THE MOTHERHOOD PENALTY

AN EMPIRICAL STUDY OF THE GENDER WAGE GAP IN THE UNITED STATES

Acknowledgments

To all the Women who fight

and fight.

Abstract

The aim of this thesis is to unveil what constitutes the Motherhood Wage Penalty, a phenomenon that according to recent research makes up a majority of the gender wage gap we observe on the labor market. More specifically, the ambition is to try to explain how motherhood affects working women and if it is possible to rule out other possible explanations for the gender pay gap, such as education and hours worked, other than motherhood itself - which would indicate that there are elements of the gender wage gap that are structural and discriminatory. The research is carried out through regression analysis with data from the United States in 2016.

Keywords: The Motherhood Penalty, The Motherhood Wage Penalty, Gender Inequality, Gender Wage Gap, The United States

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1. Introduction

Research show that women who work full-time earn about 80 % of men's wages (Hegewisch & Williams-Baron, 2017). It's also a fact that in almost all labor markets, women with children in their turn receive a substantially lower income than women without children. The big debate is no longer *whether* a gender wage gap exists – it's rather *why* it exists. Some may argue that this is a direct result of gender discrimination in a society and in an economy that does not believe in women's competence relative to men's. Others may insist that women themselves chooses professions and fields of work that pay less and offer more flexible work hours - or that women are not as well educated as men and hence cannot obtain as well-paid job to the same extent (Lundborg, Plug and Rasmussen, 2018).

Recent research nevertheless seems to indicate that the gender inequality in earnings is a direct result of women birthing children, rather than being due to women obtaining less education or because of some other inequality variable (hence *The Motherhood Penalty* (MWP)*)*. The birth of a child seems to create a gender wage gap of about 20 % in the long run, driven by variables like labor force participation, hours worked and wage. Underlying this "motherhood penalty", research show clear impacts on occupation, education and bargaining power (BP) for mothers relative to non-mothers and men. The theories as to why the gender wage gap caused by having children has increased in recent years and why it's persistent, are still dividing researchers (Kleven, Landais and Sogaard, 2018)

Despite efforts to facilitate mothers in the labor market, little is still known about the true labor market effects of having children. Policy makers have in recent years often based their progressive parental-leave policies (which are intended to support women having children) on the belief that children, indeed, have a negative effect on a women's career. These policies have further been implemented despite the fact that research of the true consequences of having children is inadequate (Gangl and McManus, 2006)

The phenomenon of *Bargaining Power* is something that the writer believes can be captured in the gender wage gap and could give a satisfying explanation as to what causes and maintains the MWP. It should nevertheless be mentioned initially that Bargaining Power as a phenomenon will be used to interpret and discuss the results of the research but establishing some sort of index or measurement of Bargaining Power is beyond the scope of this thesis.

Hence, the definition of the phenomenon will be introduced and then the results will be discussed with its stated assumptions.

Describing and exemplifying adjustments to public policy on the gender wage gap is also beyond the scope of this thesis but since the subject has an interesting interdisciplinary character and is highly relevant as to what could decrease the gender wage gap, I aim to introduce my thoughts and reflections on public policy and ethics in **8.2 Interdisciplinary Analysis.** The research questions of this thesis can hence be encapsulated to:

(i) *Is motherhood one of the variables that constitutes the Gender Wage Gap?*

(ii) *To what extent does women's Bargaining Power affect the Motherhood Wage Penalty?*

The thesis will further maintain the following structure: a brief introduction to popular and common economical and sociological theories on the MWP, where the reader is introduced more thoroughly to the phenomenon as well as to previous research. The reader is then introduced to a definition and a number of assumptions of Bargaining Power, which will prove useful when the concept is evaluated as to what extent women's Bargaining Power affects women's wages and hence the MWP. This section is foremost to give the reader some intuition as to why the MWP is an observable and persistent feature on the labor market and it will not be provided through an index or its correspondent. The idea is then to put forth the hypothesis based on the information and intuition gained from the background section. Following the hypothesis, the empirical approach is presented. Here the reader is introduced to the basics of regression analysis and the OLS. After an account of the empirical approach, the data and method are outlined and the regression variables and a dataset from the Luxembourg Income Study (LIS) are used to try and identify if motherhood is one of the variables that constitutes the gender wage gap in the United States. The stated assumptions of Bargaining Power are then applied to the empirical results and evaluated as to what role the phenomenon plays in constituting the MWP. In the succeeding sections the results are disentangles, the limitations of the conducted research are reviewed as well as its interdisciplinary implications. I will then offer some concluding remarks and propose questions for further research.

2. Background

The following sections introduces the reader to selected previous research conducted on the MWP. The reader is also introduced to a definition and a number of assumptions of Bargaining Power and what the concept is thought to embody. The literature that is being introduced and examined in this section constitutes the basis of the hypothesis and how the methods of analysis are carried out.

2.1 Previous Research

In order to give the reader a thorough intuition as to what constitutes the MWP, both economic and sociologic arguments are introduced. The research presented in the following section have been conducted in several different countries and hence on several different labor markets with different approaches on public policy and is presented here in order to give the reader an understanding and an intuition of the magnitude of the phenomenon.

2.1.1 The Motherhood Penalty

Angelov et al. (2016) argues in *Parenthood and the Gender Gap in Pay*, that the gender wage gap we observe on the Swedish labor market, mainly is due to two aspects; workplace flexibility and the effect of parenthood. The writers came to this conclusion by establishing that family responsibilities are unequally shared and as long as these structures continue to exist, the gender wage gap is not likely to close or even narrow. The researchers also state that Swedish women participate in the labor market in the same extent as men, which is a result of extensive successful policy reforms on the labor market but that the gender wage gap is a direct result of women stepping down when they become mothers. This reasoning builds upon the idea that in a family constellation, the man/father often has a higher income, due to being a few years older than the mother when becoming first-time fathers and hence, since the man has a higher income, the women steps down and work less hours or gravitate towards occupations that are more family friendly (flexible) and less paid.

Research conducted by Oesch, Lipps and McDonald (2017) in *The Wage penalty for motherhood: Evidence on discrimination from panel data and a survey experiment for*

Switzerland, shows an unexplained wage penalty for mothers in Switzerland. According to their studies, recruiters assign lower wages to mothers compared to non-mothers and the penalty increases with every child the mother gives birth to. Their research also shows that the penalty is larger for younger mothers and seems to disappear for older mothers in blue-collar occupations (professionals). The outcome of their research hence shows that recruiters discriminate towards mothers in terms of labor income. This research is particularly interesting since the diminishing penalty for mothers in blue-collar professions could indicate that the wage gap could be a result of bargaining power – that women in higher professions have a higher bargaining power and hence a lower wage penalty, which will be stated in **2.2 Bargaining Power**.

In the article *From Motherhood Penalties to Husband Premia: The New Challenges for Gender Equality and Family Policy, Lessons from Norway,* Petersen, Penner and Hogsnes (2014*)* examines the motherhood penalty in Norway, with a focus on how family status affects the MWP and the Gender Gap in Pay. The research shows that the MWP have decreased in Norway between 1979-1996, which they argue is a result of extensive expansion of family policy. The writers also undertake the phenomenon of "The Husband Premia", which is an equally interesting topic as the MWP, which states that marriage and children are favorable to men and hence serves as a form of premium, instead of a penalty as for women. The topic will however not be introduced further, since it's beyond the scope of this thesis. This research is nevertheless important, since it gives the indications that thorough and persistent public policy can have desirable effects on the labor market - something that the writer will consider briefly in **8.2 Interdisciplinary Analysis.**

In *Children and Gender Inequality: Evidence from Denmark*, researchers Kleven, Landais and Sogaard (2018) have studied the inequality in earnings between men and women on the Danish labor market and concluded that most of the remaining gender inequality is due to children. Furthermore, the researchers cement that the arrival of a child creates a gender gap in earnings of around 20 % in the long run. Kleven et al. also highlights the correlation between women's Bargaining Power and the gender wage gap by establishing that the motherhood penalty is driven by variables like promotion to manager, sector and occupation. The researchers also state that the persistence of the gender pay gap is due to transmission through generations, where the childhood environment and the structure of mother's preferences of family and career is inherited through mothers to daughters (same reasoning doesn't apply for fathers to sons).

These arguments will not be developed further in this thesis but gives an interesting proposal as to what factors could explain the persistence in wage inequality.

In the article *The Gender Wage Gap and Work-Family Supports: Women's Choices or Policy Choices*, Hegewisch and Williams-Baron (2017) tries to detangle the gender wage gap on the United States labor market. The article is of additional interest for this thesis since the aim is to explain the MWP in the US particularly. The writers' further attributes great importance to the fact that the gender wage gap seems to differ from state to state, which is assumed to be a result of varying application of public policy. The article concludes that the gender wage gap in the United States, unlike popular belief, doesn't depend on women's choices to reduce their time in paid work. State-by-state comparisons rather suggests that public policy plays a vital role in influencing family planning, where states with "better" work-family provisions (such as paid parental leave and publicly provided pre-kindergarten classes) are more likely to have a lower gender wage gap than states that offer few or no support for working families. The lack of such support further "forces" women to choose between employment or family. The article concludes that it's unlikely that we will observe a decrease in the gender wage gap unless a significantly expanded work-family infrastructure is installed throughout the states of the US. The discourse of public policy and the role it plays in eliminating the gender wage gap is intriguing but won't be discussed at great length in this thesis, apart from the writer's own reflections in **8.2 Interdisciplinary Analysis.** The writers nevertheless believe that the reader should keep these arguments in mind when interpreting the results

Rather contrary to Hegewisch and Williams-Barons conclusion, Gangl and McManus (2006) argues in *The Wage Penalty for Motherhood in Context: Economic Consequences of Motherhood in the United States and Germany*, that women in the US who are able to negotiate personal "deals" with their employers, return quickly to work after giving birth and are able to build up tenure with their employer even as they raise a family, are able to maintain their labor market rewards with little assistance from the state. The writers' further states that the solution to the gender pay gap in the US isn't to be solved by public policy but rather within the families themselves, where men often take on the role as the "breadwinner" and women chooses to step down when becoming mothers.

2.2 Bargaining Power

Bargaining Power can be defined as "the capacity to dominate others due to influence, power, size, status or through a combination of different persuasion tactics when negotiating" (Majlesi, Kaveh 2016). Bargaining Power is hence relevant in the context of the gender wage gap since the research presented above unanimously indicates that the motherhood wage penalty is a direct result of women either having to step down when becoming mothers or negotiate "deals" within their families and their offices to maintain their labor market rewards. Previous research also seems to indicate that public policy serves as an alternative to women doing their own negotiating by facilitating mothers in various ways to try and maintain their employment status. With the definition of Bargaining Power as stated above, one could think that women who maintain Bargaining Power could negotiate their salaries and further eliminate or lessen the wage gap. Since the gender wage gap is very much persistent, this would hence indicate that women and especially mothers, do not possess bargaining power to the same extent as men.

The idea with these assumptions is to try and illustrate how women with high bargaining power enjoy a significant decrease in the gender pay gap in contrast to women that does not have the ability and/or opportunity to negotiate their employment status and family constellation. A woman with high Bargaining Power would be defined as an individual who have completed a higher level of education as well as having a skilled occupation, such as being a manager (Majlesi, 2016). This definition will be used throughout this thesis when discussing how Bargaining Power could explain the MWP. As stated earlier, establishing an index or a measurement of Bargaining Power is beyond the scope of this thesis and hence the concept should not be interpreted as measureable or absolute.

The assumptions that will be made as to what defines Bargaining Power and how it is exerted is:

(i)   *Women who has completed tertiary (higher education), are professionals and has a lot of working experience will have a higher Bargaining Power than women who have completed primary and/or secondary education, are primary workers and does not have a lot if working experience.*

(ii)   *Having a higher Bargaining Power would indicate that the women has the ability to negotiate their wages and the circumstances surrounding motherhood in a way*

so that birthing a child does not affect their tenure. An economic argument for this reasoning is that women with higher/more specialized education/ professions acquires characteristics that are more difficult to replace and hence, these women are in a position where they are aware of their value to their employers and can negotiate so that the MWP diminishes

(iii)   *This would then indicate that women who have higher Bargaining Power does not suffer from the MWP to the same extent as women that have a lower Bargaining Power.*

Once again, I wish to underline that the definition and the assumptions of Bargaining Power is solely a theory that provides economic intuition rather than empirical facts. The phenomenon is included in this thesis to help and interpret the result and to give the readers some ideas for further research, which will be discussed in **7 Discussion.**

3. Hypothesis

By running several regressions with different dependent variables, the hypothesis is that we will find that motherhood does constitute a part of the gender wage gap. Therefore, we would expect to find that mothers earn less than non-mothers and men in the US and that mothers work fewer hours and less fulltime than non-mothers and men, most probably as a result of women stepping down when having children (Hegewisch and Williams-Baron, 2017). We would also predict that women who have completed higher tertiary education such as university or college education and who has acquired employment in higher occupations such as being managers and having a lot of working experience will receive a lower gender wage penalty than women with lower completed education and less skilled occupations (Gangl and McManus, 2006) – this as a direct result of women in higher occupations, with higher completed education, having a higher bargaining power since their specialized competence will be more difficult to replace (Majlesi, 2016).

4. Empirical Approach

4.1 OLS: Classical Linear Model Assumptions

In order to get valid results of the regression analysis using the OLS-method (the Classical Linear Model, CLM), certain assumptions have to be fulfilled (Dougherty, 2011). CLM assumptions 1-4 are needed in order to receive unbiased estimators, i.e. $E(ß_j) = \beta$, $j = 1, ..., k$ for any values of the parameters β_j and CLM assumptions 5-6 are needed in order to conduct the hypothesis testing using the t- and F-tests. As written in Lundquist & Eklööf (2017) following assumptions are given.

CLM Assumption 1: Linear Parameters

The model has to be linear in parameters, i.e.

$$y = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \ldots + \beta_k * x_k + u \text{ (i)}$$

As illustrated in **5.3 Regressions**, the assumption is that all the tested models in the research are linear in parameters. This assumption cannot be tested for, but the linear model further seems to be a valid approximation to the reality, as shown and argued in earlier studies. This would hence indicate that CLM assumptions 1 is fulfilled.

CLM Assumption 2: Random Sampling

A random sample on size n, *(x_{i1}, x_{i2}, ..., x_{jk}) for i = 1, 2, ... n*, shall be drawn from the population that satisfies equation **(i)** from the CLM assumption 1. The data used in the regression analysis is collected from the LIS, which is built on harmonized micro-data from national surveys, which ensures that the sampling have been made to satisfy CLM assumption 2, randomness of samples.

CLM Assumption 3: No Perfect Collinearity

None of the independent variables should be constant and there should be no perfect collinearity between them. For the regressions run in this research, the variables have been checked for multicollinearity, which hence ensures that CLM Assumption 3 is met.

CLM Assumption 4: Zero Conditional Mean

This assumption states that the error term, u, has to have an expected value of zero:

$$E(u/x_1, x_2, ..., x_k) = 0 \text{ which in turn implies } E(u) = 0$$

Assumption 4 is in fact a very relevant assumption for this thesis. The OLS states that the error term should be uncorrelated with the regressors. The presence of omitted-variable bias would violate this assumption, which would make the OLS estimator biased and inconsistent. It is also important to underline the endogeneity problem that this thesis suffers. That is, if I would not include a variable that determines selection into motherhood, my error term will no longer be zero. For example, there is a possibility that there are women who chooses to become mothers because they either feel that their career prospects are bad or that they have reached a point where they are satisfied with their tenure and hence does not strive for higher labor market rewards. It is nevertheless important to stress that it is almost impossible to control for everything and it is quite difficult to come up with a "casual" analysis of the omitted variable bias. This is further discussed in **8.1.1 Lack of Variables** and **8.1.4 Lack of Longitudinal data**

CLM Assumption 5: Homoscedasticity of Standard Errors

The variance of the standard errors should be constant (homoscedastic as opposed to heteroscedastic), i.e.

$$E(u^2/x_1, x_2) = E(u^2) = \sigma^2$$

With the possibility of having problems with heteroscedasticity of standard errors in the regression analysis, the regressions have been carried out with robust standard errors throughout. The robust standard errors hence correct the standard errors for possible heteroscedasticity in the data.

CLM Assumption 6: Normally distributed standard error

The population error is independent of the explanatory variables $(x_1, ..., x_k)$ and is normally distributed with a zero mean and a variance of σ^2, which gives $u \sim N(0; \sigma^2)$. When the sample

size of the observations is "large", generally considered N > 100, the assumption is considered to be fulfilled.

The idea was to provide histograms of the standard errors and the dependent variables, since if the dependent variables are normally distributed, it is also more likely that the error is normally distributed. Unfortunately, the java plug-in for LIS databases is unable to provide such graphs and can only display the histograms in table form. By interpreting the tables, I came to the conclusion that the standard errors as well as the dependent variables should be assumed to be normally distributed.

5. Method

5.1 Data

In order to calculate the MWP for the United States, data from the Luxembourg Income Study (LIS) is applied. LIS provides data from several upper- and middle-income countries and their database is one of the largest harmonized income micro-databases in the world.

In order to access the LIS databases, the researcher has to undergo a registration process and agree to submit the research paper to the institute when it is finished. Once the registration process is completed, the researcher can access the databases through a java plug-in with STATA as the underlying statistical package. To execute the regression analysis through the LIS databases, one is required to have previous knowledge of coding both in STATA, as well as in Java. LIS further contains household- and individual-level data for each country in a given year for several variables like labor income, employment and hours worked, which is sorted into waves. For the regression analysis, individual data from 2016 is used since it is the most recent wave available for the United States. The inability to use longitudinal data and how the inclusion of such could have had different implications on the result is further discussed in **8.1.4 Lack of Longitudinal Data.**

5.2 Variables

The MWP is calculated using Ordinary Least Squares regressions (OLS-regressions) on a given set of explanatory variables. The analysis aims at comparing wages of mothers to wages of non-mothers, as well as the wages of fathers to wages of non-fathers, hence both me n and women

are included in the sample. This means that I am using two different samples, males and females and I do not pool men and women in the analysis.

In order to provide the same number of observations for men and for women, missing observations are dropped so that the number of observations are the same throughout the samples. For women, 7,9 % of the observations for the variable *lwage* and 5,7 % of the observations for the variable *hours*, are dropped; leaving us with 5680 observations of mothers, 14 575 observations of non-mothers and 20 255 observations in total. For men, 8,9 % of the observations for the variable *lwage,* 7,4 % of the observations for the variable *hours* and 0,004 % of the observations for the variable *lwage_tot*, are dropped; leaving us with 6770 observations of fathers, 16 565 observations of non-fathers and 23 335 observations in total.

The age has been limited to range between 18-64 to include only the working population, hence 70 167 observations are excluded from the sample. To only include individuals that are employed, 9 408 men and 12 943 women are excluded from the sample. Individuals with a recorded gross hourly wage and hours worked of ≤ 0 are also excluded since this variable is used as the logarithm dependent variable and will result in data errors if included. This means that 403 observations of men and 529 observations of women are excluded because they do not work. The elimination of individuals that are employed but work ≤ 0 hours per week could possibly have an impact on the result since the "extensive margin" is lost, that is, the *decision making* whether to work or not. This will be discussed further in **8.1.1 Lack of Variables.**

For the dependent variables, the log of the gross hourly wage, "lwage" and the log of total annual labor income, "lwage_tot", are used since wages usually are skewed in the direction of higher values. The dependent variable "hours" is used to determine if mothers work less hours than non-mothers and men, which would be relevant for determining what factors could explain the gender wage gap and the MWP. The dependent variable "fulltime" is also used since it is a nice complement to the "hours" regression and it tells us if mothers work less fulltime than non-mothers and men.
This reasoning would be in line with some of the previous research presented in **2.1 previous research**, where it was stated that mothers often gravitate towards occupations where they are able to be flexible with their working hours.

As stated earlier, the MWP will most likely be most prominent for mothers with young children and therefore parents with children older than 6 years old will be excluded. This means that 41 730 individuals (mothers and fathers) are excluded from the sample since we want to compare the wages of parents with children in the ages of 0-6 to men and women without children (hence, the individuals included in the sample are parents with children 0-6 years old and individuals that does not have kids at all). The basis of the specific choice of the child's age is based on the structure of the data LIS provides. In order to determine which individuals are parents/non-parents, a dummy, "parent", is used that takes on the value 1 if the individual has at least one child in the age of 0-6 years and 0 otherwise. It could be argued that the MWP gets "worse" the more children a woman has and the choice of not including this remark is discussed in part **8.1.3 Choice of Variables.** There's also a dummy variable "single" that takes on the value 1 if the individual is not single (lives with a partner) and 0 if the person is single. This dummy is included since it's very much likely that being single limits the individual's possibility to excel at work, as well as being an indicator as to how flexible an employee can be with regards to certain occupations requiring odd work hours or travel.

As continuous variables, "age", "age squared", "work experience", and "work experience squared" are used. The squares of age and work experience are included since the measures are subjects to diminishing marginal utility. Dummy variables for a person's highest completed education is also included. The variable "educ_tert" (tertiary education) takes on the value 1 if the individual has completed tertiary education (college/university) and 0 otherwise. Thus, individuals who have only competed primary and secondary school are the reference group. More about why secondary education isn't included in the regression and the possible implications this have on the result can be read in **8.1.3 Choice of variables.**

In order to include the occupational status, two dummy variables are used with a three-category occupational classification. One dummy "mng_prof" (manager/professional) takes on the values 1 if a person is a manger/profession (ISCO 1 and 2) and 0 otherwize. The dummy "skill" (skilled labor) takes on the value 1 if the individual belongs to the category "other skilled workers" (ISCO 3-8) and 0 otherwise.
The reference group is hence people in the category "laborers/elementary professionals" (ISCO 9). Further information about the ISCO-classification codes are presented in Tables A1 in **10. Appendix.**

5.3 Regressions

In the regression analysis, four regressions are run for each of the sample groups (women and men) in an attempt to try and unveil what are the underlying factors behind the gender pay gap – which according to the hypothesis should include motherhood. The purpose of these regressions is hence to illustrate how mothers are affected on the labor market in terms of hourly wages, total labor income, hours worked and fulltime in comparison to non-mothers and men (fathers/non-fathers). The idea is then to interpret the results and see how the dependent variables are affected by motherhood. The definitions of the dependent variables are taken from METIS (lisdatacenter.org, 2016)

"lwage_tot" represents the logarithm of the annual labor income, including monetary payments and value of non-monetary goods and services received from dependent employment as well as profit and losses of goods for own consumption from self-employment. The idea is further that the coefficient *parent* will capture the MWP in regression **(ii)**:

$$lwage\_tot = \beta_0 + \beta_1 * parent + \beta_2 * age + \beta_3 * age_{sq} + \beta_4 * workexp + \beta_5 * workexp_{sq} +$$

$$\beta_6 * educ\_tert + \beta_7 * mng\_prof + \beta_8 * skill + \beta_9 * single + \varepsilon_i \textbf{(ii)}$$

"lwage" represents the logarithm of gross hourly wage rate for the main job. Overtime payments, family allowances and other social security payments are excluded in the calculation. The same independent variables are used in this regression as in the one with *"lwage_tot"* since we want to establish if there is a significant difference between gross hourly wage and total labor income for mothers/non-mothers as well as for fathers/non-fathers to establish if the MWP is a result of mothers receiving lower gross hourly wages or simply just working less hours than non-mothers and men.

$$lwage = \beta_0 + \beta_1 * parent + \beta_2 * age + \beta_3 * age_{sq} + \beta_4 * workexp + \beta_5 * workexp_{sq} +$$

$$\beta_6 * educ\_tert + \beta_7 * mng\_prof + \beta_8 * skill + \beta_9 * single + \varepsilon_i \textbf{(iii)}$$

"hours" simply represents regular weekly hours worked at all jobs currently held, including family work and overtime, paid and unpaid. It's important to underline that in most observations, this variable will refer to the regular/usual hours worked, which may differ from contractual/actual hours worked during the reference week. The same independent variables

are used in regression **(iv)** as in **(ii)** and **(iii)** in order to ascertain whether motherhood have an effect on weekly hours worked – which would be in line with the hypothesis.

$$hours = \beta_0 + \beta_1 * parent + \beta_2 * age + \beta_3 * age_{sq} + \beta_4 * workexp + \beta_5 * workexp_{sq} +$$

$$\beta_6 * educ\_tert + \beta_7 * mng\_prof + \beta_8 * skill + \beta_9 * single + \varepsilon_i \textbf{ (iv)}$$

The "fulltime" regression is, as stated above, included to complete the "hours" regression, since previous research has stated that mothers often turn to more flexible occupations when becoming mothers. By analyzing if mothers work more or less fulltime than non-mothers and men would hence be an indication that women choose to turn to more flexible tenures.

$$fulltime = \beta_0 + \beta_1 * parent + \beta_2 * age + \beta_3 * age_{sq} + \beta_4 * workexp + \beta_5 * workexp_{sq} +$$

$$\beta_6 * educ\_tert + \beta_7 * mng\_prof + \beta_8 * skill + \beta_9 * single + \varepsilon_i \textbf{ (v)}$$

Further specifications of the variables can be found in Tables A2 in **10. Appendix**

The method for calculating the MWP is based on the theories presented in **2.1 previous research**. The theories presented have further influenced the regression model by taking into account variables like parent, work experience, occupational status dummies as well as dummies for highest completed education.

6. Results

The results section starts with a summary statistics section for mothers, non-mothers and women followed by summary statistics for fathers, non-fathers and men in order to get an overview of how the variables differ between the different groups. Thereafter, an overview of the findings of the regressions is presented.

6.1 Summary Statistics

Table. 1 Summary statistics for *Mothers*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	5, 680	10.230	0.993	3.296	13.911

lwage	5, 680	2.896	0.732	0.182	6.376
hours	5, 680	36.882	10.405	1	99
fulltime	5, 680	0.790	0.407	0	1
parent	5, 680	1	0	1	1
age	5, 680	33.110	6.421	18	64
age_sq	5, 680	1137.493	450.576	324	4096
workexp	5, 680	12.95	6.213	<u>1</u>	44
workexp_sq	5, 680	206.304	203.257	1	1936
educ_tert	5, 680	0.574	0.494	0	1
mng_prof	5, 680	0.372	0.483	0	1
skill	5, 680	0.589	0.492	0	1
single	5, 680	0.792	0.406	0	1

Table 2. Summary statistics for *Non-Mothers*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	14, 575	10.282	0.957	4.500	13.910
lwage	14, 575	2.808	0.704	0.095	6.558
hours	14, 575	38.088	10.909	1	99
fulltime	14, 575	0.817	0.386	0	1
parent	14, 575	0	0	0	0
age	14, 575	40.322	14.613	18	64
age_sq	14, 575	1839.407	1207.875	324	4096
workexp	14, 575	20.468	14.619	1	49
workexp_sq	14, 575	632.654	651.294	1	2401
educ_tert	14, 575	0.502	0.500	0	1
mng_prof	14, 575	0.341	0.474	0	1
skill	14, 575	0.616	0.486	0	1
single	14, 575	0.493	0.500	0	1

Table 3. Summary statistics for *Women*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	20, 255	10.287	0.967	3.296	13.910
lwage	20, 255	2.833	0.713	0.095	6.558

hours	20, 255	37.750	10.783	1	99
fulltime	20, 255	0.809	0.392	0	1
parent	20, 255	0.280	0.449	0	0
age	20, 255	38.300	13.255	18	64
age_sq	20, 255	1642.573	1098.253	324	4096
workexp	20, 255	18.360	13.267	1	49
workexp_sq	20, 255	513.095	594.552	1	2401
educ_tert	20, 255	0.522	0.499	0	1
mng_prof	20, 255	o.350	0.477	0	1
skill	20, 255	0.608	0.488	0	1
single	20, 255	0.577	0.494	0	1

Table. 4 Summary statistics for *Fathers*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	6, 770	10.858	0.805	4.094	13.914
lwage	6, 770	3.162	0.725	0.095	7.260
hours	6, 770	43.656	9.475	3	99
fulltime	6, 770	0.964	0.187	0	1
parent	6, 770	1	0	1	1
age	6, 770	35.623	7.056	18	64
age_sq	6, 770	1318.755	536.277	324	4096
workexp	6, 770	15.896	7.021	<u>1</u>	47
workexp_sq	6, 770	301.982	272.726	1	2209
educ_tert	6, 770	0.5	0.500	0	1
mng_prof	6, 770	0.379	0.485	0	1
skill	6, 770	0.549	0.497	0	1
single	6, 770	0.970	0.169	0	1

Table. 5 Summary statistics for *Non-fathers*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	16, 565	10.513	0.959	4.094	14.201
lwage	16, 565	2.951	0.743	0.095	7.338

hours	16, 565	40.815	11.016	1	99
fulltime	16, 565	0.879	0.326	0	1
parent	16, 565	0	0	0	0
age	16, 565	39.370	14.040	18	64
age_sq	16, 565	1747.157	1158.245	324	4096
workexp	16, 565	19.995	13.981	<u>1</u>	49
workexp_sq	16, 565	595.249	630.203	1	2401
educ_tert	16, 565	0.407	0.491	0	1
mng_prof	16, 565	0.308	0.461	0	1
skill	16, 565	0.591	0.491	0	1
single	16, 565	0.443	0.497	0	1

Table 6. Summary statistics for *Men*

Variable	Observations	Mean	Std. Dev.	Min	Max
lwage_tot	23, 335	10.613	0.930	4.094	14.201
lwage	23, 335	3.013	0.744	0.095	7.339
hours	23, 335	41.640	10.670	1	99
fulltime	23, 335	0.903	0.295	0	1
parent	23, 335	0.290	0.454	0	1
age	23, 335	38.283	12.540	18	64
age_sq	23, 335	1622.868	1036.115	324	4096
workexp	23, 335	18.806	12.511	1	49
workexp_sq	23, 335	510.166	566.761	1	2401
educ_tert	23, 335	0.434	0.460	0	1
mng_prof	23, 335	0.328	0.470	0	1
skill	23, 335	0.579	0.494	0	1
single	23, 335	0.596	0.491	0	1

6.2 Overview of the Results

Table 7-8. Regressions on dependent variable *lwage_tot* with several independent variables and with parent as only independent variable for wo*men*

lwage_tot	*Women*	lwage_tot	*Women*
Year	**2016**	**Year**	**2016**
Parent	-0.062 (0.015) ***	**Parent**	0.017 (0.015)
Age	0.278 (0.014) ***	**Constant**	10.282 (0.008) ***
Age squared	-0.002 (0.000) ***	**R-squared** **n**	0.000 20, 255
Work experience	-0.150 (0.012) ***		
Work experience squared	-0.000 (0.000) ***		
Tertiary Education	-0.083 (0.046) *		
Manager/Professional	0.625 (0.033) ***		
Skilled Labor	0.271 (0.031) ***		
Single	0.089 (0.012) ***		
Constant	4.413 (0.235) ***		
R-squared	0.2974		
n	20, 255		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 9-10. Regressions on dependent variable *lwage* with several independent variables and with parent as only independent variable for wo*men*

lwage	*Women*	lwage	*Women*
Year	**2016**	**Year**	**2016**

Parent	0.056 (0.011) ***	**Parent**	0.087 (0.011) ***
Age	0.106 (0.009) ***	**Constant**	2.809 (0.005) ***
Age squared	-0.000 (0.000) ***	**R-squared** **n**	0.003 20, 255
Work experience	-0.061 (0.007) ***		
Work experience squared	-0.000 (0.000) *		
Tertiary Education	0.132 (0.031) ***		
Manager/Professional	0.431 (0.023) ***		
Skilled Labor	0.188 (0.021) ***		
Single	0.079 (0.009) ***		
Constant	0.121 (0.150)		
R-squared	0.2698		
n	20, 255		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 11-12. Regressions on dependent variable *hours* with several independent variables and with parent as only independent variable for wo*men*

hours	*Women*	**hours**	*Women*
Year	**2016**	**Year**	**2016**

Parent	-2.018 (0.178) ***	**Parent**	-1.207 (0.165) ***
Age	2.596 (0.161) ***	**Constant**	38.088 (0.090) ***
Age squared	-0.022 (0.001) ***	**R-squared** **n**	0.002 20, 255
Work experience	-1.095 (0.133) ***		
Work experience squared	0.009 (0.001) ***		
Tertiary Education	-1.449 (0.542) ***		
Manager/Professional	4.538 (0.408) ***		
Skilled Labor	1.338 (0391) ***		
Single	-0.412 (0.153) ***		
Constant	-11.118 (2.670) ***		
R-squared	0.1110		
n	20, 255		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 13-14. Regressions on dependent variable *fulltime* with several independent variables and with parent as only independent variable for wo*men*

fulltime	*Women*	fulltime	*Women*

Year	2016	Year	2016
Parent	-0.063 (0.007) ***	Parent	-0.027 (0.006) ***
Age	0.107 (0.006) ***	Constant	0.817 (0.003) ***
Age squared	-0.001 (0.000) ***	R-squared n	0.000 20, 255
Work experience	-0.045 (0.005) ***		
Work experience squared	0.001 (0.000) ***		
Tertiary Education	-0.058 (0.021) ***		
Manager/Professional	0.129 (0.016) ***		
Skilled Labor	0.041 (0.016) ***		
Single	-0.001 (0.006)		
Constant	-1.142 (0.103) ***		
R-squared	0.1007		
n	20, 255		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 15-16. Regressions on dependent variable *lwage_tot* with several independent variables and with parent as only independent variable for *men*

lwage_tot	Men	lwage_tot	Men
Year	**2016**	**Year**	**2016**
Parent	0.081	**Parent**	0.344
	(0.013) ***		(0.013) ***
Age	0.227	**Constant**	10.513
	(0.011) ***		(0.007) ***
Age squared	-0.001	**R-squared**	0.028
	(0.000) ***	**n**	23, 335
Work experience	-0.099		
	(0.008) ***		
Work experience squared	0.000		
	(0.000) ***		
Tertiary Education	-0.002		
	(0.030)		
Manager/Professional	0.618		
	(0.021) ***		
Skilled Labor	0.233		
	(0.019) ***		
Single	0.234		
	(0.012) ***		
Constant	5.566		
	(0.175) ***		
R-squared	0.3643		
n	23, 335		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 17-18. Regressions on dependent variable *lwage* with several independent variables and with parent as only independent variable for *men*

lwage	Men	lwage	Men
Year	2016	Year	2016
Parent	0.051 (0.011) ***	Parent	0.211 (0.010) ***
Age	0.091 (0.008) ***	Constant	2.952 (0.006) ***
Age squared	-0.000 (0.000) ***	R-squared	0.016
		n	23, 335
Work experience	-0.041 (0.006) ***		
Work experience squared	-0.000 (0.000) ***		
Tertiary Education	0.107 (0.024) ***		
Manager/Professional	0.487 (0.017) ***		
Skilled Labor	0.163 (0.015) ***		
Single	0.153 (0.010) ***		
Constant	0.540 (0.122) ***		
R-squared	0.2958		
n	23, 335		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 19-20. Regressions on dependent variable *hours* with several independent variables and with parent as only independent variable for *men*

hours	*Men*	hours	*Men*
Year	**2016**	**Year**	**2016**
Parent	0.821 (0.174) ***	**Parent**	2.841 (0.143) ***
Age	2.389 (0.136) ***	**Constant**	40.815 (0.086) ***
Age squared	-0.021 (0.001) ***	**R-squared** **n**	0.015 23, 335
Work experience	-0.970 (0.100) ***		
Work experience squared	0.009 (0.001) *		
Tertiary Education	-1.813 (0.397) ***		
Manager/Professional	3.630 (0.267) ***		
Skilled Labor	1.812 (0.233) ***		
Single	1.512 (0.164) ***		
Constant	-5.217 (2.211) **		
R-squared	0.1101		
n	23, 335		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

Table 21-22. Regressions on dependent variable *fulltime* with several independent variables and with parent as only independent variable for *men*

fulltime	*Men*	fulltime	*Men*
Year	**2016**	Year	**2016**
Parent	0.014 (0.004) ***	Parent	0.084 (0.003) ***
Age	0.075 (0.004) ***	Constant	0.879 (0.002) ***
Age squared	-0.000 (0.000) ***	R-squared / n	0.017 / 23, 335
Work experience	-0.024 (0.003) ***		
Work experience squared	0.000 (0.000) ***		
Tertiary Education	-0.017 (0.012)		
Manager/Professional	0.055 (0.008) ***		
Skilled Labor	0.037 (0.008) ***		
Single	0.052 (0.004) ***		
Constant	-0.528 (0.070) ***		
R-squared	0.1310		
n	23, 335		

Robust standard errors in parentheses. *** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$

7. Discussion

When analyzing the results presented in the previous section, an interesting pattern emerges across the regressions, where *most* variables, for both men and women, exhibit stability in their significance but not in their sign.

Starting with the *lwage_tot* regression for women, it is visible that when the variable "parent" is run as the only independent variable for *lwage_tot*, the effect is positive by approximately 2 %. When *lwage_tot* is run in the full regression model, the variable "parent" is negative with a 6 % decrease in annual labor income. This is an interesting result, since the variable "parent" is not significant when run alone, but highly significant when run with the other variables. The full regression model therefore tells us that mother's annual labor income is about 6 % lower than non-mother's. It also tells us that all the included variables are significant, and that tertiary education and work experience affects the annual labor income negatively – which is contrary to the hypothesis. The variables "age", "manager/professional" and "skill" further affects the annual labor income positively, which is in line with the hypothesis and the theory of Bargaining Power. The variable "single" on the other hand is affecting annual labor income positively, which is also contrary to the hypothesis, since it was expected that single mothers would have a harder time combining work and motherhood. Moving on to the *lwage_tot* for men, the variable "parent" is positive and significant both when run alone and in the full regression model. This is in line with previous research stating that the gender pay gap between men and women is observable. An interesting aspect is that when "parent" is run alone, the positive effect on annual labor income is 34 %, which indicates that fathers make 34 % more in their annual labor income then non-fathers. The percentage drops to 8 % when "parent" is run in the full regression model, which is a significant decrease, but the variable remains positive in contrary to when the model is run with women. This furthers gives fuel to the previous research stating that there is a "fatherhood premium", which indicate that fathers are rewarded on the labor market. All the variables in the full regression model, except "tertiary education" are positive for fathers which is in line with the hypothesis. The variable "tertiary education" is estimated to give a -0,2 % decrease in father's annual labor income but the variable is insignificant in the regression, so it should not be brought to much attention.

Moving on to the regression on *lwage*, gross hourly wage for women, the variable "parent" is significant and positive both when run on its own and in the full regression model with only a slight drop in percentage when run in the full regression model. It is also visible that all the variables (except the constant) are significant and all variables except "work experience" ("age squared and "work experience squared" are both -0, so they are not interpreted as being negative) are positive for *lwage*. This is an interesting result, since this seems to indicate that motherhood is affecting the gross hourly wage for women positively and affecting women's annual labor income negatively. This could nevertheless be a result of women stepping down and working fewer hours when becoming mothers, which we will take a look at later on. For men, the variable "parent" is positive both when run on its own and when run in the full regression model, but with a more significant decrease in the variable when run in the full model. All other variables except "work experience" (also in this case, "age squared" and "work experience squared "are -0, so they are not considered to be negative) are in the regression model positive and significant, which is in line with the hypothesis.

For the variable *hours*, for women, the variable "parent" is significant and negative both when run alone and when run in the full regression model. The variable "parent" also becomes increasingly negative when run in the full regression model. Further, all the variables in the full regression model are significant and the variables "age", "manager/professional", and "skill" are positive, which is expected from the hypothesis. On the other hand, the variables "age squared", "work experience", "tertiary education" and "single" are negative, which at first glance may come as a surprise. These variables could further be interpreted as, the higher work experience and education you possess as a mother, the fewer hours you have to work to maintain a higher labor income. It could also be a result of women choosing more flexible tenures when becoming mothers and that the mothers that makes these choices possess both higher education and more work experience. Either way, according to the hypothesis, it is expected that mothers work fewer hours than non-mothers, which indeed is the case. The reasoning about whether mothers with higher education and more work experience work fewer hours because they have reached a more skilled tenure or if it is a consequence of choosing to step down or switch to a more flexible tenure, should be analyzed in comparison to men and fathers next. For men, the variable "parent" is positive and significant for the variable *hours* both when run alone and in the full regression model. This is interesting since this is the exact opposite to mothers. All the variables in the full regression model are significant and positive, except for the "constant", "age squared", "work experience" and "tertiary education".

This is on the other hand (except for the "constant" and "single", which is positive for fathers) the exact same result as for mothers. This could further give support to the theory stated above, that mothers and fathers with higher education and more work experience have reached a level of profession where they are able to maintain a higher salary but work fewer hours. It could on the contrary be a result of fathers that have more work experience and higher education, are more aware of the gender inequality and the gender wage gap created by parenthood and hence actively chooses to take on a larger part of the parental leave. Either way, out hypothesis stated that mothers are expected to work less hours than non-mothers and men, which is the case according to our analysis.

The regression on the variable *fulltime* for women, shows that the variable "parent" is significant and negative both when run alone and when run in the full regression model. As in the case with *hours*, the variables "age squared", "work experience" and "tertiary education" along with the "constant" are negative. If this is a result of the reasoning mentioned above is unclear. For men, the variable "parent" is significant and positive both when run alone and in the full regression model. As for women, the variables "work experience" and "constant" are negative. This would then indicate that both mothers and fathers with more work experience work less fulltime than non-mothers/-fathers. It also indicates that mothers work less fulltime than non-mother and that fathers work more fulltime than non-fathers, which gives further support to the theory of the "fatherhood premium, motherhood penalty". It should nevertheless be mentioned that "tertiary education" is insignificant for men in the *fulltime*-regression. Another interesting aspect is that the variable "single" is significant and positive for fathers, indicating that fathers work 5 % more fulltime than non-fathers, whilst the variable was insignificant for mothers. This could be interpreted as fathers prioritizing their tenures when becoming parents, whilst mothers prioritizes the family; which goes back to the previous research stating that women have to negotiate deals when becoming mothers in order to maintain their tenure and that men has a "better" Bargaining Power than women.

As for the concept of women's Bargaining Power, the results tell us that women who has completed tertiary education and who works as managers/professionals or as skilled labors, has a higher gross hourly wage (lwage). For the annual labor income, (lwage_tot), the variable "tertiary education" has a negative effect, which is contrary to the hypothesis, whilst the variables "managers/professionals" and "skilled labors" have a positive effect on the annual labor income.

The increase in gross hourly wage in the variables "tertiary education", "managers/professionals" and "skilled labor" could indicate that these groups of women possessed bargaining power and hence have the opportunity to negotiate their salaries. Since the variable "parent" captures all mothers with children in the age 0-6, the negative values of the variable in the regressions on "lwage_tot" could very well indicate that most mothers are *not* managers/professionals or skilled laborers or have completed higher education when they become mothers. Therefore, this would indicate from the assumptions made in **2.1.2 Bargaining Power**, that a majority of mothers with children in the ages 0-6 have low or no Bargaining Power; which could be a feasible explanation to the negative values of the variable "parent" for our regression models. It should nevertheless be mentioned that our results show that mothers have a higher gross hourly wage and a lower annual labor income and since mothers work less hours than non-mothers, this seems to indicate a correlation between a lower annual labor income and fewer hours worked/less fulltime. It is however still unclear whether motherhood intrinsically affects the annual labor income.

8. Concluding Remarks

8.1 Limitations

There are several factors that pose as limitations for the conducted research – these will be reviewed below.

8.1.1 Lack of variables

Maybe the most prominent of limitations is the one that constitutes the lack of variables. The limitation as to what variables are available to the research is of highest relevance, since this could have a large effect on the outcome. As mentioned in **4.1 OLS: Classical Linear Model Assumptions,** the lack of variables that determines selection into motherhood will create a bias and an endogeneity problem but since it is almost impossible to include every single significant variable and control for everything, so it all comes down to rationalizing the theories presented in previous research.

There is also a limitation in the types and the number of variables that LIS provides. For example, the initial idea was to carry out an analysis on the Swedish labor market and the MWP,

since as a swede, I am more familiar with structures we can observe on the Swedish labor market. This is also the reason for choosing LIS, since they carried data that SCB did not provide.

Further down the line, it was made clear that LIS was missing important variables like "hours worked" and "gross hourly wage" for Sweden, which were crucial for the analysis. My point being that, if LIS had provided these variables for Sweden - this thesis would have been something else.

8.1.2 Small Sample & Lack of Graphs

The result presented in **6. Results** are based on a *relatively* small sample, which in an ideal setting would have been larger in order to draw substantial conclusions on the MWP in the US. Nevertheless, for the scope of this thesis, the sample size is abundant.

The thesis unfortunately lacks graphical representations of any kind but primarily for the histograms of the error terms as well as for the dependent variables. This is a consequence of using LIS, since the java plug-in which LIS uses for its data bases is unable to provide graphical representation. The tables I received instead of graphs were insufficient when I tried to create my own graphs with the values from the tables – which is why the thesis lacks graphs and visual intuition.

8.1.3 Choice of Variables

The manner in which the variables have been chosen is based on the research presented in **2.1 Previous Research** and the variables available through the LIS databases discussed in **5.2 Variables**. Since LIS provides a wide range of different variables, there's a possibility that some variables have been overlooked and hence, could have been included in the research.

The variable "educ_sec" was initially used in the regressions but when included, the variable "educ_tert" became "omitted", which could only be solved by eliminating the "educ_sec" variable. I controlled for several reasons as to why the "educ_tert" became omitted but could not find another solution to the bias other than eliminating the "educ_sec"-variable.

By including "educ_sec" in the regression, primary education would have been the reference group for education and it would have enabled us to see the effect of individuals who have

finished secondary education on the MWP. Now, instead, primary education along with secondary education serve as the reference group which does not do too much harm to the analysis, since the main interest is the effect of higher education, "educ_tert", on the MWP.

The wages of mothers with children in the ages of 0-6 have in this thesis been compared to the wages of non-mothers and men. Nonetheless, the number of children a woman births have been proven by previous research to worsen the MWP. This aspect of the gender wage gap has not been considered in this thesis since the available data doesn't render the possibility to control for how many children a woman has given birth to – the same issue as with the longitudinal data, which disables us from researching how the birth of the first, second and so on child affects a mother's wage and labor income. The reasoning is in line with predictions that mothers with more than one child is more severely punished than mothers with only one child; which follows from the theories presented in **2.1 previous research.**

When considering the effect of having several children compared to only one, part of the calculated wage penalty would in such case be, not the effect of being a mother or not but rather how many children the mother has. Nevertheless, assumptions have been made throughout the research stating that mothers are limited as to not being flexible in their work and often having to work less hours; hence, much of the effect of being a mother, one child or several children, have been considered in this research.

8.1.4 Lack of longitudinal data

The obtained dataset provides individual level-data but unfortunately doesn't provide corresponding datasets that are longitudinal. This implies that we're unable to research the gender wage gap and its development over time between mothers/non-mothers and men. That is, we're unable to research the casual effect of becoming a mother on the wage over time. This thesis has therefore taken the form of a correlation study, between mothers/non-mothers and men during the year of 2016 (in the US).

By not having access to longitudinal data, this also implies that we're unable to research the endogeneity problem, that is, the risk that some women may choose to become mothers just because they experience that their career prospects on the labor market is bad or that women

that have reached a certain level of pay is content and therefore decides to become mothers. This would mean that the MWP isn't an intrinsically consequence of motherhood but rather because of some inherent characteristics of females choosing to become mothers when they feel like their prospects on the labor market are unsatisfactory or perfectly satisfactory.

In such case this could've been considered through a fixed-effects model or an instrumental variable-method to solve the endogeneity problem. This is nevertheless beyond the scope of this thesis.

8.2 Interdisciplinary Analysis

According to the UN Women (2017), the pay gap between men and women won't close until 2086. I thought it was important to include, if so just a paragraph, the interdisciplinary aspect of the gender pay gap. As stated in **7. Discussion**, mothers do receive a lower annual labor income, a higher gross hourly wage but work less hours/fulltime than non-mothers. Men on the other hand, are not showing this same pattern when becoming fathers and seem to rather be rewarded when becoming parents. The reasoning further states that it is hard to separate what is intrinsically a motherhood penalty and what is a result of purely working fewer hours when becoming a mother and hence receiving a lower annual labor income; which from an economical sense is logical. I wanted to use this paragraph to highlight the fact that even if mothers work fewer hours and hence receives a lower annual labor income, it is not a desirable or sustainable situation for women and mothers on the labor market.

The discussion should further be turned towards *why* the mother is the one stepping down and working less hours/fulltime, since the result rather seem to indicate that men work *more* hours/fulltime after becoming fathers. This is where the discourse about public policy should be brought up. As mentioned in **2.1.1 The Motherhood Penalty**, public policy could very well be the solution to mothers having to step down and prioritize between family and career when becoming mothers. In Sweden, we have come a long way with publicly provided pre-kindergarten classes, payed parental leave for both men and women and generally a more expanded work-family infrastructure.

Since this analysis is conducted on the US labor market, previous research indicates that it comes down to the women negotiating her tenure when she becomes a mother, where women with high Bargaining Power are more likely to keep their labor market rewards when becoming mothers. This analysis has further indicated that most mothers do not possess high Bargaining

Power, which could be one feasible explanation as to why the variable "parent" is negative when run in the regression models "lwage_tot", "hours" and "fulltime". It follows from the discussion that the fewer hours worked and the less fulltime women work when becoming mothers, is a direct result of lower Bargaining Power and having to choose family before career.

Introducing Public Policy on payed parental leave and state-funded pre-kindergarten classes in the entire US would give women an opportunity to maintain their labor market rewards which would lessen and hopefully diminish the MWP. Such Public Policy would however be very hard if not impossible to implement. Further discussion on the topic is beyond the scope of this thesis but I would recommend further research on the MWP from an interdisciplinary perspective, since the solution hardly ever is simplistic.

8.3 Summary

This thesis has attempted to uncover whether motherhood is one of the variables constituting the gender wage gap between men and women. The results found that mothers, indeed, make approximately 6 % less in their annual labor income compared to non-mother, whereas father's annual labor income was 8 % higher than that of non-fathers. However, the result also showed that mother's gross hourly wage is higher than that of non-mothers, which would indicate that mothers work fewer hours than non-mothers. When the regressions *hours* and *fulltime* were run, it was visible that mothers do work less hours and less fulltime than non-mothers, which nevertheless was expected from the hypothesis. Fathers, on the other hand, work more hours and more fulltime than non-fathers, which was in line with the theory of the" fatherhood premium" and it is clear to see that motherhood indeed does affect the gender wage gap, since mothers make 6 % less in their annual labor income. Since mothers also work significantly less hours than non-mothers' and since mothers' gross hourly wage is *higher* than that of non-mothers', it is not possible given our results, to conclude whether motherhood *intrinsically* is creating the wage penalty or if motherhood primarily forces mothers to work less hours/fulltime.

As for the assumptions of Bargaining Power made in **2.2 Bargaining Power**, we are unable to draw substantial conclusions since the theory cannot be measured. Nevertheless, the assumptions have provided "glasses" to interpret the result with, where it could be theorized

that most women with children in the ages 0-6 lacks higher completed education and more skilled tenures since the corresponding variables were positive for the regression on gross hourly wage and annual labor income (not tertiary education); and hence has low or no Bargaining Power since women who has completed higher education and has more skilled tenures had positive values for the corresponding variables. On the basis of the assumptions made, the theory of Bargaining Power cannot be confirmed or demented but rather provide inspiration for further research on the topic.

8.4 Further Research

Some areas that are of interest for further research would be to analyze the MWP in countries were research has not been carried out. This could give indications and intuition as to what constitutes and maintains the MWP on different labor markets and in different countries with different public policies.

This would further make it easier for decision makers to acknowledge the problem and introduce solutions on how to eliminate the gender wage gap. Another suggestion would be to carry out research that measures the MWP over time, which I was unable to do since LIS doesn't provide longitudinal data. This could be of interest since some research (mentioned in **2.1. Previous Research**) suggests that motherhood constitutes a larger part of the gender pay gap than it did ten or twenty years ago, and no one seems to really know how this came to be. An equally interesting topic as the MWP is the "fatherhood premium", which the results seem to support. I would suggest that further research should continue on the subject, which could reveal structures that discriminatory towards women and mothers.

9. References

9.1 Written Sources

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10. Appendix

Table A1. Representation of ISCO-08 (major groups and sub-groups) Adapted from ISCO

ISCO-08 Major Group Code	Sub-major Groups

1. Managers	- Chief Executives, Senior Officials and Legislators - Administrative and Commercial Managers - Production and Specialized Services Managers - Hospitality, Retail and Other Service Managers
2. Professionals	- Science and Engineering Professionals - Health Professionals - Teaching Professionals - Business and Administration Professionals - Information and Communications Technology Professionals - Legal, Social and Cultural Professionals
3. Technicians and Associate Professionals	- Science and Engineering Associate Professionals - Health Associate Professionals - Business and Administration Associate Professionals - Information and Communications Technicians - Legal, Social, Cultural and Related Associate Professionals
4. Clerical Support Workers	- General and Keyboard Clerks - Customer Service Clerks - Numerical and Material Recording Clerks - Other Clerical Support Workers
5. Services and Sales Workers	- Personal Services Workers - Sales Workers - Personal Care Workers - Protective Services Workers
6. Skilled Agricultural, Forestry and Fishery Workers	- Market-oriented Skilled Agricultural Workers - Market-oriented Skilled Forestry, Fishery and Hunting Workers - Subsistence Farmers, Fishers, Hunters and Gatherers
7. Craft and Related Trades Workers	- Building and Related Trades Workers (excluding electricians) - Metal, Machinery and Related Trades Workers - Handicraft and Printing Workers - Electrical and Electronics Trades Workers - Food Processing, Woodworking, Garment and other Craft and Related Trades Workers
8. Plant and Machine Operators and Assemblers	- Stationary Plant and Machine Operators - Assemblers - Drivers and Mobile Plant Operators
9. Elementary Occupations	- Cleaners and Helpers - Agricultural, Forestry and Fishery Laborers - Laborers in Mining, Construction, Manufacturing and Transport - Food Preparation Assistants - Street and Related Sales and Services Workers - Refuse Workers and Other Elementary Workers

Table A2. Specifications for the dependent and independent variables used in regression (ii) –
(iv) for the MWP

Variables	**Specification**

lwage_tot	The log of annual labor income
lwage	The log of gross hourly wage
hours	Weekly hours worked
fulltime	If an individual works >30 hours per week
parent	A dummy variable taking on the value 1 if an individual has a child in the age 0-6 and 0 if the individual doesn't have children
age	An individual's age at the time of the survey (2016)
age_sq	An individual's age at the time of the survey, squared (2016)
workexp	An individual's total work experience in years at the time of the survey (2016)
workexp_sq	An individual's total work experience in years at the time of the survey, squared (2016)
educ_tert	A dummy variable taking on the value 1 if an individual has completed tertiary education (university/college), 0 otherwise
mng_prof	A dummy variable taking on the value 1 if an individual holds a professional or managerial occupation, 0 otherwise
skill	A dummy variable taking on the value 1 if an individual works as a "skilled laborer", 0 otherwise
single	A dummy variable taking on the value 1 if the individual lives with a partner, 0 otherwise

11. Abbreviations

BP: Bargaining Power

MWP: Motherhood Wage Penalty

LIS: Luxembourg Income Study

OLS: Ordinary Least Squared

SCB: Statistiska Centralbyrån