Working across time zones: exporters and the gender wage gap

Working across Time Zones: Exporters and the Gender Wage Gap*

Esther Ann Bøler† Beata Javorcik‡ Karen Helene Ulltveit-Moe§

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Abstract

This study argues that there is a systematic difference in the gender wage gap (GWG) between exporting firms and non-exporters. Exporters may require greater commitment from their employees, such as working particular hours to communicate with partners in different time zones or travelling at short notice, and may therefore disproportionately reward employee flexibility. If women are less flexible, or perceived as such, exporters will exhibit a higher GWG than non-exporters. This hypothesis is examined using matched employer-employee data from the Norwegian manufacturing sector for 1996-2010. The results suggest a firm's entry into exporting increases the GWG by about 3 percentage points for college educated workers. A lower overlap in business hours between the Norwegian exporter and its foreign markets and a greater need need for interactions with foreign buyers are associated with a higher GWG.

JEL: F10, F14, F16, J16.

Keywords: Exporters, Globalization, Gender Wage Gap.

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†Imperial College Business School, CEPR and CEP.

‡University of Oxford and CEPR.

§University of Oslo and CEPR.

1 Introduction

The link between globalization and income inequality has received a lot of attention in economic research as well as in the popular press. However, the debate has tended to ignore one important dimension of inequality, namely, the gender wage gap (GWG).[1] It is a well-documented fact that women earn less than men, even in relatively equal societies such as the Scandinavian countries. This is true after controlling for observable worker characteristics, hours worked and occupation, and especially so in the private sector.[2] In this paper, we set out to explore one channel through which globalization may affect gender inequality – the relationship between exporting and the GWG.

We argue that by virtue of being exposed to higher competition and doing business with partners located in faraway countries, exporters require greater commitment to work and greater flexibility of their employees. For instance, working for an exporting firm may require working particular hours and taking late night phone calls to communicate with customers in different time zones and may involve international travel arranged at short notice. The employees may be expected to be available around the clock seven days a week in case of unexpected problems with customs clearance or shipments being delayed. If women are less flexible, or are perceived as such, exporting firms will exhibit a higher GWG than non-exporters, particularly among skilled workers.

Although the relationship between internationalization, new work models and gender has received scant attention in the economics literature to date, our argument is supported by sociological studies on the impact of internationalization and competition on work organization and work practices. Kvande (2009) studies firms with a global reach and states that technology, which awards flexibility by increasing employee autonomy over time and place of work, leads to increased expectations with respect to availability via phone and e-mail and a need to adjust working hours to international business partners. Formal contracts regulating working hours appear to be replaced by moral obligations and time norms that demand total commitment.[3] Blair-Loy and Jacobs (2003) interview stock brokers, and conclude that *"the majority report that the pace of work has increased in recent years, in part due to the increased competition and new opportunities wrought by new technologies and globalization. [...] These work demands*

[1] A notable exception is the work on the impact of trade policy on gender differences in schooling (which are likely to lead to future earning differentials) in the context of India's 1991 trade liberalization. Edmonds et al. (2010) find that as the loss of tariff protection led to a relative rise in poverty in affected rural districts, families reduced investment in children's schooling with girls bearing a disproportionate share of the burden. Edmonds et al. (2009) demonstrate a similar pattern for urban districts.

[2] See Blau and Kahn (2000), Barth et al. (2017) and Goldin (2014) for overviews.

[3] An employee of a global company reported that *"[d]epending on what country he is working with, he has to adjust his time for fathering. When he was working with Malaysia he lost time with his children in the mornings, because he had to be online with their [Malaysian] time. When he is working with Austria the time with the kids in the afternoon and evening has to be adjusted to the working hours in Austria."* When asked whether he sees his job as boundless he agrees: *"Yes, and for me it is also very concrete, or physically, because wherever I go I always take my PC and my mobile phone. [...] This weekend, for example, when we were on our Sunday walk in the woods, someone phoned, and then I had to take out my PC and find out something. And with the time difference in Malaysia, which is six actually seven hours before us . . . it is obvious, isn't it, it's boundless."* (Kvande, 2009 pp. 68-69).

likely also serve as a barrier to women's entering or staying in the occupation." According to employer surveys, women are perceived as more family oriented than men, less committed to their work, and less reliable than men.[4]

To investigate the link between the GWG and exporting, we exploit a matched employer-employee data set covering the universe of joint stock firms in the Norwegian manufacturing sector and their full-time employees between 1996 and 2010.[5] The richness of the data allows us to control for observable, time-varying characteristics of the workers and firms that might otherwise confound the effects of interest. The panel structure allows us to take account of unobservable features of the worker-firm match that otherwise would bias our results. Norway provides a suitable setting for our study. It has a flexible labor market, as reflected in being ranked in the 9th place in terms of labor market efficiency in the most recent Global Competitiveness Report prepared by the World Economic Forum. It has high quality data which offer the possibility of merging the customs exports figures with the linked employer-employee information. The data are not subject to censoring of either trade activities or recorded wages, as is often the case in comparable data sets. Finally, Norway is a small, open economy with a high trade intensity.

We estimate a Mincerian wage regression controlling for a host of worker and firm characteristics. When we control for observable worker characteristics, but do not account for unobservable heterogeneity, the GWG appears to be smaller in exporting firms than in non-exporters. Hence, working for an exporting firm is associated with a smaller observed GWG. However, once we also control for unobservable heterogeneity related to the worker-firm matches, this result is reversed. We find that exporting firms exhibit a higher GWG than non-exporters with the difference between the two types of firms reaching about 3 percentage points. As expected, this effect is present only among college graduates. In other words, college educated women earn higher wages at exporting firms than at non-exporters, but they are underpaid given their unobservable characteristics. This result is robust to controlling for selection of firms into exporting with firm-year fixed effects. Firm-year fixed effect also absorb any firm-level characteristics (observed or unobserved, time-varying or not) that could confound our results, such as productivity shocks or changes to the management of the firm.

Exporters vary by size as well as complexity and geography of their operations. These are the features that are likely to affect a firm's need for commitment and flexibility from its workers. Therefore, they should matter for the GWG. We investigate the role of heterogeneity among exporters by analysing the effect of export intensity, the number of export destinations and the number of product varieties on the GWG. Again we condition on both worker-firm and firm-year fixed effects. We find that an increase in the number of export destinations, the share of output exported or the number of exported varieties are all associated with a higher GWG. To account for heterogeneity in geography, we calculate the overlap in business hours

[4]See Gislason (2007) and http://www.slatergordon.co.uk/media-centre/news/2014/08/slater-gordon-highlights-maternity-discrimination.

[5]The data set covers about 90 percent of manufacturing output in Norway in 2004.

between the Norwegian firm and its export markets.[6] Based on our hypothesis, we expect the need for client communications outside of normal business hours to matter and to depend on the geography of the firm's export markets. In line with our expectations, a smaller overlap in the business hours between the Norwegian exporter and its foreign markets is associated with a higher GWG. Since there is a negative correlation between the distance from Norway and the attitudes towards females, we check whether our results are robust to controlling for the extent of gender equality in the export market. We find that this does not seem to matter, suggesting that our results capture aspects related to physical distance and different time zones rather than the ability of females to function in the destination country.

Our conclusions are confirmed by several robustness checks. First, we show that the overlap in business hours between the Norwegian firm and its export markets has a greater impact on the GWG among workers under 45 years of age. Women in this age group are likely to have small children which limits their flexibility with respect to working hours. Thus this additional evidence is also in line with our hypothesis. Second, we show that our results hold when we control for the occupational code and when we allow the GWG to differ across occupations. Third, instead of classifying workers by their level of education we split the sample along the occupational lines. We find that the overlap in business hours matter for the GWG in the subsample of managers, professionals and technicians, but not in the subsample encompassing the remaining occupations.

A possible alternative explanation for our findings is based on Becker's theory of taste-based discrimination, which predicts that more profitable firms are better positioned to engage in costly discrimination (Becker (1957)). We conduct robustness checks to rule out that this possibility is driving our results. Namely, we show that our findings are robust to allowing the GWG to vary with firm profitability as well as other correlates of profitability, such as firm size and multinational status.

In summary, our findings suggest that firms with a larger exposure to foreign markets and thus a greater need for communications with partners located in different time zones, exhibit a higher GWG. Our findings are reminiscent of Goldin (2014) who argues that professions requiring workers to work particular hours exhibit a higher GWG. However, while Goldin (2014) draws a distinctions between different professions (lawyers versus pharmacists) and sectors (finance versus high-tech) we draw a distinction between different types of firms based on the nature of their activities. Our results add a new angle to Goldin's hypothesis by highlighting that firms requiring more temporal adaptability and more commitment from their workers exhibit a greater wage differential between men and women.

As pointed out in a recent survey of the GWG literature by Blau and Kahn (2017), both the raw and the unexplained GWG declined much more slowly at the top of the wage distribution than in the middle or the bottom part. By 2010, these female shortfalls in wages, which had

[6]For firms exporting more than one product to one market, we take the average overlap in business hours across the firm's varieties (i.e., country-product combinations).

been fairly similar across the wage distribution in 1980, were larger for the highly skilled than for others, suggesting that changes in the labour market for highly skilled workers particularly favoured men. Our findings suggest that the increasing need to work across time zones resulting from globalization may have been partially responsible for this development. The magnitude of the effects we find is non negligible when compared to the other drivers of the GWG. For instance, differences in actual labour market experience between young British men and women after 10 years in the labour market can explain no more than 6.5 of the 25 log-point gender pay gap at that point in the life-cycle (see Manning and Swaffield (2008)), as compared to our finding of the 3.2 log point female wage penalty associated with exporting. The effect we find is also sizable when compared to the impact of psychological differences between males and females which have attracted a lot of attention in the recent GWG literature.[7]

Our paper speaks to two main strands of the existing literature in economics. The first strand is the large literature on exporters and the exporter wage premium. For instance, Bernard et al. (1995) show that exporters pay higher wages than non-exporters in the US and that this wage premium goes to both production and non-production workers. More recently, the availability of matched employer-employee data has allowed researchers to examine whether the exporter wage premium is robust to controlling for various worker and firm characteristics. Among others, Schank et al. (2007), using matched employer-employee data for the German manufacturing sector, show that the wage differential becomes smaller but does not vanish once these controls are included. A study by Irarrazabal et al. (2013) on Norwegian manufacturing firms finds that exporters' wage and TFP premia fall substantially once one controls for observable and unobservable worker characteristics, suggesting that exporters attract more able workers than non-exporters. In contrast, Krishna et al. (2014) find no exporter premium using Brazilian data. A related literature explores the link between trade liberalization in the export markets and export sector wages, though its conclusions are mixed (Revenga (1997), Trefler (2004), Pavcnik et al. (2004), Goldberg and Pavcnik (2005), Goldberg and Pavcnik (2007) and Amiti and Davis (2012)).

The second strand is the large literature on the GWG. Blau and Kahn (2000) and OECD (2012) offer extensive reviews of this literature, while recent contributions include Barth et al. (2017), Card et al. (2016) and Hirsch et al. (2010). As mentioned above, of particular interest is a recent paper by Goldin (2014) who argues that the GWG is largely due to employers disproportionately rewarding individuals for labouring long hours and working particular hours. Most closely related to our paper are studies specifically on the impact of globalization on the GWG. Black and Brainerd (2004) test Becker's model of discrimination by comparing the difference in residual wage gaps between concentrated and competitive industries that were exposed to

[7]For instance, Reuben et al. (2015) measured MBA students' tastes for competition. The authors then collected data on respondents' total earnings in their first year after leaving the MBA programme and analyzed the impact of competitiveness on the GWG. They found that competitive participants earned 9.1 log points more than non-competitive ones. In addition, controlling for participant competitiveness reduced the estimated GWG in earnings by 1.2 log points (or from –0.122 to –0.110).

comparable increases in import competition. They find that the GWG narrowed more quickly in the originally more concentrated industries and interpret this result as supporting the classic prediction of Becker's theory. Juhn et al. (2014) examine how trade liberalization affects gender inequality using Mexican firm-level data. Trade liberalization induces the most productive firms to start exporting and adopt a new technology that is more modern and requires less physical strength. This improves women's labor market outcomes in the blue-collar tasks, while leaving them unchanged in the white-collar tasks. The authors use the introduction of NAFTA to test the model. They find that liberalization is associated with entry of new firms and adoption of a more modern technology at the same time as firms hire relatively more blue-collar females and increase their share of the wage bill. Finally, a theoretical contribution by Ben Yahmed (2013), based on a Melitz-type framework, predicts that trade integration widens the GWG among skilled workers.[8] To the best of our knowledge, ours is the first study directly investigating the relationship between one key feature of globalization, namely exporting, and the GWG, and doing so using matched employer-employee data.

The rest of the paper is structured as follows. The next section describes the data and the construction of our data set as well as variables. Section 3 presents the empirical model. Section 4 starts by presenting baseline results and then focuses on heterogeneity among exporters and robustness checks. Section 5 concludes.

2 Data and Measurement

2.1 Data

We have access to a rich employer-employee data set that is based on administrative registers from Statistics Norway and covers the entire working population of Norway for the period 1996-2010 with detailed information on a set of demographic characteristics like education and family.

The main source of employment and wage data for the period 1996 to 2010 is the Employee Register (AT) which holds annual records of worked hours and earned wages at the individual level. Statistics Norway links this register to the tax office database (LTO) to create a correspondence between the wage reported by the employer and those reported to the tax authorities by the individual. This joint file (ATmLTO) is a much cleaner data set and is therefore used instead of the AT register. Importantly, the recorded wages are not subject to any sort of right-censoring. In addition to information about wages at the person-firm-year level, the database includes the first and the last date of the employment spell within a given year, the total number of days worked, the municipalities in which the individual lives and works, and an indicator

[8] In her setting, men and women have the same distribution of ability but differ in their commitment levels. Firms engage in statistical discrimination which creates the GWG. Firm may choose to invest in high technology by incurring an additional cost. Complementarities between commitment/ability and technology induce exporters (which are the ones choosing to adopt the high technology) to hire more able workers and have a higher GWG among skilled workers.

for full-time and part-time employment. The ATmLTO data is then merged with time-varying demographic information about years of education, gender and the number of children, all from administrative registries at Statistics Norway.

We match the employer-employee with data on close to the universe of Norwegian manufacturing firms with detailed information on their international trade. The data set covers around 90 percent of the manufacturing output in Norway.[9] The main source of the firm-level data is Statistics Norway's *Capital database*, and contains variables such as value added, output, and employment for an unbalanced panel of all mainland joint-stock firms in the Norwegian manufacturing sector, and assigns a unique identifier to each firm. The industry classification used is the NACE Rev. 2.[10] We merge the *Capital database* with firm-level data on export values based on customs declarations. These customs data provide annual exports for all firms disaggregated by 8-digit HS product codes and destination country. Finally, we also add firm-level information on outward FDI.

2.2 Construction of the Sample and Measurement

Sample. Merging the data set for firms and employees leaves us with a panel covering the population of all mainland joint-stock manufacturing firms along with their trade, FDI and, importantly, their employees. For each worker-year combination, we assign to the worker the wage and the firm of the longest employment spell during the year. We restrict our sample to individuals who have worked for at least three months during a year. We keep only full time employees in the data set. This is done to avoid biases related to possible part time wage penalties.[11] We also restrict our sample to individuals who are between 19 and 67 years of age and to workers with at least one year of potential labor market experience. In constructing our sample we also remove outliers. To do so, we predict wages based on a simple Mincerian regression of log wages on education, experience and experience squared. See below for how the experience and education variables are constructed. We then remove observations that lie outside five times the standard error of the residual. We are left with a sample of 2,713,623 worker-firm-year observations, based on roughly 6,000 firms each year spread across 24 industries.

Wages. The outcome variable in our analysis is wages. We construct hourly wages based on information on what is referred to as cash compensation, which includes not only the basic payment but also bonuses. Non-cash forms of compensation, such as stock options and shares, are not included.

When estimating the GWG we control for a host of variables to account for observable

[9] In 2010, the manufacturing sector accounted for 26 percent of total exports, 34 percent of total goods exports and 50 percent of total mainland exports, i.e., exports excluding oil, oil-related services and ship- and platform-building. The top exporting industries within manufacturing were machinery and other equipment n.e.c.; basic metals; basic chemicals, chemical and mineral products; food products, beverages and tobacco; refined petroleum products.

[10] A list of the manufacturing industries can be found in the Appendix.

[11] It is well known in the gender wage gap literature that part-time workers have lower hourly earnings and that women are overrepresented among part-time workers, see e.g. Manning and Petrongolo (2008).

worker characteristics:

Education. We measure education using an individual's total number of years of schooling. We classify a worker as being *College* educated if the worker has 14 or more years of education, and non-college educated *(No college)* if not.

Experience. To account for work experience we use a measure of actual experience calculated from the Pension Register, and gives the actual number of years a person has been active in the labour market.[12] An alternative and often used measure of labour market experience is a person's potential experience, given by the age of the worker minus the number of years of education. However, given our focus on gender differences, we choose the actual experience to be our preferred measure of labour market experience since women typically have noncontinuous labour market histories and thus potential experience may be a poor proxy for their actual experience.[13]

Children. We include a dummy variable that is equal to one if the worker has at least one child in the year of observation, and zero otherwise. An alternative demographic characteristic would be a worker's marital status, but since cohabitation is very common in Norway also after having children, we believe a person's private life is better characterized by the *Children* variable.

Centrality. To account for geographical aspects of the location of firms and workers, we employ a centrality measure constructed by the Norwegian Institute for Urban and Regional Research (NIBR). All Norwegian municipalities are grouped into residential and labor market regions. These regions are then split into five categories along the centre-periphery axis, based on the size of the population, availability of amenities, number of jobs and distance to the nearest place categorized as central. The categories are: major cities, medium-sized towns, small towns, rural centres and periphery. We define *Centrality* variable that equals one if an individual is working in a municipality that belongs to one of the first two categories in the year of observation, and zero otherwise.

Exporter. In line with the literature, we classify a firm as an *Exporter* if the value of its total exports in the year of observation exceeds NOK 10,000 (USD 1,100). To measure the extent and complexity of exporting we use the ratio of exports to total production (*Export share),* the number of destinations to which a firm exports in a given year (*Destinations)* and the number of exported varieties (*No of varieties)* defined as the number of 8-digit HS product code-destination country combinations.

Business hour overlap. As a measure of the geography of exporting in a given year we use a weighted measure of business hour overlap. We compile data on time zone(s) for each export destination country. For countries spanning multiple time zones, we consider only mainland and use the average value. We calculate the the overlap in business hours between each destination country and Norway assuming the standard 9am to 5pm office hours. We then use information

[12]The Pension Register contains data on incomes dating back to 1967.

[13]Note however, that since employees earn pension rights also during parental leave, the registered number of years in the labour market includes these periods of leave.

on firms exports across destinations and varieties. Assuming that the need for communications with a particular country increases in the number of traded products, for each firm we take the average business hour overlap across country-product combinations relevant in a given year.

Gender gap index. We want to control for different attitudes towards women in destination countries. We therefore use the Gender Gap Index from the World Economic Forum. It pertains to 2006, and covers 115 countries.[14] The index measures gaps between men and women, rather than absolute levels of female outcomes,. Second, it focuses on outcomes rather than input measures. Third, it rewards countries for closing the gender gap, but neither rewards not penalizes countries where women have an advantage over men in certain outcomes. As with the *Business hour overlap,* we take the average of the index over all product-destination country combinations observed in a particular year.

2.3 Descriptives

In line with findings of studies from other countries, we observe that the majority of Norwegian manufacturing firms do not export. In 1996, only 34.9 percent were exporting, while in 2005, this number had risen to 38.1 percent. Figure 2 in the Appendix shows that there is also substantial heterogeneity in the share of exporting firms across Norwegian manufacturing industries.

Table 1 provides an overview of the distribution of workers between exporters and non-exporters and the average characteristics of the labour force at these two types of firms. If anything, the two types of firms appear remarkably similar with respect to observable characteristics of their labour force. However, we note that while non-exporters pay an average wage to women that is 24 percent lower than what they pay to men, exporters pay women (only) 20 percent less. Exporters on average employ workers with slightly higher education, slightly more labour market experience and workers who are slightly older, but have close to the same number of children. In line with what is observed across a wide set of countries, exporters pay substantially higher wages. The average female share in the labour force is approximately the same for exporters and non-exporters. Going beyond the table, within the group of manufacturing industries, the highest share of females among full-time employees can be found in wearing apparel (74.4 percent), followed by pharmaceuticals (50.6 percent) and textiles (43 percent).

3 Empirical Approach

We first want to investigate whether a firm's export status matters for the GWG. Then, in line with the hypothesis presented in the introduction, we want to examine whether heterogeneity across exporters with respect to the extent, complexity and geography of their operations matters for the the size of the GWG.

To answer these questions we adopt the workhorse tool from the existing literature and estimate a worker-level Mincer (1974) type wage regression. We augment it by adding a female

[14] This index was first compiled in 2005, but covered only 58 countries in that year.

Table 1: Exporters versus Non-Exporters

	Non-Exporters			Exporters		
	All	Female	Male	All	Female	Male
Average wage	105.67	84.33	110.83	129.30	108.59	134.76
Average education	12.81	12.18	12.28	12.93	12.79	12.97
Average experience	22.33	18.83	21.61	22.93	21.02	23.04
Average age	41.31	39.73	40.16	41.60	41.46	41.63
Share with Children	0.9	0.88	0.89	0.81	0.91	0.91
Average no of children	1.84	1.91	1.82	1.81	1.84	1.8
Average Centrality	0.52			0.53		
Female share in labor force	.20			0.21		
Total share in labor force	0.19			0.81		

Notes: All numbers apart from average wages are based on the panel of worker-level data for 1996-2010. Average hourly wages (in NOK) are calculated for 2001. An exporter has by definition exports above NOK 10,000 (USD 1,100).

dummy and its interaction with an indicator variable for the firm's export status. Later we will focus on measuring the extent, complexity or geography of exporting using a continuous variable. The wage equation has the following form:

$$\ln w_{ijst} = \beta_1 fem_i + \beta_2 fem_i * Exporter_{jt} + \beta_3 Exporter_{jt} + X_{it}^{'}\gamma + \varepsilon_{ijst}. \quad (1)$$

where w_{ijst} is the hourly wage of worker i employed by firm j operating in industry s at time t, fem_i is a dummy for being female, and X_{it} is a vector of observable characteristics of worker i. It includes the variables *Education*, *Experience*, *Children*, and the dummy for working in a central location (*Centrality*). As is common practice, we also include experience squared (divided by 100). *Exporter* is either a dummy equal to one if firm j is an exporter at time t or a continuous measure of its exports based on export share in sales, number of destinations, product varieties or average business hours overlap. The details on the variables and their construction were provided in Section 2.2. A statistically significant coefficient on the female dummy captures the wage gap between males and females, assuming that the included controls adequately account for differences in worker productivity. A statistically significant coefficient on the interaction term suggests that the GWG differs between exporters and non-exporters.

Estimating the impact of exporting on the GWG poses a set of challenges. To deal with these we estimate four different types of specifications that become progressively more stringent. Doing so allows us to illustrate the sources of identifying variation in our analysis.

Equation (1) contains only workers' observable characteristics. Put simply, this model compares the GWG in exporting firms to the GWG in non-exporters. Imagine, though, that exporters are concentrated in male-intensive industries (perhaps those requiring physical strength) so that the relative demand for male workers is systematically larger in exporting firms. If that

is the case, the estimate would just reflect a difference in the male-female composition between exporters and non-exporters. To address this possibility. we augment equation (1) with industry-year fixed effects (α_{st}) to account for any systematic variations in wages across industries and thus focus on within-industry variation. Thus our first specification has the followign form:

$$\ln w_{ijst} = \gamma_1 fem_i + \gamma_2 fem_i * Exporter_{jt} + \gamma_3 Exporter_{jt} + X_{it}^{'}\phi + \alpha_{st} + \epsilon_{ijst}. \quad (2)$$

But what if exporters, which tend to be the most productive firms, demand relatively more male workers, perhaps because males more frequently possess characteristics such firms find desirable. If that is the case, our estimate could simply reflect systematic differences in the workforce composition across firms. A potential solution to this issue is to focus on within-firm changes. Specifically, the GWG can be estimated by focusing on firms which switch their export status. For those firms, one would compare the change in males' wages to the change in females' wages as firms become exporters. To do that we augment our previous model with firm fixed effects (α_j). Thus our second specification is of the form:

$$\ln w_{ijst} = \delta_1 fem_i + \delta_2 fem_i * Exporter_{jt} + \delta_3 Exporter_{jt} + X_{it}^{'}\varphi + \alpha_{st} + \alpha_j + \varsigma_{ijst}. \quad (3)$$

One issue with the above model is that it compares all the females and all the males within a firm as the firm switches its export status. It is possible that as a firm becomes an exporter it modifies the composition of its workforce. Women working for exporters may be different from women working for non-exporters in ways that the econometrician cannot observe. The differential GWG observed in exporting firms could then be simply an artifact that can be explained by exporters employing different women than non-exporters. Such differences in firms' workforce could be explained by labour market sorting, where for instance, women with greater abilities and ambition seek to be employed by exporters. They can also arise if exporters are better at screening and thus employ women with higher productivity than non-exporters. Therefore, in our next specification we focus on the changes within a given worker-firm match by including job-spell fixed effects (α_{ij}) in addition to industry-year fixed effects:[15]

$$\ln w_{ijst} = \theta_1 fem_i * Exporter_{jt} + \theta_2 Exporter_{jt} + X_{it}^{'}\theta + \alpha_{st} + \alpha_{ij} + \nu_{ijst}. \quad (4)$$

When we do so, the GWG is estimated holding the within-firm gender composition constant, i.e., the gap is estimated by comparing the change in the wage of Marc to that of Melany as the firm becomes an exporter. Since no workers in our sample change gender, we drop the female dummy when including job-spell fixed effects.

In our final specification, we condition our identification on changes within the worker-firm

[15]For obvious reasons, we drop firm fixed effects.

match effects while also controlling for firm-year fixed effects (α_{jt}). The latter captures unobserved heterogeneity that may be driving selection of firms into exporting, induced firm-specific shifts in relative demand for males and females as well as potential unobservable confounders, such as, shocks to firm productivity. The female dummy and the exporter dummy drop out because they are perfectly colinear with the match-specific effect and firm-year effect, respectively:

$$\ln w_{ijst} = \sigma_1 fem_i * Exporter_{jt} + X_{it}^{'}\pi + \alpha_{ij} + \alpha_{jt} + u_{ijst}, \tag{5}$$

In all specifications, standard errors are clustered at the firm level to account for group correlation across workers within firms, as well as correlation within firms over time.[16] In what follows, we present the results from each of the four specifications.

4 Empirical Results

4.1 Exporters and the Gender Wage Gap

In Column (1) of Table 2, we present the results from estimating equation (2). They show that after controlling for education, experience and children as well as centrality of the workplace location, women earn roughly 24 percent less than men, but that this gap is lower at exporting firms (around 19 percent). Thus working at an exporter seems to have a substantial impact on closing the GWG. The estimated coefficients are statistically significant at the one percent level. Moreover, we find that working for an exporter is associated with a wage premium of about 8.5 percent. The coefficients on the other variables have the expected signs, and their magnitudes are in line with the existing literature. Both experience and education are positively correlated with wages, while having children has a negative effect.[17] We also observe that workers working for more centrally located firms tend to earn more.

Thus our first specification reveals a difference in the GWG between exporters and non-exporters. This result captures the difference in the earnings of men and women in the exporting and non-exporting firms. But, as pointed out earlier, exporters may be different from non-exporters in a number of ways. Therefore, in Column (2), we present the results based on estimating equation (3) which focuses on within-firm changes. The estimated coefficients are almost identical to those found in the first column. They are statistically significant at the one percent level and confirm that the GWG is lower in exporting firms (19 percent) than in non-exporters (23 percent).

[16] All of our results are robust to clustering at the level of individual workers.

[17] It is worth recalling at this point that *Experience* squared enters divided by 100.

Table 2: GWG: Controlling for Observables and Unobservables

	All	All	All	All	College	College	No College	No College
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female*Exporter	.058***	.054***	-.010**	-.0075#	-.032***	-.030**	-.0077	-.004
	(.007)	(.006)	(.005)	(.0046)	(.010)	(.014)	(.0054)	(.005)
Female	-.269***	-.264***						
	(.005)	(.004)						
Exporter	.082 ***	-.007 **	.006 *		.011 *		.006 *	
	(.006)	(.003)	(.004)		(.006)		(.004)	
Education	.059***	.051***	.063***	.063***	.063***	.061***	.075***	.075***
	(.002)	(.001)	(.002)	(.002)	(.008)	(.008)	(.003)	(.003)
Experience	.034***	.032***	.020***	.023***	.014	.021*	.041***	.037***
	(.000)	(.000)	(.008)	(.007)	(.011)	(.012)	(.010)	(.010)
Experience squared	-.058***	-.054***	-.055***	-.054***	-.066***	-.067***	-.051***	-.051***
	(.001)	(.001)	(.001)	(.001)	(.002)	(.002)	(.001)	(.001)
Children	-.026***	-.019***	-.066***	-.068***	-.035***	-.033***	-.083***	-.084***
	(.003)	(.002)	(.006)	(.006)	(.009)	(.010)	(.006)	(.006)
Centrality	.062***	.07***	.001	.01	.010	.011	-.003	-.006
	(.007)	(.012)	(.007)	(.006)	(.007)	(.010)	(.008)	(.005)
Industry-Year FE	Yes	Yes	Yes	No	Yes	No	Yes	No
Firm FE	No	Yes	No	No	No	No	No	No
Spell FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	No	No	No	Yes	No	Yes	No	Yes
Obs	2,713,623	2,713,623	2,713,623	2,713,623	553,611	553,611	2,160,012	2,160,012
R-squared	.40	.47	.75	.83	.81	.89	.70	.80

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Standard errors in parentheses clustered on firm. ***= p-val<.01, ** = p-val<.05, * = p-val<.1, # = p-val<.11

As the women working for exporters may be different from women working for non-exporters, in Column (3) we present the results from estimating equation (4) which includes job-spell fixed effects. A job spell is defined as a unique worker-firm combination. This estimation strategy uses variation coming only from firms changing their export status, holding all worker- and match-specific time-invariant effects constant. In this way, we circumvent the problem of endogenous mobility, and we are are able to account for firm-specific unobservable characteristics at the same time. As these fixed effects will account for all time-invariant heterogeneity of the workers, we are not able to identify the overall GWG using this methodology. As before, we also include sector-year fixed effects.

These results tell a very different story than the ones presented so far. The coefficient on our interaction term $Female * Exporter$ is statistically significant at the five percent level, but it now bears a *negative* sign. In other words, when we account for unobservable heterogeneity specific to the worker-firm match, we find that the GWG is *larger* in exporting firms than in non-exporters. This suggests that the observable characteristics that we included in our previous regressions did not capture all the relevant aspects of a worker's productivity and the quality of the worker-firm match and that exporters do indeed hire more "able" workers, in terms of unobservable characteristics. Once these unobservable characteristics are taken into account, there is a wage penalty for women working in exporting firms, equal to about one percentage point. We also find an exporter premium of 0.6 percentage point, which is in line with the other studies based on linked employer-employee data.

In our final and preferred specification, we replace industry-year fixed effects with firm-year fixed effects. In this way, we control for firm-specific time-varying shocks that may be responsible for self-selection of firms into exporting on top of controling for the worker-firm match. As visible in Column (4), the coefficient of interest remains negative and statistically significant at the 11 percent level (p-value of .103). Again we find a female wage penalty of about one percentage point.

Taking all these results together, we conclude that although women working for exporting firms earn higher wages than women employed by non-exporters, they are underpaid relative to college educated men given their unobservable characteristics.

College Educated Workers vs Workers without College Education Next we split the sample into two subsamples: college educated and non-college educated workers and estimate the wage regressions for each subsample separately. We focus on the two most stringent specifications described in equations (4) and (5). Our hypothesis about exporters demanding more flexibility and commitment applies particularly to college educated workers. Therefore, we expect to see a differential effect between exporters and non-exporters in terms of the GWG for this sub-sample.

As can be seen in Column (5), the GWG differential between exporters and non-exporters is much higher in the subsample of college educated workers than in the other subsample.

Table 3: Exporter descriptives

	Mean	Median	Min	Max
Export share	0.18	0.04	<0.01	1
Business hour overlap	7.01	7.67	0	8
No of destinations	7.31	3	1	146
No of varieties	24.88	6	1	4,126

Notes: All numbers are based on the panel of firm-level data for 1996-2010. An exporter has by definition exports above NOK 10,000 (USD 1,100). A variety is defined as product-destination combination. <0.01 denotes export share below 1 percent.

The estimated coefficient of interest is statistically significant at 1 percent level and suggests a 3 percentage points higher GWG among college educated women in exporting firms relative to non-exporters. Controlling for firm-year fixed effects in Column (6) has little impact on the estimates. This contrasts sharply with the results in Columns (7) and (8) estimated on the subsample of workers without college education, where the coefficient of interest is much smaller in magnitude and does not reach conventional significance levels. The latter finding is not surprising as our hypothesis about exporters requiring their workers to work particular hours to communicate with customers in foreign markets is unlikely to apply to production workers.

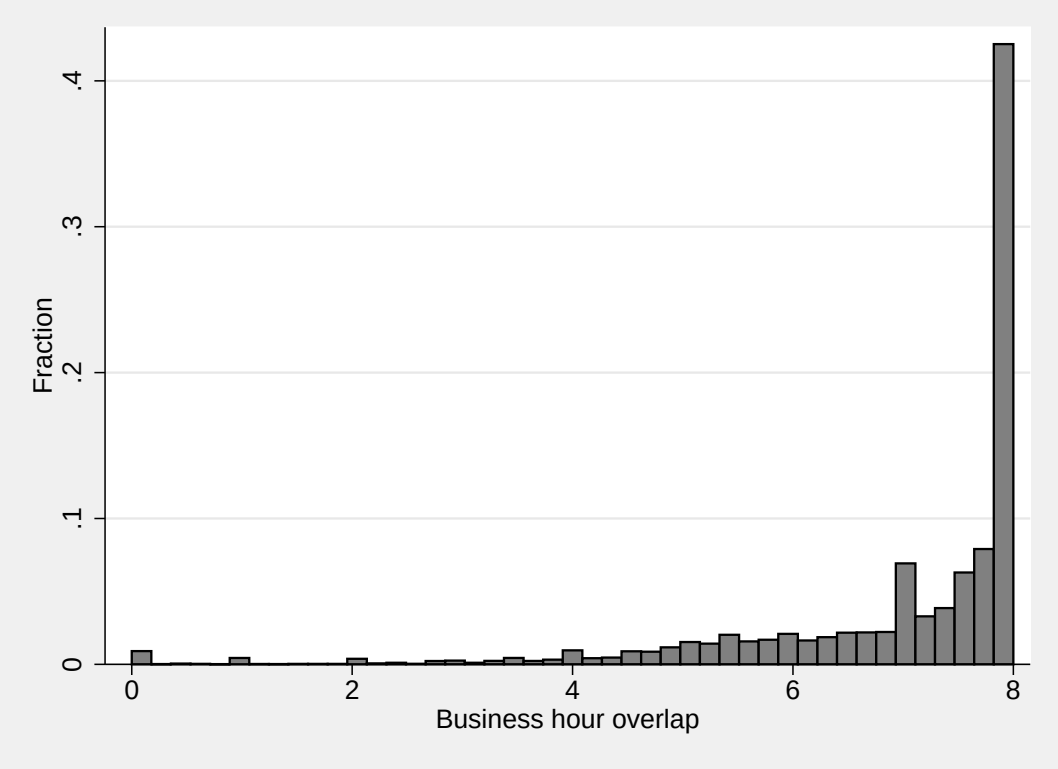
4.2 Exporter Heterogeneity and the Gender Wage Gap

So far our analysis has focused on the differential gender wage gaps between exporters and non-exporters. However, exporters themselves are not a homogenous group. Exporters vary according to the extent to which they rely on exports rather than domestic sales. They also differ with respect to the complexity of their operations which is reflected in the number of export destinations and the number of product varieties exported (a product variety is defined as the product-destination combination). As visible in Table 3, there is quite a lot of heterogeneity among exporters. The median exporter exports four percent of its sales, serves three export destinations and supplies six varieties. There are, however, exporters serving just one foreign market and those serving 146 markets. Similarly, the sample includes exporters supplying one variety as well as those with 4,126 varieties. There is also quite a lot of variation in the business hour overlap, which ranges from 8 hours to zero, with 7.67 being the mean value and quite many values found inbetween (see Figure 1).

4.2.1 Size and Complexity of Export Operations and the Gender Wage Gap

Exporting a larger share of output or supplying a larger number of destinations will typically require more interactions with foreign customers. The same will most likely be true of exporting a larger number of products, because there is a positive relationship between the number of products supplied to a market and the number of buyers (see e.g. Carballo et al. (2013)).

Figure 1: Business hours overlap



Therefore, we would expect bigger and more complex export operations to be associated with a larger GWG.

We now set out to investigate the role of heterogeneity among exporters in the GWG. We estimate our preferred and most stringent specification on the subsample of firms that are exporters in the year of observation allowing the GWG to differ with the continuous measures of exports: (i) the share of output exported; (ii) the number of export destinations; (iii) the number of exported varieties (where a variety is defined as a product-country combination).

The results in Table 4 are supportive of our hypothesis. We find that the GWG increases as each of the three measures of export intensity increases. The estimated coefficients of interest are statistically significant at the five percent level when the analysis focuses on college educated workers. Interestingly, we also find similar, albeit smaller in magnitude and less robust, evidence for workers without college education. Focusing on the college educated workers, an increase in the export share of 10 percentage points is associated with the GWG going up by 13 percentage points. Adding four additional export markets leads to the GWG going up by five percentage points. Finally, adding ten additional export varieties means an 8 percentage point increase in the earning differential between men and women. Hence, our results suggest that the magnitude and the complexity of the export operations matters for the GWG and the bigger and more complex operations are associated with a greater the GWG.

Table 4: GWG: Accounting for heterogeneity among exporters

	College (1)	College (2)	College (3)	No College (4)	No College (5)	No College (6)
Female*Export share	-.014**			-.011		
	(.007)			(.011)		
Female*Destinations		-.013**			-.007*	
		(.006)			(.003)	
Female*Product varieties			-.009**			-.006**
			(.004)			(.002)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	454,063	494,601	494,601	1,620,597	1,712,387	1,712,387
R-squared	.88	.88	.88	.79	.80	.80

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Only workers employed by exporting firms are included. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1

4.2.2 The Geography of Exporting and the Gender Wage Gap

If our hypothesis that the need for working particular hours translates into a higher GWG holds, then it is not just the number of markets that should matter but also their location. In particular, as argued earlier, what should matter is the overlap in business hours. With a smaller overlap the chances are that the interactions with customers will need to take place either before or after the standard office hours. Taking early morning or late night phone calls makes it more difficult for employees to keep the balance between their personal life and professional commitments. Moreover, a larger time difference means longer travel time required to visit the market in question and thus the need to be away from home for a longer time period. If women shy away from such duties, or are perceived as being less able or less willing to accommodate them, the GWG should increase as the business hours overlap goes down.

To test the hypothesis that where you export matters for the GWG, we generate a measure of business hour overlap based on the destination markets of the firm. As argued above, the need for communication with customers is likely to increase with the number of exported varieties. Therefore, we specify the overlap in business hours for each product-destination country combination and take an average over all varieties the firm is exporting in a given year.

Table 5 presents the estimation results from a model where we interact the log of the business hour overlap with the female dummy. The estimated coefficient on this interaction term is positive and statistically significant for college educated workers (see Column (1)) but – in line with expectations – not for workers with less education (see Column (4)). A four-hour decrease in the business hour overlap is associated with the GWG increasing by 11 percentage

Table 5: GWG: Exporting and business hours overlap, I

	All Workers					
	College	College	College	No College	No College	No College
	(1)	(2)	(2)	(3)	(4)	(4)
Female*ln Business hours overlap	.028*		.033**	.001		.001
	(.015)		(.015)	(.009)		(.009)
Female*ln Gender index		-.014	-.082		.006	.012
		(.099)	(.102)		(.048)	(.052)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	493,736	494,601	493,177	1,708,945	1,709,121	1,705,848
R-squared	.88	.88	.88	.80	.80	.80

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Only workers employed by exporting firms are included. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1

Table 6: GWG: Exporting and business hours overlap, II

	Workers under 45 years of age					
	College	College	College	No College	No College	No College
	(1)	(2)	(3)	(4)	(5)	(6)
Female*ln Business hours overlap	.042**		.049**	.005		-.036
	(.020)		(.021)	(.012)		(.080)
Female*ln Gender index		-.027	-.129		-.030	-.036
		(.124)	(.133)		(.074)	(.013)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	327,973	328,142	327,559	1,028,554	1,028,674	1,026,584
R-squared	.88	.88	.88	.81	.81	.81

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Only workers employed by exporting firms are included. Standard errors in parentheses clustered by firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1

points for college educated women.

One may be concerned that the business hour overlap is capturing societal attitudes, such as the position of women in the society in the export destination, instead of just purely reflecting the time zones where a firm's customers are located. It is possible that it is harder for female employees of Norwegian exporters to do business in countries where women's rights are restricted or women have a lower social status. Countries where this is typically known to be the case are typically far away from Norway and will thus have small business hour overlap. If so, our results could simply be reflecting lower effectiveness of female employees due to the lack of willingness among the firms' foreign partners to do business with women, rather than the need for working outside the standard office hours due to time zone differences.

To address this concern we control for attitudes towards women and gender equality at the export destinations of each Norwegian exporter. To to so we use the Gender Gap Index which is compiled by the World Economic Forum and pertains to year 2006 (see Section 2.2 for more information about the index). The value of the index relevant to each exporter is calculated in a way analogous to the business hour overlap. We first show that there is no systematic relationship between the the Gender Gap Index relevant to each exporting firm and the GWG in that firm (see Column (2)). In other words, we show that an interaction term between the female dummy and the index is not statistically significant in either subsample. Then in Column (3) we show that the relationship between the business hours overlap and the GWG is robust to allowing for the GWG to differ with the gender inequality index in the export markets. Controlling for the Gender Gap Index actually increases the significance level of the business hour overlap variable.[18]

Our results suggest that where you export matters. The smaller the overlap in business hours the greater the GWG. Regardless of whether this can be related to women being less flexible in terms of availability around the clock or whether this is about employers perception of this being the case, we may expect younger women (who are likely to have young children) to be more affected than older women. As fertility decisions are not exogenous, we restrict our attention to workers of both genders under 45 years of age and re-estimate the specifications from the previous table on this subsample. When we focus on the college educated workers (Columns (1) - (3) in Table 6), as expected, we find that a lower business hour overlap is associated with a higher GWG differential among workers under 45 than in the population of workers. The estimated magnitudes are economically meaningful. A two-hour decline in the business hour overlap increases the GWG by 10 percentage points in the subsample of college-educated workers under 45 and by 6.7 percentage points among all college-educated workers. As before, we find no statistically significant relationship for workers without college education.

In Table 7, we conduct a series of robustness checks starting with the subsample of college educated workers. First, we split the Children dummy into a dummy for having one child and a

[18]Not logging the business hour overlap or the Gender Gap Index leads to the same conclusions. See Appendix Table 10.

dummy for having more than one child. Doing so has next to no impact on the estimation (see Column (1)). Second, we address the potential concern that firms may preferentially promote men to managerial roles as they enter more export markets (or more distant markets which tend to be more demanding). We do so by controlling for occupational fixed effects. As information on the worker occupation is available only starting in 2003, doing so cuts our sample size in half. Nevertheless, the coefficient of interest increases slightly in mangitude and remains statistically significant at the five percent level. In Column (3), we allow for the GWG to differ within occupations by additionally including interactions of occupational dummies with the female dummy. These additional controls have no impact on the estimates. In Columns (4) through (6), we present the estimates for the subsample of workers without college education. As before, we fail to find a statistically significant relationship between the business hour overlap and the GWG for workers without college education.

According to our hypothesis, doing business with partners located in different time zones will affect workers who interact with foreign customers in order to negotiate contracts, coordinate deliveries, prepare billing or provide technical and other post-sales support. It will also affect workers who deal with foreign customs, tax and regulatory authorities. Put differently, our hypothesis pertains to non-production workers. We use college education as a proxy for identifying non-production workers. In the Appendix Table 11, we use an alternative way of defining non-production workers by focusing on the three occupational groups. These are managers, professionals, technicians and associate professionals. Using this alternative split leads to very similar findings. We find that a lower overlap in business hours is associated with a higher GWG among managers, professionals, technicians and associate professionals. The coefficient of interest is statistically signficiant and very similar in magnitude to our baseline results. In the subsample of the remaining occupations, we do not find a statistically significant relationship.

4.3 Other Considerations

One limitation of our study is the inability to control for overtime work. Unfortunately, our dataset, which includes all employees in the manufacturing sector, does not include information on overtime hours. Although the difference in the overtime work between men and women is a possible explanation for our results, it is worth noting that overtime work is not very widely spread. The Norwegian Labour Force Survey, which is based on a small subset of workers, reports that only 11.9 percent of all full-time employees had done any overtime work in 2013 (similar figures for other years). The Norwegian Working Environment Act is explicit about not allowing firms to use overtime on regular basis. Rather overtime is viewed a measure to be used in unusual circumstances. According to the law "work in excess of agreed working hours must not be taking place unless there is an exceptional and limited need for it." There are also strict limits on number of overtime hours per week, month and year.

Finally, we turn to a possible alternative interpretation for our baseline findings of a higher GWG among exporting firms. Becker's (1957) theory of taste-based discrimination predicts

Table 7: GWG: Exporting and business hours overlap: Robustness

	All Workers					
	College	College	College	No College	No College	No College
	(1)	(2)	(3)	(4)	(5)	(6)
Female*ln Business hours overlap	.033**	.039**	.039**	.001	-.001	-.002
	(.015)	(.015)	(.015)	(.009)	(.017)	(.017)
Female*ln Gender index	-.082	-.128	-.128	.014	.027	.028
	(.101)	(.134)	(.134)	(.053)	(.070)	(.070)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Controlling for 1 versus 2 children	Yes	No	No	Yes	No	No
Occupation FE	No	Yes	Yes	No	Yes	Yes
Occupation*Female FE	No	No	Yes	No	No	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	493,177	288,444	288,444	1,705,848	888,713	888,713
R-squared	.88	.89	.89	.80	.82	.82

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010 in Columns 1 and 4 and for 2003-2010 in the remaining ones. Only workers employed by exporting firms are included. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. *** = p-val<.01, ** = p-val<.05, * = p-val<.1

that only very profitable firms can afford to discriminate. As exporters are more profitable than other firms, they may be *better* positioned to engage in costly discrimination against women. In other words, Becker's theory would lead to the same prediction of a higher GWG among exporters, but its interpretation would be different.

To address this alternative explanation we augment our model by allowing the GWG to differ with firm profitability, measured as the log of profits divided by the operating income.[19] We also allow it to differ with firm size, measured as logged employment, and which in the Melitz (2003) framework is positively correlated with profitability. Finally, we account for its multinational status, as is known to be highly correlated with profitability.

As evident from Table 8, doing so does not affect our results. As before, we find that a lower business hour overlap is associated with a larger GWG for college educated workers. The magnitude of the effect and its significance level is the same as those found in Table 5. This is true regardless of whether we control for the Gender Gap Index. As for the additional controls, they do not appear to be correlated with the GWG, with the exception of firm profitability. The results suggest that the GWG is higher in more profitable firms, which is in line with Becker's theory.

[19]The *Profitability* variable is missing for approximately 22 percent of the sample. Instead of dropping these observations, we add a dummy for missing *Profitability* in all the specifications where *Profitability* is included.

Table 8: GWG: Alternative explanations

	College (1)	College (2)	College (2)	No College (3)	No College (4)	No College (4)
Female*ln Business hours overlap	.028*		.034**	.001		.001
	(.015)		(.015)	(.009)		(.009)
Female*ln Gender index		-.014	-.082		.006	.012
		(.099)	(.102)		(.048)	(.053)
Female*Profitability	-.000	-.000	-.000	-.002**	-.002**	-.002**
	(.001)	(.001)	(.001)	(.005)	(.001)	(.001)
Female*MNC	-.002	-.002	-.002	.002	.002	.001
	(.008)	(.008)	(.008)	(.006)	(.006)	(.006)
Female*ln Size	-.004	-.003	-.004	-.008	-.008	-.008
	(.008)	(.008)	(.008)	(.005)	(.005)	(.005)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	493,736	494,016	493,177	1,708,945	1,709,121	1,705,848
R-squared	.88	.88	.88	.80	.80	.80

Notes: Dependent variable is log wage. *MNC* is a dummy that equals one if the firm is registered as having a positive ownership share in a firm located in a foreign country in the year of observation, and zero otherwise. Estimates are based on the panel of worker-level data for 1996-2010. Only workers employed by exporting rms are included. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1

5 Conclusions

We hypothesize that exporters, by virtue of doing business with customers located in remote markets and different time zones, disproportionately reward flexibility and availability round the clock of their employees. If women are less able to accomodate such demands, or are perceived as such, exporting firms will exhibit a larger GWG. Due to the different nature of work carried out by college versus non-college educated workers, we expect this to be true in particular for white collar workers.

We test our hypothesis using matched employer-employee data from the Norwegian manufacturing sector for the 1996-2010 period. The richness of the data allows us to control for unobservable employer-employee match heterogeneity as well as for unobservable firm-year shocks. As expected, we find that for college educated workers exporting firms have on average a 3 percentage points higher GWG than non-exporters. Further, we exploit the fact that there is substantial heterogeneity among exporters with respect to the magntitude and complexity of exports. We show that the GWG increases with the share of output exported, the number of markets served and the number of export varieties. Exporters also differ with respect to the

geography of the markets that they are supplying. A priori we would expect the handling of far away destinations in different time zones to be more demanding. To investigate this we account for the average overlap in business hours a firm faces across export destinations. This allows us to test and confirm our hypothesis that the GWG is related to the need for communications outside the standard business hours in the home country. This result proves to be robust to controlling fordifferences in gender inequality and female rights across destination countries. Our hypothesis is further supported by sub-sample results showing that the magnitude of the effect is larger for workers in their child bearing years.

Our results demonstrate another, perhaps somewhat unexpected, channel through which firms' internationalization affects income inequality. Building on Goldin (2014) one may thus argue that the last chapter of gender convergence is not only about certain sectors but also about certain firms and the need for making sure that the gains from trade are distributed in such a way that they reduce rather than enhance inequalities.

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A Appendix

A.1 Manufacturing Industries

Table 9: NACE Rev. 2

NACE code	Industry name
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, except furniture
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
22	Manufacture of rubber and plastic products
23	Manufacture of non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
31	Manufacture of furniture
32	Other manufacturing
33	Repair and installation of machinery and equipment

Figure 2: Share of Exporters across industries (2005)

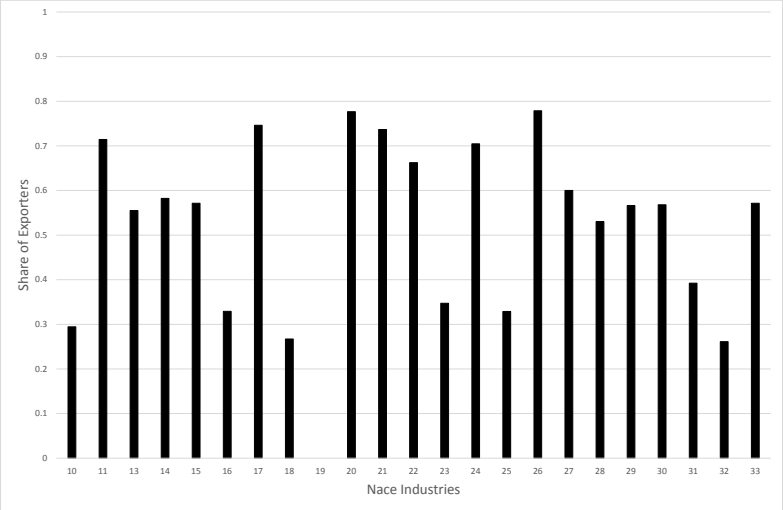

Table 10: GWG: Exporting and business hours overlap, Alternative specification

	All Workers					
	College	College	College	No College	No College	No College
	(1)	(2)	(2)	(3)	(4)	(4)
Female*Business hours overlap	.005*		.006**	.000		.000
	(.003)		(.003)	(.001)		(.002)
Female* Gender index		-.023	-.132		.006	.009
		(.136)	(.141)		(.065)	(.072)
Worker Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spell FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	494,575	494,601	494,601	1,712,218	1,709,121	1,705,848
R-squared	.88	.88	.88	.80	.80	.80

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1

Table 11: GWG: Exporting and business hours overlap: Alternative split

	All Workers	
	Managers & Professionals & Technicians	Other Occupations
	(1)	(2)
Female*ln Business hours overlap	.032*	.002
	(.018)	(.016)
Female*ln Gender index	-.011	-.025
	(.096)	(.079)
Worker Controls	Yes	Yes
Spell FE	Yes	Yes
Firm-Year FE	Yes	Yes
Obs	353,725	791,022
R-squared	.89	.80

Notes: Dependent variable is log wage. Estimates are based on the panel of worker-level data for 1996-2010. Only workers employed by exporting firms are included. Standard errors in parentheses clustered on firm. Worker controls include education, experience, experience squared, children and centrality. ***= p-val<.01, ** = p-val<.05, * = p-val<.1