

PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO



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DEPARTAMENTO DE ECONOMIA
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THE GENDER WAGE GAP, FLEXIBILITY AND FIRMS:
EVIDENCE FROM BRAZILIAN EXPORTERS

Maria Oaquim de Medeiros

No de Matrícula: 1610948

Orientador: Gustavo Gonzaga

Co-orientadora: Cristina Terra

Novembro 2019

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Declaro que o presente trabalho é de minha autoria e que não recorri para realizá-lo, a nenhuma forma de ajuda externa, exceto quando autorizado pelo professor tutor

Maria Oaquim de Medeiros

As opiniões expressas neste trabalho são de opinião única e exclusiva da autora

Acknowledgements

First, I would like to thank my advisor, Gustavo Gonzaga, for all the great support with this thesis and throughout all the economics course. I am very grateful for all the advices, opportunities and motivation over the last years.

I am also very thankful to Cristina Terra, my co-advisor, for all the assistance with the research and for being a role model of a strong and brilliant female economist.

I thank my parents who always supported me and were essential in my formation as a person, basing our relationship always on affection, fondness and dialogue.

For being an immense source of love and affection, I thank my grandparents.

I thank Professor Claudio Ferraz for inspiring me with his research. His seminars and papers helped me to fall in love with applied microeconomics.

I also thank Professor Rogério Werneck for always being very kind to me and for his amazing analysis of Brazilian Economy every PET meeting.

I am very grateful to all my teachers and coordinators of *Escola Parque* for developing an educational project that encourages critical thinking and a broad worldview.

I would like to thank all my friends that helped me in my undergraduate path. I thank Daniel for all the extensive talks on this thesis topics and for helping me designing the tables. I thank Henrique and Caetano for all the discussions we have in important issues for a better world. I thank Victor Hugo for being a really supportive friend. I thank my female economists' friends – Maria, Renata, Renata, Helena– for persisting with me in this course and for contributing to change the (still) very masculine economics field.

Finally, I would like to thank all my female friends for persisting, believing and fighting for gender equality.

Abstract

Medeiros, Maria Oaquim de; Gonzaga, Gustavo (Advisor); Terra, Cristina (Co-Advisor). **The Gender Wage Gap, Flexibility and Firms: Evidence from Brazilian Exporters.** Rio de Janeiro, 2019, 52 p.– Departamento de Ciências Econômicas, Pontifícia Universidade Católica do Rio de Janeiro

We explore how both dimensions of job inflexibility – from *occupations* and *firms* – impacts the Gender Wage Gap (GWG) in Brazil. If women demand more flexibility than men, maybe because of paid-work time competing with household chores and childcare, she could avoid working in inflexible occupations or firms with requirements of long hours of work. Also, women could be penalized in wages if she work less hours in occupations with high elasticities of wages in respect to total hours worked. Under the hypothesis that exporters require more hours worked and more commitment from their workers, as they are subjected to more competition in international markets, we explore how this possible “shock” to a firm’s job inflexibility affects the GWG when the worker’s firm start exporting. We document a significant 18,6% increase in the GWG. This thesis also provide evidence of how occupational inflexibility impacts differentially women’s wages. Our results are consistent with a bigger GWG the more inflexible the occupation. However, this effect is less pronounced –and even reversed–for college educated workers. We hypothesize that this is due to richer women outsourcing household chores and childcare. Finally, we explore both dimensions of job inflexibility trough the analysis of how occupational inflexibility affects the GWG differently in exporting and non-exporting firms. The results are associated with the GWG in more inflexible occupations being bigger in exporting firms compared to non-exporters.

Keywords

Gender Wage Gap; Flexibility; Exporters.

Resumo

Medeiros, Maria Oaquim de; Gonzaga, Gustavo (Orientador); Terra, Cristina (Co-Orietadora). **The Gender Wage Gap, Flexibility and Firms: Evidence from Brazilian Exporters. Rio de Janeiro, 2019, 52 p.**— Departamento de Ciências Econômicas, Pontifícia Universidade Católica do Rio de Janeiro

Exploramos como as duas dimensões de inflexibilidade do trabalho— por parte de ocupações e de firmas – impacta no Diferencial Salarial de Gênero (GWG, na sigla em inglês) no Brasil. Se mulheres demandam mais flexibilidade do que homens, o que pode ser devido ao trabalho remunerado competir com tarefas domésticas e cuidado com crianças, elas poderiam evitar trabalhar em ocupações inflexíveis ou em firmas com exigências de longas horas de trabalho. Além disso, as mulheres podem ser penalizadas em forma salarial caso trabalhem menos horas em ocupações com altas elasticidades de remunerações em relação ao total de horas trabalhadas. Sob a hipótese de que firmas exportadoras exigem mais horas trabalhadas e mais comprometimento de seus trabalhadores, pois estão sujeitos a maior concorrência nos mercados internacionais, exploramos como esse possível "choque" à inflexibilidade no trabalho de uma firma afeta o Diferencial Salarial de Gênero quando a empresa do trabalhador começa a exportar. Documentamos um aumento significativo de 18,6% no GWG. Esta tese também fornece evidências de como a inflexibilidade ocupacional afeta diferentemente os salários das mulheres. Nossos resultados são consistentes com um GWG maior quanto mais inflexível a ocupação. No entanto, esse efeito é menos presente - e até revertido - para os trabalhadores com nível superior. Nossa hipótese se baseia em mulheres mais ricas terceirizando as tarefas domésticas e os cuidados com as crianças. Finalmente, exploramos as duas dimensões da inflexibilidade no trabalho analisando como a inflexibilidade ocupacional afeta o GWG de maneira diferente nas empresas exportadoras e não exportadoras. Os resultados são consistentes com um maior GWG para ocupações mais inflexíveis sendo maiores nas firmas exportadoras em comparação com as não exportadoras.

Palavras-Chave

Diferencial Salarial de Gênero; Flexibilidade; Exportadoras.

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1. Introduction

Despite the growing body of literature on the Gender Wage Gap, we still lack evidence on trends and potential explanations for this phenomenon in the Brazilian context. Recent developments in the area shed light on the importance of gender differences in the demand for job flexibility (Goldin, 2014; Mas and Pallais, 2017; Wiswall and Zafar, 2017; Bøler et al., 2018). As women are still regarded as the primarily responsible for child care and household chores, jobs that requires long hours of work and inflexible schedules could be incompatible with these others “duties”.

In an influential paper, Goldin (2014) explores the relationship between the GWG and how different *occupations* reward employees that work more and in particular hours. As certain occupations demands workers to perform some tasks that are difficult to find a close substitute, working less hours in these inflexible occupations could provide a greater wage penalization in respect to hours worked. As women work less hours in paid jobs, especially after the arrival of children (Noonan et al, 2005; Bertrand et al. (2010); Kleven et al. 2019), part of the remaining unexplained gender pay gap could be attributed to women demanding more flexibility than men.

Through the analysis of the differential GWG between Norwegian exporting and non-exporting firms, Bøler et al. (2018) highlights that *firms* activities and requirements could also impact the job demand for flexibility. Because exporting firms are subjected to more competition in international markets, it could require more hours worked and more commitment from their workers. Also, making business with foreign customers could lead employees to work in particular works, for example, when they need to make late-night phone calls due to costumers located in different time-zones.

In this thesis, we aim to investigate the impact of *firm* and *occupational* inflexibility on the Gender Wage Gap. We firstly explore the impact of firm activity through the angle of the export activity. To that purpose, we use linked employer-employee data from Relação Anual de Informações Sociais (RAIS) matched with export data to investigate the differential GWG between Brazilian manufacturing exporting and non-exporting firms. We document

that women are underrepresented in manufacturing exporting firms compared to non-exporters – 26% vs 29% –and the share of female in managerial occupations is significantly lower for exporting firms– 20.4% compared to 30,6% in non-exporting firms. This last finding suggests that women could be facing a more significant *Glass Ceiling* when a firm is engaged in the export activity. Regarding differential earnings, we document a significant 18,6% higher Gender Wage Gap in exporting firms under the specification, based on Bøler et al. (2018), that controls for worker-firm match heterogeneity and endogenous selection into export activity.

Next, we explore how occupational inflexibility impacts the GWG using detailed information on job characteristics from O*NET online data. Similar to Goldin (2014), we construct an *Index of Inflexibility* based on the average of five normalized flexibility characteristics. Firstly, we document that controlling for occupational inflexibility reduces the unexplained portion of the GWG – from 31,9%, to 29%. Then, we explore how the GWG varies with occupational inflexibility: in all our four specifications –OLS, Firm Fixed Effects, Individual Fixed Effects, Two-Way Fixed Effects– more inflexible jobs are associated with higher earnings for both men and women, but the Gender Wage Gap is increasing the more inflexible is the occupation. Further, we show that inflexibility impact more non-college educated women compared to skilled female workers, a result that could arise because richer women may afford market substitutes for household chores and child-care.

The demand for flexibility approach that we are particularly interested is how *firm* and *occupational* inflexibility could both affect the Gender Wage Gap. It could be the case that a worker is employed in an inflexible occupation but the *firm* provides some amenities that are more “family-friendly”. Also, we could observe that even in an exporting firm –that are bigger, more productive and exposed to international competition– the employee works in an occupation that do not present inflexible characteristics such as rigid schedules, time pressure, constant contact with others etc. In order to explore this dual dimension of inflexibility, we test if working in an inflexible occupation provides a bigger penalty on the GWG in exporting firms– where firm activities may require more time adjustability and commitment from their worker– compared to non-exporters. In all specifications, even controlling for firm and worker observed and unobserved heterogeneities, the GWG in more inflexible occupations is bigger in exporting firms.

In summary, our results are consistent with both channels of job inflexibility – from occupations and firm activity–impacting the GWG. Even though we have evidenced that occupation inflexibility impacts more negatively the GWG in exporting firms, working for an exporter could impact the GWG through other means besides inflexibility. It could be the case that exporting firms are more lucrative and thus –according to Becker’s model of taste based discrimination (Becker, 1957) –more capable to discriminate. However, exporting firms are exposed to international competition and, according to the same model, those competitive forces could reduce discriminatory practices because the least-discriminatory employers would have lower production costs. Another channel could be through the existence of an exporter-premium combined with differential rent-sharing by gender. Neither there is evidence on the existence of exporter-premium in Brazil (Khrisna et al. 2014), nor there is conclusive evidence on rent-sharing among Brazilian firms (Martins and Esteves, 2006). Although previous evidence do not strongly support these alternative means, they need further investigation.

Related Literature. This thesis contributes to two strands of the Gender Wage Gap literature. The first is how the demand for flexibility impacts the GWG. In addition to the above mentioned Goldin’s (2014) work on different occupational elasticities of earnings due to hours worked, Bertrand et al. (2010) and Noonan et al. (2005) analyses the evolutions of earnings of ex-students in elite US programs that pursues careers in the most inflexible occupations: business and law. Both studies show a pattern of similar earnings right after graduation but an enormous evolution of the gap to more than 50% at 10 to 15 years post-graduation. They document that labor interruptions and lower hours worked, especially after the arrival of children, are the main drivers of these gaps. In a study more related to child penalties on the GWG, Kleven et al. (2019) documents that the trajectories of both gender earnings, hours worked and labor market participation are very similar until the arrival of the first children, when they start to differ sharply. They show that the GWG increases to 30% in the first years following the birth of the first child and stabilizes at 20% ten years after. The authors argue that children affects gender differences in the labor market because women start favoring family amenities over wages. Women’s probability of becoming a manager falls with motherhood and they switch more to “family-friendly” firms. Besides childcare,

household chores could also be competing with work time. Pan and Cortes (2019) test if the availability of more affordable substitutes for home production reduces the gender pay gap. Exploring variation on low-skill immigration to the US, they find that low-cost market substitutes for household chores increases the probability of women working more hours. Thus, the GWG in more inflexible occupations –that have bigger elasticities of wages due to hours worked– decreases. Also, their results suggests that more affordable home services allows women to change to more inflexible occupations. Regarding Brazilian workers, Mattar (2018) finds that children decreases the probability of holding a non-domestic job in the formal sector only for non-college educated women. He suggests that this is associated with lower willingness to pay for flexibility among high skilled workers in the presence of a market childcare.

Mas and Pallais (2017) provides experimental evidence on how women are willing to pay to more flexible schedules. They show that women, particularly mothers of young children, value more working from home and relatively dislike more irregular schedules. In another study evaluating willingness to pay for flexibility, Wiswall and Zafar (2017) conduct a research with NYU undergraduate students offering different job options that varies in possible earnings, future wage growth, probability of dismissal and work hours flexibility. The authors find that women are willing to give up 7,3% of their salaries to have more flexibility regarding hours worked (as the possibility of working part-time) compared to 1,1% for men. Women are also more willing to pay for jobs that offer more stability (4% of lower wages compared to 0.6% for men), while man are more willing to give up of their wages (3.4%) for jobs that offers more earnings growth (vs insignificant estimates of 0,6% for women). They show that these reported preferences are in line with workplaces characteristics of former students four years after graduating and estimates that the early career GWG would be reduce at least in a quarter if workplace preference were equal for men and women.

In the earlier cited paper exploring *firms* activities and the demand for flexibility, Bøler et al (2018), finds a bigger GWG – on the magnitude of 3 p.p. – in exporting firms, but this effect is only present among college graduated workers. To test in which extent the *firm* requirements, as communication with foreign costumers, affects differently men and women, they investigate if the GWG is higher when the Norwegian firm exports to markets where

there is a small overlap of hours – due to different time-zones. The results are consistent with the hypothesis of firm specific inflexible demands impacting the GWG. Further, the effect is more pronounced for women under 45 years old, that is, in the age range where the probability of having a small children is higher.

The second strand is related to the impact of firm heterogeneity on wages and, more specifically, on the GWG. If there is a segregation of women in bad firms, or simply firms with different pay policies, this could lead to a persistent wage gap (Cardoso et al. 2012). Since the seminal work of Abowd, Kramarz and Margolis (1999), there is a growing body of literature investigating how different firms rewards differently very similar workers (see Card et al. (2018) for a review). The literature of rent-sharing investigates how firm-specific productivity could lead to different wages through, for example, workers bargaining for higher earnings. Another explanation is related to job-search and matching literature where firms have incentives to offers higher wages to attract better workers. It could also be the case that firms are able to set salaries because the worker values firm's non-wages characteristics.

Besides the growing evidence on firm's impact on wages, few studies investigate how firms could impact the Gender Wage Gap. Card et al. (2016) highlights two explanations of how firm's specific premiums could impact the GWG: a *sorting* and a *bargaining* channel. The first explanation impacts gender inequality because women are underrepresented in higher wages firms, while the second arises because women earn less firm-specific wage premiums compared to their male colleagues. The authors finds evidence that both channels impact the GWG, but the *sorting* plays a bigger role. Morchio and Moser (2019) finds that 46% of the residual Gender Wage Gap in Brazil is between firms. This result sheds light on the importance of considering how the relative concentration of women in lower-paying firms impacts the gender earning inequality. It is possible that women value non-wage characteristics of a firm, as more flexibility, and that could lead to a *sorting* effect where women have lower mobility through higher paying firms.

Outline. This thesis is organized as follows. Section 2 describes the data and presents descriptive statistics related to gender, firms and the export activity. Section 3 presents the

empirical strategy and results for the analysis of differential GWG in exporting firms, while in Section 4 we investigate occupational flexibility and its heterogeneities between exporters and non-exporters. Finally, section 5 concludes.

2. Data

2.1 Sample

In this thesis, we use the RAIS (Relação Anual de Informações Sociais) dataset provided by the Ministry of Economy. RAIS is a longitudinal matched employer-employee dataset, which covers the universe of formal employees and firms in Brazil. We then merge RAIS with exporting data provided by Brazilian Customs Office (Secretaria de Comércio Exterior- SECEX).

For the following analysis, we consider the sample of workers in the 25-54 years range, between the years of 2003 and 2016, working in the private manufacturing sector. In addition, we only keep full-time jobs (more than 35 hours worked per week) held for a period longer than 3 months in a year. We then restrict for the job relative to the highest average real monthly earnings. Also, we do apply some filters to the data as dropping all firms and sectors without valid identification, non-positive real average wages and observations where the firm size (number of workers in a certain establishment) is reported as 0.

We are then left with a sample of 66,150,262 observations composed of 16,045,695 workers over 452,471 firms and 24 sectors.

2.2 Construction of Variables

Log Wage is the outcome variable of our estimation measured as the log of average real monthly earnings

Female is a *dummy* variable that is equal to 1 if the worker is a women

Schooling is a measure of education based on categorical variables for the final educational levels (Incomplete Elementary School, Incomplete High School, Incomplete College and Complete College)

Tenure measures the duration in months of the worker's contract.

Experience is a vector composed of the experience of a worker in the same firm, same sector and the experience in any formal job during the period of analysis

Exporter is a *dummy* variable that indicates if the worker is employed in a firm that exported a positive value in a given year.

Export Value is a categorical variable in the firm level related to the total value of exporters (measured in dollars) in a year.

Hours is a continuous variable that measures the Contractual Weekly Hours.

Black is a *dummy* variable related to the worker's race informed by the employer. The variable is equal to 1 if the worker is declared as Black or Pardo (mixed race) and 0 otherwise.

State is a categorical variable that refers to where the job is held.

Firm Size is a categorical variable related to the number of workers in a given firm by year.

Sector is a variable related to the Sector of Activity following CNAE 2.0 (Código de Classificação Nacional das Atividades).

Time Exporting is a continuous variable related to the total years that a firm was continuously exporting.

2.3 Descriptive Statistics

2.3.1 Firms and Export Activity

We begin analyzing the relationship between manufacturing firms in the Brazilian formal sector and the export activity. In our sample, 10,827 firms were exporting in 2003, while in 2016 this number rose to 11,479. However, during the period of analysis, the share of exporting firms fell from 7.4% in 2003 to 6.8% in 2016. It is also interesting to observe how both the total and share of exporting firms in the manufacturing sector varied highly, as shown in Figure 1 and Figure 2, respectively.

Figure 1.



Figure 2.

The average proportion of manufacturing exporting firms in our dataset is 6.6%. Our data shows that this variation in the number of exporting firms is consistent with firms changing their export status during the years of observation. Among firms that exported at least one year during the period of 2003-2016, they changed, on average, their export status 2 times. The average continuous time exporting was 4.18 years, while accounting for non-continuous years exporting results in a mean of 4.5 years.

Figure 3 shows that nearly 30% of manufacturing exporting firms only continuously exported for one year¹ during the period of analysis, whereas only 3.5% were exporting during all years of our sample. If we do also account for non-continuous time exporting, the

¹ One could think that this pattern is biased by the fact that firms were active before 2003 and we are not capturing the export activity in the previous years. In order to investigate this, we also calculate the time exporting restricting our data for the years 2006 to 2013. The results shows a similar share of firms exporting for only one year.

proportion of firms exporting only one year falls to 25.6%, but it still much larger than the ratios associated with longer years of exporting, as illustrated by Figure 4.

Figure 3.

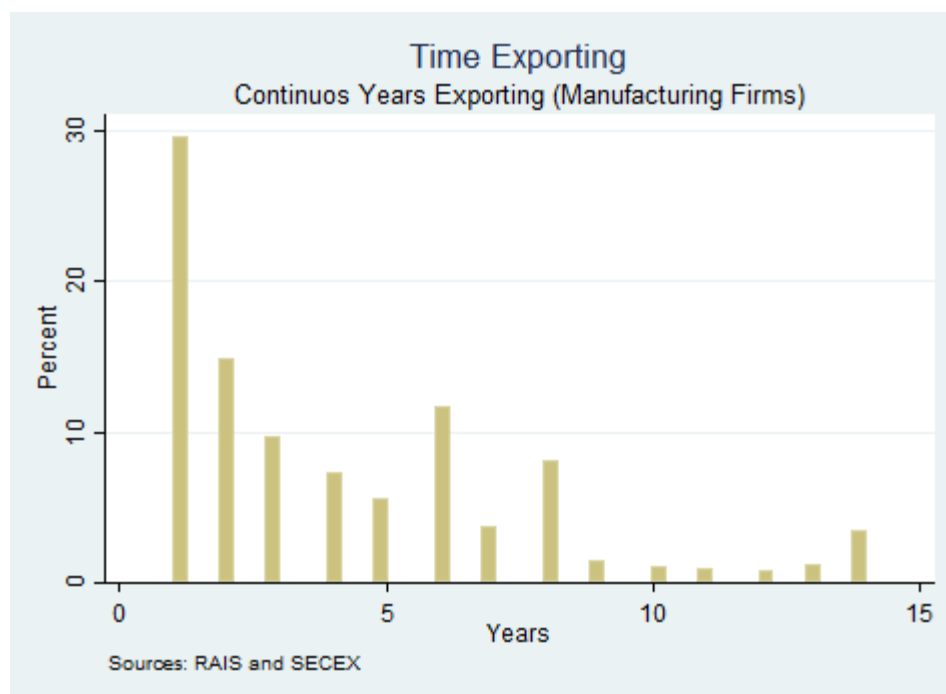
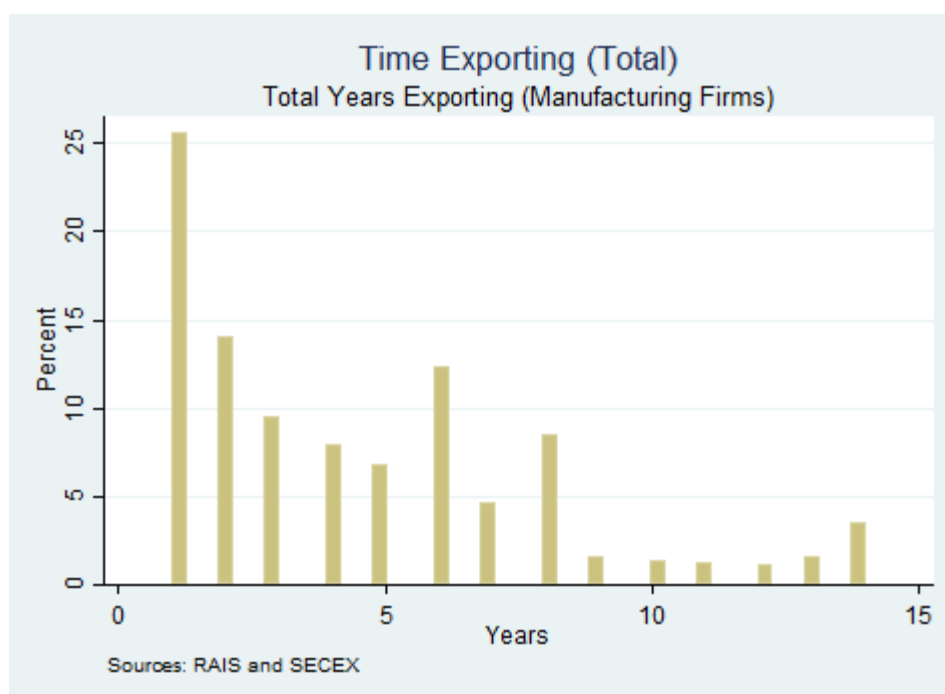


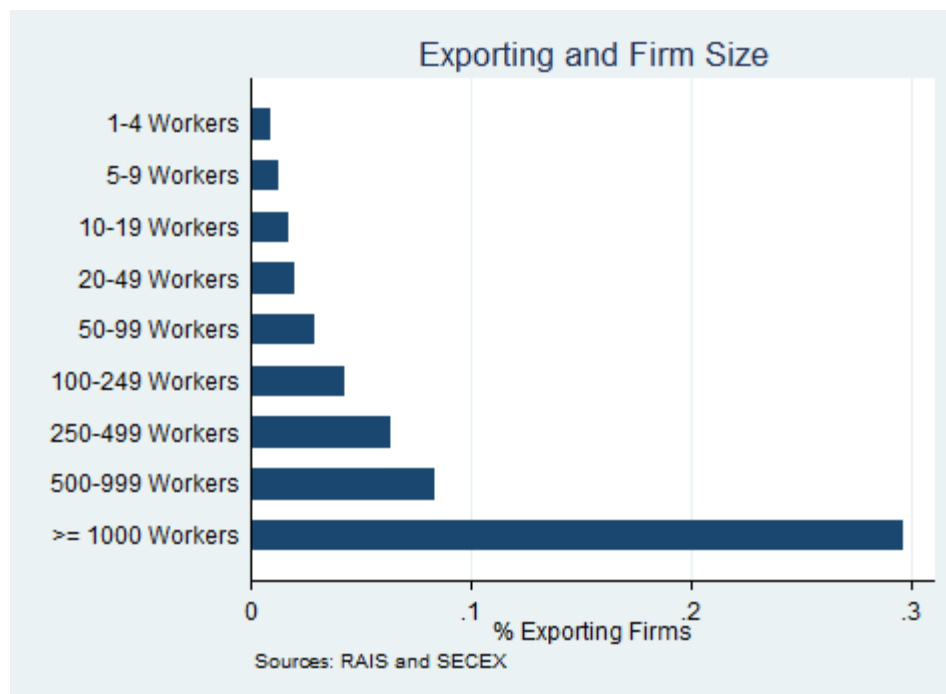
Figure 4.



Moreover, it is interesting to observe how these proportions vary by firm size. Among firms with more than 1,000 workers, 5.4% exported during the 14 years of analysis and 19.4% of them only exported continuously for one year. On the other hand, in the group of manufacturing firms with less than 1,000 workers, the proportion of firms that exported all the years of analysis was only 0.85%, while 44.5% continuously exported for just one year, as depicted by the appendix 1 and 2.

The firm size, measured by number of workers, is also strongly related to export activity among manufacturing firms, as illustrated by figure 5. For those with more than 1,000 workers, the ratio of exporting firms by year was, on average, 29,6%, while, in the group of firms with less than 1,000 employees, the proportion of exporters was only 2,8%. Furthermore, among firms that were exporting in a given year, on average, 61,9% had more than 1,000 workers. Hence, our statistics are consistent with manufacturing export activity being mainly exercised by the biggest firms.

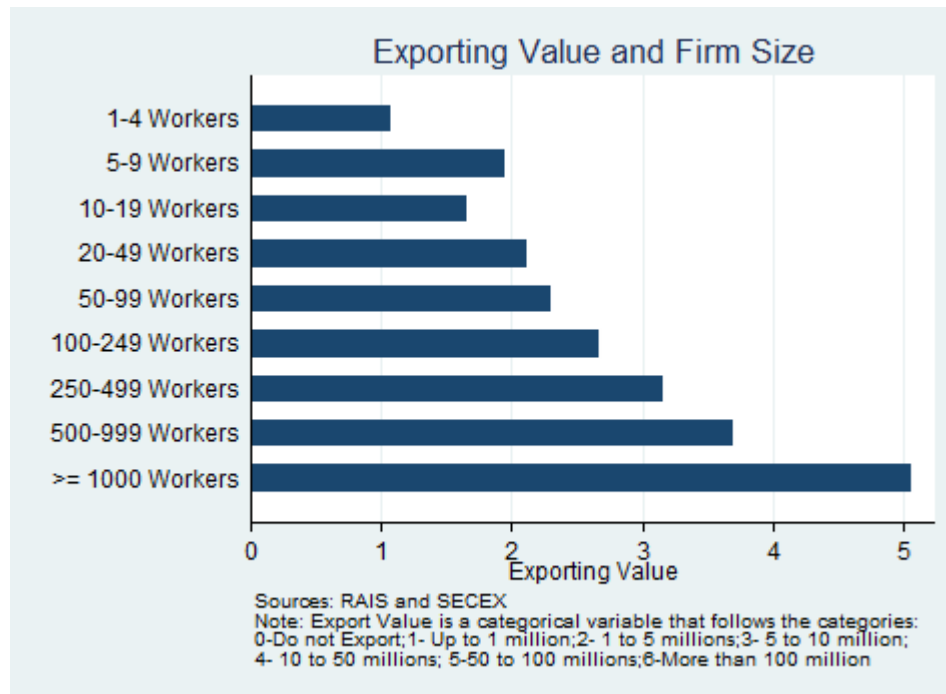
Figure 5.



In addition, the biggest manufacturing firms export more in value, as illustrated by figure 6. Among firms with more than 1,000 workers, the average value of the categorical variable is associated with the band of 50 up to 100 million dollars in value of exports by year while for those with less workers, the corresponding band is of 1-5 million dollars. Accounting for all exporting manufacturing firms in a given year, the average value of the export value categorical variable is equivalent to a range of 10-50 million dollar.

Summarizing our findings, the majority of the Brazilian exporting manufacturing firms are large firms in terms of worker employed. Also, biggest firms do export more, measured by value of exporting, and for a longer period.

Figure 6.



2.3.2 Gender and Exporters

Table 1 presents some summary statistics differentiating by both gender and exporter. Firstly, it is interesting to notice that, despite the low proportion of exporting firms among the manufacturing sector, they are responsible for half of the aggregate employment in those industries. This result is consistent with manufacturing exporting firms being bigger than non-exporter in this sector. The comparison between columns (2) and (6) shows that, on average, exporting firms pay better than non-exporters (R\$ 2321,27 vs R\$ 1247,87), their workers are employed at the firm for a longer period (64.76 months vs 40.78 months) and they have a higher share of employees that completed college (12.83% vs 4.35%). Moreover, they employ less black (30% vs 34%) and female workers (26% vs 31%) than the non-exporters.

We do observe that both the raw Gender Wage Gap and the pay gap adjusted to hours worked are bigger when a firm is involved in the export activity. While exporters pay, on average, 35% less to women compared to men, non-exporting firms presents a GWG on the order of 30%. Accounting for differences in contractual hours, the GWG do not change for non-exporting firms (30%), but marginally increases for exporters (36%). Nevertheless, women do work slightly more than their male colleagues in exporting firms (43.61 hours vs 43.35 hours), while no difference is observed for the non-exporters. Yet, it is important to highlight that we are only provided with information on contractual hours, limited to 44 hours per week by the Brazilian legislation. As employees usually work more than the maximum established by law, especially in more demanding and less flexible jobs, we may not be considering all the variation on working hours. Further, if women demand more flexibility and, thus, do less “extra time” on job compared to men, the *habitual* hours worked could be favoring male wages.

Regarding the experience on work, measured by the variable *tenure*, we observe a more significant gender gap between exporters (22% in exporting firms vs 12% in non-exporting firms). Women working in exporting firms are, on average, slightly younger than men (35 years vs 36 years), but no major difference is observed in the average age of workers in non-exporters (both 36 years). The percentage of black workers in exporting firms is 27%

for women and 31% for man, while in non-exporting firms the share of black employees vary more by gender (29% for women and 37% for men). Women are more qualified than men, as described by a higher frequency of graduated women in both exporting (15.4% for women vs 11.9% for men) and non-exporting firms (6% vs 3.6%). Nonetheless, the ratio of gender differences among graduated workers is much bigger for non-exporting firms.

Table 2 presents the distribution of gender between the Managers and Directors of exporting and non-exporting firms. As illustrated, the share of women in higher occupations inside a firm is much smaller for the exporters – 20.4% compared to 30,6% in non-exporting firms – thus suggesting a more significant *Glass Ceiling*² when a firm is engaged in the export activity.

In addition, Table 2 also shows the gender heterogeneity among Managers and Directors by firm size. Smaller firms do present a larger share of women in managerial occupations – 27.6% for exporters and 34,1% for non-exporters. Further, exporting firms with more than 1,000 workers do show an even bigger gender gap in those positions, with only 20.1% females in managerial occupations. One possible explanation involves bigger exporting firms being more lucrative and thus, according to Becker's model of taste based-discrimination (BECKER, 1957), in a better position for discriminating. Alternatively, it could be the case that women demands more flexibility than men and managerial occupations, especially in a bigger firm, are more demanding in terms of total hours worked or being available in particular hours (GOLDIN, 2014). As pointed by Bøler et al. (2018), exporters may request working for particular hours, especially if customers are in different time-zones. Those particular characteristics of the qualified work in an exporting firm can turn the job less attractive to women.

² The term refers to the underrepresentation of women in the upper part of the earnings distribution (BERTRAND, 2017)

Table 1: Descriptive Statistics by Gender and Export Status

	Total Sample		Exporter			Non-Exporters			
	All (1)	All (2)	Female (3)	Male (4)	Female/Male (5)	All (6)	Female (7)	Male (8)	Female/Male (9)
Mean Real Avg Wage	1783.1 (2340.7)	2321.3 (2949.9)	1657.0 (2240.4)	2558.1 (3130.7)	0.65	1247.9 (1303.5)	962.1 (923.9)	1376.5 (1423.4)	0.70
Average Hourly Wage	9.5 (12.7)	12.4 (16.0)	8.8 (12.2)	13.7 (17.0)	0.64	6.6 (6.9)	5.0 (4.9)	7.2 (7.6)	0.70
Average Hours per week	43.6 (1.3)	43.4 (1.6)	43.6 (1.3)	43.4 (1.7)	1.0	43.9 (0.89)	43.9 (0.75)	43.9 (0.94)	1.0
Average Tenure (in months)	52.7 (62.4)	64.8 (71.5)	53.5 (59.8)	68.8 (74.8)	0.78	40.8 (48.9)	37.4 (43.8)	42.3 (50.9)	0.88
Average Age	35.8 (7.9)	35.7 (7.8)	34.9 (7.4)	36.0 (7.9)	0.97	35.9 (8.0)	35.8 (7.8)	36.0 (8.1)	1.00
Share Black	0.32 (0.47)	0.30 (0.46)	0.27 (0.45)	0.31 (0.46)	0.87	0.34 (0.47)	0.29 (0.45)	0.37 (0.48)	0.78
Share Female in Labour Force	0.29 (0.45)	0.26 (0.44)				0.31 (0.46)			
Share Contracts in Exporting Firm	0.50 (0.50)								
Less Than Elementary	24.3%	22.3%	21.2%	22.7%	0.93	26.3%	20.4%	28.9%	0.71
Less Than High School	24.1%	19.3%	19.4%	19.3%	1.0	28.8%	28.7%	28.8%	1.00
Less Than Graduate	43.1%	45.6%	44.1%	46.1%	0.96	40.6%	44.9%	38.7%	1.2
Graduated	8.6%	12.8%	15.4%	11.9%	1.3	4.3%	6.0%	3.6%	1.7
N	66150262	32983029	8669690	24313339		33167233	10291550	22875683	

Sources: RAIS and SECEX

Table 2: Gender Share among Managers and Directors by Export Status and Firm Size

	Total Firms		Firms with less than 1000 workers		Firms with more than 1000 workers	
	Exporter	Non-Exporter	Exporter	Non-Exporter	Exporter	Non-Exporter
Female	20.4%	30.6%	27.6%	34.1%	20.1%	26.8%
Male	79.6%	69.4%	72.4%	65.9%	79.9%	73.2%

Sources: RAIS and SECEX

3. The Gender Wage Gap and Exporters: Methods and Results

3.1. Empirical Strategy

The empirical specification aims to investigate to what extent working for a firm that exports impacts on the Gender Wage Gap. For this purpose we follow a strategy similar to Bøler et al (2018). Firstly, we estimate an OLS regression based on the following model:

$$\ln w_{ijst} = \beta_0 + \beta_1 Female_i + \beta_2 Exporter_{jt} + \beta_3 Female_i * Exporter_{jt} + \beta_4 Race_i + \beta_5 Firm Size_{jt} + X'_{it} \gamma + \sum_{t=2004}^{t=2016} D_t * \tau_t + \varepsilon_{ijst} \quad (1)$$

Where $\ln w_{ijst}$ is the logarithmic of real average wage of worker i employed by firm j , working for the industry s at the year t . X' is a vector with observable characteristics of the worker i at time t as age, age squared, education, contractual hours worked, state where the job is held, tenure, experience in sector and in any formal job held between the years of analysis. Further, we added a dummy variable to control for race/color and a categorical variable in order to control for the firm size. We did also include dummies for 13 years of our panel ($\sum_{t=2004}^{t=2016} D_t * \tau_t$). Assuming that we are correctly controlling for workers productivity, the female dummy captures the Gender Wage Gap, while the Exporter dummy should capture the “Exporter-Premium”, a wage premium associated with working for an exporting firm. The interaction between female and exporter is the coefficient that measures the extent to which the GWG varies between exporting firms and non-exporters.

However, not accounting for unobservable characteristics could bias our estimators. Thus, in specification (2) we add firm fixed effects (α_j) in order to control for firms unobserved heterogeneity that may affect both exporting and wages. As pointed by

Woodcock (2008), the firm FE account for persistent different in compensations between firms that could emerge as a result of different productivity, product market conditions and compensation policies. While adding firm fixed effects, we are restricting our analysis to within-firms variation. In other words, we are investigating how wages vary by gender when a firm changes its export status.

$$\ln w_{ijst} = \beta_1 Female_i + \beta_2 Exporter_{jt} + \beta_3 Female_i * Exporter_{jt} + \beta_4 Race_i + \beta_5 Firm Size_{jt} + X'_{it}\gamma + \alpha_t + \alpha_j + \varepsilon_{ijst} \quad (2)$$

In specification (3), we account only for worker's fixed effects (α_i), while in specification (4) we do add both firm and worker FE. We report them separately in order to observe how our coefficients vary by adding each of these fixed effects. The workers fixed effects absorb unobserved heterogeneity between the individuals in our dataset as their abilities, motivation, personality traits and preferences (FOGUEL, 2016). In the following models we are unable to measure the overall GWG, as gender is a time- invariant characteristic.

$$\ln w_{ijst} = \beta_1 Exporter_{jt} + \beta_2 Female_i * Exporter_{jt} + \beta_3 Firm Size_{jt} + X'_{it}\gamma + \alpha_t + \alpha_i + \varepsilon_{ijst} \quad (3)$$

Since the seminal work of Abowd, Kramarz and Margolis (1999), various papers in the literature on wage determination includes both workers and firms fixed effects in their models. In a recent paper, Card et al. (2018) highlights the findings of several studies that estimates two-way fixed effects: while still individual effects account mostly for wage inequality, firm effects explain from 15% up to 25% of the variance of wages. Therefore, we estimate the following model:

$$\ln w_{ijst} = \beta_1 \text{Exporter}_{jt} + \beta_2 \text{Female}_i * \text{Exporter}_{jt} + \beta_3 \text{Firm Size}_{jt} + X'_{it} \gamma + \alpha_t + \alpha_i + \alpha_j + \varepsilon_{ijst} \quad (4)$$

Under the assumption on “conditional exogenous work mobility” the above mentioned AKM approach will provide unbiased estimators. This assumption requires that the match between workers and firms depends solely on the individual and firms characteristics included as controls in our model and on firm (α_j), worker (α_i) and year fixed effects. Thus, the expected conditional value of the error term in each year should attend the following hypothesis:

$$E(\varepsilon_{ijst} | \alpha_i, \alpha_j, X'_{it}, \text{Firm Size}_{jt}, \alpha_t) = 0$$

Khrisna et al. (2014) test the hypothesis of conditional exogenous work mobility for Brazil using the same match employer-employee dataset of this present thesis. Under RAIS data, they strongly reject this assumption. Therefore, our results of estimation (4) could be biased by work-firm match unobservable heterogeneity.

Labor market sorting could be explaining why women working in exporting firms are different in several unmeasured characteristics than female working for firms that do not export. If a positive assortative matching occurs, exporting firms, that are, on average, bigger and more productive (ARAÚJO, 2014) than non-exporters, could be employing more ambitious, dedicated and able women. Another possible explanation for a better worker-firm match at exporting firms is provided by Khrisna et al. (2014). They argue that high productive firms, as exporters, could be screening more intensively because of complementarities among firm productivity and worker ability.

Woodcock (2007) argues that a work-firm (α_{ij}) fixed effect, also called job-spell (or match) fixed-effect, could capture production complementarities between workers and firms that cause match-specific earning variations not captured when we add worker FE and firm FE separately. In order to manage this problem, we add the job-spell fixed-effects (α_{ij}) in

specification (5), thus focusing on firms that changes its export status but maintains their gender-composition.

$$\ln w_{ijst} = \beta_1 \text{Exporter}_{jt} + \beta_2 \text{Female}_i * \text{Exporter}_{jt} + \beta_3 \text{Firm Size}_{jt} + X'_{it} \gamma + \alpha_t + \alpha_{ij} + \varepsilon_{ijst} \quad (5)$$

In our final specification (6), we circumvent the problem that arises from the endogeneity of the firm's decision to export. If unobserved heterogeneity is correlated to both wages and selection into exporting, our results could be biased. Thus, we add firm-year fixed effect (α_{jt}) that is able to control for firm-specific time-varying shocks, as shocks to firm productivity, or even firm-specific changes in the relative demand for one gender (Bøler et al., 2018).

$$\ln w_{ijst} = \beta_1 \text{Female}_i * \text{Exporter}_{jt} + \beta_2 \text{Firm Size}_{jt} + X'_{it} \gamma + \alpha_{ij} + \alpha_{jt} + \varepsilon_{ijst} \quad (6)$$

In each specification with fixed-effects, the standards errors were clustered in the firm level in order to avoid correlation within firms over time and across workers within firms (Bøler et al., 2018).

3.2. Results

The first column (1) of Table 3 reports the results of estimation (1). ³They show a large and significant (at 1% level) Gender Wage Gap of about 29,7% and an Exporter

³ We ran all this thesis' regressions for a 20% random sample, stratified in the match level, due to computational unfeasibility of working with approximately 60 million observations. Balance tests corroborates that our sample is consistent with the full dataset.

Premium of 19,2%. The statistically significant coefficient on the interaction between *Female* and *Exporters* show us that the GWG is bigger in exporting firms, around 33,4%. The age is positively correlated with wages, but this effect is decreasing as the individual gets older, as shown by a negative coefficient in the age squared. Less consistent with the literature, the coefficient associated with hours worked reports a negative impact on wages. However, that can be due to the fact that we are only able to control for contractual hours, thus not accounting for “extra-time” on job. The coefficient associated with race/color reports a negative correlation between black workers and wages, which could be associated with racial discrimination.

As previously discussed, the differential GWG by exporting status could arise because specification (1) do not account for unobserved heterogeneity that affects wages and might be correlated with the export status. Although lower in magnitude, the results of estimation (2), reported in the second column of Table 3, still show a negative and statistically significant coefficient on the interaction term. Once we control for firm time-invariant heterogeneity, both Exporter-Premium and the Gender Wage Gap in Non-Exporting Firms are lower- 2,6% and 20,5%- respectively. In this specification, the Gender Wage Gap for exporting firms is about 24%.

In column (3) we report the coefficients related to the third model presented at the Empirical Strategy subsection. When we control solely by worker fixed effects, the Exporter Premium is bigger in magnitude when compared to the specification with firm FE (2), suggesting that firm-heterogeneity that impact wages could be correlated with the export activity. Hence, not accounting for those differences could lead us to overestimate the Exporter-Premium. The Gender Wage Gap in exporting firms remains 1,1% bigger compared to non-exporting firms, but the difference is smaller than in previous specifications. As gender is a time-invariant characteristic, we are not able to estimate the overall gender pay gap in model (3).

The estimation (4), based on a Two-Way Fixed Effect regression, reports a significant but small differential Gender Wage Gap for exporting firms- the coefficient is associated with a 0,5% bigger GWG when a firm is involved in export activity. By this specification, we have a small but significant exporter premium of about 1,1%. As we debated in the

empirical specification section, those results may be biased because the hypothesis of conditional exogenous work mobility is not valid in the Brazilian labor market.

The coefficient on the interaction between *Female* and *Exporter* in the specification (5) is significantly bigger in magnitude than in previous specifications. This suggests that when we account for the job-spell fixed effects - and thus controlling for unobservable heterogeneity specific to the worker-firm match - the GWG is 17.2% bigger for exporting firms compared to non-exporters. The exporter premium rises to 6.6%,⁴ suggesting that exporting firms have a better match than non-exporters. In our final specification (6), when we add the firm-year FE in order to control for firm-specific time-varying shocks that could be affecting the selection of firms into the export activity, the differential GWG for exporters is even bigger in magnitude- 18,6%. This considerable difference regarding the magnitude of the interaction coefficient when we add the job-spell fixed effects is consistent with the quality of worker-firm match being bigger for women that switch to exporting firms compared to female workers in non-exporting firms.

The differential GWG could arise because the exporters demands several characteristic of their workers that, on average, vary by gender. As we debated in previous chapters of this thesis, there is evidence that women demand, on average, more flexibility than men. That difference could arise because of differential *occupational* flexibility characteristics, as pointed by Goldin (2014). Also, that could be due to *firm-specific* requirements, as more demanding jobs in terms of hours worked, productivity and working for particular hours. When a firm is involved in the export activity, this demand for flexibility could be systematically different than non-exporter's, as exporting firms are, on average, more productive, exposed to more quality requirements and requests that some workers make constant contact with foreign customers. In order to evaluate to which extent the flexibility demands affects the GWG, firstly, we will focus on *occupational* characteristics. Then, we

⁴ It is worth mentioning that the "Exporter Premium" could be biased because the selection of firm into export-activity might be endogenous. Although we circumvent this problem in specification (6), our last strategy is not able to capture the "Exporter-Premium", because is based on a firm-year fixed-effect. To estimates in an unbiased manner, the strategy should rely on exogenous variation that impacts the selection of firms into exporting. As the estimation of the "Exporter-Premium" is not the purpose of this thesis, we do not pursue another strategy in order to estimate it correctly.

will turn to an examination of how the occupational inflexibility affect the Gender Wage Gap in different types of *firms*– exporters and non-exporters.

Table 3: Regression Results - GWG and Exporting

	OLS	Firm FE	Individual FE	Individual & Firm FE	Job Spell FE	Job Spell & Firm FE
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.352*** (0.000)	-0.229*** (0.002)				
Exporter	0.176*** (0.000)	0.026*** (0.004)	0.034*** (0.002)	0.011*** (0.002)	0.064*** (0.003)	
Female*Exporter	-0.056*** (0.001)	-0.045*** (0.003)	-0.011*** (0.002)	-0.005** (0.002)	-0.189*** (0.005)	-0.206*** (0.005)
Hours	-0.045*** (0.000)	0.002 (0.001)	-0.006*** (0.001)	-0.003*** (0.001)	0.001 (0.001)	0.002 (0.002)
Age	0.032*** (0.000)	0.024*** (0.001)	0.061*** (0.001)	0.060*** (0.001)	0.041*** (0.001)	0.041*** (0.001)
Age Sqr	0.000*** (0.000)	0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Tenure	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Black	-0.061*** (0.000)	-0.075*** (0.002)				
Constant	7.513*** (0.007)					
Observations	12603648	12558082	11523047	11502847	11582330	11018357
R^2	0.567	0.706	0.952	0.956	0.909	0.920
Firm-Size Control	YES	YES	YES	YES	YES	
Schooling Control	YES	YES	YES	YES	YES	YES
Experience Control	YES	YES	YES	YES	YES	YES
State Control	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	
Firm FE		YES		YES		
Individual FE			YES	YES		
Job-Spell FE					YES	YES
Firm-Year FE						YES

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

Sources: RAIS and SECX

4. Exporters, the GWG and the Demand for Flexibility

In this section, we will firstly investigate to which extent job flexibility characteristics impacts differently men and women. Next, on subsection 4.2, we will examine if job inflexibility impacts the GWG differently by the firm's export status. To these purposes, we will pursue an analysis based on the occupational characteristics reported in the O*Net database⁵. The data on worker attributes and job characteristics are available for almost 1,000 occupations based on the US Standard Occupational Classification (SOC). The information is collected from standardized questionnaires distributed to a random sample of workers in target occupations⁶. For this present analysis, five characteristics based on “work activities” and “work context” descriptions are most relevant to investigate flexibility demands (GOLDIN, 2014): Time Pressure, Contact with others, Establishing and maintaining interpersonal relationships, Structured versus unstructured work and Freedom to make decisions. These characteristics are based on a range from 0 to 100, where the biggest the index, more inflexible the occupation. The survey questions related to each occupational attribute are presented in appendix 3.

We are provided with a concordance between the O*NET data and Brazilian Classification of Occupations (CBO-2002) that allows us to investigate the flexibility characteristics of each occupation.⁷ One possible concern in using this strategy is that the US occupational requirements may be systematically different from the Brazilian job context. Maciente (2016) argues that this problem can be minimized because the correspondence is based on the most disaggregated occupational level. We first match the O*NET information with the occupational concordance between SOC-10 and CBO 2002. When there exists more than one SOC-O*NET occupation for a given CBO, we apply a suggested weight that was

⁵ The O*NET Program provides information on worker characteristics (abilities, occupational interests, work values, work styles), worker requirements (skills, knowledge, education), experience requirements, occupational requirements (work activities, organizational context, work context), workforce characteristics (as labor market information) and occupation-specific information (as tasks, technological skills and tools).

⁶ The workers selected are employed in businesses that were identified from a random sample of places that were likely to employ workers in the target occupations

⁷ We thanks Aguinaldo Maciente for sharing with us the concordance between both classifications

constructed based on the frequency of synonyms of both classifications and its correspondence with the International Standard Classification of Occupations (ISCO). Then, we merge the weighted concordance with our RAIS sample, succeeding to cover 98% of our original sample with flexibility information from O*NET.

Following a similar strategy than Goldin (2014), we normalize each O*Net characteristic by occupation. Then, we construct an Index of Inflexibility based on the average of these 5 normalized variables.

4.1. Occupational Characteristics

Table 4 presents the average of each five characteristics and the Index of Inflexibility divided by Gender. We can observe that female workers are concentrated in more flexible occupations than men, as they exhibit a more negative value in all characteristics (with the exception of “Contact With Others”). In Appendix 4, we present some heterogeneity by schooling level. Overall, college educated worker are concentrated in inflexible occupations, especially when compared with workers with high-school level or less. Further, women with college degree presents the same Index of Inflexibility as men with college degree, while for non-college educated worker there exists high gender differences: women are concentrated in much more flexible jobs than men.

Table 4: Flexibility Descriptive Statistics

	Total Sample (1)	Female (2)	Male (3)
Index of Inflexibility	-0.42 (0.69)	-0.53 (0.72)	-0.38 (0.67)
Contact with Others	-0.41 (1.09)	-0.34 (1.06)	-0.44 (1.10)
Time Pressure	0.04 (0.89)	-0.09 (0.80)	0.09 (0.91)
Work Structure	-0.53 (0.91)	-0.65 (0.94)	-0.48 (0.89)
Decision Freedom	-0.69 (1.03)	-1.01 (1.06)	-0.56 (0.98)
Interpersonal Relationships	-0.54 (0.90)	-0.55 (0.95)	-0.53 (0.87)
N	64858473	18506717	46351756

Sources: RAIS and O*NET online

In order to investigate the impact of occupational inflexibility on the GWG, we begin by documenting the overall GWG in our sample and then examine how the female dummy varies when we control for the Index of Inflexibility. These first investigations are shown in column (1) and (2) of Table 5. The overall GWG in our sample of workers in Brazilian manufacturing sector is about 31,9%, but it decreases to 29% when we control for occupational flexibility characteristics. The *Index of Inflexibility* coefficient in column (2) indicates that the more inflexible the occupation, the larger are earnings—an increase in one standard deviation on the Index is associated with wages 25,5% higher. In the following columns, Table 5 shows the regression results from a model where we interact the female dummy with the Index of Inflexibility in different specifications: OLS (3), Individual Fixed Effect (4), Firm Fixed Effects (5) and Individual and Firm Fixed Effects (6).

In column (3), the Index of Inflexibility measures the impact of one standard deviation on the measure of job flexibility characteristics on male wages (27%), while its addition to the interaction coefficient indicates the impact on women's earnings (21%). This result is consistent with a bigger GWG in more inflexible jobs under the hypothesis that we are correctly controlling for unobserved heterogeneity that could bias our estimators.

As women could be concentrated in firms that, on average, pay lower salaries to its workers, and firm unobserved heterogeneity could impact both the composition of workers in a given occupation and wages, we pursue a strategy including Firm Fixed Effects. Column

(4) shows a reduction in the GWG compared to OLS specification -23% vs $30,9\%$. This result is consistent with women underrepresentation in higher-paying firms affecting the GWG in Brazil, as evidenced by Morchio and Moser (2019). While *Index of Inflexibility* presents a bigger coefficient compared to OLS, the interaction terms is even more negative. This indicates that when we control for firm heterogeneity, more inflexible occupations remunerate man even more ($30,7\%$ vs 27% in the OLS), but for women the effect of one SD on the Index is very similar to previous specification ($21,2\%$ vs 21% in OLS). Thus, the GWG in inflexible occupation is even bigger when we restrict ourselves to within-firm analysis.

Because workers in more inflexible occupations can differ from workers in more flexible jobs in several unobserved characteristics, our results in previous specifications can be biased. Therefore, column (4) of Table 5 reports the estimation controlling for individual fixed effects. In this specification, the Index and the interaction coefficient account only for workers that changes occupation to a job with different flexibility requirements. The results indicates that moving one standard deviation in the Inflexibility Index is associated with wages $5,6\%$ larger for men and $4,5\%$ for women. This smaller gender difference compared to the previous specifications could be due to the fact that women that move to more inflexible occupations are the ones who work more and are more committed to their job.

In the last specification, we include both Firm and Individual Fixed-Effects to account for both types of heterogeneities. With this specification, we are restrng our analysis to within-firm variation of workers that change its job to an occupation with a different flexibility characteristic. The coefficients on the Index and the interaction don't vary much compared to the specification with solely the Individual Fixed-Effect: while for men moving to an occupation one SD more inflexible in the same firm is associated with $5,9\%$ higher earnings, for women this movement impacts her wages in the order of $4,7\%$.

We also perform heterogeneous analysis investigating the impact of working in an inflexible occupation in wages for college and non-college educated workers, separately. Results are presented in appendix 5. In the OLS specification, presented in column (1) and (2), the coefficients indicate that college-educated workers earn higher wages in more inflexible occupations compared to employees with high-school education or less. Also, the

coefficients on the interaction term suggests that non-college educated women experience a higher penalty on wages for working in inflexible occupations compared to college-educated women. This result is consistent with college educated female workers demanding less flexibility than non-college educated (and probably poorer) women, a finding that could be due to richer women's substituting home production and child care for market options.

Less compatible with the above mention hypothesis, while we restrict for intra-firm analysis, the GWG in more inflexible occupations is, although slightly, higher for college-educated workers. Still, the bigger impact of inflexibility on non-college educated women is also presented in specification with ID FE and Firm FE&ID FE, where the estimation comes from occupational flexibility variation. That is, for workers that move to occupations with different flexibility attributes, college educated women, have relative more wage gains compared to men, although the coefficients are very small in magnitude. However, for non-college educated workers, the GWG in more inflexible occupations remains penalizing women relatively to men.

It is worth mentioning that, as we are working with an administrative dataset that only covers formal workers, we can be underestimating the impact of inflexibility on the GWG if there is a selection into the informal sector for women that demand more flexibility. As evidenced by Maloney (2004), women may voluntarily be in the informal sector because household chores were competing with the (inflexible) formal labor market. Especially until 2017, when Brazilian experienced a Labor Reform, the rigidity of the law hindered more job flexibility. Mattar (2018) argues that some aspects of the law could be contributing to lower demand for part-time jobs in formal labor markets, as the obligation of hourly wages of part-time workers being proportional to full-time workers earnings in the same job, while the employee had fixed cost related to hiring, training and firing. Also, job flexibility in the formal market was hampered by the prohibition of over-time hours from worker in part-time regime and the inexistence of intermittent work. Thus, women demanding more flexibility could be resorting to informality, what could lead to an even bigger GWG, as informal jobs, on average, pay less.

Table 5: Regression Results: Occupational Flexibility and the GWG

	OLS	OLS Index Inflexibility	OLS Interaction	Firm FE	Individual FE	Individual & Firm F.E.
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.384*** (0.000)	-0.343*** (0.000)	-0.369*** (0.000)	-0.262*** (0.002)		
Index of Inflexibility		0.228*** (0.000)	0.245*** (0.000)	0.268*** (0.004)	0.054*** (0.001)	0.058*** (0.001)
Female*Index			-0.054*** (0.000)	-0.075*** (0.002)	-0.011*** (0.001)	-0.012*** (0.001)
Hours	-0.049*** (0.000)	-0.049*** (0.000)	-0.049*** (0.000)	-0.001 (0.001)	-0.006*** (0.001)	-0.003*** (0.001)
Age	0.032*** (0.000)	0.028*** (0.000)	0.027*** (0.000)	0.021*** (0.000)	0.059*** (0.001)	0.058*** (0.001)
Age Sqr	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Tenure	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.000*** (0.000)
Black	-0.061*** (0.000)	-0.042*** (0.000)	-0.042*** (0.000)			
Constant	7.732*** (0.007)	7.868*** (0.007)	7.891*** (0.007)			
Observations	12345461	12345461	12345461	12904872	11278435	11258675
R ²	0.556	0.593	0.594	0.735	0.952	0.957
Firm-Size Control	YES	YES	YES	YES	YES	YES
Schooling Control	YES	YES	YES	YES	YES	YES
Experience Control	YES	YES	YES	YES	YES	YES
State Control	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE				YES		YES
Individual FE					YES	YES

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

Sources: RAIS and O*NET online

4.2. Inflexibility in Exporting Firms and the GWG

If women demand more flexibility than men and the need to work more and in particular hours is bigger for exporters, this negative effect on the GWG in exporting firms should be stronger in less flexible occupations. In order to investigate to which extent this differential gender gap is related to changes in the demand for flexibility, we will analyze the relationship between gender, holding a job in an exporting firm and working in an inflexible occupation.

Table 4 presents the average of each five characteristics and the Index of Inflexibility divided by Gender and Export Status. Overall, the occupations in manufacturing exporting firms are more inflexible than non-exporters in the same sector. If we compare women working for firms with different export-status, we see a bigger concentration of women in less flexible occupation in exporting firms (and this difference is significant for all characteristics). Men working for exporting firms are also concentrated in less flexible occupation than men in non-exporting firms, but the difference between the Index of Inflexibility (-0.37 for exporters vs -0.4 for non-exporters) is smaller when compared to the difference between the same Index for Women in Exporters and Non-Exporters, -0.48 and -0.57, respectively. This could indicate that exporting firms are attracting women that demand less flexibility than women working for non-exporters.

On the other side, one could argue that this bigger concentration of women is just the reflection of a different composition of occupations on exporting-firms. Therefore, if there is a penalty on wages because women are demanding more flexible schedules—compared to men— in occupations or firms where total hours of work or working at particular time are more valuable, then a bigger difference in the GWG between exporting and non-exporting firms could arise.

Table 6: Flexibility Descriptive Statistics by Export Status and Gender

	Total Sample (1)	Exporter (2)	Non-Exporter (3)	Female & Exporter (4)	Female & Non-Exporter (5)	Male & Exporter (6)	Male & Non-Exporter (7)
Index of Inflexibility	-0.42 (0.69)	-0.39 (0.70)	-0.45 (0.66)	-0.48 (0.74)	-0.57 (0.71)	-0.37 (0.69)	-0.40 (0.64)
Contact with Others	-0.41 (1.09)	-0.41 (1.11)	-0.41 (1.07)	-0.33 (1.04)	-0.35 (1.09)	-0.43 (1.13)	-0.44 (1.07)
Time Pressure	0.04 (0.89)	0.03 (0.92)	0.05 (0.86)	-0.07 (0.88)	-0.10 (0.72)	0.07 (0.93)	0.11 (0.90)
Work Structure	-0.53 (0.91)	-0.48 (0.93)	-0.58 (0.89)	-0.60 (0.97)	-0.70 (0.92)	-0.44 (0.91)	-0.52 (0.88)
Decision Freedom	-0.69 (1.03)	-0.62 (1.04)	-0.75 (1.01)	-0.86 (1.07)	-1.14 (1.03)	-0.53 (1.01)	-0.58 (0.95)
Interpersonal Relationships	-0.54 (0.90)	-0.49 (0.91)	-0.58 (0.88)	-0.51 (0.95)	-0.59 (0.96)	-0.49 (0.90)	-0.57 (0.84)
N	64858473	32380413	32478060	8474033	10032684	23906380	22445376

Sources: RAIS, SECEX and O*NET Online

In order to test if working in an inflexible occupation provides a bigger penalty on the GWG in exporting firms, we estimate a model very similar to specification (3)-(6) of the previous section– we interact the Female dummy with the Index of Flexibility– separately for worker in exporting and non-exporting firms.

Column (1) and (2) of Table 7 reports the estimation based on an OLS model for worker in exporting and non-exporting firms, respectively. The comparison between the Female dummy in both columns shows a bigger GWG in exporting firms, consistent with the negative sign on the Interaction between Female and Exporter in column (1) of Table 3. Workers in more inflexible occupations earn more in both exporting and non-exporting firms, but the coefficient of Index of Inflexibility is significantly bigger for exporters. This result indicates that exporters remunerate better more demanding jobs compared to non-exporters. However, the GWG is rising the more inflexible the occupation, as indicated by the negative sign on the interaction between *Female* and the *Index of Inflexibility*. Further, this difference is bigger in exporting firms, as shown by a more negative sign on the interaction when we regress the model only for individuals working for exporters. The results indicate that an increase in one standard deviation on the Index is associated with 34% bigger wages for men in exporting firms, but a much significant smaller increase – in the order of 27,21%– in female wages. Yet, in non-exporting firms one SD in the Index results is associated if 21,77% higher wages for men compared to an increase in the magnitude of 17,3% for women.

When we account for firm fixed effects, the Index of Inflexibility – that capture the impact of occupational inflexibility on man's wages– increases in similar magnitude for both exporting and non-exporting firms. Also, the interaction between the Index and *Female* increases in magnitude in both columns (3) and (4), but the variation compared to the OLS model is bigger for non-exporting firms. These indicates that when we restrict to intra-firm comparison, working in an inflexible occupation penalizes even more women, but now the penalization differ less between exporters and non-exporters: an increase in one standard-deviation in the Index of Inflexibility is associated with 35.9% higher earnings for men and

26.5% for women in exporting firms, 23,3% for men in non-exporting firms and 15,7% for their female colleagues.

The estimation controlling for Individual Fixed Effects—shown in columns (5) and (6) — still presents the same pattern as the previous specifications: inflexible occupations are better remunerated in exporting firms for both man and women and the GWG in inflexible occupations is bigger in exporting firms. However, the addition of Individual FE— that restricts our analysis to workers that changes to a job with different flexibility requirements— leads to a smaller difference in the interaction coefficient between exporters and non-exporters: moving to a job that is one SD more inflexible according to the Index is associated with an increase of 6,16% of males wages and 5% for females earnings in exporting firms, while for men in non-exporting firms this increase is in the magnitude of 4,72% for men and 4% for women.

Columns (7) and (8) presents the estimation with the inclusion of Firm FE and Individual FE. That is, for workers that change to occupations with different flexibility characteristics in the same firm, the move to more inflexibility provides more gains in wages for both genders in exporting firms compared to non-exporters. Still, the GWG in more inflexible occupations is bigger in exporting firms, even if this difference by export status is the less accentuated of the four specifications.

Table 7: Regression Results: Occupational Flexibility, Exporters and the GWG

	OLS Exporter (1)	OLS Non-Exporter (2)	Firm FE Exporter (3)	Firm FE Non-Exporter (4)	Individual FE Exporter (5)	Individual FE Non-Exporter (6)	Individual & Firm F.E. Exporter (7)	Individual & Firm F.E. Non-Exporter (8)
Female	-0.386*** (0.001)	-0.323*** (0.001)	-0.277*** (0.004)	-0.233*** (0.002)				
Index of Inflexibility	0.294*** (0.000)	0.197*** (0.000)	0.307*** (0.006)	0.210*** (0.002)	0.060*** (0.002)	0.046*** (0.001)	0.060*** (0.002)	0.047*** (0.001)
Female*Index	-0.053*** (0.001)	-0.037*** (0.001)	-0.072*** (0.004)	-0.064*** (0.002)	-0.011*** (0.002)	-0.007*** (0.001)	-0.011*** (0.002)	-0.008*** (0.002)
Hours	-0.042*** (0.000)	-0.027*** (0.000)	-0.002 (0.002)	0.001 (0.001)	-0.005*** (0.001)	-0.004*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)
Age	0.032*** (0.000)	0.021*** (0.000)	0.024*** (0.001)	0.017*** (0.000)	0.071*** (0.002)	0.046*** (0.001)	0.070*** (0.002)	0.045*** (0.001)
Age Sqr	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Tenure	0.002*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)
Black	-0.064*** (0.000)	-0.017*** (0.000)	-0.063*** (0.002)	-0.046*** (0.001)				
Constant	7.735*** (0.016)	7.071*** (0.011)						
Observations	6206715	6138746	6204598	6092416	5661469	5274899	5659510	5256770
R ²	0.626	0.465	0.729	0.683	0.958	0.9370	0.960	0.944
Firm-Size Control	YES	YES	YES	YES	YES	YES	YES	YES
Schooling Control	YES	YES	YES	YES	YES	YES	YES	YES
Experience Control	YES	YES	YES	YES	YES	YES	YES	YES
State Control	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Individual FE					YES	YES	YES	YES
Firm FE			YES	YES			YES	YES

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

Sources: RAIS, SECEX and O*NET Online

5. Conclusion

In the academic debate over the persistence of an unexplained portion of the Gender Wage Gap, Goldin (2014) provided an explanation that pointed to a new direction besides employer discrimination or gender differences on psychological attributes (as bargaining, competing, risk aversion). In an influential paper, she demonstrated how the GWG is related to inflexible *occupations* penalizing employees that work less hours. Further, works on the literature have evidenced that inflexibility requirements could come not only from occupations attributes, but also from firm activities (Bøler et al, 2018).

In order to test if both dimensions of inflexibility impacts the Gender Wage Gap in Brazil, we use a rich employer-employee dataset that allows us to follow the workers through their professional path in the Brazilian Labor Market and enable us to control for individual and firm observed and unobserved heterogeneity. Firstly, we documented a differential GWG between exporting and non-exporting firms. In all specifications –OLS, ID FE, Firm-FE, ID and Firm FE, Job-Spell FE and Job-Spell& Firm-Year FE– we find a bigger Gender Wage Gap for exporters. When restricting our analysis to worker that continued in the same job-spell but experienced a change in its firm export-status, the GWG varies in a large magnitude: it is 18,6% higher in exporting firms. This could be due to the fact that the requirements of the firms– as more commitment, more total hours worked and working in particular hours– have changed after it started exporting and became more exposed to international standards and competition (Bøler et al, 2018)..

Also, we have evidenced, through occupational description available on O*NET online, that working in a more inflexible occupation rewards differently men and women. Therefore, the GWG increase the less flexible the occupation: comparing firm colleagues, the GWG increases 9,5% in one standard deviation more inflexible occupations. We have also documented that moving to one standard more inflexible occupation rewards men with 5,9% higher earnings, while for their female colleagues the gains in wages are in the

magnitude of 4,7%. Heterogeneous analysis suggests that non-college educated (and probably the poorer women) are more affected by occupational inflexibility.

Because inflexibility is a job characteristic that involves both *occupational* attributes and *firm* specific requirements and activities, we test if working in an inflexible occupation is differently rewarded in exporting and non-exporting firms. In all specifications, we find that working in a more inflexible occupation for exporters is associated with higher earnings. However, as both dimensions of flexibility could be present while working in an inflexible occupation in an exporting firm, if women demands more flexibility and work less hours, the GWG in those “double-dimension” of inflexible job could be bigger. Our findings are consistent with this hypothesis: the GWG in inflexible occupations is bigger in exporting firms compared to non-exporters. Yet, because we are only provided with contractual hours of work, we cannot directly test if women relatively work less than men in exporting firms’ inflexible occupations.

We aim that this thesis can be a starting point for future works investigating the relationship between demand for flexibility and the Gender Wage Gap in Brazil, so we can propose effective public policy that will contribute to women’s well-being. Although provided with a rich dataset, one of the limitations of this thesis is due to RAIS only providing information for Brazilian formal workers. As previous evidenced in the literature (Maloney, 2004), women could be resorting to informality in order to have some job amenities. The inclusion of the possibility of intermittent work on 2017 Labor Reform could provide women with more flexibility on the formal labor market and thus avoid that women trade-off informalities’ lower wages and job insecurity for flexibility (ULYSSEA, 2017). Still, we need evidence if this reform impacted women’s positively.

Besides designing policies for women being less penalized for demanding flexibility, we still need further evidence on where these gender difference came from. As previous documented in the literature, social norms that views childcare as mainly women’s responsibilities could be one of the explanations why women work less hours and avoid more inflexible jobs (KLEVEN et al, 2019). In Brazil, according to 2016’s National Household Survey (PNAD-C) women spend twice as much time than men in household production and care for other persons (as children, elderly). Besides social norms, the Brazilian labor

legislation could also reinforce this gender division of work due to the almost inexistence of paternity leave⁸, while mothers have the right to a 120 day of maternity leave. Further, the lack of universal public child care could contribute to fertility penalizing more poor women, especially because they cannot afford nannies.

Fortunately, discussions about the Gender Wage Gap has been gaining increasing relevance in the public debate. Yet, the media, activist and politicians focus their reports, claims and public policy proposals on the discrimination against female employees. Although previous works provides some empirical evidence on the existence of gender discrimination on the labor market (GOLDIN and ROUSE, 2000; CORREL et al. 2007), the literature has advanced to document how *observable* gender differences could provide explanations for the Gender Wage Gap trends and persistence. Further, differences in hours worked, labor market interruptions, segregation of women in lower paying firms, lower paying jobs and informality could probably impact more the overall gender pay differences than “unequal pay for equal work”. Thus, it is of the foremost importance further investigation on these gender inequalities related to the demand for flexibility if we want to design public policy that are effectively going to reduce the GWG.

⁸ According to Brazilian Legislation, fathers can take up 5 days of paid leave or 20 days if he works for the public sector or for a firm that takes part in “Empresa Cidadã” Program. For mothers, the aforementioned program allows for a maternity leave of 180 days.

6. References

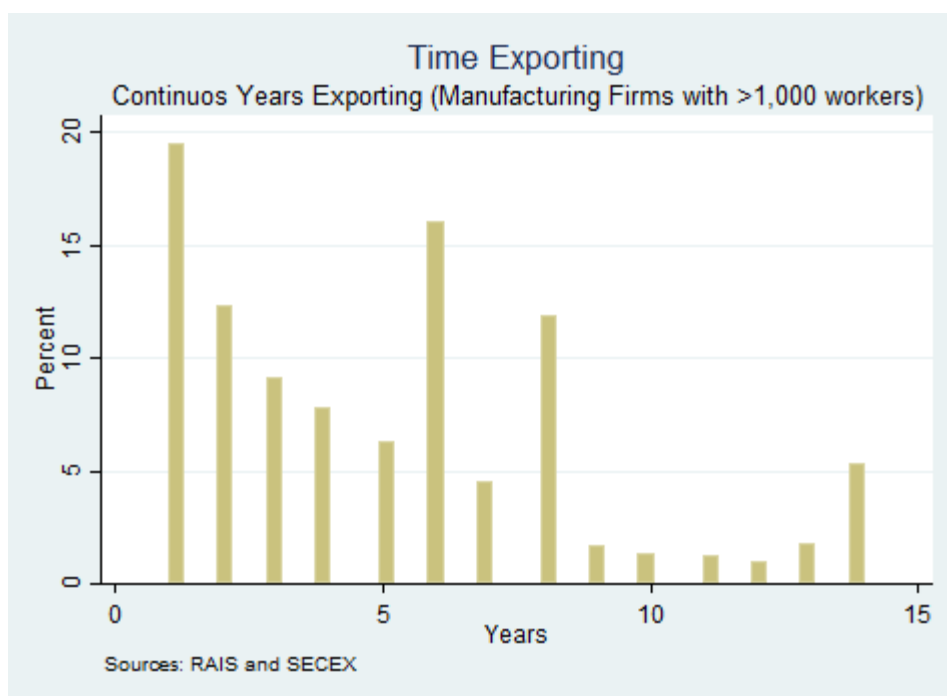
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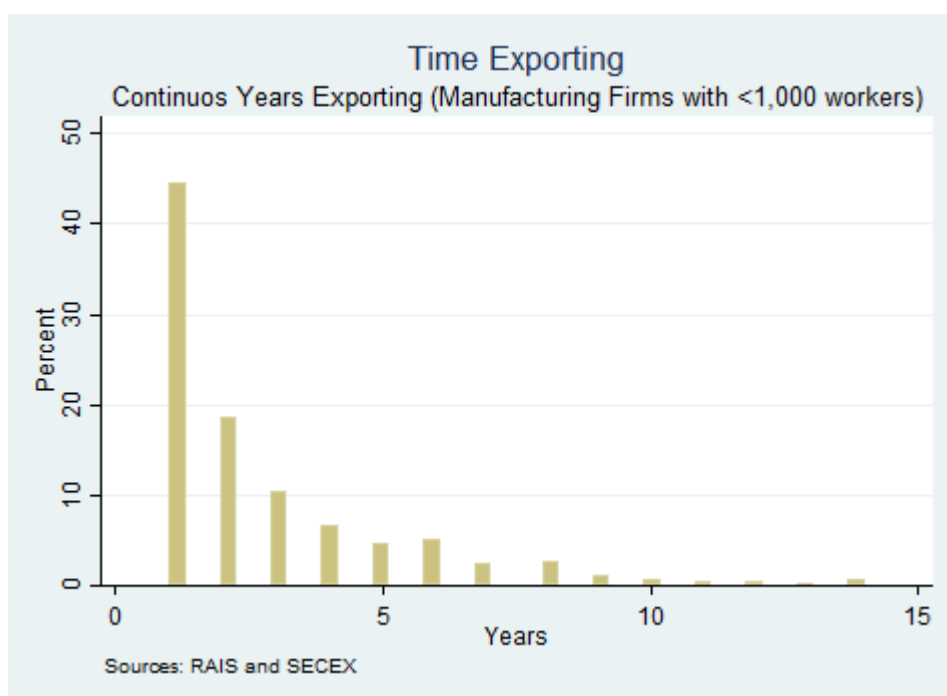
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4. Appendix

A1.



A2.



A3.

Table A3: O*NET Flexibility Characteristics

Variable	Survey Questions
Contact With Others	"How much does this job require the worker to be in contact with others (face-to-face, by telephone, or otherwise) in order to perform it?"
Time Pressure	"How often does this job require the worker to meet strict deadlines?"
Structured Vs Unstructured Work	"To what extent is this job structured for the worker, rather than allowing the worker to determine tasks, priorities, and goals?"
Freedom to Make Decisions	"How much decision making freedom, without supervision, does the job offer?"
Interpersonal Relationships	"Developing constructive and cooperative working relationships with others, and maintaining them over time (Data by level and importance) "

Sources: O*NET Online

A4.

Table A4: Flexibility Descriptive Statistics by Gender and Schooling

	Total Sample	Female	Male	Female & College	Male & College	College	Female & Non-College	Male & Non-College	Non-College
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Index of Inflexibility	-0.42 (0.69)	-0.53 (0.72)	-0.38 (0.67)	0.34 (0.56)	0.34 (0.54)	0.34 (0.55)	-0.63 (0.67)	-0.44 (0.64)	-0.50 (0.65)
Contact With Others	-0.41 (1.09)	-0.34 (1.06)	-0.44 (1.10)	0.57 (0.70)	0.42 (0.72)	0.47 (0.72)	-0.45 (1.05)	-0.51 (1.09)	-0.49 (1.08)
Time Pressure	0.04 (0.89)	-0.09 (0.80)	0.09 (0.91)	0.22 (0.64)	0.24 (0.68)	0.23 (0.66)	-0.12 (0.81)	0.08 (0.93)	0.02 (0.90)
Structured Vs Unstructured Work	-0.53 (0.91)	-0.65 (0.94)	-0.48 (0.89)	0.40 (0.87)	0.40 (0.90)	0.40 (0.89)	-0.77 (0.88)	-0.56 (0.85)	-0.62 (0.86)
Freedom to Make Decisions	-0.69 (1.03)	-1.01 (1.06)	-0.56 (0.98)	-0.06 (1.01)	0.17 (0.89)	0.09 (0.94)	-1.12 (1.01)	-0.62 (0.97)	-0.76 (1.00)
Interpersonal Relationships	-0.54 (0.90)	-0.55 (0.95)	-0.53 (0.87)	0.56 (0.76)	0.49 (0.77)	0.51 (0.77)	-0.68 (0.89)	-0.62 (0.82)	-0.63 (0.84)
N	12965947	3696599	9269348	377385	721950	1099335	3319214	8547398	11866612

Mean Coefficients. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Sources: RAIS and O*NET Online

A5.

Table A5: Occupational Flexibility and the GWG by Schooling

	OLS College (1)	OLS Non-College (2)	Firm FE College (3)	Firm FE Non-College (4)	Individual FE College (5)	Individual FE Non-College (6)	Individual & Firm FE College (7)	Individual & Firm FE Non-College (8)
Female	-0.313*** (0.001)	-0.381*** (0.000)	-0.236*** (0.008)	-0.261*** (0.002)				
Index of Inflexibility	0.506*** (0.001)	0.224*** (0.000)	0.470*** (0.013)	0.244*** (0.002)	0.045*** (0.003)	0.054*** (0.001)	0.046*** (0.003)	0.057*** (0.001)
Female*Index	-0.047*** (0.002)	-0.063*** (0.000)	-0.081*** (0.012)	-0.076*** (0.002)	0.012*** (0.004)	-0.014*** (0.001)	0.009** (0.004)	-0.016*** (0.002)
Hours	-0.067*** (0.000)	-0.046*** (0.000)	-0.001 (0.000)	-0.001 (0.001)	-0.004*** (0.001)	-0.006*** (0.001)	0.000 (0.001)	-0.003*** (0.001)
Age	0.066*** (0.001)	0.025*** (0.000)	0.066*** (0.002)	0.019*** (0.000)	0.126*** (0.006)	0.053*** (0.001)	0.119*** (0.006)	0.052*** (0.001)
Age Sqr	-0.001*** (0.000)	0.000*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Tenure	0.001*** (0.000)	0.002*** (0.000)	0.000*** (0.000)	0.002*** (0.000)	0.000** (0.000)	0.001*** (0.000)	0.000** (0.000)	0.001*** (0.000)
Black	-0.184*** (0.002)	-0.030*** (0.000)						
Constant	8.377*** (0.029)	7.827*** (0.007)						
Observations	1050724	11294737	1082431	11806109	957568	10260106	955158	10240502
R ²	0.439	0.499	0.642	0.687	0.962	0.935	0.966	0.942
Experience Control	YES	YES	YES	YES	YES	YES	YES	YES
Schooling Control		YES		YES		YES		YES
Firm-Size Control	YES	YES	YES	YES	YES	YES	YES	YES
State Control	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE			YES	YES			YES	YES
Individual FE					YES	YES	YES	YES

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

Sources: RAIS and O*NET online