The gender pay gap in the public and private sector and its influence on female entrepreneurship

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ABSTRACT,
Although efforts are still being made to reduce the inequality between the income of males and females, it is often unclear how big this difference is and whether there is a difference between the public and private sectors. This inequality in income can cause females to search for an alternative. One of these alternatives could be entrepreneurship, but whether the income difference influences this remains uncertain. The objective of this study is to gain further insights into the income differences between males and females in the public and private sectors and the effect on female entrepreneurship. This research was conducted by using data from the Office for National Statistics of the United Kingdom and the United Kingdom government's Gender Pay Gap service. This research shows that there is a difference in income between males and females in both sectors, with a higher difference in the private sector. Furthermore, it shows that the income difference in the public sector has a significant negative effect on female entrepreneurship, and the income difference in the private sector has a significant positive effect on female entrepreneurship. Some implications occurred during the research that could have impacted the outcome; like the small sample of companies that remained after filtering the data, but also the exclusion of some factors, which could also have an impact on the gender pay gap. However, these results still give further insights into the income difference and the effect on female entrepreneurship and could be used in future research to analyze the presence and impact of female wage inequalities.

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Keywords
Gender pay gap, income difference, female entrepreneurship, public sector, private sector, regional data, firm data

1. INTRODUCTION

The gender pay gap is a commonly known aspect around the world, with a lot of different industries being involved in it. In Europe, the average difference in hourly wages between females and males as a percentage of male earnings was around 16% in 2017 (Landmesser et al., 2020). The differences in the gender pay gap arise at several levels. These inequalities can be caused by various factors, such as demographic aspects of a country, but also by differences in culture. For a country like the United Kingdom (UK), it is certainly possible that gender inequality exists. Females have a large share of the labor force in the UK, but they are still impacted by lower wages and lower income and aren't as advantageous as men doing the same labor. These inequalities can lead to females being negatively influenced by becoming more dependent on their partners, but also by having lower retirement payments and lower social security benefits (Grybaite, 2006). With some of the research conducted about the differences in treatments and qualifications between the two genders (Blau & Kahn, 1999). Other discussions consider the human capital model as an explanation for the pay gap between males and females; this includes that earnings are related to the amount of investment in the concerning employment, like work experience, training, or possessed skills (Lips, 2013). However, the gender pay gap can also be looked at through differences in personality traits and social norms between males and females; these psychological states are capable of influencing someone's behavior, which can also impact someone's wage (Roethlisberger et al., 2023). The gender pay gap can certainly be determined by different factors between males and females, that are present in modern society.

It is also possible that the differences in the gender pay gap are related to the relevant employment sector. For example, there may be differences in income between the public and private sectors, both males and females work in these sectors with various jobs. People active in the private sector have to be held accountable more often when taking action, and they also have to be more visible. People in the public sector have to be completely transparent because all their work is monitored by the government. Likewise, the goals in the public sector are more unclear than those of the private sector, which is mainly focused on making profits (Kumari & Pandey, 2011). The difference between sectors in which someone is employed can influence the stratification system through different rules that may be related to position and salary. The public sector protects weak workers, such as females, from inequalities, while the private sector is a more competitive one that isn't as protective (Mandel & Semyonov, 2021). The public sector is, therefore, more women-oriented compared with the private sector (Tonoyan et al., 2020). Due to the inequalities between and within these sectors, females can choose to become entrepreneurs to avoid the negative influences caused by the gender pay gap. Entrepreneurs are people who establish new firms to exploit their perspectives and knowledge (Casson & Buckley, 2010). By choosing entrepreneurship, females are no longer linked to the income difference and are responsible for their income. However, there may be differences between the opportunities for females in the private sector compared to females in the public sector regarding becoming an entrepreneur. Females in the private sector are more likely to experience autonomy within a company but also have a broader network within companies, which can result in more opportunities to become entrepreneur (Tonoyan et al., 2020). It remains uncertain whether the difference in income between the sectors has an impact on females who opt for entrepreneurial ventures. This paper intends to investigate the gender pay gap in the public and private sectors and its influence on female entrepreneurship.

1.1 Research objective

This study aims to conduct further research into the gender pay gap while retrieving data from the UK. Various studies have already been carried out on the gender pay gap (Blau & Kahn, 1999, 2017; Grybaite, 2006; Lips, 2013). However, this research will, more specifically, delve deeper into the public and private sectors regarding their income difference and, in doing so, also focus on the influence on female entrepreneurship. This research is intended to identify whether there is a gender pay gap within the public and private sectors, but also to figure out if there are significant differences between the two, and if this influences female entrepreneurship.

1.2 Research problem

Of course, just like males, females have the opportunity to start their own business. The influence of working in the private or public sectors can have several impacts on this. For example, employment in the private sector could offer more opportunities for entrepreneurship due to job characteristic (Tonoyan et al., 2020), but other factors could also play a role in this. Thus, figuring out whether there are inequalities between females and males based on income level between the public and private sectors in the UK could help gain more insights, and also determine the level of influence it has on female entrepreneurship. This research problem can be investigated with the following research question: "Are there different effects of the gender pay gap in public and private organizations on female entrepreneurship?"

2. LITERATURE REVIEW

2.1 Gender pay gap

As discussed in the introduction, the gender pay gap is a well-known phenomenon. The occurrence of the gender pay gap can be explained by various factors: social capital, occupational segregation, and motherhood obligation. These various factors all have a different impact on the income difference between males and females and should be considered.

2.1.1 Human capital

The human capital theory states that employees' income is related to their productivity, which can be caused by the skills and knowledge they have, but also by certain education or training they have had (Lips, 2013; Olson, 2013). For example, people who have studied longer or have acquired more knowledge in the past will therefore have a higher income compared to people who did not have these opportunities. Some economists believe that the lower level of human capital among females compared with males may be a cause of the income gap because males possess higher individual and collective qualities (Tverdostup & Paas, 2017). However, according to Lips (2013), the human capital model does not take into account all factors that can influence income differences. For example, differences in capabilities, the number of working hours of a male and female, and also the number of weeks worked are not taken into account. The research conducted by Polachek and Xiang (2009) focuses on other factors such as the presence of a male or female in the household, which can have an impact on human capital. This influences the presence in the labor market, which can cause a difference in income. So more factors play a role in the gender pay gap, rather than just the human capital approach.

2.1.2 Social capital

Another influencing factor could be social capital. Social capital can be determined as having resources made available by having different networks and relationships with others (Zheng, 2010). The number of males located in a higher corporate setting

compared to females can influence social contacts. According to, Javakhadze and Shelton (2022), males are more likely to provide certain benefits related to a company by having a higher level of social capital. As a result, females with the same type of position receive a lower wage due to having fewer contacts. Purcell et al. (2010) also draw the same conclusion. According to them, the presence of an extensive network has advantages such as information, support, and resources, and these can result in differences in the workplace that lead to income discrimination. Having a more extensive network can be a cause of the income difference between males and females.

2.1.3 Occupational segregation

The third influencing factor is related to occupational segregation, a concept that occurs in various industries. Occupational segregation is the difference between the proportion of males in an occupation compared with females (Wright et al., 2015). Blau and Kahn (2017) conducted research into occupational segregation and its influence on the female pay gap and compared between 1980 and 2010. Although there were occupational improvements, there was still an increase in the female pay gap. Some researchers, like Gauchat et al. (2012) also believe that occupational segregation does influence the gender pay gap. Mainly because the number of females who operate in lower-paid positions is higher than compared with males. The research conducted by Elass (2024) concludes the same, with the outcome that occupational segregation influences the gender pay gap, but from her perspective, this is more related to the upper wage distribution. So, occupational segregation could be determined as a factor, which has an impact on the female pay gap. Females are more dominant in occupations with lower wages, but it can also be related to upper wage distributions.

2.1.4 Motherhood obligation

The presence of maternal obligations can influence the difference in income between males and females. Females who are forced to care for their children will not be able to work full-time and therefore have less income. Even after removing differences in experience, work hours, education, and other factors, mothers still earn less than females without children, mainly due to the reduction in work hours. If the stated factors were removed, mothers still would earn less (Budig et al., 2012). According to Oesch et al. (2017), the difference in income between a mother and a female without children can only arise from the unobserved influences of motherhood on work productivity and employer discrimination against mothers. However, these factors are related to females themselves, but it can be concluded that the income difference between males and females could be greater. Research done by Hegewisch and Gornick (2013) concluded that females with children have an intermittent work pattern and that they have to worry about caring for the children; this will negatively impact their income and thus glorify the gender pay gap. The research conducted by Blau and Kahn (2017) has, somewhat, the same outcome: that extra hours spent on motherhood obligations at home negatively influence wages, with results being stronger for married females compared to married males. Due to motherhood obligations, females have fewer opportunities compared to males regarding work experience, achieving skills, and prioritizing the work environments, which could have an impact on income differences between males and females

2.1.5 Glass ceiling & Sticky floor

The glass ceiling and sticky floor effect relate to the income distribution of the difference between males and females. Regarding the glass ceiling, reference is made to an income difference between males and females at the top of the income distribution. With a sticky floor, it is exactly the opposite because the differences at the bottom of the distribution are larger (Kee, 2006). According to Still (1997), the glass ceiling could be considered as a transparent barrier to moving up within a company and as a barrier that holds back qualified individuals. According to her, sticky floors prevent females from changing positions; this mainly relates to low-level jobs predominately occupied by females. It is also possible that there may be differences between the public sector and the private sector. However, there has not been enough research done to explain this further.

2.2 Public vs private sector

According to Bouckaert et al. (2000), public organizations are related to whether they operate in certain functions based on government authorities, economy market-based, or welfare state activities. Whereas the private sector has a positive influence on job creation and could be seen as a source of incremental and radical innovation in different products, and a contribution to the national budget (Van Le & Tran, 2022). Research conducted by Rahman and Shahriar (2016) argues further on these differences and also states that organizations in the public sector are mainly controlled by political forces and not by market forces like those in the private sector, but differences in goals occur. While organizations in the private sector, more or less, focus mainly on making a profit, organizations in the public sector have, most of the time, multiple intangible goals. These goals can result in the private sector being more unpredictable. One of the reasons that the public sector is also seen as a female-dominant sector is because of protected characteristics that make it attractive for females (Mandel & Semyonov, 2021; Tonoyan et al., 2020).

All these differences between the public and private sectors can contribute to a difference in income between the two. The income difference between the sectors concerned may be related to institutional characteristics that influence the labor market. These characteristics can include the following: minimum wage laws, the centralization level of the public sector, differences in recruitment procedures, and employment protection legislation (Christofides & Michael, 2013). Some researchers have conducted studies to identify whether there are differences in wages between the public and private sectors. According to results from research by Ma and Li (2022), it can be concluded that the income difference was smaller between the public and private sectors between 2002 and 2018 in China, but the differences are still present. The research conducted by Barón and Cobb-Clark (2010) also focuses on the income differences between the public and private sectors but takes the female and male pay gap into account. Their results are based on data from Australia, with the conclusion that in the private sector, the income difference increases as the income level also increases, up to an increase of 20.1 percentage points, and in the public sector, the income difference between males and females is 12.5%. Considering both studies, it can be concluded that there are differences in wages between the public and private sectors. However, the data set from China concluded that the wage gap was wider in the low wage distribution than in the higher wage distribution. For the other data set regarding Australia, the wage gap was smaller at the low distribution and wider at the high wage distribution (Barón & Cobb-Clark, 2010; Ma & Li, 2022). Meaning, that there could also be differences regarding the wage distribution level between the sectors.

2.3 Entrepreneurial Impact

Entrepreneurship is considered as people being able to make crucial judgments related to the economy, as well as developing

and evaluating opportunities related to new products, services, or combining existing resources into something new (Casson & Buckley, 2010; Schumpeter, 2000; Stam et al., 2012). There has been an increase in the number of companies founded by females, which has increased females' contribution to innovation, work, and prosperity (Brush & Cooper, 2012; Estrin & Mickiewicz, 2011). The choice of females to opt for entrepreneurship can be substantiated by various reasons. For example, one of the reasons may be that the conditions of usual work are not optimal for females, and one of the causes may also have to do with cultural aspects that negatively affect females (Solesvik et al., 2019). According to Džananović and Tandir (2020), the choices made by females can also be explained by pull and push factors. These push factors are external factors such as poor working conditions, too low salary, or job dissatisfaction. The pull factors concern internal factors such as self-fulfillment, independence, and self-confidence. These factors can contribute to females' choice to become entrepreneurs. As stated, these factors can be determined both externally and internally.

The opportunities for females in the public sector to become entrepreneurs will differ from the opportunities for females in the private sector. Females in the private sector are more likely to have certain qualities that make it easier to become an entrepreneur (Özcan & Reichstein, 2009). Continuing on this, according to Tonoyan et al. (2020), the opportunities for females in the public sector are lower due to the higher level of bureaucracy, formulation, and hierarchy that can influence the acquisition of certain skills and knowledge that can help in becoming an entrepreneur In addition, people in the private sector are more likely to have connections with business-related people who can provide opportunities when it comes to becoming an entrepreneur. Furthermore, the public sector is also seen as less stimulating than the private sector due to the lower level of innovation, the lower level of small businesses present, and the lower level of dynamism. These conditions can reduce opportunities to take advantage of favorable chances that entrepreneurship can offer (Tonoyan et al., 2020).

3. METHODOLOGY

To reach a clear conclusion, two different datasets will be used, both of which provide information about the income difference between females and males, but also about female entrepreneurship. The data will be processed in different ways to use it efficiently. This section will explain how the data will be processed for use and analysis. First of all, some of the data will still need to be labeled, although most of it has already been labeled. In addition, all the data that is not useful will have to be removed to obtain only the necessary results. As a final step, the data will have to be processed to conclude. Figure 1 shows, step by step, the order in which this will happen.

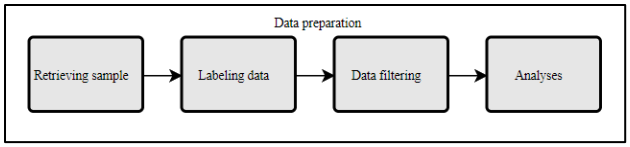

Figure 1. Steps for preparing the data

3.1 Sample

This research uses a combined data set with retrieved data from the Office for National Statistics of the United Kingdom and the United Kingdom government's Gender Pay Gap service. These share information about the incomes of certain residents of the UK. The data is divided into two different datasets, one dataset providing information based on regions called "Female_SelfEmployment" and the other dataset providing information based on companies called "firm_data". Both datasets contain information about the income of females and males living in the UK. The dataset, "Female_SelfEmployment" based on regions mainly provides information about the presence of males and females working and also information regarding the income difference between them, and the presence of males and females in certain quartiles, these quartiles relate to the division between them and the occupational segregation in companies. In addition, information has been provided about the number of self-employed females present, which concerns female entrepreneurship. In the dataset with information about companies called "firm_Data", approximately the same information is provided only from the company's perspective. A distinction has also been made in various sectors the company operates. This allows a link to be made between the public and private sectors.

3.2 Data Filtering

First of all, all unusable data must be filtered to remove unnecessary information from the dataset. Regarding the regional data, a small portion has to be filtered out. However, the company data must be filtered to keep it clear. Two new datasets must be filtered from the total dataset to only retain companies that are present in either the public or private sector.

Figure 2 shows how much of the actual data set remains after the correct data has been filtered out. Figure 2 shows that the sample size for the regional data has not decreased that much, because most of the data was already sufficient to use. The regional data decreased only to 310. However, this is not the case for the company data. In "Firm data Gov" 2092 companies have been filtered out that are suitable and in "Firm data Public" 356 companies have been filtered out. This means that the data can now be used for further analyses.

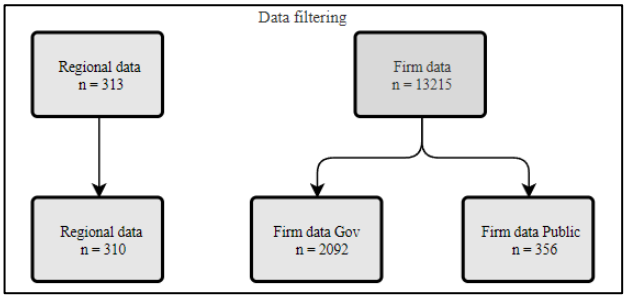

Figure 2. Amount of data after filtering

3.3 Data Labeling

The datasets will first have to be divided into different sections to make them clearer. Additional groups must be created within the data set to create relationships. The females who work in the sector in question will have to be divided to make it possible to analyze it. The new datasets will be divided into the private sector with the name "Firm_data_Public" and the public sector with the name "Firm_data_Gov". The data set will consist of females present in the public sector and also females present in the private sector, including the relevant difference in income between males and females. In addition, the influence of female entrepreneurship will still have to be taken into account, but this can be done using regional data. The variables within the data set must be distinguishable to measure the relationship. Combining and labeling the data to make it easier to work with in RStudio is key to progressing efficiently. An overview of the variables with an explanation is given in Appendix 9.4.

3.4 Analysis

To analyze all the data, RStudio will be used to work efficiently and, in the end, come to a decent conclusion. First of all, the data sets have to be imported to RStudio to work with it. To ensure that the correct analysis can be done, it is important to use the correct codes. This also includes keeping track of and recording the codes (Rivas, 2012). Once the data set has been completely imported and all errors have been filtered out, it can be used. With the correct data set, it can be determined whether the data set is normally distributed, and it can also be analyzed whether there is a relationship between the variables in question. The first part of the research question can be figured out by focusing on the relationships between the variables, which can be measured utilizing a Welch Two Sample t-test to analyze the differences between the public and private sectors. Visualizing the data with charts and plots can be an efficient way to show the outcomes. Through these methods, a conclusion can be drawn about the gender pay gap in the public and private sectors.

To answer the second part of the research question, which is related to the effect of the income difference on female entrepreneurship a regression analysis will be used, which can be performed by using the lm function in RStudio. The results concern the relationship between the different variables used. These variables can be distinguished between dependent, independent, and control variables. As a dependent variable "Share_Self_Fem_Act" will be used, which indicates the share of female entrepreneurship on the active population. As independent variables, the following are used; "GovInstitution", "DiffMeanHourlyPercent" and "GovInstitution * DiffMean HourlyPercent". The variable "GovInstitution" indicates the number of public sector organizations within the dataset, "DiffMeanHourlyPercent" indicates the mean income difference between males and females per hour in a percentage, and the interaction variable indicates the effect of the relation between the two independent variables on the dependent variable. For the control variables the following are used; "Brexit_EPE", "Share_Females" and "PopDensity". The variable "Brexit_EPE" indicates the voting from the population on this particular political party in the region, "Share_Females" indicates the total share of females in the region, and the "PopDensity" indicates the population density in a given region. These variables are used for the analyses of the second part of the research question, which is mainly focused on the effect on female entrepreneurship.

4. RESULTS

As stated in the methodology, the various data will first have to be placed in RStudio. Of course, part of the data still had to be filtered to continue with the next phase of this research. Firm data will be used for the analysis relating to the income difference between males and females, and regional data will be used to analyze the effects on female entrepreneurship. To determine whether the various variables are normally distributed, a Shapiro-Wilk test was used, which can be seen in Table 5 in the Appendix. This was done for the dependent variable "Share_of_ Self_Fem_Act" and also for the independent variables "DifferenceMeanHourlyPercent" and "GovInstitution" in the regional data. This test was also carried out for the variables with a difference in mean hourly percent from the firm data. However, the null hypothesis can be rejected because the p-value for all variables is smaller than 0.05, which means that the variables are not normally distributed. Figures 3-8 show the distribution of the relevant variables.

4.1 Descriptive analysis

4.1.1 Firm data

Table 1 provides an overview of descriptive statistics from the firm data that provides information on the average income difference between males and females and the presence of females in a business at a certain classification. A lower quartile is related to a lower classification within a firm, and a higher quartile is related to a higher classification. Furthermore, is a more detailed explanation of these variables given in Appendix 6.4.

For the difference in income between males and females, both the average and the median are given for both the public and private sectors. Table 1 shows that the difference between the average income gap between males and females in the public and private sectors is 9.93704. However, regarding the median, the difference is only 1.2892. If we focused on the different quartiles from the public and private sectors, a decrease can be seen in both cases, which can also be seen in Figures 9–12 in the Appendix. These graphic images show how the percentage of females present in the various quartiles decreases per quartile. With the following quartiles: "FemaleLowerQuartile", "FemaleLowerMiddleQuartile", "FemaleUpperMiddleQuartile" and "FemaleTopQuartile". The average of females present in the different quartiles in the public sector decreases from the lowest quartile at 74.4223 to the highest quartile at 62.1503, and for the private sector, the average decreases from the lowest quartile at 47.0437 to the highest quartile at 26.7860. The difference between the average of the public and private sectors regarding the different quartiles is also increasing. At the lower quartiles, the difference is 24,873, which increases to a difference between the public and private sectors of 39,849. The presence of females in the relevant quartiles is decreasing in both sectors, but the difference between the two sectors is also increasing towards the higher quartiles. The standard deviation of the various quartiles is not the same between the two sectors only for the top quartile the difference is not significant. The standard deviation indicates that there is a greater spread in the lower and middle quartiles of the private sector compared to the public sector, this difference decreases in the highest quartile.

Table 1 - Descriptive statistics

	Mean	*Sd*	*Median*	*Mean (-)*
Difference				
Mean hourly percent				
Public	13.4875	10.1988	12.81917	9.937
Private	22.4246	16.0387	21.76083	
Median hourly percent				
Public	15.8047	16.3889	12.85	1.289
Private	16.8571	13.8385	16.45133	
Quartiles				
Lower				
Public	74.4223	15.3947	76.93	24.873
Private	47.0437	19.7741	49.275	
Lower middle				
Public	72.5850	15.3716	74.27333	28.456
Private	40.9567	19.9898	39.95	

Upper middle				
Public	68.8355	15.3006	70.25833	31.976
Private	35.1783	18.8305	33.44667	
Top				
Public	62.1503	15.4019	63.1375	39.849
Private	26.7860	15.4921	25.435	

4.1.2 Regional data

Table 2 provides information regarding the descriptive statistics extracted from the regional data. A further explanation of these variables can be found in Appendix 9.4. The percentage of self-employed females of all working people in the various regions is an average of 5.33, which can be linked to female entrepreneurship in the general population. In addition, the average number of females is 51.05 percent of the regions together.

The income difference based on the regional data has an average of 13.01 percent with an associated standard deviation of 3.65. The variability of the income gap between males and females using the regional data is fairly consistent. Focusing on the variable government institutions, it can be determined that of all regions together, the average number of government institutions is 20.83 percent, which can be linked to the number of companies present in the public sector. This is accompanied by a standard deviation of 11.92, which indicates that the spread of government institutions between the regions is relatively high.

Table 2 Descriptive statistics

	Mean	*Sd*	*Median*
Share_Self Fem_Active	0.05326599	0.0166248	0.0511755
Brexit_EPE	0.3555649	0.1019531	0.36945
Share_Female	0.5104613	0.006624226	0.51
PopDensity	1818.017	2530.907	745.95
GovInstitution	0.2081612	0.119155	0.1894057
DiffMean HourlyPercent	13.00651	3.651742	13.27835

4.2 Welch two sample t-test

To demonstrate actual differences between the public and private sectors, a Welch two-sample t-test was used, which is shown in Table 3. This is used because both the variance and the sample size are different (Sakai, 2016). Regarding the income difference between males and females in both sectors, there is a p-value of < 2.2e-16, which means a highly significant difference between the two groups. The confidence interval for the mean difference is from -10.664640 to -7.209455, which is far from 0, which also indicates high significance, but the negative confidence interval indicates also that there is a significantly lower income difference in the public sector than in the private sector.

For the other variables related to the presence of females in the various quartiles, there is also a low p-value, which is < 2.2e-16 for all four quartiles. This indicates that the null hypothesis can be rejected and that there is a significant difference in average between the public and private sectors regarding the presence of females in the quartiles. The confidence interval is approximately around 4, which indicates that there are more females in the public sector for all the quartiles compared to the private sector.

Table 3 - Welch two sample t.test

	Group	*Mean*	*P value*	*Confidence interval 95%*
DiffMean HourlyPercent	Public	13.4875	< 2.2e-16	-10.66464, -7.209455
	Private	22.4246		
Quartiles				
Lower	Public	74.4223	< 2.2e-16	25.21512, 29.54210
	Private	47.0437		
Lower Middle	Public	72.5850	< 2.2e-16	29.44374, 33.81300
	Private	40.9567		
Upper Middle	Public	68.8355	< 2.2e-16	31.58846, 35.72595
	Private	35.1783		
Top	Public	62.1503	< 2.2e-16	33.62055, 37.10805
	Private	26.7860		

4.3 Regression analysis

Table 4 shows a regression model with various variables. The proportion of self-employed females was used as the dependent variable, and the percentage income difference between males and females, the presence of government companies (public sector), and the interaction between these two variables were used as the independent variables. Voting for Brexit, the total share of females, and the population density were used as control variables in this regression model. The adjusted R-squared of the regression model is 0.2594, which indicates that 25.95 percent of the variance of the proportion of self-employed females is explained by this model, and multiple R-squared indicates that approximately 25.94% of the variability in the dependent variable is explained by the model. In addition, the F statics indicate that the regression model is generally significant due to the low p-value, which is given < 2.2e-16.

4.3.1 Independent variables

The data in Table 4 show that the coefficient is 0.0680 with a p-value of 0.00873 regarding the relationship between the proportion of self-employed females and the presence of government institutions, which indicates a moderate significance. Concerning the relationship between the proportion of self-employed females and the percentage of income difference between males and females, a coefficient of 0.0015 is present with a p-value of 0.00128. This result also indicates a moderately significant relationship between these two variables. The last variable is the interaction between government institutions and the percentage income difference. The coefficient of this variable is -0.0045 with a p-value of 0.015333, which indicates that the interaction is statistically significant. These regression results are shown in different graphs in Appendix 9.4 with as the interaction value the mean of the shared self-employed females active. In Figure 13 the negative relationship between the share of self-employed females and the interaction variable is shown, in Figure 14 the positive relationship between the share of self-employed females and the income difference between males and females.

4.3.2 Control variables

The regression model in Table 4 also shows the results of the constant variables. For the variable "Brexit_EPE", the coefficient is -0.0713 with a p-value of 1.085e-02, which has a significant negative impact on female self-employment. For the variable "Share_Female", the coefficient is 0.9949 with a p-value (2.24e-

13), this indicates that there is a significant positive relationship with female self-employed workers. In addition, the variable "PopDesntiy" has a coefficient of -2.097e-06 with a p-value of 2.71e-06, which indicates that there is a highly significant negative relationship between population density and female self-employment.

Table 4 - Regression results

Variables	*Coefficient*	*Standard Error*	*Significance level*
Constant	-4.464e-01	6.674e-02	1.09e-10***
Independent variables			
GovInstitution	0.0680	2.576e-02	0.00873**
DiffMean HourlyPercent	0.0015	4.565e-04	0.00128**
GovInstitution * DiffMean HourlyPercent	-0.0045	1.863e-03	0.01533*
Control variables			
Brexit_EPE	-0.0713	1.085e-02	2.19e-10***
Share_Female	0.9949	1.296e-01	2.24e-13***
PopDensity	-2.097e-06	4.385e-07	2.71e-06***
Fit statistics			
Residual standard error: 0.01445 on 303 degrees of freedom			
Multiple R-squared: 0.2594			
Adjusted R-squared: 0.2448			
F-statistic: 17.69 on 6 and 303 DF, p-value: < 2.2e-16			

**, **, * and . coefficients are statistically significant at 0.001, 0.01, 0.05 and 0.1, respectively

4.4 Summary of Results

From the first results of the Shapiro-Wilk test, it can be concluded that all the given variables of the regional data and those of the firm data are not normally distributed because the p-value for all variables is lower than 0.05. The descriptive results of the firm data indicate that there is an income difference between males and females for both the public sector and the private sector. The Welch two-sample t-test provides additional certainty about this and indicates that there is indeed a significant difference between the public and private sectors when it comes to the mean of the given variables because the p-value is lower than 0.05.

The regression analysis shows a positive, moderately significant relationship between the proportion of self-employed females, the income difference between males and females, and the presence of government institutions. For the interaction variable, there is a negative relationship with the proportion of self-employed females. Regarding the control variables, all three are significant, as can be seen in Table 4. "Brexit-EPE" and "Pop Density" have a negative relationship with self-employed females, and "Share_Females" have a positive relationship.

5. DISCUSSION

This research aimed to gain insight into the income difference between males and females, also known as the gender pay gap, in the public and private sectors and its effect on the presence of female entrepreneurship. To conduct this research, the following research question was formulated: "Are there different effects of the gender pay gap in public and private organizations on female entrepreneurship?" The first part of the research question mainly concerns the gender pay gap in the public and private sectors. Firstly, the results showed that there is a significant difference in income between males and females for both the public sector and the private sector; this difference is higher in the private sector than in the public sector. This conclusion is consistent with several studies conducted by other researchers (Drolet & Mumford, 2012; Moreno-Mencía et al., 2022). The research conducted by Moreno-Mencía et al. (2022) concludes that there is an income difference in both the public and private sectors, but that this difference is less in the public sector. According to Drolet and Mumford (2012), almost the same conclusion is drawn, which concludes that there is certainly an income difference in the private sector.

The presence of females in the various quartiles can also influence the more significant difference in pay in the private sector. The higher income difference in the private sector may be caused by the lower number of females in the quartiles compared to those in the public sector. Overall, there are fewer females in each quartile in the private sector compared to the public sector. This corresponds to research by Démurger et al. (2012), which points out that the income difference between the two sectors can be caused by differences in the bottom parts of the income distribution. In addition, according to research by Gunderson (1979) and Barón and Cobb-Clark (2010), the lower income difference in the public sector can also be determined by the regulation of wage-price guidelines, several wage criteria, and political forces, which are not determined by the market environment like for the private sector. Furthermore, according to Lucifora and Meurs (2006) females in lower-scaling jobs are better paid in the public sector compared to the private sector; this could be a reason for the differences in females present between the sectors in the lower quartiles. Lastly, the higher income difference in the private sector can be caused by the Glass ceiling effect, which refers to an invisible barrier that prevents women from moving up within a company (Stroh et al., 1996). Occupational segregation can also influence this, but this is more focused on the presence of females in specific occupations (Weeden et al., 2018). For example, the lower-paid professions are often in the public sector, which is a more female-dominated industry.

The second part of the research question is mainly focused on the influence of the income difference between males and females on female entrepreneurship. The regression analysis shows that there is a significant positive relationship between female entrepreneurship, also called female self-employment, and the income difference between males and females. In addition, there is also a significant positive relationship between female entrepreneurship and the number of government institutions, which refers to public sector companies. However, with the help of interaction between the variable income differences and public organizations, a link can be made between the sectors. It can be concluded from this that the effect of the gender pay gap on female entrepreneurship has a negative relationship with the public sector. Without the interaction variable, the gender pay gap has a positive relationship with female entrepreneurship, which can be linked to the private sector. From this, it can be concluded that when the gender pay gap increases, the number of female entrepreneurs also increases in the private sector, and when the gender pay gap increases in the public sector, it negatively impacts female entrepreneurship. The results are consistent with some literature. Although studies by Tonoyan et al. (2020) and Estrin and Mickiewicz (2011) conclude that public

companies make it more difficult for females to take the step towards entrepreneurship. Sundin (2011) conducted research that concludes that business changes within the public sector can influence entrepreneurship. For females in the private sector, the gender pay gap can encourage them to become entrepreneurs because these females have qualities that suit entrepreneurs, and they often have a more extensive business network which can help them with an entrepreneurial career. (Özcan & Reichstein, 2009; Tonoyan et al., 2020). In general, there is an impact of the gender pay gap on female entrepreneurship, but this is different for each industry. A preliminary study by Gaweł and Mroczek-Dąbrowska (2022) indicates that the income difference actually has an influence on female entrepreneurship, but that male and female dominance in the industry also plays an important role in this.

The regression model also indicates that for the control variables Brexit EPE and for population density, there is a negative significant relationship with the share of self-employed females. There is also a significant relationship for the control variable share of women, but this relationship is positive.

6. CONCLUSION

As mentioned in the discussion, this study aims to investigate the income difference between males and females in the public and private sectors and the effect on female entrepreneurship. From the results, it can first be concluded that there is an income difference between the public sector and the private sector, with a higher income difference in the private sector. In addition, concerning female entrepreneurship, it can be concluded that there is a positive relationship between the share of female entrepreneurs in the private sector and the gender pay gap and a negative relationship between the share of female entrepreneurs in the public sector and the gender pay gap between males and females. This means that females who are influenced by the gender pay gap in the public sector are not as tempted to switch to female entrepreneurship compared with the females in the private sector.

6.1 Practical implications

From a practical perspective, this research aimed to demonstrate whether there was a difference in income between men and women at all, whether this occurred in both sectors and the effect on female entrepreneurship. The results of this research indicate that there is certainly an income difference between males and females and that this applies to both sectors. Firstly, public sector companies could be able to examine whether there are possibilities to further reduce the income difference and to offer males and females equal opportunities. The negative influence of the gender pay gap on female entrepreneurship indicates from the public sector that solutions or opportunities must still be offered to females who see an opportunity in female entrepreneurship but do not want to fulfill this opportunity because they do not have the right resources. These females could be helped by adjusting policies, such as more flexible work arrangements, but also training and development programs. Private sector companies could be more concerned with equal income and equal opportunities within companies for females. To ensure that the push factors for women towards female entrepreneurship decrease, which are mainly related to these income differences and unequal opportunities. Furthermore, if a female chooses to pursue entrepreneurship, these companies provide the right resources and support.

6.2 Theoretical implications

Regarding theoretical implications, several studies support the results of this study. Firstly, research conducted by Castagnetti and Giorgetti (2019) regarding income differences in the public and private sectors. Although this research has the same conclusion, the influence of the glass ceiling and sticky floor effect was further examined. Further results from this study refer more to other factors, such as hiring-selection methods, and also putting more effort into applications that focus on gender equality. In addition, unexplained components such as male preferences in management positions and non-monetary benefits are examined. Another study conducted by Tonoyan et al. (2020) concerns the influence of public and private sector opportunities on female entrepreneurship. This research focuses more on the characteristic features within the public and private sectors that offer opportunities for females. The public sector is seen more as a female-dominated sector compared to the private sector. However, certain resources, such as social, human, and financial, are less available in the public sector. In addition, public sector companies are more familiar with formality, hierarchy, and bureaucracy, which makes it more difficult to become an entrepreneur. In the private sector, the characteristics are more favorable regarding long working hours, the development of new products, and a higher level of innovation, all of which can be beneficial to entrepreneurship (Stam et al., 2012). These characteristics are related to the results of this study, which also show that in the private sector, the choice to become an entrepreneur is more likely to be made from a female perspective.

6.3 Limitations & future research

This research entails several limitations. Firstly, one of these limits concerns the different samples of the firm data. As shown in Figure 2, there were initially 13,215 different companies within the dataset. However, after filtering out the redundant data, 2092 remained for public companies, and only 356 companies remained for private companies. With a larger data set, the results and statistical power of this study would be more reliable. In addition, as shown in Table 4, the R-squared value is 25.94% of the variance in the dependent variable, which means that certain decisive factors have not been included in the analysis. The value of the income difference between males and females is significant, but the value itself is very small, so it has almost no influence on the dependent variable. Finally, some factors are not included in this study; these factors could also influence the income difference between males and females. These factors can be things such as age, home situation, number of children, and origin. In the future, further research can be done on the income differences between males and females and their influence on female entrepreneurship. For example, future studies could focus on other industries instead of the public and private sectors. In addition, other variables could be used to examine it from a different perspective. This research was done with data from the United Kingdom, and data from other countries could provide a different conclusion regarding this research. To create a different perspective, it is recommended to add different variables and include other industries, which can also build on the research about the gender pay gap.

7. ACKNOWLEDGMENTS

Finally, I would like to express my gratitude to my supervisors Dr. Maximilian Goethner and Dr. Igors Skute. I would like to thank Dr. Maximilian Goethner for supporting and helping during this research, and I would like to thank him for his critical and clear guidance during this process. Lastly, I would like to thank my family and friends who supported me throughout my studies.

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9. APPENDIX

9.1 Normality

Table 5 - Shapiro Wilk test

Shapiro Wilk test	Statistic	Significance level
Regional data		
Female entrepreneurship	0.9623	3.034e-07
Income difference	0.98595	0.003814
Governmental institution	0.93826	3.896e-10
Gov institution * Income diff	0.89434	6.171e-14
Firm data		
Income difference public	0.99432	3.437e-07
Income difference private	0.89406	5.137e-15

Figure 3 - Histogram female entrepreneurship

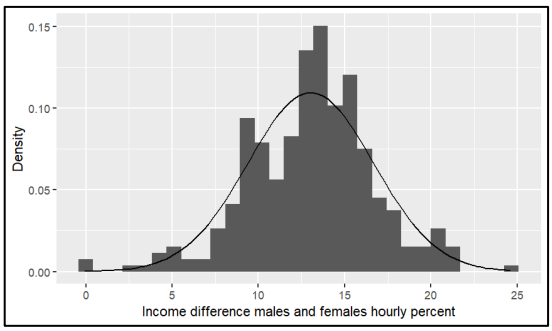

Figure 4 - Histogram income difference regional data

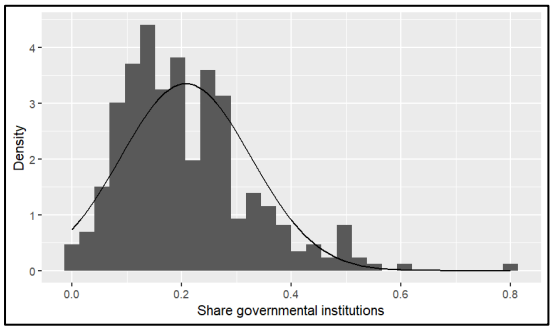

Figure 5 -Histogram governmental institutions

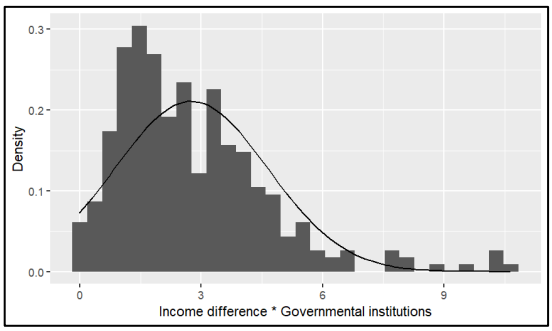

Figure 6 – Histogram Income diff * Gov institutions

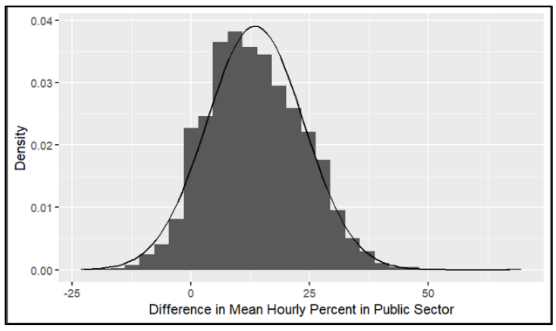

Figure 7 - Histogram income difference public sector

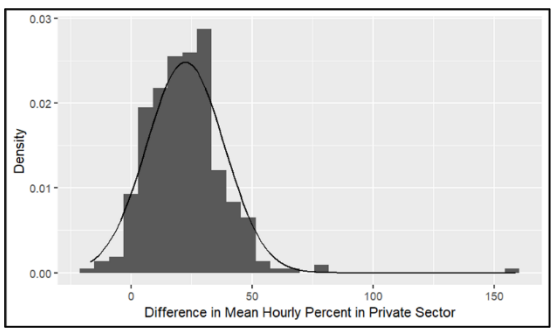

Figure 8 - Histogram income difference private sector

9.2 Histogram mean of different quartiles of public and private sector

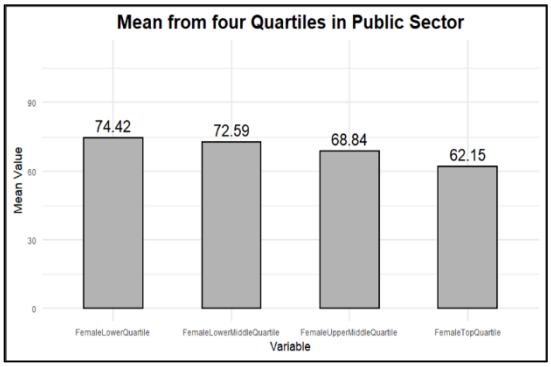

Figure 9 - Histogram quartiles public sector

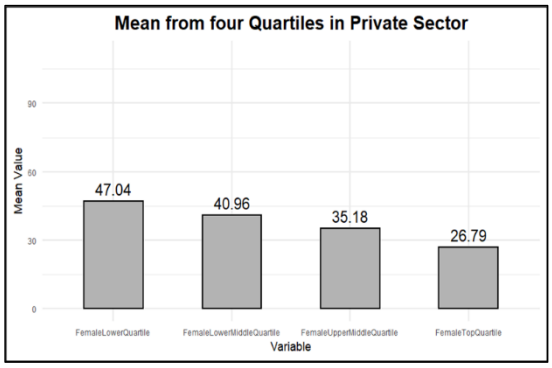

Figure 10 - Histogram quartiles private sector

9.3 Boxplot mean of different quartiles of public and private sector

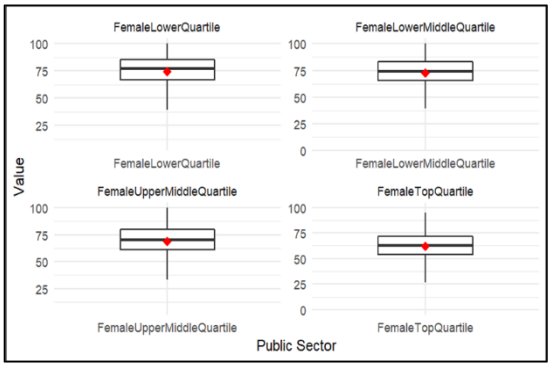

Figure 11 - Boxplot quartiles public sector

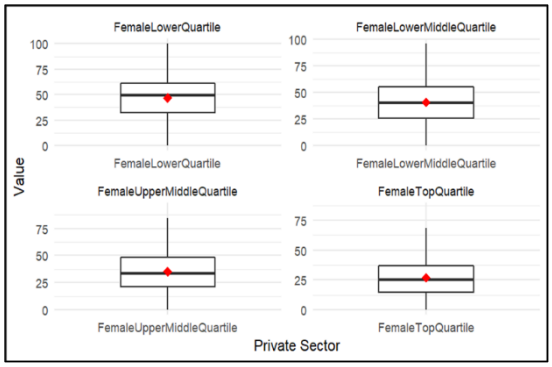

Figure 12 - Boxplot quartiles private sector

9.4 Regression from different independent variables

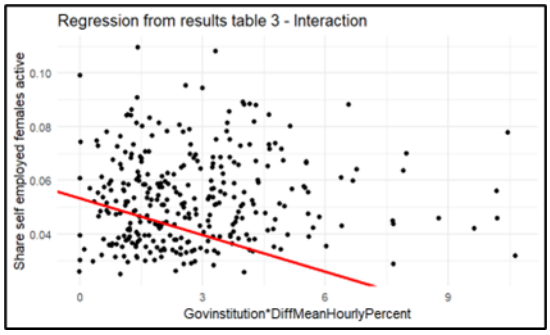

Figure 13 - Regression with share self-employed females active & interaction

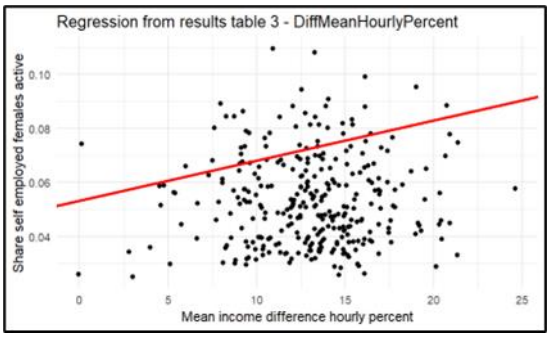

Figure 14 - Regression with share self-employed females active & income difference

9.5 Description of datasets variables

Table 6 – Description of variables

Variable	***Definition***	***Measurement ratio***
Female_SelfEmployment	Dataset	
Share_Self_Fem_Act	The share of female self-employed individuals in the active population can be explained as the share of female entrepreneurship	Ratio
Brexit_EPE	The percentage of the active population voting for Brexit	Ratio
Share_Female	The share of females active in the whole population	Ratio
PopDensity	The density of the population given in a specific region	Ratio
GovInstitution	The percentage of government institutions in the region can be seen as the percentage of companies present in the public sector.	Ratio
DiffMeanHourlyPercent	The difference in average hourly pay between male and female	Ratio
Firm_data_Gov & Firm_data_Public	Dataset	
FemaleLowerQuartile	Females present in a lower classification regarding position in the business	Ratio
FemaleLowerMiddleQuartile	Females present in a lower middle classification regarding position in the business	Ratio
FemaleUpperMiddleQuartile	Females present in an upper-middle classification regarding position in the business	Ratio
FemaleTopQuartile	Females present in the top classification in the business regarding position	Ratio