The Last Working Time Reduction

Lessons from the statutory working time reductions in Sweden and Norway 1969-1980

by

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Abstract. Statutory standard weekly working time reductions (SWRs) have been associated with a number of positive effects. Some of which include work-sharing, increased gender equality, and fewer workplace injuries. This paper exploits the timing of the introduction of the SWRs to the 40-hour workweek in Sweden (1973) and Norway (1977) to estimate effects on hours worked, employment, female employment, wage growth, and workplace injuries. Panel fixed effects estimates indicate that a SWR of 2.5 hours is associated with a fall in actual hours worked per week by 1 hour. Neither difference in differences nor panel fixed effects estimates yield any employment effect. The introduction of the 40-hour SWRs is associated with a 0.05 percentage points reduction of wage growth. No relationship between SWRs and female employment or the rate of workplace injuries is found.

Keywords: statutory working time reduction, employment, work sharing, gender equality, workplace injuries.

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Introduction

At the height of the Great Depression, John Maynard Keynes (2010) wrote an essay titled "Economic Possibilities for our Grandchildren". He predicted that, within a hundred years, productivity would allow us to work only fifteen hours a week. But Keynes' vision is not within sight. Working hours in many advanced economies have barely fallen since the 1980s (Boppart and Krusell, 2020), despite relatively stable productivity increases. Today, instead of exploring how rapid technological improvement can enable more free time, the public has been more concerned with its impact on employment.

Some argue that rapid technological improvement, manifested as automation, is a systemic threat to employment (Brynjolfsson and McAfee, 2014; Frey and Osborne, 2017) while others phrase it as what may be "the greatest challenge of our time" (Ford, 2015). But even if there is significant disagreement as to the extent of the challenge (Winick, 2018), assessing policy responses before we know which predictions turned out to be correct is important. If technological unemployment indeed becomes a structural problem, then public discontent and other, unforeseeable, issues may burgeon.

This has prompted some to propose further statutory standard working time reductions (SWRs) as a policy to counter this looming threat. The idea is simple. By reducing the standard weekly working hour, those who are unemployed will be able to share the existing jobs with currently employed. But SWR's with the explicit intent of creating employment opportunities, so-called "work-sharing reforms", were exceptions. Historically, other arguments were more often used to justify these reforms such as increased quality of life, a more equal division of work in the household and improved health. This paper approaches SWRs from both perspectives by assessing the employment effects, relevant for contemporary policy discussions, as well as some of the claims that were used in the past to support SWRs.

This paper exploits the timing of the introduction of the 40-hour statutory standard weekly working time in Sweden (1970-1973) and Norway (1977) and the historically rooted similarities of the two countries to answer the following questions:

- How much did weekly working time fall after the SWRs from 42.5 hours to 40 hours in Sweden and Norway?
- Did the SWRs impact employment, female employment and the rate of workplace injuries?

Given the endogeneity problems in evaluating the effects of a SWR on a macroeconomic variable such as employment, previous studies have relied on microeconomic data extrapolated to the whole economy. Furthermore, comparative studies on the impact of working hours are scarce because of difficulties in comparing data across countries that define and measure employment, working hours and other variables of interest in different ways.

Thus, this paper contributes to the literature in three key respects. First, it innovates the use of difference-in-differences identification methods by applying it to two culturally, historically and economically integrated countries, comparable to US states. This approach may be more widely applicable. Second, it assesses the evidence for important claims regarding the effects of working time reductions. In particular, it assesses the effects of SWRs on employment during economic shocks (OPEC I, OPEC II) for small and closed economies. It also assesses claims regarding the impact on female employment and workplace injuries which were central arguments used in favour of the SWRs at the time. To the best of my knowledge, this has not been done before.

This paper is organized as follows. The next section provides a comparative historical overview of the development of the regulation of working hours in Sweden and Norway. This is followed by a review of existing literature. The theory section aims to outline the theoretical conditions under which working time reductions could yield positive employment effects by considering the net effect on labour demand and the firm's alternative to hiring new employees in response to increased labour demand. The analysis is then extended to analyse the asymmetric effects of SWRs on labour demand in the traded, non-traded and public sectors assuming either SWRs with wage compensation or without wage compensation. The methods section explains how difference in differences estimates solve omitted variable biases and presents the regression equations estimated in the empirical section. Results are presented and discussed in terms of internal and external validity. Lastly, by analysing changes of the exogenous parameters influencing the impact of SWRs on employment, the paper concludes that it is much less likely that SWRs could increase employment today than in the 1970s.

Background

Prior to the industrial revolution, life mainly revolved around producing goods to ensure our most basic material needs. This changed with the advent of new technology, fossil fuels and global trade - all of which paved the way for the Great Divergence. However, new technology, increasing trade and the structural transformation that followed was not was not welcomed by all.

The Luddites rose to fame because of their opposition to new technology. They made their first appearance in the English Midlands in 1811, protesting, attacking machines and threatening manufacturers in order to stop the manufacturers' use of certain machines (Binfield, 2004). They did so because they perceived these machines as a threat to their livelihood. Even though automation has had similar effects on workers today, the world is yet to see neo-Luddites en masse. However, some scholars warn that an alarming number of occupations can be readily automated soon (see Brynjolfsson and McAfee, 2014; Frey and Osborne, 2017). If automation creates fewer employment opportunities than it takes away, then economists and policymakers ought to prepare solutions to solve this problem.

Unemployment is a highly pertinent problem on both a societal and an individual level. The harms of unemployment are well documented in terms of significantly lower incomes (Davis and Wachter, 2011) and negative impacts on mental health (see Reichert and Tauchmann, 2011; Black and Salvanes, 2015). With a higher proportion of unemployed, the number of taxpayers decreases. This may be perceived as unfair for the working and tax-paying majority. Thus, high unemployment has strong political ramifications. To this end, statutory standard weekly working time reductions (SWRs) have been proposed as a remedy (SOU, 1996, p.52). In particular, this idea has often been raised during recessions with high unemployment. The idea has been that if some work less, then some of the unemployed can fill this gap. Thus, these types of SWRs have often been referred to as "work-sharing reforms".

In order to put the SWRs of the 1970s into perspective, it can be useful to be aware of the historic path of working time legislation. The comparison between Sweden and Norway is also important because parts of the empirical analysis in this paper relies on the assumption that Sweden and Norway had very similar economic structure and labour policies at the time. The following comparative analysis will show that working time regulation occurred in tandem throughout the majority of the 20th century while more quantitative comparisons will be made in the data section.

Working time reductions in Sweden

In 1856, the first statutory standard weekly worktime reduction (SWR) was proposed and dismissed by the Swedish parliament. Radical for its time, it proposed a maximum daily working time to 12 hours for adults and 8 hours for youth under 16 (SOU, 1968, p.18). It was not until after the Russian revolution that the first successful statutory maximum standard weekly working time was implemented in the Nordic countries.

The threat of a socialist revolution in Sweden was real, prompting the government at the time to pass several bills to mollify the vehement working class. Labour union membership had grown rapidly during this period, going from 17 per cent in 1910 to 38 per cent in 1920 while the share of national income going to the capital relative to labour reached the highest peak in modern Swedish history (Bengtsson and Molinder, 2016). Thus, it came to no surprise that talks of revolution had been around within left circles in Sweden in 1918, prompting the social-democratic and liberal coalition government to expedite an investigation of regulation of working hours (SOU, 1968). During fall 1919, a revised version of the commission law proposal was passed, setting the maximum working day to 8 hours for workers in industry and services, effective from January 1920 (SOU, 1968).

Following the second world war, reducing standard working hours became a political priority. Statutory standard working time in Sweden was reduced from 48 hours to 45 hours in 1958, and in 1969 the maximum standard weekly working time was 42.5 hours (SOU, 1968). The legislation was flexible in that it could be replaced by agreements between recognized labour unions and employer organizations, an essential characteristic of the so-called "Swedish model". The last working time reduction from 42.5 hour to the 40 hour workweek followed almost immediately after the 1969 reform (SOU, 1976).

Working time reductions in Norway

The development of working time legislation in Norway followed a similar path. Development of working hour regulation occurred alongside the growth of the labour union movements (NOU, 2016). As in Sweden, this period was characterized by social unrest, prompting the Norwegian government to legislate the standard workday to eight hours, albeit only for a limited proportion of the labour force (Byrkjeland, 2006 cited in NOU, 2016, p.49).

The 1919 working time legislation was largely unchanged for the 40 years that followed until a new comprehensive worktime reform introduced in Norway in 1958 (NOU, 2016). The statutory standard weekly worktime was first reducedto 45 hours in 1958 and then to 42.5 hours in 1968 (NOU, 2016). Similar to Sweden, labour unions and employer organisations in Norway were allowed to overrule the legislation through union contracts (NOU, 2016). Up until this point, reforms of the statutory working hours in Sweden and Norway had almost been identical in terms of timing and content. However, the Norwegian 40-hour workweek was introduced in 1977 (NOU, 2016), four years after Sweden had done so. As in Sweden, this law now encompassed virtually all occupations, with a few exceptions, including agricultural workers, service industry workers and public servants (NOU, 2016). Furthermore, the 1977 SWR in Norway was part of a comprehensive reform of labour protections in Norway, seeking to improve the worker's safety and working conditions. This impacts the empirical estimates of this paper because it means that the estimates of the impact of the 40-hour SWR can't be disentangled from the effects of the other laws that were introduced at the same time.

Sweden and Norway as false twins

Once one understands the extent of Sweden's and Norway's historic, cultural and economic integration, the similarity in labour legislation comes as no surprise. As a corollary of the Napoleonic wars, Norway was forced into a union with Sweden between 1814 and 1905, sharing both flag, monarch and foreign policy (Helmfrid et al., 2020). The integration of the Scandinavian countries was an important part of a movement called 'Scandinavianism', the advocacy of an integrated region composed of Sweden, Norway and Denmark (Britannica, 2020). Given the economic, cultural and political similarities of the countries, a pan-Scandinavian monetary union was formed in 1873 (Jonung, 2003). Even though the union was disbanded after the first world war, the currencies in the three countries are all referred to as "krona".

These long-standing historic and economic ties were formalized in a 1954 protocol between Sweden, Denmark, Norway and Finland, allowing citizens of all the Nordic countries to freely work and settle down in any other Nordic country without any need for passport nor work permit (Nordiska rådet, 2019). Economic and political reforms were often introduced in tandem throughout the 20th century. Norway introduced three weeks of annual paid leave in 1947 and four weeks in 1966 (Gisle, 2018). Sweden introduced the same policies in 1951 and 1963 (LO, 2016). Wages were also similar.

Average real wages in Norwegian kronor (2011 base year) for the time period 1969-1980 were 1.54 and 1.58 for Norway and Sweden, respectively. Employment growth in manufacturing (ISIC 2-4), construction (ISIC 5) and government (ISIC 9) all follow similar trends for Norway and Sweden, see appendix B figure 2-4. This is particularly important given those three industry categories employed an overwhelming majority of workers in Sweden and Norway at the time. Even though the economies at large were similar, there were still major differences as will be elaborated on in the data section. This paper posits that the agricultural, forestry and fishery industry category (ISIC 1) in Sweden and Norway are similar enough for difference in difference (DD) identification. The type of production, level of technology and type of workers in this sector is deemed to be similar enough to justify this method and the assumptions required for DD identification seems to be satisfied, see method figure 3 and figure 4.

How were working time reductions justified?

In the past, work time reductions were motivated by a plethora of arguments. Key arguments in the past have been relating to the welfare-enhancing aspects of SWRs or the productivity-increasing effects of SWRs. Other motivations for SWRs have been characterized by more egalitarian concerns in that such reforms would reduce the differences between classes or that it could make the division of the unpaid household work more even between men and women (SOU, 2002, p.11).

The 1973 SWR in Sweden was mainly justified as a welfare-enhancing reform (SOU, 1996). Specifically, it was argued that the gains of increasing productivity should be exploited to decrease working hours rather than increasing income because people, generally, preferred more leisure above higher consumption. Boppart and Krusell (2020) argue that this is a result of the income effect dominating the substitution effect of increased hourly wages, i.e. that the marginal utility of additional income was lower than the marginal utility of additional leisure. Björnhaug (1985, p.40) emphasize that such accounts fail to acknowledge the political movements that underpinned these reforms, objecting to the notion that reductions in working hours came about naturally as a result of increases in productivity and wages.

The idea that SWRs could constitute work-sharing reforms did only appear in Sweden after the 1980s. Because of its relevance to contemporary policy discussions, this was chosen as the main focal point of this paper. This paper first estimates the extent to which actual working hours fall following SWRs. It also investigates how

wages were correlated with SWRs because the expected impact of SWRs differ significantly if they are introduced with or without wage compensation. The reason for this is because the primary mechanism by which SWRs influence employment is through its impact on unit production costs, of which wages is an essential part. Other important factors include productivity and capital utilisation as will be elaborated on in the theory section.

SWRs were also seen as potential tools for promoting gender equality during the 70s (SOU, 2002, p.11). At the time, men were the main breadwinners for households, working full time. This also means that they were predominantly affected by SWRs. When women entered the workforce, many of them worked part-time but female workforce participation was still not close to that of men. If the length of full-time working hours was a deterring factor for entering the workforce, then a reduction of the definition of full-time may have prompted more women to choose to seek employment. Higher rates of female employment can be interpreted as a step towards increased gender equality. With income, the economic reliance on the man diminishes and the woman has more freedom to choose between various paths in her life. Thus, this paper also investigates whether the 40-hour SWRs had any effects on female employment.

Another common argument was that SWRs would improve workers' health. Thus, this paper also examines the extent that workplace injuries were affected by SWRs. The idea was that the more tired a worker was, the greater the risk of injury was. The official governmental report (SOU) from 1964 argues that the 1958 SWR reduced workplace-leave rates (sickness, injuries and personal reasons included) (SOU, 1964, p.160). However, when the official government report from 1968 studied workplace injuries specifically, no such reduction was found (SOU, 1968, p.85). So although some measures of workers' health seemed to be affected, no evidence suggests that this was true for workplace injuries. Despite this, the claim that SWRs would reduce workplace injuries was frequently used in public discussions leading up to the SWRs of the 1970s. Thus, this paper investigates whether there was a relationship between SWRs and workplace injuries.

Existing literature on SWRs internationally

The assumption behind worktime reductions as a work-sharing reform is that employers would need to employ more people to produce the same output. That is, the firm is theorized to compensate the labour-hours lost due to the statutory worktime reduction by hiring more workers which assume fixed output levels and fixed

labour hours per unit of output. However, much of the recent empirical literature has failed to find positive effects on employment (Hunt, 1999; Skuterud, 2007; Estevão et al., 2008; Chemin and Wasmer, 2009). The primary mechanism explaining this lack of positive employment effect has been argued to be an increase in real wages. Thus, the focus of many studies has been to evaluate real wage effects of worktime reductions, general or partial, affects real wages.

Hunt (1999) uses cross-industry variation in the reduction of standard hours in West Germany in 1985 to explore the wage-effects of worktime reductions. She finds that the worktime reductions were deliberately tied to real wage increases, compensating the hours of lost income, as was also a claim made by unions promoting these reforms. Consequently, she hypothesizes that "Germany's work-sharing experiment has thus allowed those who remained employed to enjoy lower hours at a higher hourly wage, but likely at the price of lower overall employment" (Hunt, 1999, p.145). Similarly, Cahuc and Zylberberg (2008) focus on wages in their theoretical analysis of the effects of a SWR. They conclude that a model of a perfectly competitive market suggests that, at best, there is a net-zero effect on employment, and that a SWR may even have negative effects on employment. Furthermore, they elaborate on household-centred (supply side) mechanisms that could explain why employment could increase as a result of a SWR. They argue that loss of income for a household member induces currently inactive members to try to find a job – an effect that has been observed before (Chiappori, 1992; Blundell and Macurdy, 1999). However, it is unclear to what extent these empirical results found by Hunt (1998) and the theoretical results presented by Cauhuc and Zylberberg (2006) would hold in the Swedish-Norwegian setting characterized by strong labour unions and heavily regulated markets.

A number of empirical papers have tried to estimate the effects of SWRs explicitly aimed at reducing unemployment. Skuterud (2007) investigates the effects of the 1997-2000 reduction in standard workweek from 44 to 40 hours in Quebec without finding evidence for positive employment effects of the SWR. This result is particularly notable because the policy did not mandate full wage compensation, as many other reforms indeed have. He finds only weakly significant effects of the SWR on the reduction in actual working hours for men, and insignificant, close-to-zero estimates for women. Chemin and Wasmer (2009) study the effects of the French SWR from 39-hours to 35-hours by exploiting historically rooted legislative differences in Alsace-Moselle. Their probit difference in differences specification, looking at the individual probability of employment, yield no significant effects on the likelihood of

employment for the affected industries.

In sum, neither of the two most empirically robust studies conducted have found that SWR leads to increased employment. However, there is an inherent complexity in terms of the number of co-dependent variables that together impact employment. Furthermore, the economies of Sweden and Norway were radically different in the 1970s in terms of economic structure, business cycle and the exposure to global trade and capital flows compared to the aforementioned studies. Thus, these results may not be directly extrapolated without further analysis.

Existing literature on SWRs in Sweden

The economic literature on SWR in Sweden is surprisingly sparse. Bengtsson and Molinder (2016) has studied the effects of the working day reduction from 10 to 8 hours with wage compensation in 1920 finding no significant employment effects in the non-traded industry whilst finding negative employment effects in the traded industry. They theorize that this was due to the non-traded services industries being very labour intensive by nature with a low degree of substitutability with capital so that employment could remain constant. Also, the non-traded industries were in a better position to pass on the real wage increases to consumers. However, as the traded sector faced higher levels of competition, the employment effects were found to be negative.

Anxo (1988) analyses the short-run effects of a statutory reduction of working time on employment in the context of a general recession. He employs a microeconomic framework using data on labour productivity in Swedish manufacturing industries and several production function specifications to conclude that SWRs do not lead to significant increases in productivity. Furthermore, using a comprehensive microeconomic analysis, he concludes that there may be positive employment effects on the micro-level while macro-level employment effects are likely negative as positive employment effects require significant efforts in order to ameliorate the cost-increasing effects of a SWR (Anxo, 1988, p.203).

Several official government commissions have been delegated to assess the effect and desirability of further SWRs. As Sweden decided to implement 45-hours statutory standard average weekly working time (from the previous 48 hours), a commission headed by Yngve Åberg was delegated to evaluate the effects of this SWR (SOU, 1964, 1968). Although their focus was not primarily the work-sharing effects of the SWR, they found that employment in-

creased during the period 1957-1958 and that "no evidence contradicts the idea that the SWR contributed to this increase" (SOU, 1964, p.170). They also suggest that this was driven by a positive business cycle wherein labour demand in industrial production was very high, thus causing the reduction in working hours to lead to more workers being employed to compensate for the labour hours lost (SOU, 1964, p.167).

The official government report SOU (1976:34) approached the employment effect from a production point of view. How many labour hours are lost due to a given SWRs and to what extent can other production factors compensate for this? They find that for manufacturing industries, the SWR from 45 hour to 40 hours (an 11 per cent reduction) lead to a fall in output of 6.1 per cent and conclude that other mechanisms such as increased employment, productivity improvements and increased capital utilisation accounts for the gap between the reduction in labour input per worker and the aggregate fall in output (SOU, 1976, p.65). As unemployment grew as a pertinent issue in the public debate, the next official government report (SOU 1979:48), firmly reject the idea of SWRs as work-sharing reforms (p.140). They also note that further SWRs, both with and without wage compensation, would lead to large increases in labour demand for the public sector which already faces difficulty in finding employees.

No official governmental report concerning the effects of SWRs has directly analysed female employment. Starting with SOU 1979:34, more extensive reporting of female employment statistics began. For example, it is reported that only a fifth of full-time shift-working employees were women in 1974 and that the overwhelming majority of part-time workers were women (SOU, 1976, pp.37-38). The overview of the public debate surrounding the introduction of a six-hour workday revolved arguments pertaining to the benefits for women; more equal standing between men and women, part-time working women would work full time and many more women would have time to partake in cultural, political and labour union work (SOU, 1976, p.43). However, to my knowledge, no existing literature has aimed to explore whether SWRs asymmetrically affects women's employment, for example through increased workforce participation as lower working hours might be more in line with their income-leisure preferences.

The research into the health effects of previous SWRs is similarly scarce. The 1968 official government report (SOU 1968:66) looked into the extent to which health, and specifically workplace injuries, were affected by the 1958 SWR. They found no evidence suggest-

ing that the previous reform had any impact on workplace injuries. On the contrary, they found that injuries were relatively evenly divided throughout the workday and not, as would've been expected if fatigue was a determining factor for injuries, towards the end of the day (SOU, 1968, p.85). However, it is worth noting that a recent study by Berniell (2012) found more long-term health benefits in terms of increased probability of smoking, alcohol consumption and physical inactivity. More recent literature on the health effects of working hours seem to point to significant adverse effect for more than 48 hours work per week (for an overview, see Tucker and Folkard 2012) but does not specifically address the question whether workplace injuries would increase with a SWR from 42.5 hours to 40 hours.

Theory

This section seeks to provide a better understanding of the highly complex web of mechanisms that determine the employment effects of SWRs (Anxo, 1988; SOU, 1979, 1996, 2002). This will be done by considering changes to inputs factors and parameters of the production function:

$$Y = f(K, L, A)$$

However, the empirical section of this paper does not estimate each of these individual changes. Instead, the empirical estimates should be interpreted as the net effect of all mechanisms indicated in figure 1. Furthermore, this section has been limited to analysing the employment effects of SWRs as a full model for female employment and workplace injuries is outside the scope of this paper.

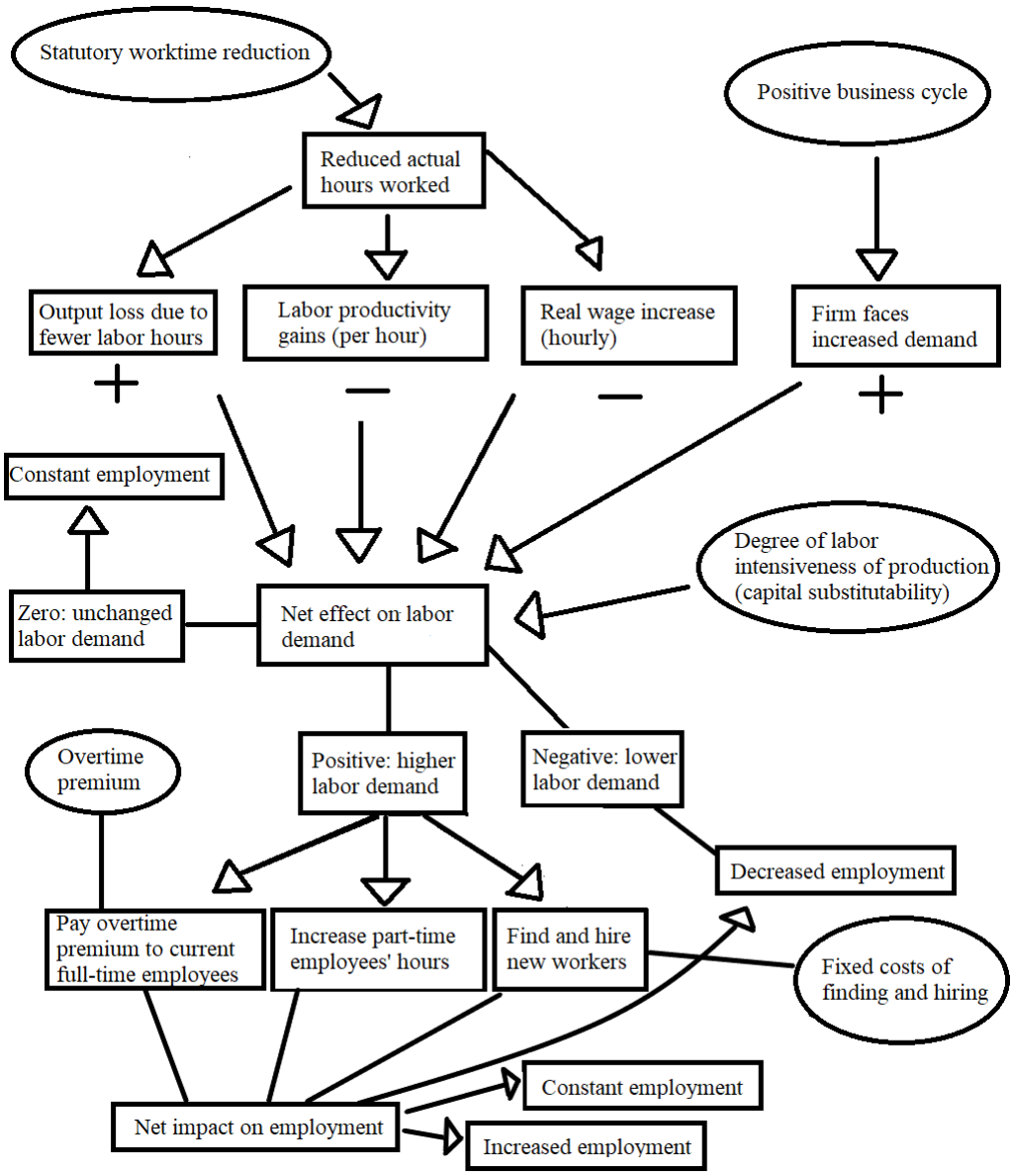

Figure 1: Schematic overview of the mechanisms influencing the impact of SWRs on employment. "+" and "-" indicates a positive and negative effect on labour demand, respectively.

The effects on employment

The employment effects of SWRs are determined in two stages, illustrated by the following questions. First, how does it affect labour demand? Second, to what extent does (positive) labour demand translate into the hiring of new employees?

Figure 1 shows this two-stage analysis. After an exogenous SWR, labour input (in hours) fall. Holding all other things constant, this leads to (a) output loss, (b) productivity gains, (c) hourly real wage increases. Neither productivity gains or wages must necessarily in-

crease but we assume that this is the case now. The first has a positive impact on labour demand whereas the latter two are assumed to have a negative effect on it. Furthermore, two exogenous variables influence labour demand too, namely: the business cycle and the degree of capital substitutability. With higher demand, businesses may want to increase production which leads to higher labour demand. The more labour intensive production is, the less likely it is that firms increase their physical capital stock in their production. After these effects have played out, we may have three possible scenarios: unchanged labour demand, higher labour demand or lower labour demand.

The second stage of the analysis concerns the firms' decision assuming there is a positive net effect on labour demand due to a SWR. The employment effect depends on the relative cost per unit of output between (a) increasing the working time of current part-time employees (b) increasing overtime work of current full-time employees, paying for the overtime premium, (c) hiring new employees. This means that the elasticity of employment with respect to labour demand is likely less than one. To illustrate, if labour demand of a given firm increases by 200 hours, then the firm might increase part-time workers' hours by 40 hours, buy a machine that reduces labour demand by another 40 hours, pay 20 hours of overtime wage to current workers and lastly hire new employees to work 100 hours.

However, this is a simplified analysis serving to illustrate the operation of the main mechanisms. In reality, the firm does not have a constant level of output which it seeks to maintain as implicitly assumed above. Rather, the firm output is a function of costs and the firm's goal is to maximize profits meaning that it will choose labour input such that profits are maximized. For more details, see Anxo (1988).

Reduction of working hours and wages

Wages can be set in one of two ways during negotiations between employer organizations and labour unions. First, the wages are set such that the hourly wages do not increase proportionally to the reduction in total work hours. That is, the loss of income from the SWR is not fully compensated by an increase in hourly wage. Second, wages can be set such that the hourly wage partially or fully compensates the loss of income due from the SWR.

Without wage compensation

Here we assume that the SWR does not include an increase in wages such that the income remains constant even though working hours have been reduced. In other words, the overall income of employees who previously worked full-time is now lower. Moreover, we assume that the demand for public goods is constant as government decisions to cut-back or increase public goods are set in longer time horizons. Being small economies, world market prices and demand are assumed to be fixed for the traded sector. As pointed out earlier, labour (input) demanded by companies is determined by their first-order condition, i.e. maximizing profits (Anxo, 1988, p.88). This means that the analysis should focus on how SWRs impact firm costs rather than assuming a certain fixed labour input that needs to be compensated for as has been done in previous official government reports (e.g. SOU 1979).

The analysis is divided into three cases: non-traded sector except public services [I], public services [II] and traded sector [III], see table 1. Industries classified as non-traded sector include, for example, hotels and restaurants, retail trade and transportation while examples of industries thought of as traded include many manufacturing industries and mining industries.

Table 1: Comparative statics analysis for working time reductions with constant hourly wages.

I.	Non-traded sector except public services: ambiguous effect.	a. Constant hourly wage → income decreases → demand for NT goods decrease → output decreases → labour demand decreases b. Labour input (hours) decrease → labour demand increases
II.	Public services: labour demand increase.	a. Constant hourly wages → labour demand is constant b. Labour input decrease, constant output → labour demand increases
III.	Traded sector: labour demand increase.	a. Constant hourly wage → firm unit production cost constant → labour demand constant b. Labour input (hours) decrease & constant output → labour demand increase

As can be seen in table 1, a SWR with constant hourly wages is expected to lead to increased labour demand in public services and in the traded sector while having ambiguous effects on the non-traded sector except public services. However, increased labour demand does not mean that more people will be employed due to mechanisms such as overtime work and part-time workers increasing hours worked and other mechanisms that will be elaborated upon below. The aggregated result is also contingent on the relative size of the three sectors.

With wage compensation

If wages increase proportionally to the reduction in working hours, then hourly wages increase and production costs increase, ceteris paribus. This scenario is the most realistic as household surveys from the period indicate that while they were willing to reduce working hours in lieu of future wage increases, households were not willing to reduce working hours at the expense of an immediately lower annual income (SOU, 1968, p.81). The same assumptions as above are applied and the analysis is similarly divided into three cases. However, there is one crucial difference which is that production costs are affected in this scenario. This means that it is not plausible to assume that firms will choose the same quantity of labour input, i.e. the quantity of labour input for a given iso-production curve.

The effects of working time reductions with increased hourly wages are ambiguous, see table 2. In the short run, labour demand increases for the non-traded sector and public services while the effects on traded sector labour demand are ambiguous. In the medium, we can expect ambiguous employment effects for non-traded industries and tax increases or downsized public services.

Labour intensiveness of production

Capital substitutability mechanism refers to the degree that labour can be substituted by capital in the production function. This coefficient is different for various industries and types of production. Generally speaking, firms in the non-traded sector are going to have a lower substitution coefficient while traded sector firms such as manufacturing industries are going to have a higher substitution coefficient. This means that if labour costs increase and labour input decrease then employers may choose to increase the quantity of physical capital in their iso-product curve in the medium to long run as a response meaning that labour demand may not increase proportionally to the reduction of labour input (hours).

Table 2: Comparative statics for working time reductions with increased hourly wages.

I.	Non-traded sector except public goods: ambiguous effect.	a. Increased hourly wage → income increases → demand for NT goods increase → output increase → labour demand increases b. Increased hourly wage → unit production cost increases → profits decrease in the short and medium-term, prices of non-traded goods increase in the medium term. c. Labour input (hours) decrease, constant output → labour demand increases d. Labour input (hours) decrease, lower output → ambiguous effect.
II.	Public services: labour demand increase (short term), tax increases or reduced labour demand (medium term)	a. Increased hourly wage → unit production cost increases → government expenditure increases → taxes increases/downsized public services (medium term). → labour demand decrease (if public services are downsized) b. Labour input decreases, constant output → labour demand increases
III.	Traded sector: ambiguous effect.	a. Increased hourly wage → unit production cost increases → traded sector profits decrease and/or output decrease (short term)[12], capital flight and production relocation (medium term) → labour demand decrease b. Labour input (hours) decrease, constant output → labour demand increase c. Labour input (hours decrease), reduced output (medium term) → ambiguous effect

Labour productivity

SWRs has been argued to increase productivity for many reasons (Anxo, 1988). The first mechanism is fatigue. As workers become more tired over the course of the day, they become more tired and productivity is decreased. This means that a shorter workday overall will mean that the average productivity per day will increase. In industries where fatigue is more relevant such as in manufacturing and construction, this productivity gain would be more significant. Secondly, longer work time means less time leisure and recreational time which in turn decreases sick leave and accidents at the workplace. Thirdly, employers get stronger incentives to rationalize production (increase efficiency) as they will want to avoid increased costs in the form of overtime or having to hire new employees. Lastly, capital can be used to a greater extent through shift work. However, if shift work is not possible then the productivity per unit of labour input in hours may be constant, ceteris paribus, whilst productivity per unit of capital decreases.

Data

One of the main difficulties in conducting historic empirical analysis with a multiple-country data is that it is very difficult to find comparable data. Very often different definitions of working hours, employment and other variables are used by the statistical agencies. This is not the case for Sweden and Norway for this time period. Furthermore, the economic integration in terms of labour mobility and comparable wages means that this setting lends itself very well for econometric analysis. Lastly, both countries implemented the SWR to 40 hours within 4 years of one another. If we assume that changes in the external environment did not affect Sweden and Norway asymmetrically over that time frame and that the impact of the 40 hours SWR were the same for both countries, then it is possible to estimate the effect of a reduction from 42.5 hours to 40 hours using panel fixed effects estimates. Figure 2 shows the development of statutory standard weekly working time in Sweden and Norway between 1966-1980. However, Sweden undergoes transition periods from 1966-69 and 1971-73 meaning that the numbers for those years are estimates.

The data set

The data set used in the empirical analysis is compiled from multiple official governmental statistics from Sweden and Norway. The data for the two countries are comparable as both follow the International Standard Industrial Classification (ISIC) revision 2 from 1968. Most macroeconomic data are taken from Statistical yearbooks of Sweden and Norway or the official Labour force surveys from the period. Simple linear interpolation was used when there were missing observations with observations before and after that point. When working hours or other variables were reported in a disaggregated form (by sub-industry or by gender), the aggregation was made with weights determined according to the relative number of salaried employees of each disaggregated part, see appendix A for details.

Definitions

The measure of employment used in this paper is the number of salaried employees. Both countries followed the ILO recommendation at the time which defined a salaried employee as everyone who, during the survey week, performed at least one hour of salaried work as an employee as well as all employees who did not work during the survey week due to illness, temporary leave (e.g. for child-care), military service, workplace conflict (strikes, lockouts) or other forms

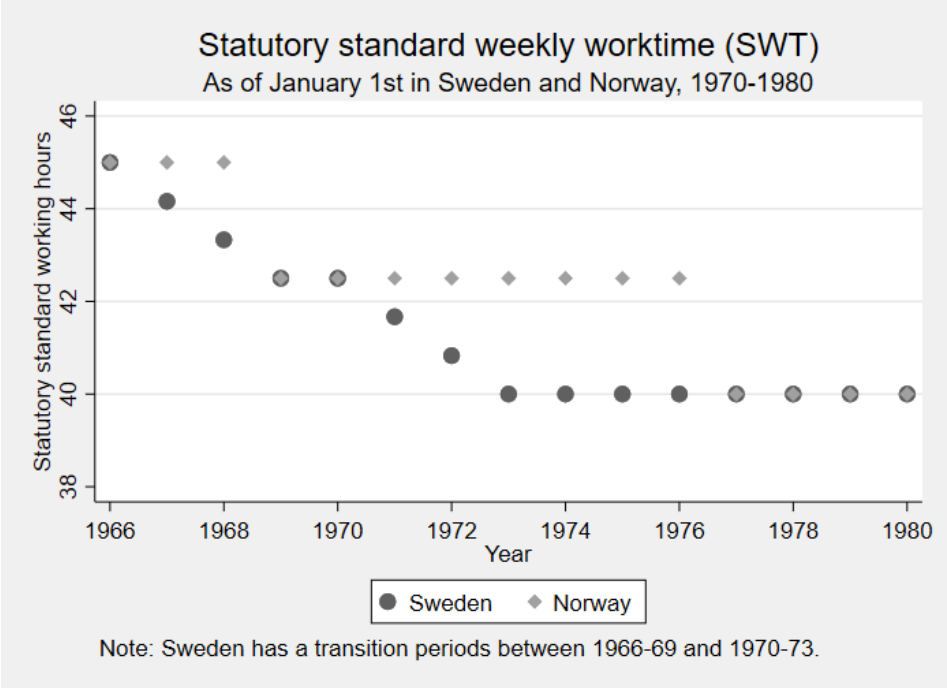

Figure 2: Shows the statutory standard average weekly worktime in Sweden and Norway, 1966-1980.

of temporary leave (both paid or unpaid) (SCB, 1981, p.7; NOS, 1978, p.17). This excludes the two other forms of employment: self-employed and people who worked at least 15 hours as unpaid workers in a business owned by a family member with whom he/she lives. Wages were estimated using nominal hourly wages in the domestic currency. This was then converted to NOK and adjusted for inflation. Actual average weekly working hours were estimated on the basis of data on persons at work.

Workplace injuries are defined as reported workplace injuries and deaths. However, it was not possible to find more precise definitions of what was reported as injuries. The statistics on workplace injuries exist because of the national insurance policies of Sweden and Norway mandating it. This also means that the degree of reporting is at least partially dependent on the rules surrounding insurance claims. Thus, there are some uncertainties in regard to the comparability of data between Sweden and Norway in this respect. Furthermore, it was also not possible to calculate a comparable measure of workplace injuries per unit of time. Therefore, the data used in this paper is the number of workplace injuries per 1000 workers, see appendix A for further details.

The data on the number of salaried employees are disaggregated by ISIC categories and collected from 1966-1980. However, not all data was disaggregated fully meaning that ISIC categories 2,3 and

4 are classified as one industry for all regression estimates in this paper. In other words, mining and quarrying, manufacturing and electricity, gas and water are combined. Manufacturing dominates in this category as it accounts for more than 90% of the number of employees. Also, gaps in the data mean that data over wages were only available from 1972. No data on the average hourly wage for ISIC 9 was available. This means that regressions with controls for wages only contains six industry categories (1, 2-4, 5, 6, 7, 8) between 1972 and 1980 for Sweden and Norway.

Table 3: Summary statistics for Norway and Sweden, 1966-1980.

Norway

Variable	**N**	**Mean**	**Std. Dev.**	**Median**	**Min**	**Max**
Number of salaried employees (1000s)	104	197.95	143.10	144.00	25.00	544.00
Nominal wages (domestic currency)	54	30.89	10.77	29.97	12.10	53.16
Real wage (in NOK, 2011 base year)	54	1.54	0.33	1.57	0.89	2.01
Actual hours worked (per week)	63	38.75	3.37	39.40	32.10	45.10
Labour force, ages 16-74	63	1800.33	100.68	1821.00	1677.00	1946.00
Workplace injuries per 1000 workers	77	20.84	15.54	21.75	0.74	64.6
Share of female salaried employees	77	0.367	0.252	0.245	0.03	0.833
GDP per capita (current US$)	11	8330.59	4031.41	8204.45	3306.22	15772.24

Sweden

Variable	N	Mean	Std. Dev.	Median	Min	Max
Number of salaried employees (1000s)	105	482.34	393.31	256.00	60.00	1389.00
Nominal wages (domestic currency)	73	24.30	9.61	22.88	10.12	49.45
Real wage (NOK, 2011 base year)	73	1.58	0.29	1.49	1.11	2.19
Actual hours worked (per week)	84	37.35	2.36	37.55	33.00	42.10
Labour force, ages 16-74	84	4081.00	142.93	4086.00	3855.00	4318.00
Workplace injuries per 1000 workers	77	43.61	33.00	45.90	0.95	113.80
Share of female salaried employees	77	0.321	0.187	0.25	0.047	0.615
GDP per capita (current US$)	11	9766.37	3988.95	10034.47	4697.44	16957.84

Comparing Sweden and Norway

Sweden and Norway were similar in many aspects. Wages were comparable with Sweden having an average hourly wage adjusted for inflation of 1.58 NOK and Norway an average hourly wage of 1.53 NOK (base year 2011) during the period, see table 3. This is very reasonable given the free labour mobility that was established between the Scandinavian countries in 1957, likely causing wages to converge in the region. GDP per capita is relatively similar with Norwegian GDP per capita being on average 85% of that of Sweden's during the period 1970-1980. Furthermore, employment growth seems to follow similar trends for some of the key industries (manufacturing, construction, social and public services), see appendix B.

The trend in female employment differs significantly for Sweden and Norway during this period. We see that between 1970 and 1980, the proportion of female salaried employees in Norway increased from around 32 per cent to 42 per cent while this number remains stable at around 34 per cent in Sweden, see appendix B. Similarly, the absolute number of female salaried employees increased significantly between 1970 and 1980 mainly due to increases in female employment in ISIC 9 (Community, Social and Personal services), see appendix C.

Method

This study employs two empirical strategies. Firstly, it exploits the timing of the reforms and the economic, cultural and political similarities of Sweden and Norway to estimate the effects of the 40-hour SWR on employment in agriculture, forestry and fishing industries in Norway. Secondly, it uses ordinary least squares with panel data fixed effects to estimate the effects of the SWR on employment, female employment and workplace injuries.

In econometric analysis, identification is the term used to describe the method by which we identify causal effects. Correlation does not imply causation because there is always a plethora of unobservable variables that may be driving the outcome and are correlated with the explanatory variable. We say that a regression that does not solve this problem contains an omitted variable bias. Difference in differences is one method for dealing with omitted variable bias.

Difference in differences

Identification of causal effects using difference in difference (DD) is based on certain assumptions. In essence, the identification is based on the existence of two observation groups for which the omitted variable bias (OVB) is argued to be the same over a given timeframe. That is, these unobserved characteristics are the same for the two observation groups (or in this case: two countries). Consider a standard regression model $Y_{it} = a + bT_{it} + dX_{it} + e_{it}$ where Y is our outcome variable for observation i in time t. $t = 1$ is after the treatment and $t = 0$ is before the treatment, T is our treatment dummy (in this case: the 40-hour SWR), X are the unobserved characteristics of the observation and e is the error.

If we only had cross-sectional data after the treatment, then we would only be able to observe the difference between the treated and the untreated group. This means we empirically observe the true effect b and the OVB:

$$E[Y_{i1}|T_{i1}=1]-E[Y_{i1}|T_{i1}=0]=b+\underbrace{d(E[X_{i1}|T_{i1}=1]-E[X_{i1}|T_{i1}=0]}_{\text{OVB}_1}.$$

However, with panel-data we can also observe the difference between the treated and untreated group before the treatment:

$$E[Y_{i0}|T_{i1}=1]-E[Y_{i0}|T_{i1}=0]=\underbrace{d(E[X_{i1}|T_{i1}=1]-E[X_{i1}|T_{i1}=0])}_{\text{OVB}_0}.$$

If we take the difference between these two regressions, then the omitted variable bias will cancel out and we get an unbiased estimate of "b":

$$DD=b+\text{OVB}_1-\text{OVB}_0=b.$$

This paper utilise difference in difference to estimate the effect of the 40-hour SWR in Norway on employment in Agriculture, Hunting, Forestry and Fishing (ISIC 1), using Sweden as the control group. The parallel trends assumption is satisfied for both employment levels and actual hours worked for ISIC 1 but not for the other industry categories. Figure 3 shows that employment in both countries follows a similar downward-falling trend prior to the introduction of the 40-hour SWR in 1977, after which employment in ISIC 1 in Norway stabilizes. Figure 4 shows the parallel trend in actual hours worked per week.

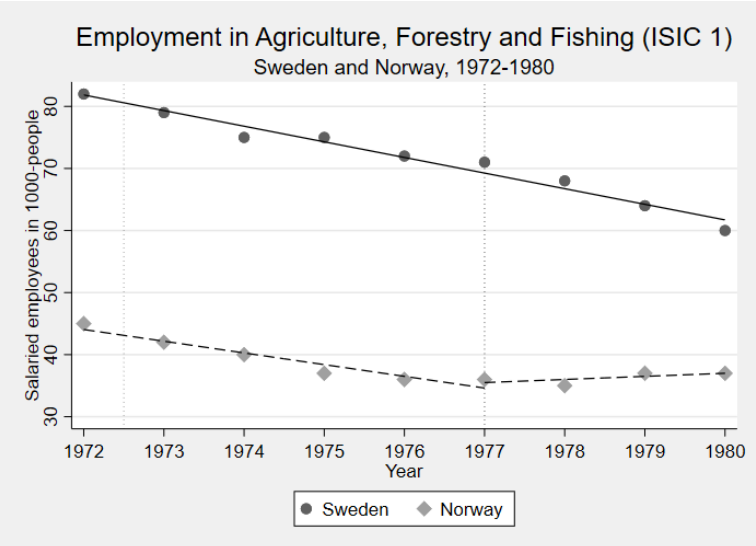

Figure 3: Shows the number of salaried employees in ISIC 1 in Sweden and Norway, 1972-1980.

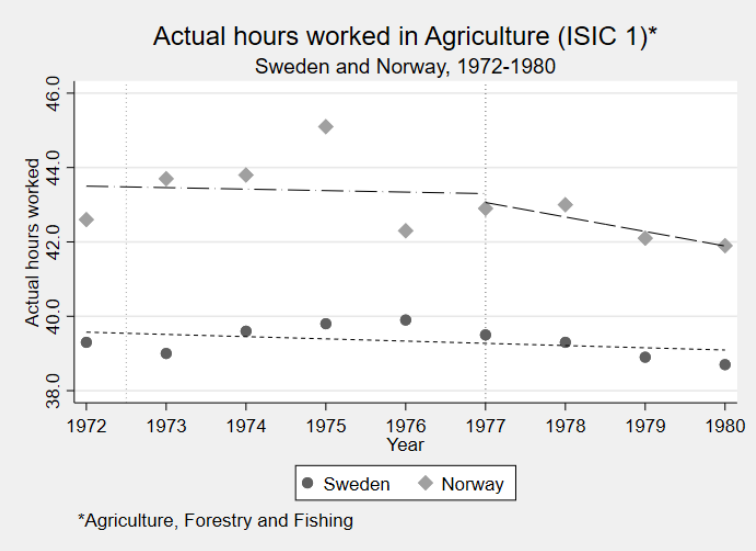

Figure 4: Shows actual hours worked in ISIC 1 in Sweden and Norway, 1972-1980.

These parallel trends may be an indication that the unobserved characteristics of firms in ISIC 1 are similar in Sweden and Norway meaning that a DD can remove OVB. However, pre-intervention observations are very few and the observed parallel trend may be spurious. Furthermore, Sweden had already implemented the 40-hour workweek in 1973 so further assumptions must be made. First, that the SWR in Sweden does not impact the unobserved characteristics. Second, that the impact of the SWR in Norway was primarily in the form of a shock leading to a new employment trend in Norway. Third, that we don't observe such jumps in the employment trend in Sweden was because the Swedish reform between 1971-1973 was gradual, i.e. employers and labour-unions negotiated contracts specifying a certain reduction of working hours each year so that there would be no such shocks. In Norway, there were no such gradual transition agreements.

The following is the estimated DD regression equation:

$$E = b_0 + b_1 DD + b_2 T + b_3 Post + cX' + e$$

where E is the growth of employment, b_1 is the estimated causal effect of the SWR on employment, DD is a dummy coded $DD = 1$ if the observation is both in the treated group and after treatment and $DD = 0$ otherwise, T is the treatment dummy coded $T = 1$ for observations in Norway, $T = 0$ for observations in Sweden, $Post$ is the time-dummy coded $Post = 1$ for observations after treatment, $Post = 0$ for observations before treatment, X' is a vector of observable covariates (time fixed effects, wage growth, labour supply growth, GDP growth) and e is the error term.

Panel fixed effects

This paper also employs panel fixed effects regressions to estimate effects on various outcomes. The method assumes that there are universal time-fixed effects that are shared between observation. Thus, by adding dummies for each year, industry and country, we remove the influence of those characteristics. In other words, we assume that Sweden and Norway are exposed to the same time fixed effects such as economic shocks and other trends and that there are industry-specific fixed effects that do not vary between Sweden and Norway.

Panel fixed effects are used to estimate the relationship between SWRs in both Sweden (1973) and Norway (1977) and actual hours worked, wage growth, employment, female employment and rate of workplace injuries. The regression equation for these panel fixed effects estimates is specified as:

$$Y_{c,i,t} = b_0 + b_1 T_{c,i,t} + cX'_{c,i,t} + fSweden + \sum_{t=1971}^{1980} g_t Year_t + \sum_{t=1}^{7} h_t Industry_t + e_{c,i,t}$$

where $Y_{c,i,t}$ is the outcome of interest - actual hours worked, employment growth, wage growth, number of salaried female employees or share of salaried female employees - in country c, industry i and year t. T is the treatment coded $T = 1$ if the statutory standard weekly working time is 40 hours for that observation. X' is a vector of covariates (wage growth, labour force growth, GDP growth). $Sweden$, $Year_t$ and $Industry_i$ controls for country, time and industry* fixed effects and $e_{c,i,t}$ is the stochastic error term.

The rate of workplace injuries is estimated in a slightly different manner because of a lack of data and because the rate of injuries differs so radically between industries. In other words, there are no plausible theoretical reasons for why we can expect SWRs to have similar effects across all industries. Therefore, workplace injuries per 1000 salaried employees are regressed on actual hours worked for each industry separately. The data on actual hours worked start in 1970 for Sweden and 1971 for Norway. The last year with data on workplace injuries is 1976. This means that the sample size is very small for each regression and that there are not enough degrees of freedom to add controls.

*Note that ISIC 2-4 are aggregated into one industry in these regressions

The regression equations for ISIC industries 1-9 are specified as follows:

$$Y_{c,t} = b_0 + b_1 H_{c,t} + fSweden + \sum_{t=1970}^{1976} g_t Year_t + e_{c,t}$$

where $Injuries_{c,t}$ is the rate of injuries in country c and year t. H is the number of actual hours worked. $Sweden$ and $Year_t$ controls for country and time fixed effects and $e_{c,t}$ is the stochastic error term.

Empirical analysis

The empirical estimates are in line with existing literature and the theoretical analysis in this paper. Regression results for actual hours worked per week, growth of the number of salaried employees (employment) and wage growth are reported in table 4. The SWRs from 42.5 to 40 hours in Sweden and Norway are estimated to yield a reduction of actual working hours by approximately one hour ($p < 0.01$) using panel fixed effects meaning that the elasticity of actual weekly worktime with respect to the statutory standard weekly worktime is less than one. These results hold after robustness checks using alternative measures for labour supply and wages but not with the assumption that industry fixed effects differ in Sweden and Norway, see appendix D. Panel fixed effects regressions yield no significant relationship between growth of the number of salaried employees and the 40-hour SWR. However, the implementation of the SWRs are associated with a 0.5 percentage point reduction of wage growth ($p < 0.01$).

Baseline difference in difference estimates yield close to zero effects wherein the SWR is associated with an increase in employment growth of 0.07 percentage points ($p < 0.1$) in Agriculture, Hunting, Forestry and Fishing (ISIC 1), see table 5. However, the full model yield no significant employment effect. Moreover, it should be noted that the sample size of 16 is not enough given that the many controls used in the regression.

No evidence was found suggesting a correlation between SWRs and female employment. Neither estimates of the share of female or the number of female salaried employees are significantly different from zero, see table 6. Lastly, no significant correlation is found between actual hours worked per week and the rate of workplace injuries for any ISIC industry except commerce (ISIC 6)*. For commerce,

*Commerce is here used as a shorthand for the actual industry label: "Wholesale and Retail Trade and Restaurants and Hotels"

a one-hour reduction of weekly working time is associated with a reduction of workplace injuries by 0.6 per 1000 employees ($p < 0.1$), see table 7.

Table 4: Actual hours worked, employment growth and wage growth regressed on 40-hour SWR.

	Actual hours worked		Employment growth		Wage growth	
INDEPENDENT VARIABLES	(1) Fixed effects	(2) Full model	(3) Fixed effects	(4) Full model	(5) Fixed effects	(6) Full model
40-hour SWR	-0.656**	-1.123***	0.0174	0.00470	-0.0364***	-0.0553***
	(0.326)	(0.390)	(0.0138)	(0.0179)	(0.0126)	(0.0111)
Constant	42.44***	42.98***	-0.00500	-0.0414*	0.0394***	-0.0471***
	(0.312)	(0.522)	(0.0190)	(0.0220)	(0.00808)	(0.0151)
Observations	147	114	203	114	114	114
R-squared	0.915	0.906	0.341	0.403	0.630	0.730
ctrl FE	yes	yes	yes	yes	yes	yes
ctrl wages	no	yes	no	yes	no	no
ctrl labour supply	no	yes	no	yes	no	yes
ctrl GDP	no	yes	no	yes	no	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Employment growth regressed on the 40-hour SWR (DD).

	Employment growth				
INDEPENDENT VARIABLES	(1) Base case	(2) Ctrl wages	(3) Ctrl labour force	(4) Ctrl GDP growth	(5) Full model
40-hour SWR	0.0740*	0.0718*	0.0725*	0.0788*	0.0823
	(0.0313)	(0.0345)	(0.0317)	(0.0373)	(0.0504)
Wage growth		-0.119			0.0613
		(0.454)			(0.598)
Labour force growth			-0.599		0.270
			(1.275)		(2.117)
GDP growth				-0.00682	-0.00936
				(0.00949)	(0.0154)
Observations	16	16	16	16	16
R-squared	0.650	0.658	0.667	0.686	0.688
ctrl FE	yes	yes	yes	yes	yes
ctrl wages	no	yes	no	no	yes
ctrl labour supply	no	no	yes	no	yes
ctrl GDP	no	no	no	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Salaried female employees and share of female salaried employees regressed on 40-hour SWR.

	Salaried female employees		Share of salaried female employees	
INDEPENDENT VARIABLES	(1) Base model	(2) Full model	(3) Base model	(4) Full model
40-hour SWR	23.54	5.235	0.0153	0.0264
	(15.68)	(18.27)	(0.0361)	(0.0180)
Observations	161	161	154	154
R-squared	0.013	0.745	0.001	0.949
ctrl time FE	no	yes	no	yes
ctrl country FE	no	yes	no	yes
ctrl industry FE	no	yes	no	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Rate of workplace injuries regressed on actual hours worked.

	Injuries per 1000 salaried employees						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
INDEPENDENT VARIABLES	Agric. Panel	Manuf. Panel	Construction Panel	Commerce Panel	Transport Panel	Finance Panel	Services Panel
Hours worked	-0.907	7.417	2.669	0.612*	-3.225	-0.402	1.897
	(0.739)	(4.813)	(1.593)	(0.225)	(1.483)	(0.830)	(1.007)
Sweden	53.16***	41.37**	47.16***	12.38***	6.493	-1.241	3.374***
	(2.627)	(7.312)	(5.116)	(0.519)	(5.848)	(1.026)	(0.434)
Constant	73.55	-276.7	-80.59	-17.49	159.4*	16.75	-54.74
	(31.89)	(195.5)	(68.12)	(8.608)	(62.74)	(30.60)	(34.13)
Observations	13	13	13	13	13	13	13
R-squared	0.999	0.993	0.998	0.999	0.998	0.486	0.962
ctrl time FE	yes	yes	yes	yes	yes	yes	yes
ctrl country FE	yes	yes	yes	yes	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Discussion

This section concerns the internal and external validity of this study. The former will be discussed by considering the limitations of the data and econometric assumptions. The external validity will be discussed primarily by analysing to what extent the lessons of this study can be extrapolated to the present. Specifically, it asks whether a statutory working time reduction would be more, or less, likely to have any significant employment effects.

Data limitations

The primary concern of this paper is that there are too few data points for inference. Even though the sample size on salaried employees is relatively large (1966-1980), this cannot be used in regressions that control for wages because there is no data on wages prior to 1972. The difference in difference regressions relies on having only two observations per year with a total sample of 16 observations. There are similar issues with the workplace injuries regressions. Furthermore, the data set does not contain data on wages in ISIC 9 (Community, Social and Personal Services, referred to as "Government and Services") meaning that all regressions controlling for wages will exclude all ISIC 9 observations.

Another concern relates to the standard working time for a given industry. The Swedish SWR was legislated such that 40 hours would be reached by January 1973 meaning that employer organizations and the recognized labour-union negotiated the terms of transition. This means that the standard weekly working time differed across industries for a given year during the transition (SOU, 1968). Even if there were national standard, regional labour-unions and employers had the freedom to negotiate their own terms. Thus, the standard weekly working time could differ even within the same industry.

The 1977 SWR in Norway was part of a larger legislative reform of labour protection. This means that it is not possible to disentangle the effects of those other legislative reforms from that of the working time reduction.

The measure used for workplace injuries is not directly answering whether SWR reduces the rate of injuries. The hypothesized relationship between SWRs and workplace injuries is that SWRs lead to less fatigue so that the number of accidents and other injuries fall. However, the longer employees are present at the workplace, the more exposure to and the higher likelihood of being injured they have. Thus, measuring the rate of injury per unit of time should more accurately reflect the extent to which injuries are affected by SWRs. See appendix A for a more detailed discussion. Moreover, it is unclear to what extent injuries defined in the same manner for Sweden and Norway. There are also some questions regarding the inter-temporal comparability of the data. The reason for this is because the data on injuries are based on health-insurance claims meaning that the incentive to report in a given year can be affected by the specific policy regarding insurance claims in that year.

Econometric assumptions

The panel fixed effects regressions do not exclude the possibility that some other unobserved variable is driving the result. For example, the OPEC crises in 1973 and 1977 had a depressing effect on the economy, presumably lowering demand and thereby labour demand. The panel fixed effects regressions in this paper adjust for this in two ways. First, by controlling for GDP growth. However, this may not capture the full extent of the OPEC shocks since investment and production decisions are forward-looking. Second, by adding time-fixed effects. The efficacy of this control depends on the extent to which we believe that the two countries are exposed to the same shock. If we assume that the controls did not fully capture the effect of the OPEC crises and they did have a depressing effect on employment, then that would suggest that our estimate of the impact on employment growth is biased downwards.

One of the key assumptions of this paper is that Sweden and Norway are comparable enough to be considered false twins. This might be true in a limited context such as for agriculture, forestry and fishing. However, Sweden had a much more developed manufacturing industry at the time and may not have faced the same economic shocks as Norway in other sectors of the economy. In other words, the omitted variable bias may be different in other sectors of the economy, thereby undermining the accuracy of estimates given by panel fixed effects regressions. Because of this difference in industrial structure, the OPEC crisis may not have impacted Norway's economy to the same extent that it impacted Sweden's economy. For example, Norway did not have a well-developed shipbuilding industry comparable to that of Sweden.

Furthermore, the panel fixed effects estimates crucially assume that industries are homogeneous, see table 4. In other words, it is assumed that the impact of a SWR for all the ISIC divisions are the same. This is not true as was explained in the comparative statics analysis in the theory section. The effects of SWRs differ for tradable, non-tradeable industries and public services.

External validity

What would be the employment effects of a SWR today? The extent to which the results of this study, if we assume internal validity, can be used to draw conclusions regarding SWRs today depends on how the context has changed. If changes to structural parameter suggest that positive employment effects are much less likely today than in the 70s and this study found no evidence for an effect in

the 70s, then it can be argued that a SWRs today is unlikely to yield positive employment effects. What will now follow is a discussion of four aspects that may have changed and how this affects the employment effects of a SWR.

First, a meta regression analysis by Lichter et al. (2015) found that elasticity of labour demand with respect to price is higher today than it was 40 years ago. This means that labour demand is more sensitive to wage increases than before. The literature suggests several possible mechanisms. The first suggestion is that the "α-parameter", defined as the weight of capital in a Cobb-Douglas production function, is higher in modern production processes than before. Another suggestion is the reduction in transportation costs meaning that companies now face greater pressure from foreign competition. Lastly, the higher degree of capital mobility means that businesses can relocate their production if profit margins are threatened by reforms that in some way increase production costs.

A second aspect that may have changed is the extent to which lower working hours affects productivity gains. The relationship between working hours and productivity gains has been subject to many studies (e.g. Schein et al., 1977; Anxo and Bigsten, 1989; Pencavel, 2014) and the decision of some businesses to reduce working hours has drawn the attention of the public. But even if there were some productivity gains in the 70s and today, it remains unclear whether the gains have changed over time – on an aggregate societal level. In other words, has the elasticity of productivity with respect to working hours changed?

One might argue that in today's society, production intensity is higher than before and because of the complexity of modern society, there is much less time to rest. This would mean that the productivity gains of increasing leisure time are greater than before. On the other hand, it is also possible to argue that productivity gains are smaller than before. That is, there might be falling returns to leisure with respect to productivity gains. This would mean that the more leisure we have, the lower the productivity gains of additional units of leisure.

A third aspect that could change the employment effects of a SWR is the nature of unemployment today. Back in the 70s, the need for highly skilled workers was not as great as today in the sense that an unskilled worker could easily learn the skills needed at that workplace. Firms today may have higher skill requirements for new employees. This is a complicated empirical question but if it is the case that there's a skills-gap in between the skills demanded

by employers and the skills that currently unemployed have, then this would indicate that a SWR would be less likely to lead to job-sharing today.

A fourth aspect that may differ today is that the share of tradeable industries (export industries) may have increased relative to non-tradable industries. The effect of SWRs differs for tradeable sectors of the economy and non-tradable sectors. As explained in the theory section, tradeable sectors are more sensitive to changes that affect their costs because they cannot push the costs over to consumers. This means that a SWR is much more likely to lead to reduced labour demand, ceteris paribus. For Sweden, the share of exports has increased from around 25 per cent of GDP to 45 per cent of GDP whereas for Norway it around the same as in the 70s – 35 per cent (World Bank, 2020).

In conclusion, a SWR is most likely to have a weaker work-sharing effect today compared to the 1970s. There are cogent arguments suggesting that a SWR would have weaker work-sharing effects such as the higher elasticity of labour demand with respect to wages and the higher share of traded goods. In contrast, the factors that could suggest otherwise are unclear. Both changes in productivity and the state of unemployment can work in either direction.

Future research

There is a lot of potential for future research in regard to SWRs and related concepts. The SWR to 40 hours had a transition period between 1971-1973 wherein employer organisations and labour-unions were free to negotiate the specifics surrounding the transition. This time-difference can be exploited for causal identification of the effects of SWR since industries or firms that did not make transitions at the same pace can be used as plausible controls for those that reduced working hours faster. Another interesting area of research is the extent to which there exists or will exist, a large skills-gap between what employers need and the unemployed workforce. The existence of large gaps would be another indication that SWR or other forms of working time reductions would not salvage unemployment concerns.

Conclusion

The aim of this paper was to study the effect of the statutory standard weekly working time reductions (SWR) from 42.5 hours to 40 hours in Sweden and Norway between 1969 and 1980. Given the limited data that was available from this period, conclusions must be drawn with caution. The panel fixed effects estimates and DD estimates fall short on either data availability or on assumptions meaning that one cannot make causal interpretations of the estimated coefficients. First, the SWRs of 2.5 hours were found to be associated with a fall in actual hours worked by around 1 hour. The SWRs were associated with a 0.05 percentage point fall in real wages. However, no evidence indicating work-sharing effects of SWRs. Nor was there any indication that SWRs are associated with female employment, female employment share or the rate of workplace injuries.

Is it likely that a SWR today would have work-sharing effects? In line with existing literature, this paper finds no evidence that the SWRs in Sweden and Norway in the 70s led to work-sharing. Not only has globalization caused firms to be more sensitive to changes in production costs, but the rise of increasingly sophisticated machines means that firms may choose to invest in new machines rather than new employees when given the choice to renew. Thus, the evidence and analysis seem to suggest that work-sharing effects are even less likely to occur today compared to 50 years ago.

However, working time reductions can still be worth pursuing for reasons other than combating unemployment. Improved quality of life is one reason. As household incomes increase, having more free time to spend with friends and family may become more important than having more money to spend. Sustainability is another reason for further reductions. Consumption is resource-demanding and contributes to global warming. Choosing more leisure time above increased income (and consumption) could, therefore, reduce our planetary impact both directly, by consuming less, and indirectly, by having more time to consume time-intensive services could be less resource demanding.

In 1930, Keynes envisioned that a 3-hour workday was an economic possibility of the future. This would be brought about thanks to technology. But technology may prove to be a threat to our system by causing systemic unemployment. The claim that a statutory standard working time reductions can move us one step closer to Keynes' vision and simultaneously bring jobs to the unemployed seems to be good to be true. That is because it probably isn't true.

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Appendix A

Data sources

Bolt, et al., (2018) "Maddison Project Database" was used for growth levels, World Bank (2018) was used for GDP deflators and exchange rates were obtained from Bank of Norway (2018). For data on employment, wages and actual hours worked in Sweden, the following sources were used: "Statistisk årsbok" (Statistical yearbook of Sweden) between years 1970-1983, "Löner. Privat sektor tjänstemän" (private sector salaries statistics) between years 1969-1980, "Arbetskraftsundersökningarna 1963-1975" Am 1978:32 (Labor force surveys 1963-1975) and "Arbetskraftsundersökningarna 1970-1980" Am 1981:33 (Labor force surveys 1963-1975). For on data on number of salaried employees, wages and actual hours worked in Norway, the following sources were used to compile the dataset: Statistisk årsbok (Statistical yearbook of Norway) between years 1966-1982, Lønnsstatistikk (Wage statistics) between years 1973-1981 and Arbeidsmarkedstatistikk (Labor market statistics) between years 1969-1982.

Discussion on using workplace injuries per 1000 employees

Using workplace injuries per 1000 salaried employees may be misleading since employees worked fewer hours after the SWRs, thereby decreasing their time and the workplace and thus their risk of injury. The ideal measure is to measure workplace injuries per unit of time as that would capture injury-reducing effects of SWRs more accurately. However, it can still be interesting to see if there are any correlations even if we cannot interpret them as causal. If the econometric estimate yield no correlation between SWRs and injuries even when using this biased measure, then it is even less likely that workplace injuries standardized per time unit would yield a correlation. It can therefore still be useful to use the rate of workplace injuries.

Appendix B

Employment growth in Sweden and Norway, 1970-1980

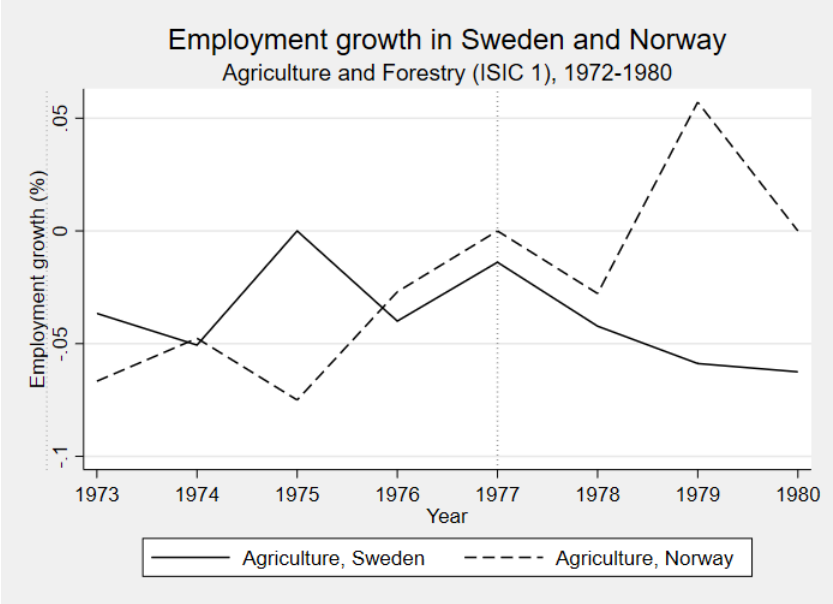

Figure 1: Growth in the number of salaried employees in Agriculture and Forestry (ISIC 1) in Sweden and Norway, 1970-1980.

Figure 2: Growth in salaried employees in Manufacturing and Mining (ISIC 2-4) in Sweden and Norway, 1970-1980.

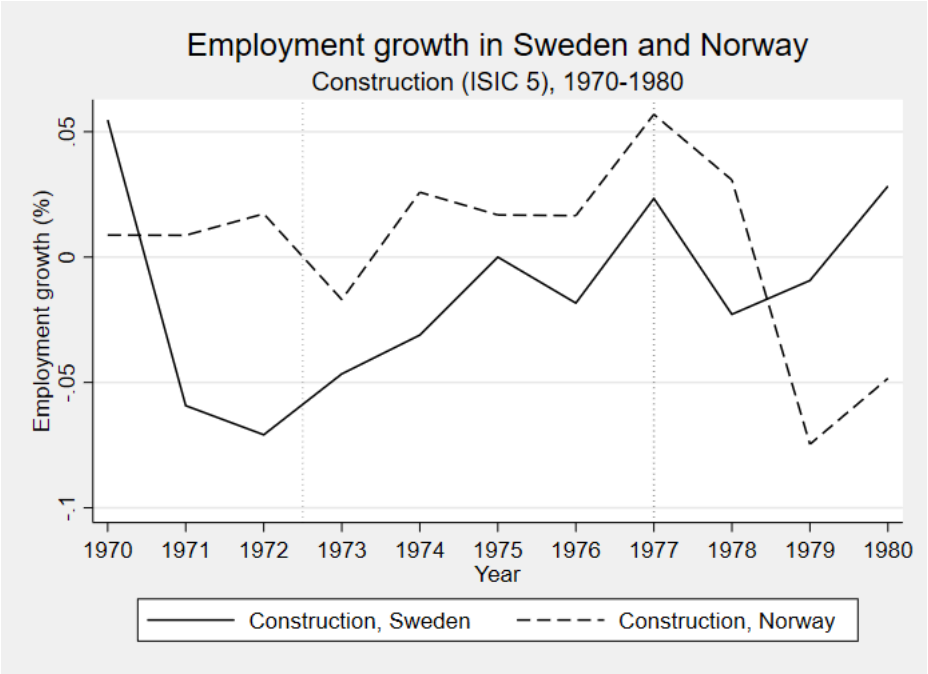

Figure 3: Growth in salaried employees in Construction (ISIC 5) in Sweden and Norway, 1970-1980.

Figure 4: Growth in salaried employees in Community, Social and Personal Services (ISIC 9) in Sweden and Norway, 1970-1980.

Appendix C

Female employment in Sweden and Norway

Table 1: Number of female salaried employees in all industries in Norway, 1970-1980.

Industry	N	Mean	Std. Dev.	Median	Min	Max
Agriculture, Forestry and Fishing (ISIC 1)	12	6.1	1.7	6	1.9	9
Manufacturing, Mining and other (ISIC 2-4)	12	89.5	7.2	92.5	74.1	98
Construction (ISIC 5)	12	6.2	1.8	6.5	3.3	9
Commerce, Hotels and Restaurants (ISIC 6)	12	138.3	20.7	136	101.7	169
Transport and Communications (ISIC 7)	12	32.5	4.6	33	25.1	40
Banking and Insurance (ISIC 8)	12	34.5	10.5	35	17.4	48
Government and Services (ISIC 9)	12	271.9	60.8	274.5	167.5	352

*Measured in 1000s salaried employees

Table 2: Number of female salaried employees in all industries in Sweden, 1970-1980.

Industry	N	Mean	Std. Dev.	Median	Min	Max
Agriculture, Forestry and Fishing (ISIC 1)	11	12.3	2.4	12	10	19
Manufacturing, Mining and other (ISIC 2-4)	11	264.8	12.6	264	247	288
Construction (ISIC 5)	11	14.9	2.0	14	12	19
Commerce, Hotels and Restaurants (ISIC 6)	11	281.3	6.0	283	273	290
Transport and Communications (ISIC 7)	11	23.4	2.9	24	18	27
Banking and Insurance (ISIC 8)	11	86	4.3	87	78	93
Government and Services (ISIC 9)	11	131.6	13.5	132	116	149

*Measured in 1000s salaried employees

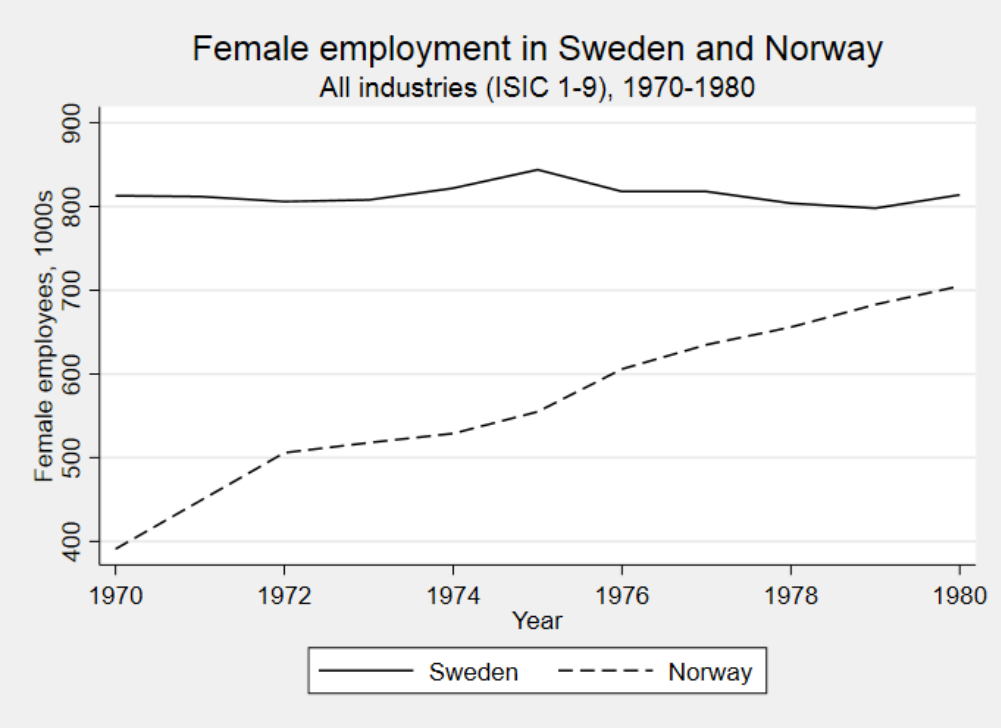

Figure 1: Female employment in all industries (ISIC 1-9) in Sweden and Norway, 1970-1980.

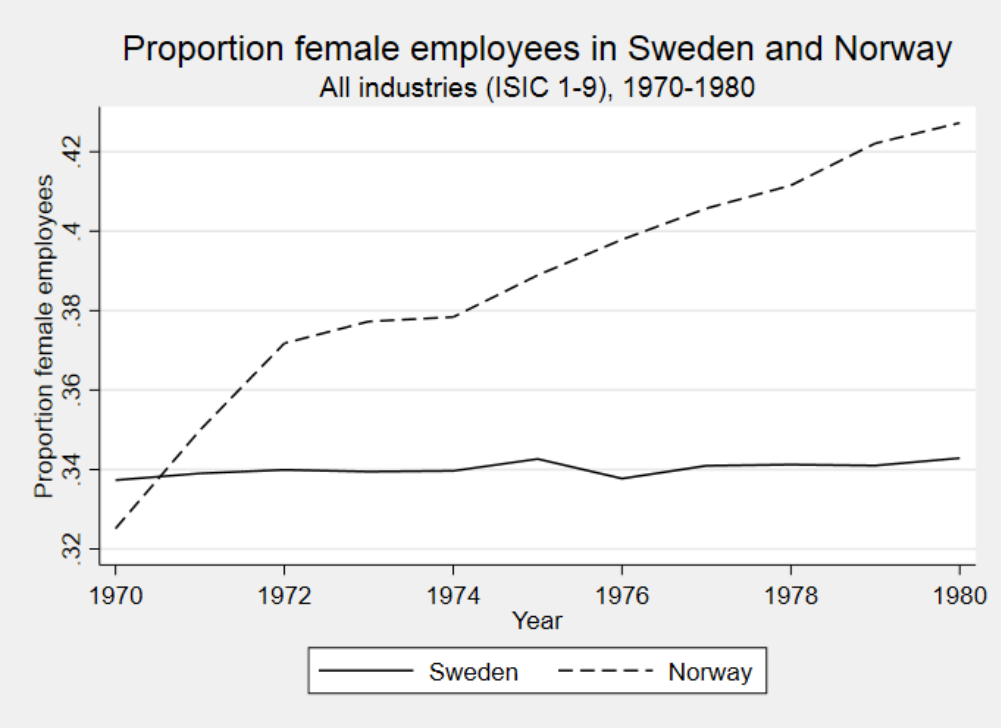

Figure 2: Share of female employment in all industries (ISIC 1-9) in Sweden and Norway, 1970-1980.

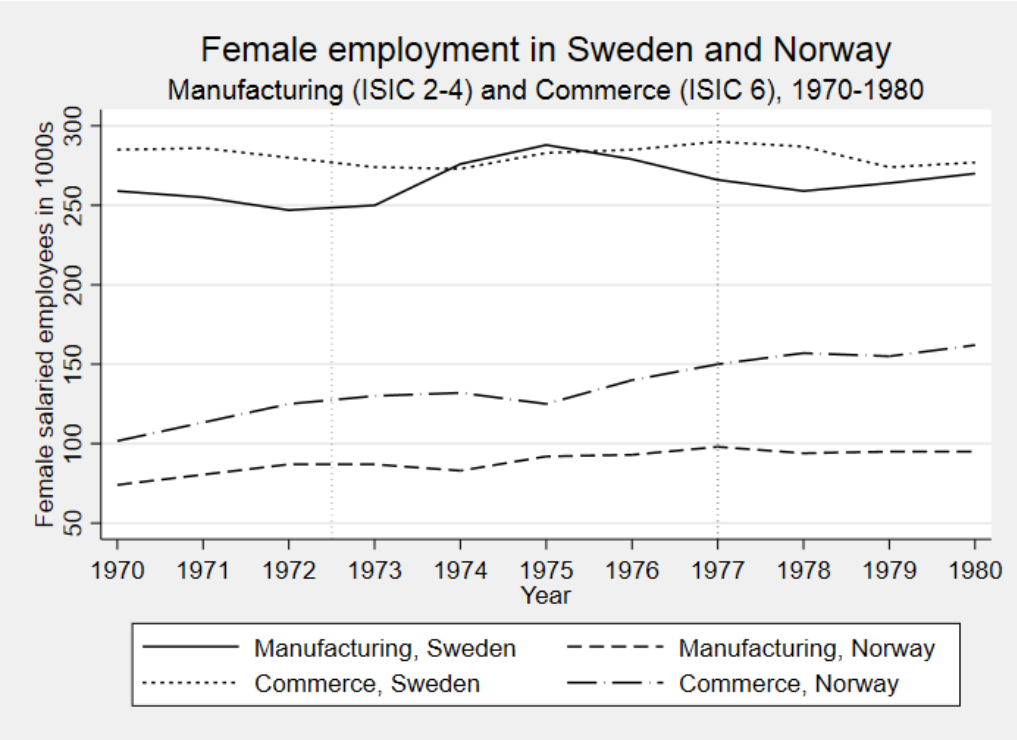

Figure 3: Female employment in Manufacturing and Commerce in Sweden and Norway, 1970-1980.

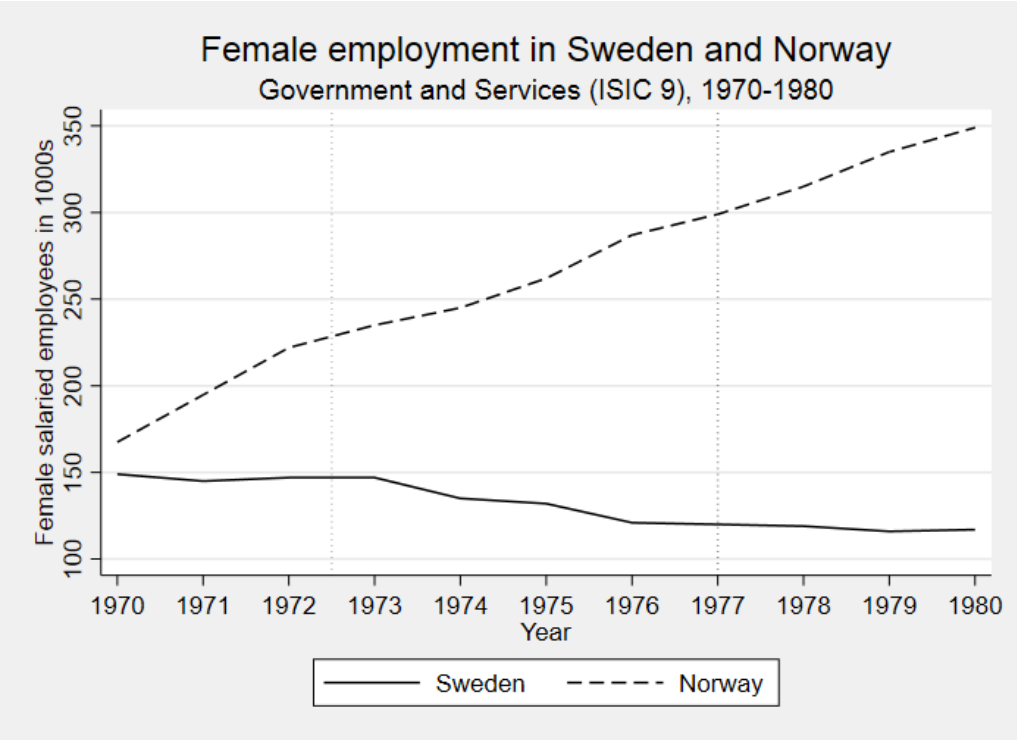

Figure 4: Female employment in Government (ISIC 9) in Sweden and Norway, 1970-1980.

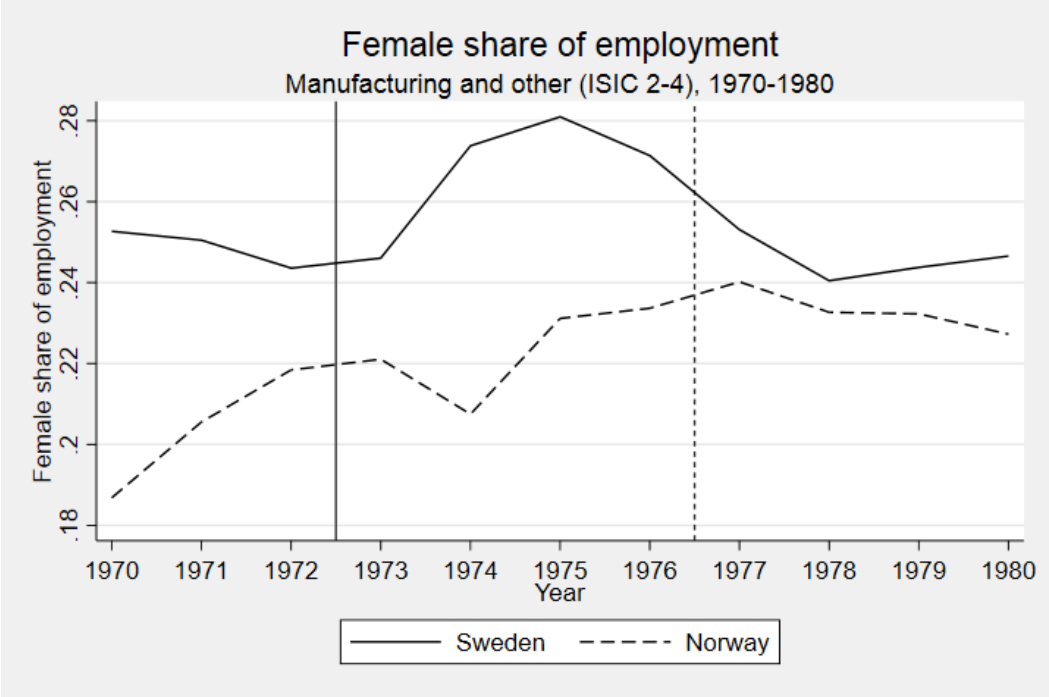

Figure 5: Share of female employment in Manufacturing and Mining (ISIC 2-4) in Sweden and Norway, 1970-1980.

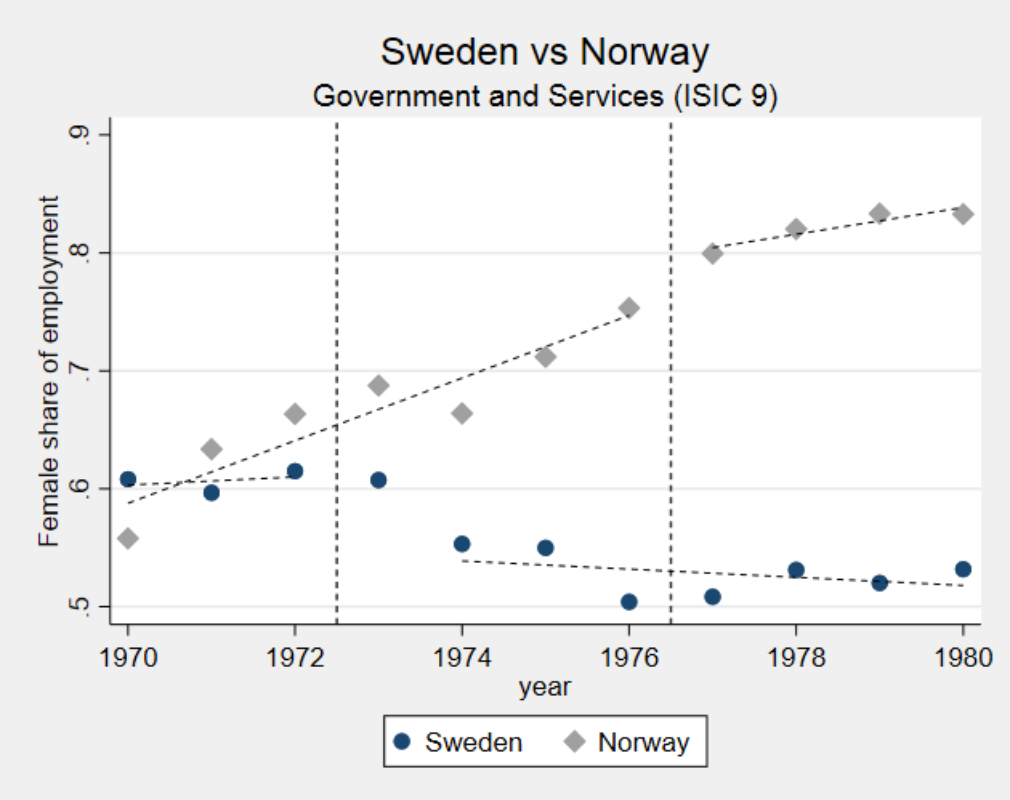

Figure 6: Share of female employment in Government (ISIC 9) in Sweden and Norway, 1970-1980.

Appendix D

Robustness checks

Table 1: Robustness checks for actual hours worked regressed on the 40-hour SWR using alternative proxies for industry fixed effects, wages and labour force.

	Actual hours worked		
	(1)	(2)	(3)
INDEPENDENT VARIABLES	Country specific industry FE	Nominal wages	Population
40-hour SWR	0.121***	-1.041***	-0.755**
	(0.0457)	(0.332)	(0.372)
Actual hours worked	0.0202		
	(0.0222)		
Log (Real wages in NOK)	0.0443		-0.312
	(0.159)		(1.153)
Labor force	-0.000220	0.00463	
	(0.000601)	(0.00535)	
Log (Nominal wages)		0.0525	
		(1.051)	
Population			-0.0137
			(0.00870)
Observations	127	127	127
R-squared	0.992	0.905	0.907
ctrl FE	yes	yes	yes
ctrl wages	yes	yes	yes
ctrl labor force	yes	yes	yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1