around-the-clock work and changes therein.

Unsocial hours and labor market dualization

Whereas the literature does not offer an unambiguous indication of who is at risk of unsocial hours, it still suggests that working unsocial hours is characterized by social inequalities. These inequalities exist by sector, gender and skill level. In this study, we investigate to what extent these inequalities exist in European countries and whether the inequalities can be attributed to dualization in the labor market. Dualization can be defined as an increasing differentiation between insiders who enjoy broad welfare rights, entitlements and services and outsiders who do not have the same access (Emmenegger et al., 2012; Schwander and Häusermann, 2013). Dualization can be seen as the outcome of deindustrialization and the disappearance of relatively well-paid and secure manufacturing jobs and the rise of low-skilled employment in the services sector. While globalization puts pressure on the maintenance of low-skilled manufacturing jobs, dualization is associated with the feminization of the workforce and the entrance of women into especially low-skilled service sector jobs.

In the dualization literature, following the economic insider-outsider theories (Lindbeck and Snower, 2001; Saint-Paul, 1996), outsiders are usually defined as those who are unemployed or atypically employed (including part-time and temporary jobs), while insiders are those fully employed on permanent contracts. Insiders have greater bargaining power toward employers, which allows insiders to negotiate higher wages and better working conditions, while externalizing any negative effects on the outsiders. Others have expanded the conceptualization of outsiders to those who not only are unemployed or atypically employed at a certain point in time but are also at risk of becoming so based on their social class (Fleckenstein, Saunders and Seeleib-Kaiser, 2011; Schwander and Häusermann, 2013). They found that in post-industrial societies, high-general-skill occupational groups are in much more secure labor market positions than those with low-general or specific skills. In addition,

occupational skill level has been found to be a dividing line in access to different work-time arrangements, more than contract status (Chung, 2018; Wiss, 2017).

Considering the negative aspects of working unsocial hours, one of the consequences of dualization could be that insiders are able to negotiate regular work hours for themselves and refuse to outside those hours. Outsiders lack the power to do so and have no choice but to work during the hours that insiders refuse to work and that are assigned by employers. Presser (2003) found that there is a large involuntary aspect of work at nonstandard hours: Three-fifths of the respondents indicated that it was because they could not get another job, that the work hours were mandated by the employer or that the nature of the job required it. Therefore, work at unsocial hours can also be considered an employer-centered flexibility arrangement, contrasting employee-centered flexibility arrangements, such as family-friendly working-time arrangements (Chung and Tijdens, 2013). A recent study by Chung (2018) showed that insidership is associated with greater access to family-friendly working-time flexibility. In this article, we examine whether the opposite also holds: Is outsidership associated with a greater risk of employer-centered flexibility that is family-unfriendly, namely unsocial work hours?

Cross-national variation in unsocial work hours and dualization

Emmenegger et al. (2012) emphasized that dualization is not the automatic result of structural forces, but the scope and impact depend on national politics and the implementation of national policies. Similarly, unsocial work hours are not the automatic result of a rising 24/7 economy but are the result of political decisions and implemented policies. Due to varieties in national contexts, we expect there to be differences in the extent to which working unsocial hours is common and the extent to which the risk of working unsocial hours is dualized in each country.

The 24/7 economy is unlikely to happen by itself. It is the result of deregulation and liberalization of various aspects of the product and labor markets. In most countries, inter-firm competition, opening hours of shops and barriers to trade and investment are regulated to a greater or lesser extent. In countries where opening and service hours are deregulated, there is more need for firms to extend their employees' working time beyond the regular hours. At the same time, deregulated product markets lower the barriers for new firms, both domestic and foreign, to enter the market. This could lead to increased competitive pressures on firms

to extend production and service hours. We expect that the more deregulated the product market, the more likely there is a need for around-the-clock work and unsocial work schedules.

Even if product markets are strongly deregulated, workers can be protected against unsocial work hours by regulation of working time. It can be expected that countries that have strict regulations regarding working time, e.g. by forbidding work outside regular hours or requiring employers to pay premia for overtime or irregular hours, will have lower incidence of work during unsocial hours. However, strict regulation needs to be implemented and monitored in order to reduce work at unsocial hours and ensure that regulations do not only apply to insiders, but to outsiders as well.

Usually it is assumed that countries with strong and inclusive trade unions and broad coverage of collective bargaining are more likely to impose stricter working-time regulation, improve employee-friendly working-time arrangements and reduce inequality between insiders and outsiders (Chung, 2018). Yet, if trade unions have a narrow interest in protecting the interests of insiders only, stronger corporatism might actually result in greater dualization (Lindbeck and Snower, 2001; Palier and Thelen, 2010). However, indicators of working-time regulation, trade union density and collective bargaining coverage do not necessarily provide any information on how decisions about working-time standards are actually taken. Even if the influence of trade unions and corporatism in wage-setting or employment policies are strong, it is possible that decisions about working-time arrangements are taken elsewhere.

Berg, Bosch and Charest (2014) suggest that especially when working-time arrangements are negotiated by employee and employer organizations or imposed by the state, working-time arrangements are more beneficial for employees than when they are set unilaterally by the employer. Hence, in the so-called “mandated” and “negotiated” configurations, the incidence of unsocial hours is expected to be lower than in the “unilateral” configuration. Still, differences in unsocial work hours can be expected between the mandated and negotiated regimes. On one hand, as bargaining in the negotiated configuration usually takes place at the sector level, employer and employee organizations may decide on more possibilities for work at unsocial hours in sectors where they are more common or needed than in others (Eurofound, 2016). In the mandated configuration, standardized regulations are expected to apply to all. On the other hand, enforcement of working-time standards might be more effective when employers and employees are involved in decision-making and committed to

implementation, rather than when the state has to rely on external enforcement, e.g. through labor inspection. When possibilities to enforce regulations are weak, work at unsocial hours is expected to be more common.

The extent to which work at unsocial hours is dualized is expected to vary by each of these configurations as well. In the unilateral configuration, employers often have freedom to decide who works unsocial hours and who does not, allowing them to apply different standards between, for example, high-skilled permanent workers and low-skilled temporary workers (Chung, 2018). As in the mandated and negotiated regimes working-time policies are expected to be more inclusive, this dualization should be less prominent (Berg, Bosch and Charest, 2014). Yet, in the mandated regime there is a risk that politicians and central policy-makers have little concern for the risk of dualization because insiders are usually politically better mobilized (Emmenegger et al., 2012).

Data/methods

Data

In the analysis, we use the European Labour Force Survey (EU-LFS) data for the latest year available, that is, 2016. The data includes the 28 EU member states and three members of the European Free Trade Association (Iceland, Norway and Switzerland). For this article, we used the data for 30 countries. We excluded Switzerland as it was not classified by Eurofound (2016) among the working-time setting regimes. Because of the large amount of data, we drew a balanced random representative sample of around 1000 cases per country of those between 15 and 64 years old (N = 30,129). The respondents were in dependent employment at the time the survey was conducted, performing at least one hour of work for pay during the reference period. This criterion excludes self-employed and conscripts performing compulsory military or community service, but includes those working part-time.

Dependent variable

To construct the dependent variable, we used several variables to establish whether a respondent worked during unsocial hours. In a set of questions, respondents could indicate whether they did shift work (yes or no) or work during evenings, nights, Saturdays or Sundays (usually, sometimes or never). In the EU-LFS data, 'usually' for work during evenings and nights means at least half of the days worked during a reference period of the preceding four weeks, while 'sometimes' means less than half of the days worked but at least one hour during the same period. For work during weekends, 'usually' means at least two of the Saturdays/Sundays during a reference period of the preceding four weeks, while 'sometimes' is defined as work on one Saturday/Sunday and at least one hour during the same reference period. We created a dummy variable indicating that someone worked unsocial hours if that person indicated he or she worked shifts or *usually* worked during evenings, nights or weekend days. We included only those who usually worked during unsocial hours rather than only

sometimes, to analyze only those cases where unsocial hours are a structural characteristic of the job rather than an occasional event.¹

To check whether the sample and new composite indicator are representative of each country, we cross-checked this data with Eurostat data from 2016. Eurostat provides country-level weighted percentages for each component (shift, evenings, nights, Saturdays and Sundays). We found that the sample was representative for each component, with only small deviations of a few percentage points for some of the countries.

Independent individual-level variables

At the level of individuals, we focus on the association between the degree of outsidership in the labor market and working during unsocial hours. Following the recent dualization literature, we use a risk-based measure of defining insiders and outsiders (Schwander and Häusermann, 2013). Rather than analyzing whether someone is atypically employed or unemployed, we employed social class as a proxy for being at risk of atypical employment or unemployment. Similar to other studies, we used ISCO-08 to distinguish between occupations with high-general, low-general and specific skills (Chung, 2018; Fleckenstein, Saunders and Seeleib-Kaiser, 2011; Wiss, 2017).

High-general-skill occupations (managers, professionals, technicians and associate professionals) are considered insiders. Managers and professionals work in occupations that usually require high educational attainment and have skills that are highly portable between firms and industries. This group also includes technicians and associate professionals, who do not necessarily have tertiary-level education, but still have highly portable skills. Low-general-skill occupations include clerical support, service workers and elementary occupations, who also have portable skills but only lower educational attainment. Specific skill occupations (craft workers or machine operators, and assemblers) have low educational attainment and low portability of skills (Fleckenstein, Saunders and Seeleib-Kaiser, 2011). To simplify the analysis

¹ Various versions of composite scales measuring the intensity and number of types of unsocial work hours were also created and checked, but were unsuitable for further analysis due to the high incidence of those experiencing no work at unsocial hours and therefore the high skewedness of such scales.

and similar to Chung (2018), we grouped low-general-skill and specific skill occupations together into one low-skill outsider category.

Moreover, we controlled for two 'traditional' indicators of outsidership: working on a temporary instead of a permanent contract and working part-time instead of full-time. Dummies were included for each. Some have argued that part-time employment is not necessarily an indicator of outsidership, especially during certain stages of the life course (e.g., women combining work with family life) and when it is voluntary (Chung, 2018; Schwander and Häusermann, 2013). However, in this context, it is also important to control for the possibility that part-time work is a determinant of unsocial hours. It can be expected that certain groups, especially students, are more likely to work part-time jobs and especially in evenings and on weekends. As we included only those employed at the time of the survey, we automatically excluded a third group traditionally defined as outsiders, namely those who were unemployed.

Following related study designs by Chung (2018) and Wiss (2017) on family-friendly working-time arrangements, we added a series of control variables on the individual level, although the EU-LFS does not contain all the same indicators used in the European Working Conditions Survey. We included dummies for gender, being married and age group to control for sociodemographic characteristics. Age groups were divided into 15–29, 30–44, 45–54 and 55–64 years old. From a life-course perspective we expected those who are married and in the parenting ages of 30–44 to have the lowest incidence of unsocial work hours, while the youngest age group was expected to have the highest incidence (Presser and Ward, 2011). Controls for labor market factors include having a supervisory role, company size and sector of employment. Company size was divided into three categories: 1–10, 11–49 and 50+ staff. This classification was limited by the categories that the EU-LFS offers. We distinguished between eight sectors, using the sector with the lowest incidence of unsocial work hours (the financial and insurance sector) as the reference group. Summary statistics of the individual-level variables are provided in Table A1 in the Annex.

Finally, a dummy was included for having citizenship of the country of residence to control for the possibility that migrants are at higher risk of work at nonstandard hours. Although there have not been any studies on the direct relation between migrant status and nonstandard work schedules, previous research has shown that in some countries, such as the UK and Spain, foreign workers are a primary source of low-skilled labor supply (Oesch, 2011). Other

studies have shown that immigrant workers often experience poorer working conditions, although there are large differences between countries and migrant communities (Sterud et al., 2018).

Country-level variables

At the country level, to analyze variation in the extent to which deregulation and liberalization drive work at unsocial hours, we used the OECD indicator for economy-wide product market regulation (PMR) for 2013. PMR is a composite and comparative indicator measuring the degree to which policies across countries promote or inhibit competition in areas of the product market where competition is viable (OECD, 2018). PMR encompasses regulations in state control of business enterprises, legal and administrative barriers to entrepreneurship, and barriers to international trade and investment. The higher the PMR, the more regulated the product market can be considered.

A composite indicator for working-time regulation strictness was created with the use of the CBR Labour Regulation Index (Adams, Bishop and Deakin, 2016). In this database, for each country and each year there are seven items measuring the intensity of particular aspects of working time regulation: annual leave entitlements, public holiday entitlements, overtime premia, weekend working, limits to overtime working, duration of the normal working week and maximum daily working time. It incorporates regulations that are binding by law or collective agreement extension. Not all these items are directly related to unsocial working time, but taken together they may provide a reliable indication of the overall strictness of working-time regulation in each country. Each item is coded between 0 and 1, where 0 means that legislation is non-existent and 1 means maximum regulation. Averages of the seven items were multiplied by 100. Data for each country was taken from the last available year, i.e. 2013.

To measure the degree of protection against unsocial hours that trade unions and collective bargaining can offer, we included three different variables. We used data from the ICTWSS dataset 5.1 for the trade union density and the collective bargaining rates for the year 2013 or the latest year available (Visser, 2016). To identify working-time configurations, we used the Eurofound (2016) classification of working-time setting regimes for each country. In addition to the pure mandated (state plays a dominant role in regulating working-time standards)², negotiated (working-time regulations are the result of bargaining between employer and

² Represented by Bulgaria, Estonia, Hungary, Lithuania, Latvia, Poland, Romania and Slovenia.

employee organisations, mainly at a sector level)³ and unilateral (employer closes individual agreements with employees)⁴ regimes, Eurofound adds an adjusted mandated regime⁵ where government-imposed standards can be adjusted by collective bargaining at the sector, company or individual level. Summary statistics of the country-level variables are provided in Table A2 in the Annex.

Methods

We applied multilevel logistic regression models, also known as generalized linear mixed models, to estimate the effects of individual- and country-level factors on the risk of working unsocial hours. These models allow accounting for the impact of being nested within countries on individual-level outcomes. In the first step, we analyzed the fixed effects of the individual-level variables in the model with random intercepts. Although the main focus is on the composite dependent variable, we also analyzed each component of unsocial hours separately, the results of which can be found in the Annex.

Next, we checked whether the effects of dualization on the likelihood of working unsocial hours differed by country by allowing random slopes for the skill-level, contract-type and part-time employment variables. Finally, we added the country-level variables to analyze whether product market regulation and the various dimensions of collective bargaining can explain the cross-country variation in work at unsocial hours and interacted these variables with the random slope dualization variables to analyze how they affect the gap between insiders and outsiders. The `melogit` command for multilevel logistic regression in STATA 14 was used for the analysis.

³ Represented by Austria, Belgium, Cyprus, Germany, Denmark, Spain, Finland, Iceland, Italy, Luxembourg, the Netherlands, Norway and Sweden.

⁴ Represented by United Kingdom.

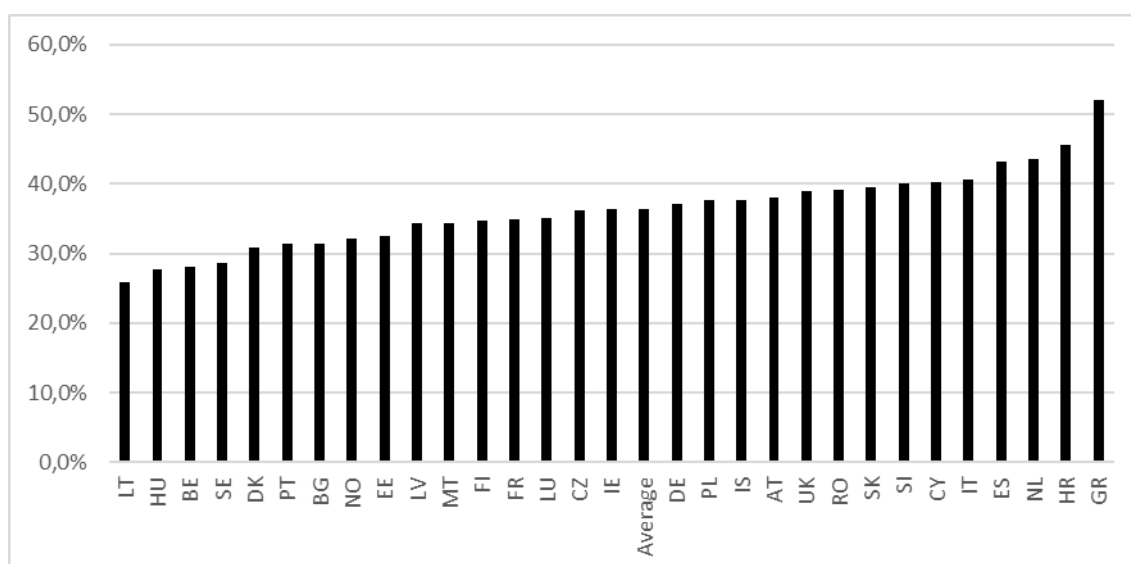
⁵ Represented by Czech Republic, France, Greece, Croatia, Ireland, Malta, Portugal and Slovakia.

Results

Descriptive results

Figure 1 shows the proportions of the study population who usually work at unsocial hours in each country. The percentages range widely from 25.8% in Lithuania up to 52.0% in Greece. The average across European countries is 36.4%. There are no clear divisions along the lines of traditional welfare-state or employment regimes, and most countries are concentrated quite closely around the European average. Among the Nordic countries, often considered to be uniform in having the most employee-friendly working-time arrangements, Sweden (28.6%), Denmark (30.9%) and Norway (32.1%) have relatively low incidence of unsocial work hours, while Finland (34.8%) and Iceland (37.7%) are closer to the average. Among the countries with the highest percentages of unsocial work hours are several Southern European countries, such as Greece (52.0%), Spain (43.2%), Italy (40.5%) and Cyprus (40.3%), but then again, Portugal is among the countries with the lowest rates with only 31.4%. The former communist EU new member states can be found among the countries with the highest rates (e.g., Croatia, 45.6%, and Slovenia, 40.2%) as well as those with the lowest rates (e.g., Lithuania, 25.8%, and Hungary, 27.7%).

Figure 1. Percentage of the study population working unsocial hours per country



Multilevel models

Table 1 shows the results of the multivariate multilevel logistic regression analysis with fixed slopes and random intercepts. Reported are odds ratios with standard errors for each covariate. The intra-class correlation (ICC) indicates that in the null model and the full model, 1.7% and 2.1%, respectively, of the unobserved variance in the propensity to work unsocial hours can be attributed to between-country variation. This means that individual characteristics have a substantially strong role in explaining the risk of working unsocial hours. The reduction in the -2 log likelihood in the full model (35,455.2) compared to the null model (39,165.2) indicates a statistically significant improvement in the model's fit.

Table 1. Nested logistic regression models explaining the risk of working unsocial hours across 30 European countries in 2016

		Model 1
Occupational level (ref: managers/professionals)	Low and specific skills occupations	2.660*** (0.032)
Contract status (ref: permanent)	Temporary contract	0.996 (0.042)
Working hours (ref: full-time)	Part-time	1.009 (0.039)
Gender (ref: male)	Female	0.855*** (0.029)
Age group (ref: 15-29)	30-44	0.697*** (0.039)
	45-54	0.708*** (0.043)
	55-64	0.595*** (0.047)
Marital status (ref: single or divorced)	Married	0.919** (0.029)
Nationality (ref: native)	Non-native	1.301*** (0.052)
Supervisory role (ref: not in supervisory role)	Supervisor	1.262*** (0.035)
Firm size (ref: 1-10 employees)	11-49 employees	1.121** (0.037)
	50+ employees	1.563*** (0.035)
Sector (ref: Business, finance and insurance)	Agriculture	1.434*** (0.097)
	Manufacturing and construction	1.054 (0.058)
	Wholesale and retail trade, hotels	3.184*** (0.059)

		Model 1
	Transport, storage and communication	1.670*** (0.066)
	Public administration and defense	0.918 (0.070)
	Education	0.721*** (0.075)
	Health and social services	3.402*** (0.063)
	Other services	2.412*** (0.076)
Intercept		0.210*** (0.086)
ICC empty model		0.017
ICC full model		0.021
-2 Log likelihood empty model		39,165.2
-2 Log likelihood full model		35,455.3
N observations	30,129	
N countries	30	

Notes: Model includes random intercepts and fixed slopes. Indicated are odds ratios (SE).

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The results confirm our expectation that workers with specific skills and low-general skills are at a substantially higher risk of working unsocial hours than those with high-general skills. Table A3 in the Annex shows that the effect of skill levels is consistent for each type of unsocial hours. However, we did not find evidence that those on fixed-term contracts, overall, are more likely to work unsocial hours than those with a permanent contract, although workers with fixed-term contracts were somewhat less likely to work shifts but more likely to work on Saturdays (Table A3). There was also no statistically significant association between being employed part-time and the likelihood of working unsocial hours, despite part-time work being negatively related to shift work and night work.

In addition, men are more likely to work unsocial hours, which contradicts claims that women are at a higher risk as a result of working low-skilled service jobs. Married persons are less likely to work unsocial hours. Work during unsocial hours is more common among especially the youngest workers, which was expected because of the greater probability of students working part-time side jobs and the greater flexibility in this phase of life. Immigrants, as anticipated, are at higher risk of unsocial work schedules. In addition, those in supervisory roles are more likely to work unsocial hours. Unsocial work hours are more common in larger firms than in smaller firms. These results are largely consistent for all components of unsocial

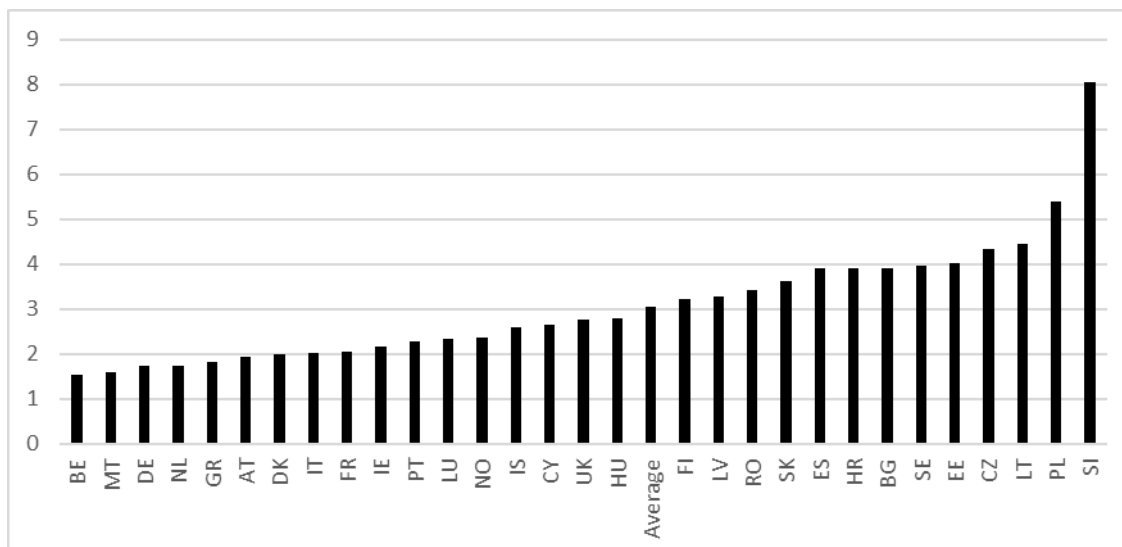
work (Table A3). As expected, we found unsocial work hours most common in particular sectors: the agriculture, commerce and hospitality, transportation, and health and social services sectors. There were some differences between sectors and the types of unsocial work hours. In agriculture, work on Sundays and Saturdays is especially common. In manufacturing, shift work is more common, but Sunday work is less likely to occur.

As the estimates for the associations between temporary and part-time employment with unsocial hours were not statistically significant in the fixed-slope models, we continued the analysis focusing on the occupational skill variable.⁶ In the next step, we introduced random slopes for the occupational skill variable. An ANOVA test comparing Model 1 with the random slopes model showed a statistically significant reduction in the -2 log likelihood ($F = 83.11$, $p < 0.001$), confirming that there are considerable differences between countries in the gap between those in low-skilled occupations and those in high-skilled occupations in the risk of working unsocial hours.

To illustrate the variance in this gap across countries, we ran logistic regression models for each country separately, including the same variables as in Model 1, and plotted the odds ratios of the low-skill dummy for each country in Figure 2. It shows that the risk of working unsocial hours is greater among lower-skilled workers than among higher-skilled workers in all countries, but that the gap is smallest in Belgium, Malta and Germany and largest in Lithuania, Poland and Slovenia. Again, there were no clear patterns along the lines of welfare-state or employment regimes, although the countries with above-average gaps are predominantly former communist EU new member states.

⁶ We tested for random slopes with the temporary and part-time work variables as well. For both models, the goodness-of-fit improved somewhat in terms of a small but statistically significant reduction in the -2 log likelihood, showing that there might be cross-national variance in the association of temporary and part-time work with unsocial hours. However, the estimates continued to be statistically insignificant when we controlled for the same factors as in Model 1.

Figure 2. Odds ratios of those in low and general skilled occupations and working unsocial hours, controlled for the same factors as in Model 1 (Table 1)



To identify the country-level factors that explain the prevalence of unsocial work hours and the gap between lower- and higher-skilled occupations, we included the country-level variables and their interaction terms with the random-slope skill variable in the models. Each country-level variable and its interaction with the random-slope skill variable were entered separately in the model, while all of the other individual-level variables with fixed slopes were kept as in Model 1 in Table 1. Table 2 reports the results of this analysis, showing only the estimates for the relevant covariates. The table shows that product market deregulation as such, in terms of a lower PMR, does not statistically significantly increase the risk of working unsocial hours for high-skilled workers, but that the gap in unsocial work hours between low- and high-skilled workers is larger in an economy with higher PMR (Model 2a). Regulation of working time does not have a statistically significant effect on the overall risk of working unsocial hours, yet has a small effect in closing the gap between low- and high-skilled workers (Model 2b). There is no significant effect of a country's union density on the overall risk of working unsocial hours or on the gap between low- and high-skilled workers (Model 2c). In addition, the coverage rate of collective bargaining does not reduce the risk of working unsocial hours as such, but higher coverage reduces the gap in working unsocial hours between low- and high-skilled workers somewhat (Model 2d).

Table 2. Multilevel models with interactions between low-skilled workers with country-level factors

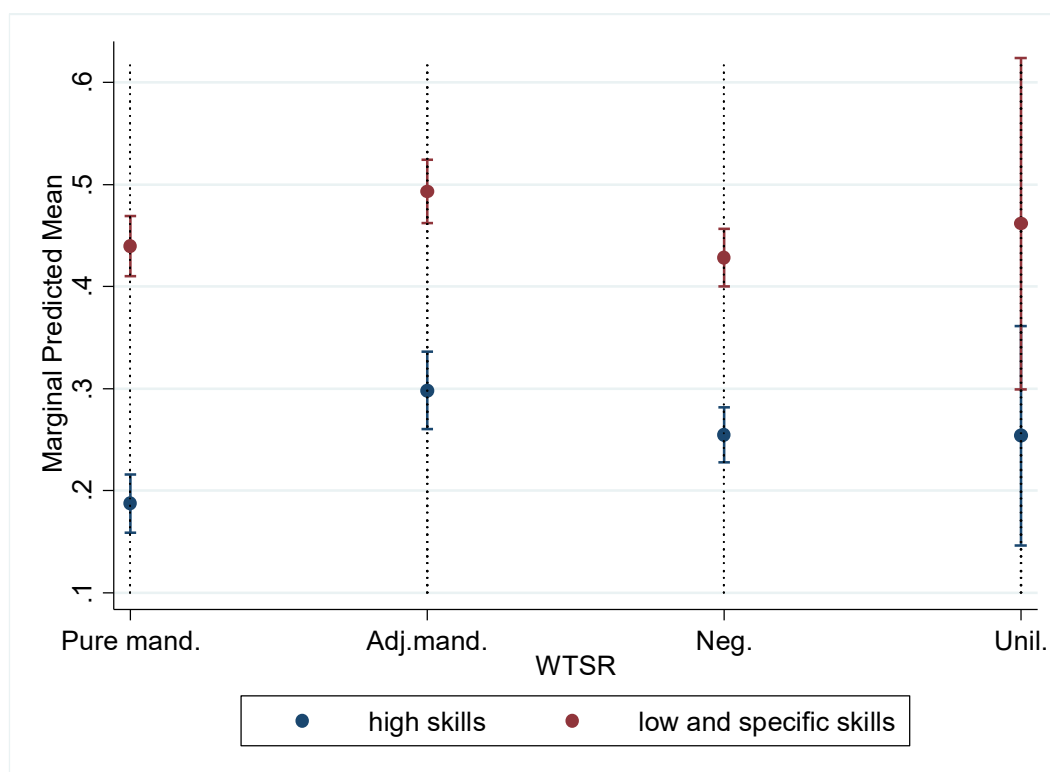
Model		2a	2b	2c	2d	2e
<i>Individual level variable</i>						
Low and general skill occupations		2.755*** (0.046)	2.652*** (0.052)	2.682*** (0.049)	2.728*** (0.045)	3.821*** (0.084)
<i>Country level variables</i>						
Product market regulation (PMR)		0.759 (0.243)				
Working-time regulation (WTR)			0.996 (0.004)			
Union density (UD)				1.000 (0.003)		
Collective bargaining coverage (CBC)					1.004 (0.002)	
Working-time setting regime (WTSR) (ref: Mandated)	Adjusted mandated					1.945*** (0.145)
	Negotiated					1.532** (0.129)
	Unilateral					1.524 (0.332)
<i>Interactions</i>						
Occupation * PMR		2.201*** (0.189)				
Occupation * WTR			0.988** (0.004)			
Occupation * UD				0.997 (0.002)		
Occupation * CBC					0.994*** (0.002)	
Occupation * WTSR	Adjusted mandated					0.655** (0.115)
	Negotiated					0.621*** (0.104)
	Unilateral					0.725 (0.265)
Intercept		0.214*** (0.087)	0.214*** (0.083)	0.207*** (0.087)	0.212*** (0.089)	0.146*** (0.123)
Variance level 2		0.101 (0.028)	0.081 (0.021)	0.110 (0.029)	0.109 (0.029)	0.088 (0.024)
Variance random slope		0.048 (0.015)	0.079 (0.022)	0.067 (0.018)	0.048 (0.014)	0.042 (0.013)
-2 Log likelihood		35,346.0	35,336.8	35,341.8	35,364.0	35,327.5

Notes: Model includes random intercepts, random slopes for the occupation variable and fixed slopes for all other variables. Models include all variables as in Model 1 in Table 1. WTR, PMR, UD and CBC have been mean-centered. Indicated are odds ratios (SE).

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

There are strong indications that the way working time is regulated has an impact on the risks of working unsocial hours (Model 2e). The association of working-time setting regime type with the risk of working unsocial hours among low- and high-skilled workers based on Model 2e are plotted in Figure 3. In countries where the involvement of social partners in the working-time regulation is stronger, that is, in the adjusted mandated and negotiated regimes, the risk of working unsocial hours among high-skilled workers is greater than in the mandated regime. However, the unsocial-hours gap between low- and high-skilled workers is smaller in countries that have greater involvement of trade unions and employers than in countries where working time is set mainly by the central government. In the adjusted mandated regime, this is due to the relatively high risk of unsocial hours among high-skilled workers as well. In the negotiated regime, the absolute risk of working unsocial hours among lower-skilled workers is lowest compared to the other regime types.

Figure 3. Predicted risk of working at unsocial hours for low-skilled and high-skilled workers in four working-time setting regimes (pure mandated, adjusted mandated, negotiated and unilateral)



Discussion

This study contributes to the existing literature by providing cross-national empirical evidence for the incidence and risks of working unsocial hours. The results show that there is no overall 24/7 economy or society in Europe, if the incidence of unsocial work hours is used as an indicator. We found large variations between countries. However, on average, more than one out of three of the employees in this study typically worked at unsocial hours, ranging from one out of four in Lithuania to one out of two in Greece. These proportions are relatively high, given the negative effects of unsocial hours on health and family lives that previous studies have found. However, the types of unsocial hours with potentially the strongest detrimental effects, shift and night work (Härmä and Kecklund, 2010; Harrington, 1994), were relatively uncommon, and other studies have shown that shift and night work have been declining in recent decades (Eurofound, 2015; Hamermesh, 1999). The most common forms of unsocial work hours were related to work in evenings and on Saturdays.

Within countries, we found great variation between various sociodemographic groups in the risk of working unsocial hours. As expected, unsocial hours were largely concentrated in particular sectors where unsocial hours have been traditionally and intrinsically part of the work around the clock, especially in shops, restaurants and hotels, and social- and healthcare (Henly, Shaefer and Waxman, 2006; Presser 2003; Presser, Gornick and Parashar, 2008). Shift work is more common in manufacturing and construction while agricultural workers are more likely to work Saturdays and Sundays. Although unsocial hours are especially common in low-skilled service jobs, the cross-national data confirmed that unsocial hours cannot be seen as a result of labor force feminization: In 2016, men were at higher risk of working unsocial hours (Glorieux, Mestdag and Minnen, 2008).

Married persons were less likely to work unsocial hours, while the risk of unsocial hours also decreased with age. This result suggests that the likelihood of working unsocial hours is closely connected to a certain life-course stage, that is, being younger and not having a family, while people with families are able to reduce the risks associated with work at unsocial hours (Presser, Gornick and Parashar, 2008; Presser and Ward, 2011). However, further research with longitudinal data is needed to confirm to what degree individuals working unsocial hours at younger age are able to change to standard work schedules at a later age.

Workers with a migrant background were at greater risk of work at unsocial hours than native workers. This is in line with studies that show that migrants are often labor market outsiders (Oesch, 2011) and experience poorer working conditions (Sterud et al. 2018). Yet, migrants are a heterogeneous group and European countries differ considerably in the sizes of their immigrant populations and the integration of migrants in their labor market. Therefore, further research is also needed among different groups of immigrants and on the role of varieties in immigration regimes in explaining work at unsocial hours.

We found that there are large socioeconomic inequalities in working unsocial hours. Using a risk-based conceptualization of insiders and outsiders (Fleckenstein, Saunders and Seeleib-Kaiser, 2011; Schwander and Häusermann, 2013), we showed that there was a substantial and consistent gap in the risk of working unsocial hours between workers with high-general skills and workers with low-general or specific skills. The findings indicated that other commonly used criteria for outsidership—having a fixed-term contract and working part-time—were not relevant predictors of working unsocial hours. These findings suggest that working unsocial hours is a structural and long-term risk for those with low skills, rather than just characteristic of certain jobs. The potentially negative effects of working unsocial hours might be reinforced by the other social and labor market risks that this group is exposed to, including poverty, job immobility and lower access to family-friendly working-time arrangements (Chung, 2018; Emmenegger et al., 2012).

The gap between insiders and outsiders differed across countries. Unlike previous studies that found labor market dualization is strongest in continental and southern European countries (Emmenegger et al., 2012; Schwander and Häusermann, 2013) and dualization in access to family-friendly working-time arrangements is strongest in countries with the most generous family policies, that is, continental and Nordic countries, the present findings suggest that the gap between insiders and outsiders in their risk of working unsocial hours was the largest in many of the EU new member states.

Analyzing country-level characteristics that could explain the incidence of and the skill gap in unsocial work hours, we found that greater deregulation of product markets does not automatically lead to a 24/7 economy. There was no statistically significant relation between the country-level PMR indicator and the propensity of working at nonstandard hours. However, the results showed that in countries with higher PMR the gap between low- and high-skilled workers was larger. One possible explanation is that higher PMR is prevalent in

countries with more static and traditional economic sectors, as well as more strictly regulated boundaries between professions, such as by licensure. The latter might lead to a greater gap between those with qualifications and certifications and those without, while the barriers to enter those regulated professions are more difficult to surpass. However, to our knowledge, the PMR indicator has not been tested in other empirical studies, and its accuracy and reliability are somewhat uncertain.

Stricter overall regulation of working hours did not significantly reduce the overall risk of working at unsocial hours in a country, but did reduce the gap between low- and high-skill workers. Therefore, the results suggest that stricter working-time regulation especially benefits the more vulnerable outsiders in the labor market. We found that stronger trade unions, as measured by union density rates, had no impact on the risk of working unsocial hours or on the gap between low- and high-skilled workers as such. In addition, the rate of collective bargaining coverage had no effect on the risk of working at unsocial hours. However, there was a small negative effect of the interaction between low-skilled occupations and the collective bargaining rate, suggesting that in countries where collective agreements between social partners have broader coverage, low-skilled workers are better protected against working at unsocial hours.

More important, however, appears to be the role of the country's working-time setting regime (Berg, Bosch and Charest, 2014; Eurofound, 2016). Although the risk of working unsocial hours was greater for high-skilled workers in economies where collective bargaining has a greater influence on working-time regulation, the gap between low- and high-skilled workers was greater in mandated regime than in the adjusted mandated and negotiated regimes. This means that collective bargaining in the negotiated regime in particular reduces social inequalities and lowers the risk of nonstandard working hours for low-skilled workers. This effect might be due to the greater power of employee organizations in the negotiation process, as well as the inclusion of employer organizations in finding solutions that employers are committed to implementing. This finding suggests that collective bargaining can reduce dualization and does not increase it, as some insider-outsider theories of dualization suggest (Lindbeck and Snower, 2001; Palier and Thelen, 2010).

The statistically significant interaction effects of PMR, working-time regulation, collective bargain coverage and working-time setting regime with the occupational skill variable are possibly related. A country with a more centrally regulated product market is also likely to

have a more centrally regulated labor market. The new EU member states, where the gap in unsocial work hours between low- and high-skilled workers was found to be the highest, generally have a weak tradition of collective bargaining but a history of strong government intervention in the market, despite deregulation during previous decades.

Stricter working-time regulation, may help in reducing inequalities, but our results suggest that the parties involved in regulating and the level of decision-making matter to a great extent. Central policy-makers can impose formal restrictions on bad working conditions but at the same time increase social inequalities if regulations are not properly implemented and monitored among the more vulnerable in the labor market. Given that insiders are often better politically organized and mobilized (Emmenegger et al., 2012; Schwander and Häusermann, 2013), politicians may have a greater interest in gaining the votes of these 'median voters' rather than caring about the outsiders. Therefore, policy-makers may be less inclined to put their weight behind implementation and monitoring of regulations that benefit outsiders the most.

However, if regulations result from negotiations between employers and employees, both parties might have a greater interest in ensuring that rules are applied and followed. Moreover, if negotiating working time takes place predominantly at the sector level, it can take into account differences in practices and needs that exist between sectors while finding suitable compensation for nonstandard work schedules, including higher pay, overtime premia or shorter work hours. When one-size-fits-all regulation is imposed without accounting for sectoral differences, such package deals might be more difficult to reach.

There were several limitations to this study. The EU-LFS data did not provide all of the same variables that related studies based on the European Working Conditions Survey included (Chung, 2018; Wiss, 2018). This reduces the possibility of comparing the present findings to those studies. However, EU-LFS provided a larger representative study sample, and some of the present central findings related to the importance of occupation skill levels are in line with those previous studies. Moreover, this study analyzed data for only one survey year, and it is not possible to draw conclusions about whether the incidence and causes of nonstandard work schedules have changed over the years. Although some studies have addressed trends in unsocial work hours (Eurofound, 2015; Anttila and Oinas, 2018; Glorieux, Mestdag, and Minnen, 2008; Ojala and Pyöriä, 2015), more research is needed on the possible changes

across countries and socioeconomic groups and the role that a broader range of country-level factors might play.

Given the wide occurrence yet far-reaching negative effects, it is somewhat surprising that the regulation of nonstandard work schedules is not higher on the political agendas in the EU and its member states. The present study results suggest, however, that top-down imposed legislation does not necessarily have the desired effect of reducing the incidence of unsocial work hours across society. Any effective strategy for addressing this issue must involve effective employee organizations, as well as the active engagement and commitment of employers.

Furthermore, as unsocial working hours are unlikely to be completely eradicated, solutions should also be sought in health and family policies to address negative outcomes. For example, access to occupational healthcare and greater control over one's own working-time arrangements could contribute to lower the risks of accidents and adverse health effects (Nätti et al., 2014), while flexible access to childcare arrangements might offer possibilities to reduce tensions between work- and family lives. Finally, a job with unsocial work hours can suit someone in a certain phase of life (e.g. a young person with no children) or might serve as a stepping-stone to a job with more standard work hours. In order for it not to be a dead-end street in one's working life, policies should aim at enabling skill-upgrading and occupational mobility.

Literature

- Adams Z, Bishop L and Deakin S (2016) *CBR Labour Regulation Index (Dataset of 117 Countries)*. Cambridge: Centre for Business Research.
- Anttila T and Oinas T (2018) 24/7 Society – The new timing of work? In: Tammelin M (ed) *Family, Work and Well-Being*. Berlin: Springer, pp. 63-76.
- Berg P, Bosch G and Charest J (2014) Working-time configurations: a framework for analyzing diversity across countries. *Industrial & Labor Relations Review* 67(3): 805-837.
- Chung H (2018) Dualization and the access to occupational family-friendly working-time arrangements across Europe. *Social Policy & Administration* 52(2): 491-507.
- Chung H and Tijdens K (2013) Working time flexibility components and working time regimes in Europe: using company-level data across 21 countries. *The International Journal of Human Resource Management* 24(7): 1418-1434.
- Davis KD, Benjamin Goodman W, Pirretti AE and Almeida DM (2008) Nonstandard work schedules, perceived family well-being, and daily stressors. *Journal of Marriage and Family*, 70(4): 991-1003.
- Emmenegger P, Häusermann S, Palier B and Seeleib-Kaiser M (eds) (2012) *The Age of Dualization. The Changing Face of Inequality in Deindustrializing Societies*. Oxford: Oxford University Press.
- Eurofound (2015) *Developments in Working Life in Europe: EurWORK Annual Review*. Dublin: Eurofound.
- Eurofound (2016) *Working Time Developments in the 21st Century: Work Duration and its Regulation in the EU*. Luxembourg: Publications Office of the European Union.
- Fleckenstein T, Saunders AM and Seeleib-Kaiser M (2011) The dual transformation of social protection and human capital: comparing Britain and Germany. *Comparative Political Studies* 44(12): 1622-1650.

- Glorieux I, Mestdag I, and Minnen J (2008) The coming of the 24-hour economy? Changing work schedules in Belgium between 1966 and 1999. *Time & Society* 17(1): 63-83.
- Goos M and Manning A (2007) Lousy and lovely jobs: the rising polarization of work in Britain. *Review of Economics and Statistics* 89(1): 118-133.
- Hamermesh DS (1999) The timing of work over time. *The Economic Journal* 109(452): 37-66.
- Härmä M and Kecklund G (2010) Shift work and health - How to proceed? *Scandinavian Journal of Work, Environment and Health* 36(2): 81-84.
- Harrington JM (1994) Shift work and health--a critical review of the literature on working hours. *Annals of the Academy of Medicine, Singapore* 23(5): 699-705.
- Henly JR, Shaefer HL and Waxman E (2006) Non-standard work schedules: employer- and Employee-driven flexibility in retail jobs. *Social Service Review* 80(4): 609-634.
- Joshi P and Bogen K (2007) Nonstandard schedules and young children's behavioral outcomes among working low-income families. *Journal of Marriage and Family* 69(1): 139-156.
- Kalleberg AL, Reskin BF and Hudson K (2000) Bad jobs in America: standard and nonstandard employment relations and job quality in the United States. *American Sociological Review* 65(2): 256-278.
- Lindbeck A and Snower DJ (2001) Insiders versus outsiders. *Journal of Economic Perspectives* 15(1): 165-188.
- Mills M and Täht K (2010) Nonstandard work schedules and partnership quality: quantitative and qualitative findings. *Journal of Marriage and Family* 72(4): 860-875.
- Nätti J, Oinas T, Härmä M, Anttila T and Kandolin I (2014) Combined effects of shift work and individual working time control on long-term sickness absence. A prospective study of Finnish employees. *Journal of Occupational and Environmental Medicine* 56(7): 732-738.
- OECD (2018) Economy-wide regulation. *OECD Product Market Regulation Statistics* (database), <http://dx.doi.org/10.1787/data-00593-en> (accessed on 13 April 2018).

- Oesch D and Menés JR (2011) Upgrading and polarization? Occupational change in Britain, Germany, Spain and Switzerland, 1990-2008. *Socio-Economic Review* 9: 503-531.
- Ojala S and Pyöriä P (2015) Working around the Clock? The Time and Location of Paid Work in Finland, 1979–2010. *Electronic International Journal of Time Use Research* 12(1): 73-96.
- Palier B and Thelen K (2010) Institutionalizing dualism: complementarities and change in France and Germany. *Politics & Society* 38(1): 119-148.
- Pickering TG (2006) Could hypertension be a consequence of the 24/7 society? The effects of sleep deprivation and shift work. *The Journal of Clinical Hypertension* 8(11): 819-822.
- Presser HB (2003) Working in a 24/7 Economy. *Challenges for American Families*. New York: Russell Sage Foundation.
- Presser HB, Gornick JC and Parashar S (2008) Gender and nonstandard work hours in 12 European countries. *Monthly Labor Review* 131(2): 83-103.
- Presser HB and Ward BW (2011) Nonstandard work schedules over the life course: a first look. *Monthly Labor Review* 134(7): 3-16.
- Saint-Paul G (1996) Exploring the political economy of labour market institutions. *Economic Policy* 23: 265-315.
- Schwander H and Häusermann S (2013) Who is in and who is out? A risk-based conceptualization of insiders and outsiders. *Journal of European Social Policy* 23(3): 248-269.
- Sterud T, Tynes T, Sivesind Mehlum I, Veiersted KB, Bergbom B, Airila A, Johansson B, Brendler-Lindqvist M, Hviid K and Flyvholm M.-A. (2018) A systematic review of working conditions and occupational health among immigrants in Europe and Canada. *BMC Public Health* 18: 770.
- Strazdins L, Clements MS, Korda RJ, Broom DH and D'Souza RM (2006) Unsociable work? Nonstandard work schedules, family relationships, and children's well-being. *Journal of Marriage and Family* 68(2): 394-410.

Visser J (2016) *ICTWSS Data base, version 5.1*. Amsterdam: Amsterdam Institute for Advanced Labour Studies (AIAS), University of Amsterdam. September 2016.

Wight VR, Raley SB and Bianchi SM (2008) Time for children, one's spouse and oneself among parents who work nonstandard hours. *Social Forces* 87(1): 243-271.

Wiss T (2017) Paths towards family-friendly working time arrangements: comparing workplaces in different countries and industries. *Social Policy & Administration* 51(7): 1406-1430.

Annex

Table 3. Summary statistics of individual-level variables

Occupational level	Low and specific skills occupations	60.0%
Contract status	Temporary contract	11.9%
Working hours	Part-time	16.1%
Gender	Female	49.9%
Age group	15-29	18.3%
	30-44	36.4%
	45-54	27.7%
	55-64	17.7%
Marital status	Married	55.5%
Nationality	Non-native	7.1%
Supervisory role	Supervisor	20.9%
Firm size	1-10 employees	22.6%
	11-49 employees	28.9%
	50+ employees	48.5%
Sector	Agriculture	2.3%
	Manufacturing and construction	25.9%
	Wholesale and retail trade, hotels	19.4%
	Transport, storage and communication	9.3%
	Finance and insurance	7.0%
	Public administration and defense	9.1%
	Education	10.2%
	Health and social services	12.0%
	Other services	4.9%
		N

Table 4. Summary statistics of country-level variables

	Min.	Max.	Mean	SD
Product market regulation (PMR)	0.92	2.08	1.44	0.22
Working-time regulation (WTR)	21.86	77.71	56.94	12.93
Union density rate (UD)	6.53	80.71	30.70	21.34
Collective bargaining coverage rate (CBC)	9.89	98.00	57.09	28.17
N countries = 30				

Table 5. Nested logistic regression models explaining the risk of working various forms of unsocial hours across 30 European countries in 2016

		Shift work	Evening work	Night work	Saturday work	Sunday work
Occupational level (ref: managers/professionals)	Low and specific skills occupations	3.022*** (0.039)	2.033*** (0.043)	2.551*** (0.063)	2.378*** (0.038)	2.229*** (0.045)
Contract status (ref: permanent)	Temporary contract	0.866** (0.049)	0.919 (0.054)	0.921 (0.083)	1.124* (0.048)	1.084 (0.056)
Working hours (ref: full-time)	Part-time	0.814*** (0.048)	1.063 (0.049)	0.719*** (0.083)	0.956 (0.044)	0.996 (0.051)
Gender (ref: male)	Female	0.958 (0.034)	0.765*** (0.038)	0.523*** (0.058)	0.842*** (0.034)	0.756*** (0.040)
Age group (ref: 15-29)	30-44	0.774*** (0.045)	0.711*** (0.050)	0.840* (0.075)	0.741*** (0.045)	0.679*** (0.053)
	45-54	0.719*** (0.049)	0.722*** (0.055)	0.907 (0.080)	0.775*** (0.050)	0.729*** (0.058)
	55-64	0.594*** (0.056)	0.652*** (0.061)	0.797* (0.090)	0.691*** (0.055)	0.693*** (0.064)
Marital status (ref: single or divorced)	Married	0.913** (0.034)	0.908* (0.039)	0.968 (0.056)	0.946 (0.035)	0.968 (0.041)
Nationality (ref: native)	Non-native	1.025 (0.063)	1.187* (0.067)	1.311** (0.097)	1.362*** (0.057)	1.267*** (0.067)
Supervisory role (ref: not in supervisory role)	Supervisor	1.100* (0.042)	1.166*** (0.047)	1.044 (0.069)	1.300*** (0.042)	1.279*** (0.049)
Firm size (ref: 1-10 employees)	11-49 employees	1.655*** (0.046)	1.198*** (0.050)	1.364*** (0.082)	0.925 (0.042)	1.201*** (0.052)
	50+ employees	2.892*** (0.044)	1.593*** (0.047)	2.046*** (0.075)	1.007 (0.040)	1.492*** (0.049)
Sector (ref: Business, finance and insurance)	Agriculture	0.730* (0.131)	1.084 (0.136)	1.061 (0.192)	2.460*** (0.112)	2.126*** (0.131)
	Manufacturing and construction	1.187* (0.071)	0.917 (0.080)	1.018 (0.116)	0.889 (0.076)	0.681*** (0.093)
	Wholesale and retail trade, hotels	2.217*** (0.072)	1.928*** (0.079)	0.815 (0.126)	4.005*** (0.073)	2.468*** (0.088)
	Transport, storage and communication	1.559*** (0.080)	1.456*** (0.089)	1.754*** (0.124)	1.890*** (0.083)	1.670*** (0.098)
	Public administration and defense	1.095 (0.084)	0.872 (0.098)	1.453** (0.132)	1.045 (0.091)	1.305* (0.104)
Education	0.247*** (0.124)	0.832 (0.103)	0.209*** (0.255)	0.734** (0.101)	0.685*** (0.123)	
Health and social services	4.502*** (0.075)	2.506*** (0.084)	3.717*** (0.121)	3.346*** (0.079)	4.358*** (0.091)	
Other services	1.204 (0.103)	1.472*** (0.106)	0.997 (0.180)	3.061*** (0.091)	2.164*** (0.111)	

The 24/7 economy and work during unsocial hours in Europe

		Shift work	Evening work	Night work	Saturday work	Sunday work
Intercept		0.059*** (0.135)	0.084*** (0.136)	0.025*** (0.167)	0.101*** (0.122)	0.055*** (0.135)
ICC		0.088	0.079	0.059	0.062	0.060
-2 Log likelihood		27,386.4	23,188.0	12.619.4	27,132.6	20,892.8
N observations	30,129					
N countries	30					

Notes: Model includes random intercepts and fixed slopes. Indicated are odds ratios (SE). ***

p < 0.001, ** p < 0.01, * p < 0.05