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Why Women Still Can't Have It All

A Causal Analysis of the Reduction in the Paternity Quota on Mothers' Labor Participation and Career Prospects

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When we first discussed what to write about in our master thesis, it became clear that we wanted to write about a topic intersection of politics and economics. Choosing to write about gender equality strongly fulfilled this desire.

Working on this thesis has been both challenging and rewarding. But most of all, it has been a truly fun experience. We feel fortunate to write about a topic that is important to both us and the society.

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Abstract

The Norwegian paternity quota was reduced from 14 to 10 weeks in 2014. This resulted in an immediate fall in the average length of fathers' parental leave. In this paper, we investigate what effect this has had on mothers' labor participation and career prospects. We utilize data from the Norwegian Labor Force Survey to investigate labor market outcomes in the short- and medium-term.

Previous research has found that the introduction and increase of a paternity quota has had ambiguous effects. While some studies find that the introduction had positive effects on equality among parents and on children's performance, other find no significant effects.

Using a differences-in-differences analysis, we find significant, negative causal effects of the reduction of the Norwegian paternity quota. In the short-term we find that reducing the paternity quota has led to a decline in mothers' work hours by 9.1 hours per week, and that the share of women attending seminars declines by 20.2 percentage points. In the medium-term, we find that the share of employed mothers decreases by 9.5 percentage points and that mothers work 21.1 hours less per week. We also find that the share of mothers attending seminars drops by 25.5 percentage points. We are unable to determine whether the reduction of the paternity quota has had an effect on the share of women holding leadership positions or on planned work hours. These results suggest that reducing the paternity quota has had severe effects on mothers' labor participation and career prospects, resulting in a weakened position in the workplace. Several robustness checks strengthen the validity of our findings. However, the magnitude of the estimates is at times unreasonably large, which may be explained by the relatively small sample examined.

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1. Introduction

1.1 Motivation for this Thesis

Today, Norway is a top-ranking country in matters of gender equality (World Economic Forum, 2016). This benefits companies and society as a whole, as well as individuals. For instance, companies with a high degree of gender diversity are 15 percent more likely to have financial returns above their respective national industry medians (McKinsey & Company, 2015). Further, increasing a society's labor force is a source for economic growth, through increasing both the labor force and the talent pool (see for instance Solow (1956) and Mankiw, Romer and Weil (1992)).

However, there is still room for improvement in many areas, particularly in terms of economic and professional opportunities (World Economic Forum, 2016). Evidence finds that women start lagging behind career-wise after becoming mothers (Lyng & Halrynjo, 2010). Traditionally, staying at home with infants and toddlers has been a mother's privilege, but often a professional inconvenience. In 1993, Norway introduced a paternity quota to incentivize fathers to stay at home in the formative years of their children, with a long-term goal of increasing gender equality both at the workplace and at home (NOU 1991:3, 1991). In 2014, the paternity quota was reduced by 29 percent, from its all-time high of 14 weeks, to 10 weeks. The question is whether the paternity quota was able to reshape corporate culture and societal structures before its reduction, or if politicians have in fact declared victory too soon. In this thesis, we seek to examine how the reduction of the paternity quota impacted mother's labor outcomes.

Since the introduction of the policy, women's position in the workplace has been strengthened and the division of work in the household is more evenly divided between both parents (Rønsen & Kitterød, 2014). These trends have increased concurrently with the quota. Due to other family related reforms taking place in the same period, this cannot solely be ascribed the paternity quota. Nevertheless, the clear trend is towards less traditional family roles and more equality between mothers and fathers in terms of time allocation.

Based on previous research on the effect of the paternity quota, we hypothesize that a reduction of the quota has two possible effects. Our first hypothesis is that reducing the quota has negative effects on mothers' labor market outcomes. This implies that the paternity quota is a powerful policy which is still necessary to maintain the level of mothers' work participation. A second hypothesis is that we find no effect of reducing the paternity quota. This will occur if the paternity quota has created lasting changes in norms and culture during its 21 years of existence.

We use a set of variables to estimate the effect on a broad spectrum of mother's labor market outcomes. We examine workforce participation and to what extent career prospects of women have changed. First, to investigate women's workforce participation, we analyze changes in employment status, and planned and actual hours worked. Second, to evaluate the effect on women's career prospects, we use two proxies. These are the share of women attending seminars while working, and the share holding leadership positions. The proxies will reveal to what extent both the employer and employee invests in the individual.

Our identification strategy is a differences-in-differences approach, comparing the outcomes of mothers who are subject to different lengths of paternity quota. We compare the labor market outcomes of women who gave birth after the quota was reduced on July 1st, 2014, (the treatment group) to women who gave birth just before this date (the control group). Our analysis is based on the Labor Force Survey, conducted by Statistics Norway, which registers data on the work force on a quarterly basis (Bø & Håland, 2015). The differences-in-differences estimator reveals how reducing the paternity quota has affected labor outcomes for mothers. To isolate the effect of the paternity quota from other trends, we control for both time specific effects and individual characteristics.

To our knowledge, this is the first paper to analyze the effect of *reducing* the paternity quota on women's labor market outcomes in Norway. Therefore, our thesis may provide valuable insights to an area of research not many have investigated earlier. In addition, the results will potentially have widespread ramifications. The effects that we find suggest that women are particularly vulnerable to changes in policies aimed to facilitate mothers' work participation. These insights on the mechanisms of family dynamics and labor division could be transferable to other family policies, such as cash-for-care and day-care schemes

Our analyses reveal significant effects both in the short- and medium-term. Mothers affected by the policy change are significantly less likely to be employed than mothers who gave birth a year earlier. We find a reduction of 9.5 percentage points in the medium-term, but no effect in the short term. Further, the estimated hours worked is reduced by 9.1 hours in the short-term, and 21.1 hours in the medium-term. Both results indicate that the quota reduction had a negative effect on mothers' labor participation. Seminar attendance show a significant decrease of 20.2 percentage points in the short-term and 25.5 percentage points in the medium-term. This could indicate that mothers are seen as less valuable future resources for the company, or that their career focus is less prominent. We do not find any significant results examining planned work hours or share of women in leadership position, and can therefore not conclude on the causal effect on these outcomes. The estimates are robust to a series of robustness checks, and shows a clear trend in mothers' labor market outcomes. However, it is important to acknowledge that we have examined a relatively small sample and that the differences-in-differences approach is prone to overestimating the significance of estimates.

1.2 Research Question

Based on this motivation, we examine the following research question:

How did reducing the paternity quota from 14 to 10 weeks in 2014 affect mothers' labor market outcomes in the short- and medium-term?

We seek to answer this question through the following chapters. Chapter 2 describes the background for the parental benefits and gender equality in Norway. Chapter 3 gives an overview of previous research, and elaborates on how this primes our expectations for our findings. Chapter 4 describes the main data source, The Labor Force Survey, and how we have adapted it before utilizing it in the empirical framework described in chapter 5. Next follows a presentation of the results in chapter 6. A set of robustness test are performed in chapter 7. In chapter 8, we elaborate on the limitations to the dataset and the empirical strategy. Finally, we discuss our findings and compare them to previous research in chapter 9. Chapter 10 concludes this thesis.

2. Background

This chapter provides an overview of the parental benefit scheme in Norway and the history of the paternity quota. We also elaborate on the relationship between gender equality and female labor participation.

2.1 Parental Benefit Scheme in Norway

Parental benefits are economic contributions given to parents (Folketrygdloven, 1997, §14-4). It grants parents a statutory right to take 49 weeks[1] of paid leave during the three first years after childbirth, and later to return to the same job position. It is funded by the Norwegian National Insurance Scheme (Folketrygden) and was first introduced in 1977 (NOU 2017: 6, 2017).

We look at the period from the first quarter of 2013 to the second quarter of 2017. To qualify for parental benefits during this period, the mother must be part of the National Insurance Scheme, have been employed 6 of the last 10 months, and earned a minimum of one half G (the official basic pension) during these months (Folketrygdloven, 1997, §14-6). In 2014, this amount corresponded to 44,185 NOK (NAV, 2017d). Normally, the official basic pension is upwardly adjusted by 1-4 percent every year. If the mother does not fulfill the qualifications, the family will be granted a lump sum grant. Parental benefit is normally calculated based on the parent's pensionable income, and cannot surpass six times the official basic pension[2] (Folketrygdloven, 1997, §14-7). Only under special circumstances can the father be granted parental benefits if the mother does not qualify.

2.2 The Paternity Quota in Norway

The paternity quota was proposed by Mannsrolleutvalget (*The Male Gender Role Panel*) in 1991 (NOU 1991:3, 1991). They suggested increasing the parental leave period considerably.

[1] The period can be extended with another 10 weeks, to 59 weeks in total. The total sum of disbursements is still the same, but is distributed over 59 weeks, instead of 49. This is called the contribution margin ratio.

[2] Many employees have a salary that surpasses six times the basic pension. In these cases, some employers choose to compensate for all or some of the difference between 6G and full income (Arbeids- og velferdsdirektoratet, 2015).

At that time, it consisted of 28 weeks[3], where the first six weeks after childbirth were reserved for the mother. Parents had the option of dividing the remaining 22 weeks between the father and the mother. However, in nearly all families, the mother took up the entire parental leave period. To ensure more equal division of leave, the panel suggested increasing the total parental leave period to 18 months, with 6 months reserved for each parent. They argued that reserving a portion for the father would allow father and child to connect. At the same time, they recognized the need for rest and nursing for both mother and child the months after birth. The historic development of the paternity quota is displayed in table 2.1.

Table 2.1: Evolution of Parental Leave Since 1992

Year	Weeks of Parental Leave	Weeks of Paternity Quota	Change in Parental Leave	Change in Paternity Quota
1992	35 weeks			
1993	42 weeks	4 weeks	7	4
2005	43 weeks	5 weeks	1	1
2006	44 weeks	6 weeks	1	1
2009	46 weeks	10 weeks	2	4
2011	47 weeks	12 weeks	1	2
2013	49 weeks	14 weeks	2	2
2014	49 weeks	10 weeks		− 4

Note: The table shows changes in parental leave since the introduction of the paternity quota in 1993, with the parental leave level of 1992 included for comparison. Rows 2 and 3 show the amount of total leave and the leave reserved for fathers respectively. Rows 4 and 5 show the number of weeks by which the total leave period and the paternity quota has changed, respectively. Since 1989 it has been possible to take up part-time parental leave of 80 percent, see note 1. This option is available for the entire period. Source: NOU 2017:6, 2017.

Norway introduced the paternity quota as a part of the parental leave scheme in 1993 (NOU 2017: 6, 2017). Four weeks of paid paternity leave were reserved for the father. After 2005, the paternity quota was increased step-by-step, reaching 14 weeks in 2013. In 2014, the paternity quota was reduced from 14 to 10 weeks, keeping the total amount of parental leave unchanged. We will refer to this policy change as the reduction in the paternity quota.

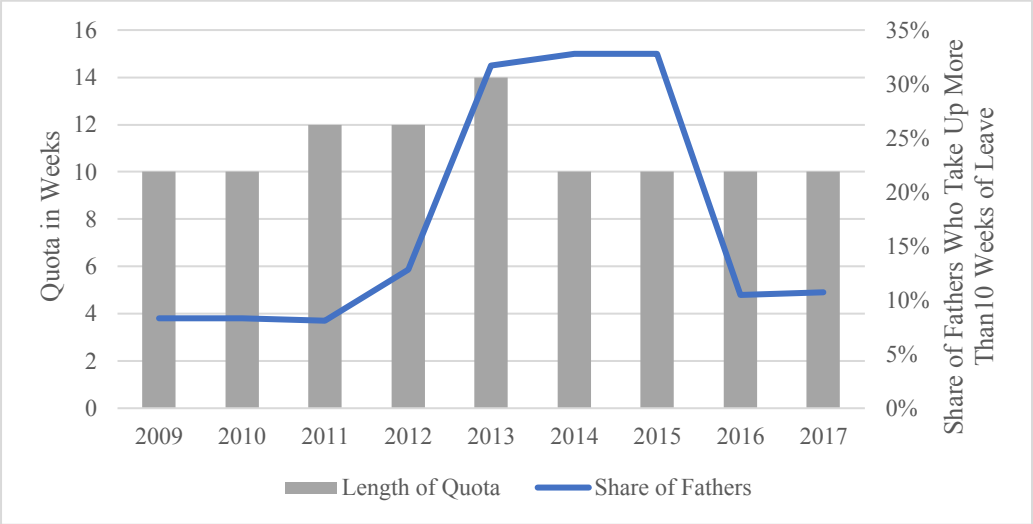
In this thesis, we analyze the reduction of the paternity quota in 2014, and its effect on women's labor market outcomes.

[3] Or 35 weeks if they extend the leave period, see note 1.

2.2.1 Why the Prime Minister Is Disappointed in Norwegian Men

Introducing the paternity quota has largely been successful in terms of incentivizing men to take up parental leave (NOU 2017: 6, 2017). The decision to reduce the quota in 2014 was based on the Solberg government's belief that Norwegian families no longer needed a quota to ensure that both parents made use of the parental benefit (NTB, 2017). However, fathers largely limit their leave to the allotted quota (NAV, 2017a).

Figure 2.1: Share of Fathers Who Take Up 10 Weeks or More Paternity Leave



Note: The figure shows the share of fathers who take up 10 weeks or more of paternity leave. The length of the paternity quota each year is included for reference. Length of the paternity quota on January 1st the given year on the left axis. Percentage of fathers taking 10 weeks or more of paternity leave on the right axis.
Sources: NAV, u.d; NOU 2017: 6, 2017

After the quota was reduced, the average amount of paternity leave days taken out has declined, both in Norway and Denmark (Rostgaard & Lausten, 2015; NAV, 2016b). This led the prime minister of Norway to state her disappointment in Norwegian men for their lack of willingness to stay at home with newborn children (NTB, 2017). Figure 2.1 show the share of men taking up more than 10 weeks of parental leave. Only 7 out of 10 fathers take up exactly their allotted quota (NAV, 2017a). There seems to be a slight lag in fathers' response to the quota, which might be caused by the possibility to take up leave within a period of three years after childbirth.

The fact that the paternity quota and leave follows each other closely is key for the research question of this thesis. This relationship makes the hypothesis that the length of paternity leave may have affected women's labor market outcomes plausible. It is likely that mothers pick up the slack and stay longer at home with the baby when fathers opt out of paternity leave (NOU 2017: 6, 2017).

2.3 Gender Equality and Women's Labor Participation

One aspect of achieving gender equality is to improve women's position in the labor market. One can distinguish between formal and substantive gender equality. Formal gender equality refers to equality before the law. Substantive gender equality (we use this term interchangeably with gender equality) also include equality in outcomes (European Institute for Gender Equality, u.d.). While discrimination based on gender has been prohibited by law in Norway since 1978, one can argue that substantive gender equality is not yet achieved. In this thesis, we investigate a policy change that does not compromise formal gender equality, but where the effect on substantive equality is central. The following paragraphs will introduce measures of gender equality and present statistics on gender equality in Norway.

World Economic Forum produces the Global Gender Gap Index (GGG), by which they rank countries according to the level of parity between the genders (World Economic Forum, u.d.). The index measures outcomes, not policies, and can be looked at as a measure of substantive gender equality.

The sub-index "Economic Participation and Opportunity" contains indicators of work-related outcomes, as described in the following excerpt:

> *This subindex contains three concepts: the participation gap, the remuneration gap and the advancement gap. The participation gap is captured using the difference between women and men in labour force participation rates. The remuneration gap is captured through a hard data indicator (ratio of estimated female-to-male earned income)[1] and a qualitative indicator gathered through the World Economic Forum's Executive Opinion Survey (wage equality for similar work). Finally, the gap between the advancement of women and men is captured through two hard data statistics (the ratio of women to men among legislators, senior officials and managers, and the ratio of women to men among technical and professional workers).*
>
> *Source: World Economic Forum, u.d.*

The index gives countries scores on the different indicators, with 0.00 representing imparity and 1.00 representing perfect parity between the genders. In the report from 2016, Norway ranks 3rd overall with a score of 0.842, and 7th on the sub-index "Economic Participation and Opportunity", scoring 0.586 (World Economic Forum, 2016). This points to a society which is fairly gender balanced, yet with room for improvement in economic opportunities and labor participation.

The following tables (Table 2.2 and Table 2.3) contain statistics of gender imbalances in the labor market. Notably, there is a quite large gap favoring men on several indicators (Statistics Norway, 2017a). For instance, men earn 530,000 NOK on average every year while women's average salary is only 354,000 NOK. In other words, men's average salary is 49.7 percent higher than women's. Further men work on average 4.8 hours more each week than women. We also see clear tendencies that some sectors have an overrepresentation of one gender in the workforce. Education, and human health and social work activities are overrepresented by women. The share of men is 34 percent and 19 percent, respectively. Many occupations in the secondary sector have an overweight of men. For instance, in construction, only 8 percent of employees are women.

Table 2.2: Labor Statistics by Genders

	Men	**Women**
Average Wages	530,100 NOK	354,000 NOK
Unemployment Rate	4.6 %	4.1 %
Share in Temporary Employment	6.5 %	9.4 %
Share Doing Part-Time Work	20.7 %	46.5 %
Share in Leadership Positions	9.3 %	5.9 %
Average Number of Hours Worked	36.5 h	31.7 h
Share Working in the Public Sector	30 %	63 %

Note: The table presents average wages and hours worked for each gender. Shares of the gender in temporary employment, working part time, holding leadership positions, and working in the public sector, as well as unemployment rate are presented in percentages of the total labor force. Source: Statistics Norway, 2017a

Table 2.3: Gender Dominated Professions

Male Dominated Professions	***Share of Women***
Agriculture, Forestry and Fishing	21 %
Mining & Quarrying	20 %
Manufacturing	24 %
Power and Water Supply, Sewerage/Remediation activities	21 %
Construction	8 %
Transportation and Storage	20 %
Information and Communication	29 %
Female Dominated Professions	***Share of Men***
Education	34 %
Human Health and Social Work Activities	19 %

Note: The table shows share of the minority gender working in a profession where more than 60 percent of the workforce is one gender. For male dominated professions, the share of women in each sector is presented in percentages, and vice versa for female dominated professions. Source: Statistics Norway, 2017b

3. Literature Review

The effect of introducing the paternity quota in the Nordic countries has been subject to extensive investigation. We have less knowledge about the consequences of a reduction. So far, only Denmark and Norway have chosen to repeal or reduce the quota. The Danish results may foreshadow the results of this thesis. This chapter introduces the gender equality effects of introducing the paternity quota, followed by research investigating the total repeal of the Danish quota in 2002. Finally, we discuss the implications of existing literature for our thesis.

3.1 Effects of Introducing a Paternity Quota

An increasing number of studies find that the paternity quota has significantly affected the division of household work, partnership dynamics, and labor market outcomes in Norway and Denmark. These findings are presented in the following sections.

3.1.1 A Movement in Traditional Family Patterns

There are numerous studies on how paternity leave affects traditional family patterns. Kotsadam & Finseraas (2011) used the Norwegian introduction of a four-week quota in 1993 as a natural experiment. Their results suggest that the policy lead to a substantial change in conflict level and division of household work between parents. This is supported by Rønsen & Kitterød (2014), who demonstrated that fathers spend more time on work in the household, comparing 1980, 1990, 2000 and 2010. They also found that fathers spend more time with their toddlers each decade.

3.1.2 Increasing Equality in the Labor Market

Traditionally, men are regarded as the main breadwinner of the family, being the sole or primary wage earner. Rege & Solli (2013) find a reduction in men's future wages for fathers of children born after the introduction of the paternity quota in 1993. Fathers also decrease the time spent on paid work during the same period (Rønsen & Kitterød, 2014). The reduction in wages was prevalent among fathers entitled to the paternity quota. The results imply an increasing wage gap among men with and without children. Cools, Fiva, & Kirkebøen (2015) find similar effects on wages in a causal analysis of the introduction of the quota, but their results are not significant nor causal.

Evidence also show a change in women's work pattern. This cannot solely be ascribed the paternity quota, due to changes in other family related reforms during the same period[4]. Nevertheless, a comparison of panel data found evidence supporting a change in mothers' allocation of time in favor of salaried work. A study by Rønsen & Kitterød (2012) found that women in 2010 take shorter parental leave than before. They hypothesize that this is due to both fathers being more involved, and easier access to formal day-care. Women have also increased the amount of time spent on salaried work during the years following the introduction of the paternity quota. A comparison of panel data from 1980, 1990, 2000 and 2010, i.e. before and after the introduction of paternity quota, show a change in the importance of children on women's work hours (Rønsen & Kitterød, 2012). Women in 1990 worked less after giving birth and slowly increased their working hours as their children grew up to be teenagers. This process seems to have accelerated. The data from 2010 show that, on average, mothers of children older than two years, work just as much as mothers of teenagers. This indicates that having small children today has less impact on women's work hours than before.

Dahl *et al.* (2013) find that the expansions in the maternity benefits has little effect on a series of outcomes for both parents and their children, including parental earnings and work participation in both the short and long run. A study by Cools, Fiva & Kirkebøen (2015) use a differences-in-differences approach to analyze the effects on paternity leave on parents' labor supply and children's school performance. Their methods resemble those used in this thesis. They found no significant changes in women's or men's labor supply or earnings. However, they found a significant improvement in children's school performance 15 years after the policy introduction. The results are strongest in families were fathers have high education. The authors suggest this might be due to children spending more time with their fathers. These hypotheses can be supported by Nepomnyaschy & Waldfogel (2007). They find that men who take paternity leave, also spend more time with their children nine months later. In addition, another study shows that children of mothers who took maternity leave tend to have a 2 percent lower drop-out rate and 5 percent higher income level at the age of 30 (Carneiro, Løken, & Salvanes, 2015).

[4] Other family related reforms include increased availability of day-care spots and the introduction of the cash-for-care scheme. (Rønsen & Kitterød, 2012)

3.2 Relationship Between Paternity Quota and Uptake of Leave

Denmark experienced a total repeal of the paternity quota in 2002. This section provides an overview of research examining this policy's impact. Analysis of the consequences of the abolishment could give indications of the effects of a reduction in paternity quota in Norway.

The number of fathers choosing to take paternity leave correlates with the length of the paternity quota (Rostgaard & Lausten, 2015; NAV, 2017a). Further, fathers whose brother or coworker took up leave are respectively 15 percent and 11 percent more likely to take up leave themselves (Dahl, Løken, & Mogstad, 2014). After the introduction of the paternity quota in Denmark, the share of Danish fathers on parental leave sparked from 12 percent to 26 percent, while the removal of the quota resulted in a similar drop, from 36 percent to 22 percent. The causal effects of the policy were investigated, revealing that fathers were significantly more likely to take up paid leave after the quota was first introduced (Rostgaard & Lausten, 2015). Using logistic regression, they examined the probability of fathers taking paid leave before, during, and after the period (1998-2001) of paternity quota in Denmark. Fathers were almost four times more likely to take leave in the period of the paternity quota, compared to the period before the policy was introduced. The opposite effect occurred after the removal of the quota, when the odds for taking up any leave was reduced to 0.82.

3.3 Implications for Our Thesis

Some of the previously mentioned research implies that the Norwegian paternity quota has improved gender equality, both in the workplace and at home. Others find no effect. Analyses of the Danish repeal of the paternity quota provided strong evidence that the number of fathers taking out parental leave is affected by the presence of a quota. Register data describes a similar trend in Norway after the reduction of the quota (NAV, 2015). The existing literature leads us to expect two possible effects on women's labor market outcomes. First, if the paternity quota during its 21 years of existence has managed to create lasting changes in norms and corporate culture, we find no changes in labor market outcomes. On the other hand, a possible consequence is that the reduction of the paternity quota leads to negative effects on mothers' labor market outcomes. Thus, reducing the quota reverses some of the trends from the introduction and previous increases of the quota.

4. Data

This chapter describes the data that are the foundation for our analyses. First, we introduce the Labor Force Survey, which is the data source. Second, we explain how we define the estimation sample. Third, we describe our selected outcome and control variables. Finally, we present descriptive statistics of the sample's characteristics.

4.1 Data Source

The main data source for this thesis is the Labor Force Survey (AKU), conducted by Statistics Norway (SSB). The Labor Force Survey is a survey panel data set with the main purpose of mapping employment development in Norway (Bø & Håland, 2015). The survey is conducted through phone interviews on a rolling sample of 24,000 individuals in the age group 15-74. The sample is intended to be representative of the Norwegian working age population. While approximately one eight of the sample is replaced each quarter, the sample is at all times a balanced cross-section of the population.

The total dataset consists of 46,428 individuals and 289,322 observations in the time period from the first quarter in 2013 to the second quarter in 2017. Each interviewee participates eight times during a time range of two years (quarterly) (Bø & Håland, 2015). Not all participants complete all eight interviews, although they are required by law to respond. While penalties are not exercised, the participation rate is historically relatively high, ranging from 80 to 90 percent (Statistics Norway, 2017c).

The interview objects are asked about their employment status and work participation (Bø & Håland, 2015). The survey also includes demographic information, such as age, gender, marital status, educational level, and municipality type for all respondents. The Labor Force Survey also provides information about number of children and age of the youngest child for women. Furthermore, the survey includes questions in the following categories: employment status, working hours, underemployment, changes in working hours, temporary absence, new jobs and education. It also includes a weighting variable constructed by Statistics Norway to account for attrition in the sample.

The Labor Force Survey data is stored in data sets for each survey cohort, were each individual is an observation. We combine data from 18 cohorts and remove the duplicates that occur

when combining the data sets. We then transform the data set from wide to long format, allowing us to examine each variable over time.

4.2 The Estimation Sample

We assume that a woman is affected by the policy change if two criteria is fulfilled. The first criterion is that both parents have to be entitled to paid parental leave. This includes all married and cohabiting parents as well as single mothers, as long as the child has a registered father. Six percent of our observations are of women who are not married or cohabiting. The likelihood that these women are affected by the policy change is somewhat smaller than for married or cohabiting women. However, we are not able to determine whether both parents were eligible for parental benefits nor whether the father actually took parental leave, for any of the individuals in the survey[5]. We therefore include women who are not married or cohabiting in the sample, as they may still be affected by the reduction in the paternity quota. Placing mothers in treatment or control group is done using date of birth for the youngest child. The second criterion is that the child had to be born after July 1st, 2014, when the policy was put into effect. The data provide possibilities to verify this, see section 5.2.5.

We also need to include a comparison group of individuals not affected by the treatment, i.e. a control group. The control group consists of women who have given birth before the policy change, during an equal sized time window as the treatment group. The estimation sample consists of mothers who have given birth after January 1st, 2013, and before December 31th, 2015, and includes all observations of these individuals.

[5] We can determine the employment status of women who gave birth during the six final quarters of their Labor Force Survey participation. We can however not establish if their wages were sufficiently high, or if the father was eligible for leave or took up leave.

4.3 Selection of Outcome Variables

The purpose of this thesis is to investigate the effect on women's labor participation and career prospects after the reduction of the paternity quota. To accomplish this, we investigate five outcome variables. Employment status and planned and actual work hours measure labor participation. Share of women attending seminars or holding leadership positions are proxies for career prospects.

4.3.1 Measures of Labor Participation

Number of Work Hours

The number of work hours, both planned and actual, are of interest. Planned work hours capture both the expectations women have, as well as how many hours they are allotted. Actual numbers depict the reality, where absence for various reasons (e.g. own or a family member's sickness) could reduce the final number of working hours. A reduction in the quota could lead to a more skewed division of the domestic and professional work load within the family. This is supported by Kvande and Brandht, referenced to in Official Norwegian Report 2017:6 (2017, p. 151), who argues that a long paternity quota is essential to avoid the father from becoming a secondary provider.

Employment Rate

To investigate if the reduced paternity quota leads to more women standing outside the job market, a dummy variable for being employed is constructed. We include all variations of being employed from the Labor Force Survey. Employed individuals include those who worked a minimum of one hour during the week of the interview, hereafter known as the reference week, or were absent from work due to for example illness. Also, those who participate in compulsory military service are defined as being employed.

Further, we include mothers who state they are on maternity leave during the reference week. The reason for this is that mothers must have been employed for six of the last ten months before birth to qualify for parental leave. They also have a statutory right to keep their position during the period of leave. Excluding these individuals would bias the estimates as a large share of the individuals, for obvious reasons, would be on parental leave after becoming mothers.

4.3.2 Proxies for Career Prospects

Seminar Attendance

Educational seminar granted by the workplace could indicate whether the employee is prospected as a future asset for the company. It also indicates whether a person is willing to invest time and effort in self-education, and can be viewed as a proxy for career prospects. The dummy variable indicating if the interview object attended a seminar during work hours in the reference week (from here on, seminar attendance) is used to signify that the employee is invested in by the employer.

Leadership Position

Part of the initial goal of reserving a quota of the parental leave for men was to increase gender equality in the workforce. This include increasing the share of women in leadership positions. A dummy is therefore generated to separate leaders from non-leader positions. This dummy captures to what extent both the employee and employer invests in the career of the individual.

4.4 Selection of Control Variables

When estimating relationships between variables, one seeks to avoid omitted variable bias (Wooldridge, 2009). To achieve more precise estimates, the model should include control variables that are likely to affect the outcome variable. The estimation of the variable of interest's effect on the outcome is more precise if we can remove the control variable's impact from the error term. The controls included are variables intended to capture three different types of effects: personal characteristics, macroeconomic factors, and seasonal variation.

Aspects of an individual's personal characteristics could explain the outcome variable. As all outcome variables are labor market outcomes, we include controls that are shown to influence these. Age, number of children under the age of 16, and educational level are implemented in the model as control variables for personal characteristics. Educational level is transformed to three dummies for compulsory school, upper secondary school, and higher education. Age and number of children is used without further manipulation.

Finally, macroeconomic factors affecting the labor market unevenly across sectors and time, could contribute to explaining outcomes. The fall in the oil price had a greater impact on the secondary industry than the primary and tertiary industry (Hvinden & Nordbø, 2016). This is

accounted for by creating dummies for primary, secondary and tertiary industries, and quarterly and yearly dummies to account for seasonal variations. In all cases where a group of control variables could result in perfect multicollinearity, i.e. the quarterly dummies, one variable is omitted from the regression.

4.5 Descriptive Statistics

Our data set consists of 584 individuals and 4,000 observations. Table 4.1 shows descriptive statistics of the sample. Each respondent has participated on average 6.85 times. The average mother is 30.6 years old and have 1.7 children, where the youngest child is 1.5 years old. 94 percent of the sample is married or living in cohabitation with a partner. 60 percent has completed higher education, 24 percent have upper secondary school as their highest completed education, while 15 percent have only completed compulsory schooling. The majority works in the public sector. Half of the mothers in the sample work in a profession where the share of women is over 60 percent. Only 14 percent work in a male dominated profession where men make up over 60 percent of the workforce. The remaining 35 percent are either unemployed or in a profession which is not dominated by either gender.

Table 4.1: Summary Statistics of the Total Sample

Personal Characteristics	
Age	30.59 (4.964)
Number of Children Under 16 Years Old	1.720 (0.831)
Age of Youngest Child	1.524 (1.885)
Share Married/Living in Cohabitation	0.939 (0.240)
Highest Education Level, in Shares	
Compulsory School	0.147 (0.354)
Upper Secondary School	0.241 (0.428)
Higher Education	0.607 (0.489)
Employment, in Shares	
Employed	0.684 (0.465)
Employed in the Public Sector	0.557 (0.497)
Employed in Male Dominated Profession	0.137 (0.344)
Employed in Female Dominated Profession	0.493 (0.500)
Observations	4,000

Note: The table show summary statistics of the total sample. Standard errors in parentheses. Personal characteristics are age, number of children under 16 and age of the youngest child in the week of the interview, as well as marital status. Interview objects are asked about their highest completed education level. The share of women belonging to each category is presented. Individuals counted as employed includes part-time employment and compulsory military service, and individuals who are temporary absent during the reference week. Male and female dominated professions are professions where the majority gender accounts for more than 60 percent of the workforce. Source: (Statistics Norway, 2017b)

5. Empirical Strategy

This chapter introduces the identification strategy for our thesis. We present the empirical framework, specify the empirical strategy and elaborate on the validity of the model assumptions.

5.1 Presenting the Empirical Framework

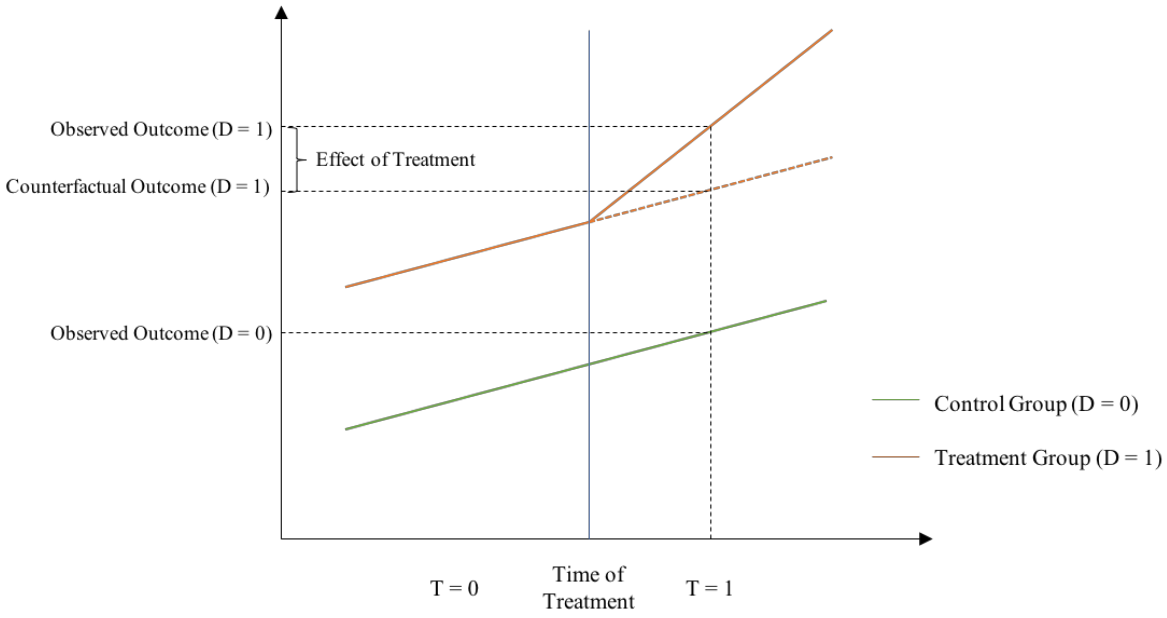
This thesis aims to estimate the effect of reducing the paternity quota on women's labor market outcomes and career prospects. To do this, we need an empirical strategy that can identify the causal effect of the policy measure and preclude other confounding factors. This thesis uses the differences-in-differences approach, which is a special application of the Ordinary Least Squares regression model. In the following sections, we explain the empirical framework and specify the regression model.

5.1.1 Differences-in-Differences is the Estimation Model of Choice

The differences-in-differences approach consists of comparing the development of a dependent variable between a treatment and a control group (Angrist & Pischke, 2014). The sample is divided into a treatment (D = 1) and a control group (D = 0), and a post- (T = 1) and a pre-treatment period (T = 0). A graphical representation of the differences-in-differences model is shown in Figure 5.1.

The goal is to isolate the causal effect by comparing the true outcome to an unobserved counterfactual outcome. The unobserved counterfactual outcome is the outcome one would have seen in the treatment group had they not received the treatment. To estimate this, one assumes that the treatment and control group would have moved identically in absence of the treatment.

Figure 5.1: Illustration of The Differences-in-Differences Model



Note: The green solid line illustrates the development in an outcome for the control group. The solid orange line represents the observed outcome for the treatment group. The dashed, orange line represents the hypothesized development in the outcome variable without the treatment. The trends before the treatment are parallel, though not equal. Time of treatment is represented by the vertical, blue line. The causal effect of the treatment is the difference between the hypothesized and true outcome for the treatment group. Inspired by Angrist and Pischke, 2014.

The key assumption for differences-in-differences is that the treatment and control group share similar trends in the dependent variable before the policy change took place. We compare the outcomes after treatment, and estimate the difference between the observed and hypothesized outcome. For the differences-in-differences strategy to yield the causal effect there must not exist any other exogenous policy changes that would likely have influenced the explained variable. Parallel trends are discussed in section 5.2.8, while confounding shocks is elaborated on in section 8.2.

5.1.2 Approach to Analyse Heterogeneity Between Sub-Groups

To analyze whether the effects differ between sub-groups of the sample, we include a triple interaction term identifying the sub-groups in the differences-in-differences model. This allows us to examine whether the effect is stronger in either group. The same assumptions as for the main specification of the model applies for this approach.

5.1.3 Difference Between Intention-to-Treat and Treatment-on-the-Treated Effects

In policy evaluations, one must be cautious with the interpretation of its effects on the population. In most cases, one cannot be certain that the treated group in fact complies with the treatment, nor that the untreated group does not receive treatment through other means (Angrist & Pischke, 2014). We must therefore distinguish between the intention-to-treat effect (ITT) and the effect of treatment-on-the-treated (TOT). The ITT is the effect on the population that is the object of the policy, not knowing whether an individual has in fact received treatment. The TOT is the effect on those who did receive treatment.

5.2 Presenting the Estimation Strategy

We have chosen two complementary strategies to be able to look at both short-term outcomes for a small sample of mothers, and medium-term outcomes for an extended sample. The estimation model is the same for both samples, but the definition of the pre- and post-treatment period differs, as does the time dimension itself (see section 5.2.4).

The following sections present the estimation model, sample definitions and suitability of the specified model.

5.2.1 Specifying the Differences-in-Differences Model

We estimate the effect of the change in the paternity quota using the following model:

Equation 1

$$Y_{it} = \alpha + \beta_1 \mathbb{X}_i + \beta_2 \boldsymbol{T}_t + \beta_3 Treatment_i + \beta_4 Post_{it} + \delta(Treatment_i \times Post_{it}) + \epsilon_{it}$$

We estimate the specified model on different outcome variables, Y_{it}. $Treatment_i$ and $Post_{it}$ are dummy variables. $Treatment_i$ takes the value 1 if the observation is in the treatment group and 0 for the control group. $Post_{it}$ is a dummy variable indicating whether the observation is before or after the time of treatment. If $Post_{it}$ takes the value 1, the observation happened after the defined time of treatment.[6] We use control variables for both individual

[6] We use two different time dimensions in our analysis. To investigate short-term effects, we define Post as after childbirth. For medium-term effects, Post is defined as after July 1st, 2014. For more information, see section 5.2.4

characteristics and time. $\mathbb{X}_i$ is a vector of individual-specific characteristics of the mother, i.e. education level, age, and sector of occupation. $\boldsymbol{T}_t$ is a vector of time variables including dummies for year and quarter. A complete list of control variables can be found in section 4.4. $\beta_1$and β_2 are vectors of coefficients that captures the effects of the control variables. δ is the interaction of the $Treatment_i$ and $Post_{it}$ dummies, and is the parameter of interest. The interaction term takes the value 1 for observations of the treatment group after the treatment, and 0 for all other observations. δ shows the causal effect of the policy change on the outcome variable given that the assumptions are fulfilled.

5.2.2 The Treatment is a Four-Week Reduction of the Paternity Quota

In the differences-in-differences framework, a policy change can be considered a natural experiment. On July 1st, 2014, the Norwegian government reduced the part of the parental leave reserved for the father from 14 to 10 weeks, a reduction of 28.5 percent (NOU 2017: 6, 2017). The total leave period was not changed. Decreasing the paternity quota therefore means that the family have four more weeks to divide between the parents as they please. For families where the father does not take up leave, this is in fact an increase in the leave time available for the mother.

5.2.3 Approaches to Estimate Short- and Medium-Term Effects

To estimate the direct effect of the change in the paternity quota, we need to compare mothers who gave birth after the policy change to mothers unaffected by the reduction. We perform two sets of regressions, one on a small and one on an extended sample of the treatment and control group. For the small sample, we look at outcomes relative to childbirth. For the extended sample, we use calendar time. See further explanations in section 5.2.4. Doing both regressions allows us to know the effects of the paternity quota on labor market outcomes both in the first two years of motherhood, and on mothers of older children. Individuals in the small sample are observed within a smaller time frame. They are therefore less exposed to exogenous factors unrelated to the treatment, thus, the assumption that the only difference between control and treatment group is the treatment is stronger in the small sample. The extended sample

includes more observations and is therefore suitable to evaluate medium-term effects. If the results are similar in both analyses, we argue that this speaks in favor of the policy having an effect. The following sections presents the advantages and drawbacks of each approach.

The Small Sample Reveals Effects in the Short-Term

We want to investigate the short-term effect on labor market outcomes for mothers. To do this, we only look at women who gave birth while being registered as part of the Labor Force Survey panel. This approach allows us to compare women in similar life situations, as the interviews are performed in proximity to childbirth. All observations in the pre-treatment period are of women expecting a child, while all observations in the post-treatment period are postnatal women. The treatment group are identified as mothers who gave birth the three quarters after July 1st, 2014, and the control group three quarters before. There may be exogenous factors that differ between the groups. Nevertheless, we argue that differences in labor market outcomes are likely to be caused by the policy change as long as the parallel trends assumption holds.

Due to the design of the Labor Force Survey the sample is restricted to women who gave birth while part of the panel. This yields few individuals and a maximum observation period of seven quarters before or after giving birth. The likelihood of finding significant results using this approach is modest, because of the sample size.

The Extended Sample Demonstrates Medium-Term Effects

Professional outcomes after childbirth, such as hours worked and employment status may take some time to change. To look at medium-term effects, we expand the sample to include women who gave birth before being part of the Labor Force Survey panel.

The extended sample naturally results in more observations. This makes it feasible to examine whether there are heterogeneous effects.

Looking at medium term effects makes it more likely that other exogenous factors have affected the outcomes we are interested in. The extended sample is not limited to mothers of newborns, but also includes mothers of toddlers. Therefore, the time window allows for more impact of other exogenous factors affecting everyday life of new parents. However, as long as the control and treatment group share parallel trends, we consider the estimates to reveal causal effect of reducing the paternity quota.

5.2.4 Different Specifications of Time Dimensions for the Samples

To examine short-term and medium-term effects, we use two different time dimensions. The time dimension for each sample is explained in detail in the following sections.

Analyzing the Small Sample Relative to Time of Childbirth

In the small sample, we look at developments in labor market outcomes relative to the time of giving birth. We define t=0 as the first quarter that the respondent has stated that she has more children than in the previous interview. Time is registered as quarters before and after giving birth. For example, a mother responding that she has two children in the second quarter of 2014 and three children in the third quarter of 2014, is registered with t = 0 for 2014q3, t = 1 in 2014q4 and t = –1 in 2014q2. This way we can estimate differences in outcomes relative to the quarter that the mother gave birth, and establish whether there are differences between the treatment and control group. Pre-treatment is defined as $t < 0$ and post-treatment as $t \geq 0$. We compare outcomes before and after having a child for two groups exposed to different lengths of paternity quota.

Analyzing the Extended Sample Using Calendar Time

The extended sample is analyzed using a conventional differences-in-differences approach, where time is defined as actual time. The pre-treatment period is from January 1st, 2012, until June 30th, 2014. Post-treatment is defined from July 1st, 2014, to March 30th, 2017.

5.2.5 Assigning Mothers to Treatment and Control Groups

The control and treatment group should consist of individuals with similar characteristics. The following section describe how we identify these groups.

The Small Sample Consists of Mothers Who Gave Birth During the Interview Period

The treatment group of the small sample is defined as mothers who gave birth during the three quarters after the policy change – in other words between July 1st, 2014, and March 31th, 2015. For the control group, we use the corresponding sample from 2013, i.e. mothers whose youngest child was born between October 1st, 2013, to June 30th, 2014. We have two ways of identifying the mothers who gave birth while part of the panel. First, we check if the number of children increased from one interview to another. Second, to identify first-time mothers, we check if the number of children increases from missing in a survey, where we know they

responded to other questions, to non-missing in the next survey. Missing observations indicates either that the individual did not respond to the survey during that quarter, or that she did in fact have no children. Further, if any missing values makes it impossible to determine time of birth, we do not assign them treatment nor control status, and they are consequently not included in the sample.

All mothers, in both the control and treatment group, gave birth during the time range of their interview. Their behavior is therefore possible to follow before and after giving birth.

The Extended Sample Includes Mothers Who Gave Birth Within a Larger Time Frame

The extended treatment and control groups include mothers identified in the small sample. We also include mothers with children born in 2013 in the control group and in 2015 for the treatment group. Because of the design of the questionnaire, we are able to identify these mothers even though they participated after giving birth. We do this by checking the year of birth for the youngest child. The latest interviewees included are those leaving the survey after the second quarter of 2017. Mothers in the control group must have finished the survey before the fourth quarter of 2015, to ensure balance in the number of women and observations in the control and treatment group, as well as the observation period. We observe the control group for six quarters more in the pre-treatment period, and the treatment group for six quarters more in the post-treatment period. This specification leads to an imbalance between the control and treatment group concerning the window of observation. See table 5.1 for description of the control and treatment group.

Table 5.1: Control and Treatment Group in the Different Samples

	Small Sample		**Extended Sample**	
	Treatment Group	**Control Group**	**Treatment Group**	**Control Group**
Individuals	128 individuals	174 individuals	289 individuals	295 individuals
Time of Childbirth	July 1st, 2014 – March 28th, 2015	October 1st, 2013 – June 30th, 2014	July 1st, 2014 – December 31st, 2015	January 1st, 2013 – June 2014
Window of Observation	January 2013 – June 2016	January 2012 – December 2015	January 2013 – June 2017	July 2011- October 2015

Note: The table presents number of mothers in treatment and control group for the small and extended sample. Time of childbirth refers to the period in which the mother has given birth. The treatment occurred July 1st, 2014, and separates the control and treatment group.

5.2.6 Using Clustered Standard Errors to Correct for Serial Correlation

For the OLS results to be BLUE (best, linear, unbiased estimators), the error terms must not be correlated (Wooldridge, 2009). Panel data is advantageous because it makes it possible to observe changes in an individual over time. The same individual will be observed over up to eight periods, this means that there may be correlation in the error terms over time. The following model demonstrates this. An individual $i = 1, \ldots, I$ is followed over time with several observations $m = 1, \ldots, M$. The sum of observations is $N = \sum_m M = IM$. The simple OLS model is as follows:

$$Y_{im} = \beta_0 + \beta_1 x_i + e_{im}$$

where Y_{im} is the outcome variable that varies with individuals and time of observation, and is dependent on the regressor x_i, which varies between individuals. The error term is specified as follows:

$$e_{im} = v_i + \eta_{im}$$

η_{im} is the idiosyncratic error term relating to the individual and observation, whereas v_i is the individual-specific component. As v_i will be identical for all m, serial correlation and intra-class correlation is present. This results in a severe underestimation of the standard errors, potentially leading to a wrongful rejection of the null hypothesis of insignificant coefficients.

We assume that the error terms are identically and individually distributed between the individuals, but suffer from serial correlation. To control for serial correlation and achieve more precise test statistics, we use standard errors clustered on the individual level (Angrist & Pischke, 2009).

5.2.7 Analyzing Differences Between Sub-Groups

It is possible that there are different effects of the treatment on different sub-groups. We therefore look for heterogeneity between female and male dominated professions. We define a profession to be gender dominated if more than 60 percent of the employees belong to that gender. This is a commonly used threshold for determining whether the workforce is gender balanced, for instance it is the explicit goal to have 40 percent representation of each gender in boards of corporations (Store Norske Leksikon, 2014). Both cultural and institutional

aspects may lead to heterogeneous outcomes. These aspects include attitudes towards mothers in the work place that vary between professions, or tenure regulations that are different for the private and public sector.

To check for heterogeneous effects between two subgroups, we include a third interaction term to Equation 1. The interaction term is a dummy variable indicating whether the observation belongs to an individual within the relevant subgroup. We estimate the following model:

Equation 2

$$Y_{it} = \alpha + \beta_1 \mathbb{X}_i + \beta_2 \boldsymbol{T}_t + \beta_3 Treatment_i + \beta_4 Post_{it} + \beta_5 (Treatment_i \times Post_{it}) + \delta (Treatment_i \times Post_{it} \times Subgroup_{it}) + \epsilon_{it}$$

The parameter of interest is δ, which shows the effect of reducing the paternity quota.

5.2.8 Discussing the Assumptions for the Empirical Model

The following section addresses the assumptions mentioned in the empirical framework and discuss the model fit of each assumption.

The Policy Change's Effect on Fathers' Behavior

A strong assumption for the empirical model is that the reduction in the paternity quota in fact leads to a change in fathers' decision to take up paternity leave (Angrist & Pischke, 2009). The parental benefit system is constructed such that men still *may* take leave up to 39 or 49 weeks, depending on the contribution margin ratio (Folketrygdloven, 1997). The change is that the time reserved for fathers is reduced by four weeks. Fathers may also choose to not take up any paternity leave.

Both before and after the policy change, one could divide fathers into groups of compliers, always-takers and never-takers (Angrist & Pischke, 2009). These terms are normally used in an instrumental variable framework, but are helpful in explaining the mechanisms concerning the outtake of the paternity quota. We define compliers as the fathers who always take up exactly the quota. Never-takers do not take paternity leave no matter the size of the quota. Always-takers take up more than 14 weeks, which is the largest level of the quota in our time period.

Data from the Norwegian Welfare Authorities show that historically, 7 out of 10 fathers take up exactly the allotted quota (NAV, 2017a). This indicates that fathers in Norway to a large extent are compliers. This supports the strong assumption that a reduction in the paternity quota changed fathers' behavior.

As the dataset does not contain statistics about partner's parental leave status, we cannot know how many, or if any, weeks of paternity leave the partner of a mother has taken. Our estimates will therefore reveal the intention-to-treat effect on mothers who gave birth after the policy change.

The Parallel Trends Assumption

The key assumption when estimating the effect of a policy utilizing the differences-in-differences approach is that the treatment and control group share similar trends before the policy intervention (Angrist & Pischke, 2014). The following paragraphs discusses whether the parallel trends assumption is satisfied. In all graphs, a vertical dashed line marks the time of the policy change. The graphs for the small sample are presented on the left-hand side, and the extended sample to the right. For the extended sample, the panels are unbalanced, but the window of observation is of equal length, 10 quarters. The control group is observed between the first quarter of 2011 and second quarter of 2013. The treatment group is observed between the first quarter of 2013 and the second quarter of 2017.

Employment Status

Figure 5.3 A: Women's Employment Rate in the Small Sample

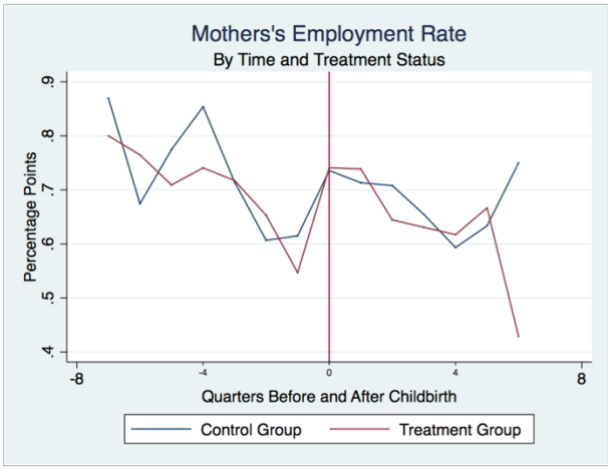
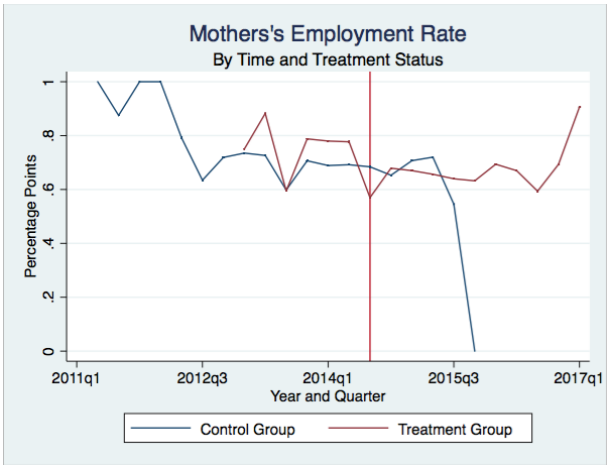


Figure 5.3 B: Women's Employment Rate in the Extended Sample



Figures 5.3 A and B shows the development of employment in the treatment and control groups. Employment is defined as having a paid job and includes persons with temporary absence from a position (e.g. due to parental leave). The pre-treatment trends follow each other closely in both the small (A) and extended (B) sample. There are some differences in the level of employment between the treatment and control group after the policy change. We consider the differences-in-differences model to be suitable for analysis of this variable.

Hours Worked

Figure 5.4 A: Planned Work Hours in the Small Sample

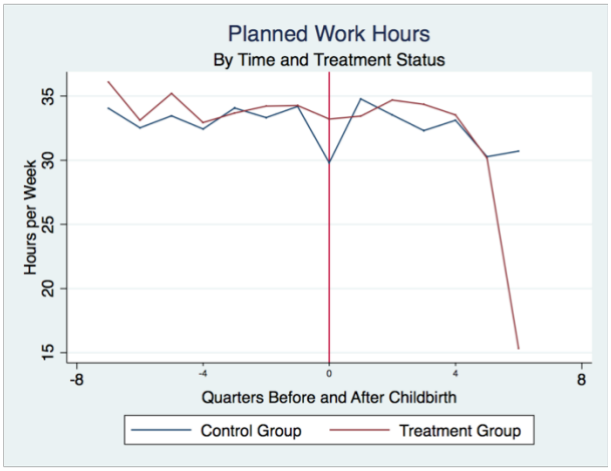


Figure 5.4 B: Planned Work Hours in the Extended Sample

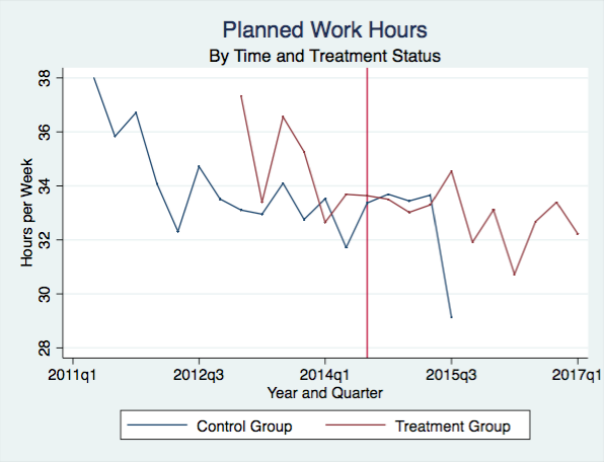


Figure 5.5 A: Actual Hours Worked in the Small Sample

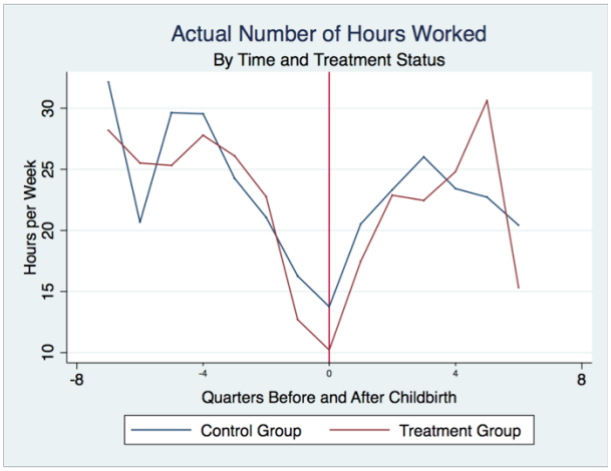
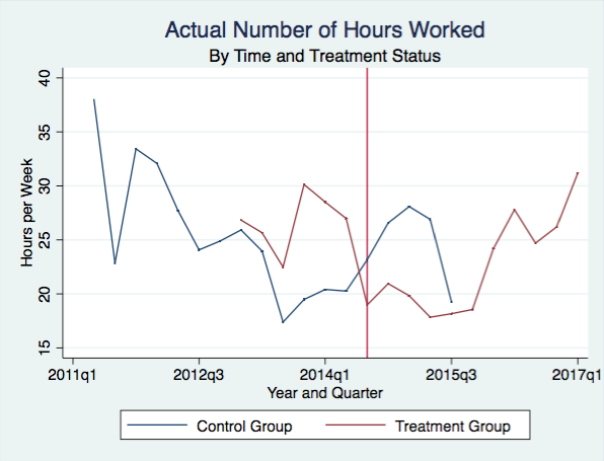


Figure 5.5 B: Actual Hours Worked in the Extended Sample



The Labor Force Survey registers both planned and actual hours worked. Figures 5.4 A and B shows the former, while figures 5.5 A and B shows the latter. Both graphs are constructed from a sub-sample where mothers on parental leave are excluded to avoid skewed samples. In the small sample, the trends follow each other closely in both plots. For the extended sample, the pre-treatment trends are similar for the planned work hours (Figure 5.4 B), making it suitable for a differences-in-differences analysis. The parallel trends assumption for actual hours worked is questionable. A reasonable explanation might be that pregnancies affect mothers work hours in the period before childbirth. The results on this outcome variable must be interpreted with caution.

Seminar Attendance

Figure 5.6 A: Seminar Attendance in the Small Sample

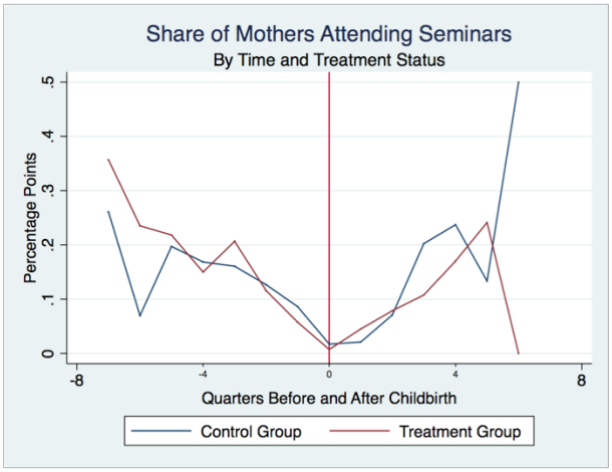
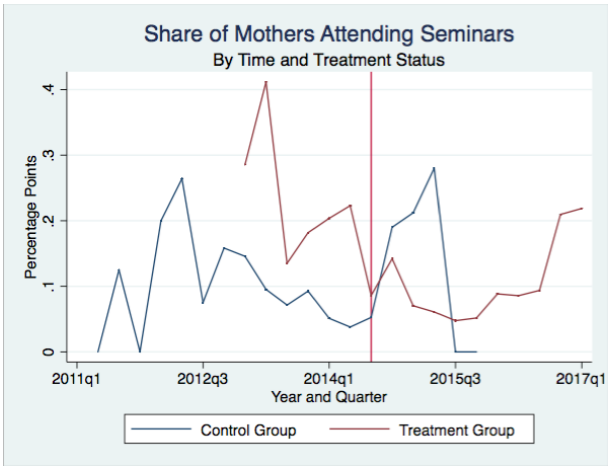


Figure 5.6 B: Seminar Attendance in the Extended Sample



The share of mothers attending seminars or classes share a similar trend ahead of the policy change. In the small sample (Figure 5.6 A), we see that the trends before giving birth are nearly identical, while there is a difference in the development afterwards. This is suitable for further analysis. As for the extended sample (Figure 5.6 B), the pre-treatment trends are quite similar, but not identical, and we proceed with caution when evaluating this effect.

Women Holding Leadership Positions

Figure 5.7 A: Leadership Positions in the Small Sample

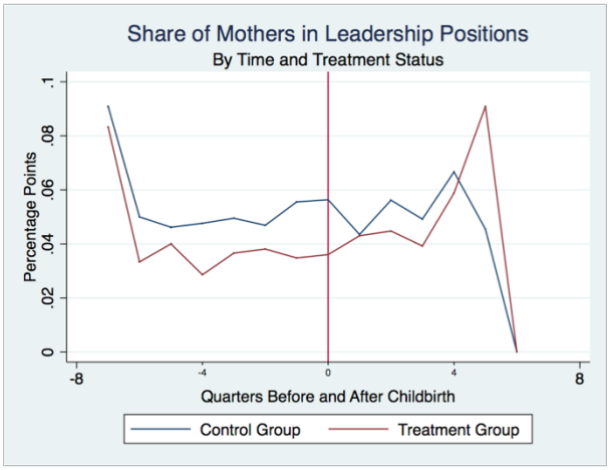
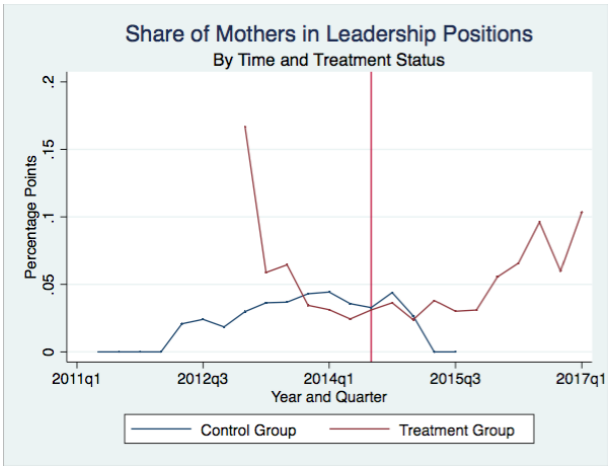


Figure 5.7 B: Leadership Positions in the Extended Sample



A very small share of women holds leadership positions. The small sample trends are satisfyingly parallel (figure 5.7 A), thus, we can analyze the effect on leadership positions using the small sample. Nevertheless, the treatment group consists of 3 leaders, while in the control group, 9 individuals hold leadership positions. The likelihood of significant results is small, and the sample is not large enough to draw inference from. In the extended sample

(figure 5.7 B), there are only 13 individuals who hold leadership positions in the treatment group, and 10 in the control group. For the extended sample, the trends are not parallel, making the variable unsuitable for a differences-in-differences analysis.

Parallel Trends Assumption in Sub-Groups

For the subgroup analysis to yield a causal interpretation, the key assumption of parallel trends must still hold (Angrist & Pischke, 2009). As mentioned, we use the extended sample for the heterogeneity analysis as this contains more observations. In the following paragraphs, we will present the variables within each sub-group which are eligible for a differences-in-differences analysis based on the parallel trends assumption. The plots of the trends are found in appendix 2, Figures A1-A5

Male Dominated Professions

In both groups, 14 percent of the sample work in male dominated professions. After reducing the sample to mothers in male dominated professions, the sample consists of 560 observations and 70 individuals. The employment rate and actual number of hours worked share similar trends for this sub-group, and will be analyzed further. The other variables either has dissimilar trends or too few observations to determine a trend.

Female Dominated Professions

48 percent of the mothers in the control group and 50 percent of the treatment group are employed in female dominated professions. Planned work hours, seminar attendance and employment rate share similar trends before the intervention and will be analyzed within the differences-in-differences framework.

Exogeneity of Treatment Status

Differences-in-differences analysis compares a treatment group which receives the treatment to a control group that is left untouched (Angrist & Pischke, 2014). An assumption for causal analyses is that individuals themselves cannot choose their treatment status. The reduction of the paternity quota is universal, meaning that all individuals who are eligible to receive parental benefits are affected by the change. Some individuals may prefer to be either in the treatment or control group. In the following sections, we argue that the policy change leaves few incentives to alter family planning decision and discuss whether it is feasible to choose treatment status for oneself.

There are some economic incentives to plan childbirth according to the policy change. The change in paternity quota is not a de facto reduction of the parental leave period. For the family as a whole, the leave period remains the same. Only the time allotted to the father is reduced, thus it is a change in a nudge, not in the parental leave itself. However, if the family prefers flexibility in the division of parental leave, they may have an incentive to delay conception to ensure that their child is born during the 10-week quota regime.

The reduction of the paternity quota was announced on September 30th, 2013. This is 273 days prior to the effectuation of the policy change. Pregnancies normally last 275 days, though this can vary (Norwegian Institute of Public Health, 2017). It therefore exists a slim theoretical and biological possibility to conceive a child immediately following the announcement and to give birth before the paternity quota was reduced. We find it unlikely that couples would be able to plan childbirth in order to stay within the 14-week quota regime. Therefore, we argue that the treatment status is exogenous.

Characteristics of the Treatment and Control Group

Treatment and control group should share similar characteristics for the analysis to yield the causal effect. The treatment and control group are similar in both personal and professional characteristics. The personal characteristics include being married/living in cohabitation, number of children, age, and education level, while the professional characteristics include industry and sector. Summary statistics for the treatment and control group aggregated over time is shown in Table 5.2.

During this period, the Norwegian economy experienced a downturn following the fall in oil prices. The unemployment rate increased along with job uncertainty for many. A study finds that the high school dropout rate decreases in economic down turns (Strøm & Reiling, 2015). The authors suggest that people experience the risk of standing outside the job market is larger in economic downturns. This leads to a higher experienced necessity to stay in school in order to be competitive in the job market. One can argue that the same fear of job uncertainty could have occurred for employed individuals after the fall in oil prices. Increased job uncertainty might incentivize people to be less away from work than they would in a normal situation, which might skew our results on labor participation. This phenomenon is difficult to rule out or establish, but should it in fact occur, this would invalidate the assumptions of similar characteristics in the treatment and control groups.

Table 5.2: Summary Statistics of Treatment and Control Group of the Extended Sample

	(1) Control	(2) Treatment	(3) Mean Difference	(4) T-Statistic
Age	30.59	30.59	0.00	0.03
Number of Children under 16 Years Old	1.77	1.67	0.1	3.36***
Age of Youngest Child	1.52	1.53	-0.02	-0.25
Married/Living in Cohabitation	0.94	0.94	0.00	0.57
Compulsory school	0.16	0.13	0.03	2.93**
Upper Secondary School	0.25	0.23	0.03	2.01*
Higher education	0.58	0.64	-0.06	-4.14***
Employment Status	0.69	0.68	0.02	1.19
Employed in the Public Sector	0.56	0.55	0.01	0.52
Male Dominated Profession	0.14	0.14	0.00	-0.35
Female Dominated Profession	0.48	0.5	-0.02	-1.19

Note: The table shows summary statistics for the treatment and control group (columns 1 and 2), and difference in means between the groups (column 3). T-statistics from a t-test for samples with unequal variances are listed in column 4. We use the Welch t-test as the samples are not equal in size, and thus have unequal variance (Keller, 2012). Wherever the group means are statistically different, asterisks annotate this according to the significance level. Source: (Statistics Norway, 2017b)
* p<0.05, ** p<0.01, *** p<0 .001

The control and treatment groups are quite similar, though with some exceptions. On average, the control group has more children than the treatment group. The treatment group has a slightly higher share of women with higher education. We control for these variables to improve the estimates, see section 7.4.

The average age of first time mothers has increased the over the last decade (Statistics Norway, u.d.). This might create significant dissimilarities between the treatment and control group that could invalidate the results. The T-statistics do however not show statistical differences in age between the groups.

The summary statistics presented are for the extended sample of the population. As the small sample is a sub-set of this sample, we only note that the characteristics, averages, and t-statistics are on the same level for this group. A printout of these characteristics can be found in appendix 1, Table A1.

6. Results

The following chapter describes the estimated effect of the reduction in paternity quota on women's labor participation. The outcome variables are employment rate, planned work hours, actual working hours, whether the interview object attended a seminar, or had a leadership position during the reference week. Further, we present how the estimates differ between gender dominated professions. If otherwise is not stated, all estimates are ceteris paribus. We control for personal characteristics, macroeconomic factors and seasonal variations in all regressions.

6.1 Effects on Mother's Labor Participation and Career Prospects

We find significant results for several of the outcome variables, indicating that the policy has had a negative impact on mothers' labor participation. The results for the small sample are printed in Table 6.1. For the extended sample, see Table 6.2.

Employment Rate

The regressions for the employment rate give ambiguous results. We find no significant effects from the regression on the small sample, indicating that there are no short-term effects of the policy. On the other hand, when using the extended sample, we find a reduction of 9.5 percentage points within a 95 percent confidence interval. The extended sample exhibit similar trends, but the estimates may suffer from a positive bias. The magnitude is uncertain, but the results suggest that the causal relationship is negative.

Actual Hours Worked

We find significant and negative effects of the reform on actual hours worked, using the small and the extended sample. Based on the small sample we estimate a reduction in hours worked of 9.1 hours weekly. For the extended sample, the estimate is a reduction of 21.1 hours weekly. The parallel trends for actual hours worked are questionable in the extended sample, and the result should therefore be interpreted with caution. A reduction of 21.1 hours compared to the pre-treatment average of 25.1 hours seems unreasonably large, and we are skeptical to the magnitude from this estimate alone. In the small sample, the trends are virtually parallel upon visual inspection. This indicates that our estimate of a reduction in hours worked of

approximately 9 hours per week is the unbiased causal effect. As the trends are negative in both cases, we claim that the policy change has influenced treated mothers to work at least nine hours less per week. Both estimates are significant within a 99.9 percent confidence interval.

Seminar Attendance

We see similar results for the dummy indicating seminar attendance in both models. The consistent negative trend indicates that a smaller share of mothers in the treatment group attended seminars during the interview week than the share of mothers in the control group. The estimates differ slightly in the two models. The estimates on the small sample show a decrease in 20.2 percentage points, while the estimates from the extended sample show a decrease in 25.5 percentage points. In the extended sample, the pre-treatment trends were not perfectly parallel, and the results from this regression must therefore be interpreted with caution. The small sample has virtually parallel trends, so the decline in seminar attendance on 20.2 percentage points is the unbiased causal effect. These estimates are significant within a 99.9 percent confidence interval.

Planned Work Hours and Leadership Positions

For the outcome variables planned work hours and leadership positions, the estimates are small and insignificant. We can therefore not determine if the policy change has had an effect on these outcome variables.

Table 6.1: Small Sample: Differences-in-Differences Regression Results with All Control Variables

	(1) Employment	(2) Actual Hours Worked	(3) Planned Work Hours	(4) Seminar Attendance	(5) Leadership position
Treated	0.0387	-2.219	1.911	0.0351	-0.0265
	(0.0496)	(2.248)	(1.368)	(0.0525)	(0.0409)
Post	0.172***	-12.47***	1.597	-0.0258	-0.0224
	(0.0443)	(1.974)	(1.220)	(0.0407)	(0.0319)
Treated × Post	-0.00762	-9.075***	0.723	-0.202***	0.0408
	(0.0539)	(2.555)	(1.338)	(0.0564)	(0.0332)
Constant	0.959***	72.57***	30.41***	0.233	-0.168+
	(0.140)	(6.347)	(5.869)	(0.149)	(0.0902)
N	1304	1303	1300	1301	1304
adj. R^2	0.04	0.154	0.123	0.055	0.019
Controls Included	Yes	Yes	Yes	Yes	Yes
Individuals	239	239	239	239	239

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Employment, seminar attendance and leadership position are dummy variables. Estimates on share of women employed, attending seminars and holding leadership positions are changes from the average level in percentage points, all else equal. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. The pre-treatment period refers to the quarters before the mother give birth, and the post-treatment period is the time after delivery. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter are included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

Table 6.2: Extended Sample: Differences-in-Differences Regression Results with All Control Variables

	(1) Employment	(2) Actual Hours Worked	(3) Planned Work Hours	(4) Seminar Attendance	(5) Leadership Position
Treated	0.00851	11.80***	-0.253	0.154***	-0.013
	(0.0329)	(1.682)	(1.135)	(0.0410)	(0.0259)
Post	0.0237	12.76***	-0.182	0.166***	-0.0121
	(0.0323)	(1.619)	(0.753)	(0.0309)	(0.0130)
Treated × Post	-0.0956*	-21.11***	0.247	-0.255***	0.0241
	(0.0390)	(2.081)	(1.027)	(0.0499)	(0.0215)
Constant	1.277***	30.35***	21.17***	-0.0383	-0.113
	(0.0794)	(6.079)	(6.336)	(0.111)	(0.0629)
N	2364	2363	2360	2360	2364
adj. R^2	0.022	0.117	0.108	0.038	0.01
Controls Included	Yes	Yes	Yes	Yes	Yes
Individuals	455	455	455	455	455

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Employment, seminar attendance and leadership position are dummy variables. Estimates on share of women employed, attending seminars and holding leadership positions are changes from the average level in percentage points, all else equal. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. The post-treatment period is defined as the time after July 1st, 2014. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

6.2 Heterogeneous Effects for Gender Dominated Professions

There are clear indicators that the Norwegian labor market is somewhat segregated between genders (Statistics Norway, 2017a). To assess whether there are heterogeneous effects, we have included a dummy for working in a gender dominated profession to the main model specification. The aim of this analysis is to compare the effects within male dominated professions to non- and female dominated professions, and vice versa for female dominated professions. The sub-group analysis is performed solely on the extended sample, due to sample size. We have only looked at outcomes where the control and treatment group shared similar trends prior to the policy change. The significant findings are discussed in the following section. Results are printed in table 6.3.

Table 6.3: Heterogeneous Results for Male and Female Dominated Professions in the Extended Sample

	Male Dominated Professions		**Female Dominated Professions**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Employment	**Actual Hours Worked**	**Employment**	**Planned Work Hours**	**Seminar Attendance**
Treated × Post × Gender Dominated Profession	-0.276**	-28.84***	-0.0272	0.338	-0.260***
	(0.0847)	(5.475)	(0.0527)	(1.485)	(0.0693)
Constant	1.278***	33.92***	1.285***	21.99***	-0.0412
	(0.0742)	(6.420)	(0.0735)	(6.392)	(0.0892)
N	2622	2621	2622	2618	2618
Adjusted R^2	0.025	0.113	0.028	0.116	0.035
Personal Characteristics	Yes	Yes	Yes	Yes	Yes
Industry of Employment	No	No	No	No	No
Individuals	503	503	503	503	503

Note: Sub-group and outcome variable are indicated in the column header. Standard errors in parentheses. The post-treatment period is defined as the time after July 1st, 2014. The estimates show if the effect of reducing the paternity quota is stronger within male dominated professions (columns 1 and 2) and female dominated professions (columns 3, 4 and 5) than in other professions. Employment and seminar attendance are dummy variables. Estimates on share of women employed and attending seminars are changes from the average level in percentage points, all else equal. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
$^{+}$ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Employment Rate

The effect of the policy change is significantly stronger in male dominated occupations than in female dominated and non-dominated professions. The estimated employment rate of mothers in male dominated occupations are 27.6 percentage points lower, on a 99 percent significance level. We therefore infer that mothers in male dominated occupations are even less likely to be employed after the reduction in the paternity quota.

Actual Hours Worked

The analysis of mothers working in male dominated occupations reveals a large and significant reduction in actual hours worked compared to the control group. The estimation finds a reduction of 28.8 working hours, at 99.9 percent confidence. This estimate is large in magnitude. Nevertheless, the result is robust as the parallel trends assumption is fulfilled. This gives an indication that mothers working in male dominated occupations work considerably less than mothers not treated by the policy change. We find no significant results in female dominated professions.

Seminar Attendance

Seminar attendance is reduced by 26 percentage points in female dominated occupations. This estimate is significant at 99.9 percent confidence level. This indicates that treated mothers self-educate less in female dominated occupations, compared to other occupations. In male dominated professions we find no significant results. This may be due to sample size.

7. Sensitivity Analysis

We perform several robustness tests. This section presents the results from four different types of tests on the both the small and the extended sample. First, we remove outliers from the numerical outcome variables and run the regression model without these. Second, we remove observations from the secondary industry to see if the oil price drop drives the results. Third, we discuss a set of placebo tests. Last, we compare the results from the regression model with and without covariates. At the end of this chapter, we summarize the results of the robustness checks.

7.1 Removing Outliers

For the variables containing actual and planned work hours, we remove the top and bottom percentile and run the regression model without these, both on the small and the extended sample. If removing outliers yields the same results as the original model, we can assume that extreme observations do not drive the results.

We compare the results from the two main models with the models without the highest and lowest percentile. We find no large changes in the results, and the significance level is equal for all outcome variables. The estimates for the small model deviates with 0.6 hours for actual work hours, from 9.675 (standard error 2.539) to 9.075 (2.555). This is a change of 6 percent. In the extended model, the significant estimates for actual hours worked deviates with 0.06 hours, from 20.00 (standard error 1.890) to 20.06 (1.825). This corresponds to a 0.3 percent change from the main model. The estimates are not significantly different from each other in either sample. For planned work hours, the estimates are still insignificant and approximately the same as for the models with the original specification. We can conclude that the results are not likely to be driven by outliers. The regression output is found in appendix 1, Table A2 and Table A3.

7.2 Removing the Secondary Industry

We exclude individuals working in the secondary industry and run the regressions on in the small and extended sample to check if the results might be driven by the downturn caused by the fall in oil prices. We find significant results on the same outcomes as the main

specification. The coefficients are similar in magnitude, and are not statistically different from the original regression. We therefore infer that changes in the secondary industry does not considerably drive our results. The regression output is found in appendix 1, Table A4 and A5.

7.3 Placebo Tests

Placebo tests are common to test whether the effect estimated by the differences-in-differences is in fact due to the treatment (Gertler & Martinez, 2010). If the placebo tests yield significant results, the estimates may not be the causal effect, but spurious results due to how the treatment and control group is defined. Significant results from placebo tests are an indication that the parallel trends assumption is violated. In the following sections, we discuss two different types of placebo tests: using a placebo time of treatment and using a placebo outcome variable.

7.3.1 Using a Placebo Time of Treatment

For policy analysis, using a placebo time of the treatment on the same sample would be an obvious choice of robustness check. Such a test would not be feasible in our empirical model for two reasons. First, the data set is a rolling panel, where one eighth is replaced every quarter. To perform this robustness check, it would be necessary to change the sample, thus we would not examine the same individuals. Secondly, the paternity quota has been subject to a set of substantial changes the resent years (NOU 2017: 6, 2017). The number of allocated weeks to the father was expanded in 2009, 2011, 2013 before the reduction in 2014. Placing the treatment time at another date would not reveal a placebo treatment, but rather the effect of another policy.

7.3.2 Using a Placebo Outcome Variable

To test the assumption that the treatment is the cause of the changes in the outcome variables, we run the model on a variable that we assume to be unaffected by the policy change (Gertler & Martinez, 2010).

We use a dummy variable indicating whether the individual lives in a municipality where the main industry is either primary, secondary or tertiary. We deem it unlikely that reducing the paternity quota would have had an effect on the share of women living in different types of

municipalities. Therefore, the treatment and the placebo outcome variable should be uncorrelated. This may not be a perfect placebo outcome variable, but it is the variable that we consider to be least affected by the policy within our data set. The resulting differences-in-differences estimator should be zero. If the estimate is different from zero, this indicates a problem with the specification of the model. The results of this estimation are printed in Table 7.1.

For the small sample, we find significant effect on the share of mothers living in the municipalities dominated by tertiary industries. This may indicate that there are some unobserved differences between the control and treatment group in the small sample. However, there is no effect on the share of women living in other types of municipalities, so we do not consider this result to be grave.

When we estimate the effect of the policy on municipality of residency for the extended sample, we find a small, insignificant effect. This implies that the model is not biased by the definition of the treatment and control group, and strengthens the validity of our results.

Table 7.1: Differences-in-Differences Estimates with Placebo Outcome Variable

	Small Sample			**Extended Sample**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	Primary Sector Municipality	**Secondary Sector Municipality**	**Tertiary Sector Municipality**	**Primary Sector Municipality**	**Secondary Sector Municipality**	**Tertiary Sector Municipality**
Treated × Post	0,0345 (0.0324)	0,0902 (0.0647)	-0.126* (0.0567)	0,00947 (0.0199)	-0,00466 (0.0435)	-0,00461 (0.0403)
Constant	-0,109 (0.155)	1.195*** (0.270)	-0,0987 (0.231)	-0,0524 (0.104)	0.863*** (0.188)	0,113 (0.158)
N	1304	1304	1304	2951	2951	2951
Adj. R^2	0,005	0,009	0,013	0,004	0,007	0,002
Number of Individuals	239	239	239	466	466	466
Controls Included	Yes	Yes	Yes	Yes	Yes	Yes

Note: Sample and outcome variables are indicated in the column titles. Standard errors in parentheses. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Estimates are unit changes from the average outcome, all else equal. For the small sample, the pre-treatment period refers to the quarters before the mother give birth, and the post-treatment period is the time after delivery. For the extended sample, the post-treatment period is defined as the time after July 1st, 2014. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

7.4 Controlling for Covariates

This section investigates how controlling for different covariates alters the results. Including control variables aims to capture how characteristics of individuals and industry of employment affects the sample. For instance, including industries of employment may account for some of the macroeconomic effects of the downturn following the oil price drop.

Time dummies are necessary controls for the model, and are always included. We estimate the model from Equation 4.1, and compare the baseline results of including only time dummies, including personal characteristics, including industry of occupation, and including both. The regression results from these comparisons are found in Table 7.2 and 7.3, for the small and extended sample respectively. The baseline estimates are shown in column (1), and estimates with different controls in columns (2) through (4).

For the extended sample, the estimate for employment status is smaller in magnitude when controlling for both personal characteristics and industry of occupation. This is driven by the effect of including personal characteristics, as the effect controlling for only industry is larger than the baseline estimates. The estimate is insignificant when including only personal characteristics as controls. The significance level falls from 99 percent to 95 percent when controlling for both characteristics and industry of occupation. The effect on employment rate in the small sample is insignificant. This is true for all compositions of control variables.

For actual hours worked, the estimate varies very little when controlling for covariates. None of these differences are statistically significant for either sample.

The estimate on seminar attendance is statistically different from the baseline estimate when including only industry of occupation and both set of covariates as controls. This is true for both samples. A plausible explanation for this is that the oil price drop affected industries differently.

The baseline estimates for planned work hours and leadership positions are not significantly different from zero, and including covariates does not leads to significant results. Planned work hours changes sign when controlling for different covariates, but these differences are not statistically significant, nor is the estimate itself.

Table 7.2: Comparison of Estimates Controlling for Different Covariates in the Small Sample

	(1) Time	(2) Time and Personal Characteristics	(3) Time and Industry of Occupation	(4) All Controls
Employment				
Treated × Post	0.0157	0.0318	0.0127	-0.00762
	(0.0556)	(0.0645)	(0.0443)	(0.0539)
Constant	0.418***	-0.222	0.746***	0.959***
	(0.108)	(0.234)	(0.0624)	(0.140)
Actual Hours Worked				
Treated × Post	-10.60***	-9.511***	-10.31***	-9.075***
	(2.139)	(2.440)	(2.239)	(2.555)
Constant	41.23***	71.32***	41.86***	72.57***
	(3.593)	(6.109)	(3.662)	(6.347)
Planned Work Hours				
Treated × Post	0.294	0.263	0.627	0.723
	(1.200)	(1.326)	(1.187)	(1.338)
Constant	28.90***	29.99***	28.43***	30.41***
	(2.789)	(5.883)	(2.781)	(5.869)
Seminar Attendance				
Treated × Post	-0.161***	-0.152**	-0.214***	-0.202***
	(0.0416)	(0.0493)	(0.0479)	(0.0564)
Constant	0.256***	0.332*	0.297***	0.233
	(0.0611)	(0.160)	(0.0797)	(0.149)
Leadership Positions				
Treated × Post	-0.00761	0.042	-0.00286	0.0408
	(0.0267)	(0.0389)	(0.0213)	(0.0332)
Constant	-0.00686	-0.154	-0.0156	-0.168+
	(0.0425)	(0.0954)	(0.0372)	(0.0902)

Note: The estimates are from a differences-in-differences regression including different sets of control variables. The column titles indicate what control variables are included in the regression. Outcome variables are marked in bold in the left column. The pre-treatment period refers to the quarters before the mother give birth, and the post-treatment period is the time after delivery. All estimates include controls for year and quarter. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009).

$^{+}$ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7.3: Comparison of Estimates Controlling for Different Covariates in the Extended Sample

	(1) Time	(2) Time and Personal Characteristics	(3) Time and Industry of Occupation	(4) All Controls
Employment				
Treated × Post	-0.114**	-0.0758	-0.131***	-0.0956*
	(0.0412)	(0.0465)	(0.0341)	(0.0390)
Constant	1.004***	0.430*	1.034***	1.277***
	(0.0618)	(0.173)	(0.0230)	(0.0794)
Actual Hours Worked				
Treated × Post	-20.41***	-22.07***	-20.01***	-21.11***
	(1.838)	(2.075)	(1.891)	(2.081)
Constant	29.38***	34.21***	28.02***	30.35***
	(4.565)	(6.406)	(4.706)	(6.079)
Planned Work Hours				
Treated × Post	-0.288	0.0620	-0.326	0.0174
	(0.963)	(1.013)	(0.964)	(1.027)
Constant	36.86***	21.43***	36.74***	21.17***
	(1.634)	(6.296)	(1.853)	(6.336)
Seminar Attendance				
Treated × Post	-0.213***	-0.219***	-0.260***	-0.255***
	(0.0351)	(0.0436)	(0.0405)	(0.0499)
Constant	0.0983	0.0894	0.112	-0.0383
	(0.0573)	(0.110)	(0.0742)	(0.111)
Leadership Positions				
Treated × Post	0.00494	0.0251	0.000731	0.0241
	(0.0225)	(0.0218)	(0.0212)	(0.0215)
Constant	-0.00515	-0.125	-0.00473	-0.113
	(0.00765)	(0.0660)	(0.0135)	(0.0629)

Note: The estimates are from a differences-in-differences regression including different sets of control variables. The column titles indicate what control variables are included in the regression. Outcome variables are marked in bold in the left column. The post-treatment period is defined as the time after July 1st, 2014All estimates include controls for year and quarter. The outcome variables are annotated in bold in the far-left column. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009).

$^{+}p < .1$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

7.5 Remarks on the Robustness of the Analysis

The sensitivity analysis reveals that removing outliers does not significantly alter the results, neither does removing the secondary industry. This suggests that the analysis is robust to extreme observations and sector-specific abnormalities.

Using placebo outcome variables on the extended sample does not yield significant results. We do however find one effect for the placebo outcome variable in the small sample. This suggests that there are differences between the control and treatment group that we are unable to control for, and that are not negligible.

Changing the composition of control variables does not considerably alter the results, indicating that the chosen control variables improves the model.

To a large extent, the robustness tests strengthens the validity of our results.

8. Limitations

In this chapter, we discuss limitations to the data set and estimation strategy that could threaten the validity of the results in this thesis.

8.1 Limitations to the Data Set

Certain aspects of the Labor Force Survey pose a challenge for the chosen empirical strategy. This section will describe the obstacles that follow from the design of the questionnaire, the panel's time range, and the survey's attrition.

First, the design of the questionnaire, combined with the timing of the policy change, complicates the process of correctly identifying the treatment status of all respondents in the small sample. By identifying whether the child was born before or after July 1st, 2015, we can correctly assign them to the treatment or control group. The child's date of birth is only registered by year, resulting in many observations that cannot be assigned to either treatment or control group. This limits the sample size substantially, to 128 individuals in the treatment group and 174 in the control group (see section 5.2.5). Due to the small sample size, we find less precise results, and are unable to analyze heterogeneity in this sample.

To analyze medium-term effects and heterogeneity we utilize an extended sample, adding all mothers of children born in 2013 to the control and all mothers of children born in 2015 to the treatment group. This is not ideal, as it limits the possibilities to ensure that the model compares two similar groups. Particularly the fact that the treatment group will include both pregnant women and new mothers poses a problem for the estimation. In addition, the increased time range allows for more possible disturbance.

Further, to actually be treated by the policy change, the mother must have shared the parental leave period with the father of the child. Households where only the mother is eligible for parental leave will not be affected by the policy change. The data do not inform about the eligibility within each family. Consequently, we are unable to estimate the treatment-on-the-treated effect.

The Labor Force Survey lacks information about the parental status of men. While the data allow us to investigate the direct effect on women's labor market outcomes, we are unable to

compare men and women. A comparison of labor participation and opportunities between the genders is necessary to evaluate how reducing the paternity quota has affected gender equality in a broader sense, which was the original purpose of introducing the paternity quota.

The short range of time each individual is followed complicates the analysis of long-term effects. Analysis of characteristics that seldom change, such as job description, suffer from lack of variation. Data for a longer range of time could reveal important results on for instance women in leadership positions.

As described in section 5.2.8, there are some significant differences between the characteristics of the control and treatment group. We can control for these variables, therefore this in itself is not a problem. However, it may indicate that there are unobservable differences between the groups that could bias the results.

Finally, as in many surveys, attrition weakens the estimations. A 14.4 percent attrition is however not grave in this dataset. There exist no indications that attrition bias the sample in any direction.

8.2 External Factors Challenging the Model Assumptions

There are some limitations both concerning the assumptions of the model and the model itself, both are discussed in the following sections.

8.2.1 Discussion of the Parallel Trends Assumption

Differences-in-differences relies on the assumption that the only difference between the control and treatment group is exposure to the treatment. This is visible through the parallel trends assumption. Most of the analyzed variables have practically identical trends and it is evident that this assumption holds. For actual hours worked and seminar attendance in the extended sample, this is less clear. For these outcomes, the resulting estimates may not in fact yield the causal effect of the treatment, and the estimates could be biased.

8.2.2 The Timing of the Policy Announcement

We can say with absolute certainty that children in the control group were born exogenously to the policy. The government announced the reduction in September 30th, 2013, and

implemented in July 1st, 2014, exactly nine months later. Birth statistics show that there are no considerable deviations in birth numbers of June and July of 2014, looking at the years from 2011 to 2016 (Statistics Norway, u.d.). We therefore presume that the children in the treatment group were not planned as a consequence of the reduction in paternity quota.

8.2.3 Exogenous Factors Affecting the Outcomes

For the model to hold, we must assume that no other external factors influenced the explained variables. In the time range of our data, several policy changes and macroeconomic shocks occurred. This section discusses the possible interference exogenous factors might have on the model assumptions.

Cash-for-Care and Day-Care

In 2014, the same year as the paternity quota was reduced, the government expanded the cash-for-care scheme, a monthly disbursement to parents of one year olds without a day-care spot (NOU 2017: 6, 2017). The monthly amount was increased with 20 percent, from 5,000 NOK to 6,000 NOK, making postponing the return to work more attractive than before. The change in the cash-for-care scheme is however not a problem as the total sample of both treatment and control group are affected equally.

Further, as mentioned, day-care have undoubtedly been important for parents' liberty to return to work after parental leave. A change in the day-care enrollment in August 2014 excluded children born after August 31st from the yearly enrollment, creating difficulties for many parents. Many expected an increase in families exploiting the cash-for-care scheme (Ruud, 2014). Regardless, the number of parents receiving cash-for-care did not increase considerably, thus this reform should not interfere with our analysis (NAV, 2016a).

Petroleum Price Drop

As previously discussed, the effect of control variables indicate that other macroeconomic shocks could have affected the outcome variables in this thesis. It is reasonable to expect that business cycles would hit employees equally, regardless of parental status. The results in this thesis suggest that the parents of small children might be more vulnerable than other employees. Both control and treatment group do however have small children, therefore the differences in outcomes should be minor.

Further, parents on leave have job protection until three years after childbirth, and parental status is legally required to be a neutral factor in both downsizing and hiring processes. However, parental status could still impact decision makers, directly or indirectly, disfavoring mothers of toddlers.

By including dummies for time and industry of occupation, we have attempted to account for macroeconomic shocks. Including the secondary industry as a control variable increases the significance level of the estimates for employment rate from 95 percent to 99.9 percent, which tells us that the industry explains some part of the employment rate. We cannot ascribe the total effect on the employment rate to the policy change alone. In addition, and we cannot conclude that the shocks have not affected the explained variables through other channels.

8.2.4 Uneven Exposure to Paternity Quota in the The Control Group

The control group consists of mothers of children born between January 1st, 2013, and July 1st, 2014. The length of the paternity quota was subject to an expansionary change mid-2013, from 12 to 14 weeks. Consequently, not all individuals in the extended control group were subject to the same regulations. We investigate the effect of a reduction of the quota to 10 weeks. It is therefore justifiable to include mothers with unequal exposure to the policy, as they were all exposed to a paternity quota larger than the treatment. Nevertheless, it is a weakness that may not be negligible.

8.2.5 Spillover and Peer Effects

The dataset could also suffer from spillover or peer effects. One could imagine that employers' and society's expectations of the treated group could transfer to all women trough for example corporate culture, including those in the control group. Dahl, Løken and Mogstad (2014) find that men are more likely to take up leave when their peers do. Changes in mothers' work behavior may also influence their peers and female coworkers. Both of these phenomena would result in the treatment affecting both the control and treatment group, challenging the fit of the differences-in-differences model. Due to the time specifications in the extended model, it is not possible to ensure that the behavior in the control group is exogenous to the policy change. If both groups were in fact treated, this would manifest in movement in both trends, making the true effect impossible to estimate with our model. Regardless, the estimated

effect revealed in this thesis suggests a negative impact. The existence of spillover effects only indicates that the effect is stronger than estimated, and will not invalidate the main findings.

8.3 Critisism of the Differences-in-Differences Model

While differences-in-differences is a popular approach to estimating policy effects, the method itself has been subject to criticism (Bertrand, Duflo, & Mullainathan, 2004). Bertrand *et al.* (2004) demonstrates that the prevalence of serial correlation in panel data over time results in inconsistent standard errors and a wrongful interpretation of the significance level of the estimates. As our data is individual-level data over two years, this issue is certainly present in our data set. To avoid this issue, all estimations in this thesis are done using standard errors clustered on individuals. This mitigates the problem, but there may still be problems concerning serial correlation.

9. Discussion

In this chapter, we discuss potential explanations of the results and compare our findings to previous research.

9.1 If the Goal is to Increase Gender Equality, Reducing the Paternity Quota is Counterproductive

The Male Gender Role Panel first proposed the paternity quota as an instrument to reach gender equality in the workplace and at home (NOU 1991:3, 1991). Improving women's professional position is a means towards this goal. This thesis uses a set of parameters to measure the effect of the reduction of the paternity quota on mother's position in the workplace. Our analysis finds that reducing the paternity quota led to lower work participation, both in employment rate and in hours worked. We also find a decline in firm's investment in mothers, measured by paid seminar attendance. Our results indicate that reducing the paternity quota has worked against the purpose of reinforcing women's professional position. The available data has not permitted evaluating the effects on men, thus we cannot draw conclusions about gender equality overall.

One of the common mistakes that hinder policies from making lasting changes in corporate culture and societal structures is that decision makers declare victory too soon (Kotter, 1995). If the current policy has not successfully changed social norms and shared values, the transformation effort is likely to fail. The results from our analysis may support the idea that it takes a long time to change gender role patterns. This may be particularly prominent in gender dominated professions. If politicians still believe in the original purpose of the paternity quota, one can conclude that they have declared victory too soon.

9.2 Reducing the Paternity Quota Affects Women's Professional Life

The literature on the reduction of a paternity quota is limited, hence the possibilities to compare our results with previous research are scant. On the other hand, many have investigated the effects of both the introduction and expansion of the paternity quota. Our

research reveals that some of these effects are prevalent with the opposite sign after the latest policy change.

9.2.1 The Quota Has Impacted Families Allocation of Time

Mothers' Have Longer Spells of Absence

Rønsen & Kitterød (2014) found that mothers spent increasingly less time at home before returning to the labor market after the quota was introduced, comparing data from 2010 to 1990 and 1980. Our result on the employment level suggests that the opposite occurred after the reduction of paternity quota. Medium-term results indicate that mothers abstain from work after giving birth to a larger degree than before the policy change. The trend identified by Rønsen and Kitterød (2014) therefore seems to be reversed.

The motivation behind mothers' change in time allocation would give valuable insights for future policies. As parents have a statutory right to maintain their job after parental leave, it is unlikely that the reduced labor participation is a result of decisions made by the employer. A plausible explanation may be that the effect on employment rate is a result of voluntary absence. If this is the case, the paternity quota is a strong policy instrument which severely impacts family behavior.

Mothers Spend Less Time Working

Since the introduction of the paternity quota in 1993, mothers have spent increasingly more hours working, and the negative impact toddlers have on career opportunities is reduced (Rønsen & Kitterød, 2014). Our estimates show that this trend is reversed after the policy change. Treated mothers work considerably fewer hours when they return to work after childbirth. This change in behavior could be explained by a study done by Lyng & Halrynjo (2010). They found that long absence from work during parental leave periods often make mothers the primary caregiver, i.e. an irreplaceable person who often will be the first string to stay at home with sick children. It is not unlikely that the phenomenon where treated mothers participate less in the labor market is a result of a strengthened position as primary caregiver.

Professional Mothers Are Less Invested in by the Employer

We find a significant decrease in the parameter describing attendance at seminars during work hours. This could signal that treated mothers to a lesser extent are prospected as valuable future assets for the company, and hence are given fewer opportunities to self-educate. As mentioned,

mothers often fall behind in the wage and career development compared to other coworkers at their tier (Lyng & Halrynjo, 2010). This may be because their long absence makes them replaceable at work, so they are given fewer opportunities to flourish. The result from this thesis supports the theory of Lyng and Halrynjo (2010), and could indicate an increasing gap between family and career-oriented women.

Traditional Family Patterns May be Strengthened

Nepomnyaschy & Waldfogel (2007) found that men who spend time with their children during their first year maintain this habit when their children grow up. Comparing statistics from 2014 and 2015 reveals that the average length of paternity leave decreased with 4 percent after the policy change (NAV, 2016b). Simultaneously, we find that treated mothers allocate less of their time towards the workplace, and presumably more time towards the family and home. This, in concert with the results of Nepomnyaschy and Waldfogel (2007), indicates that the division of labor in the household is more traditional in families affected by the quota reduction. This might be due to cementing of family roles in the children's early years.

The Quota Has Changed the Degree of Substitutability Within a Household

The results of our analysis point towards an asymmetric pattern of substitutability within a family. The mother and the father are both to some extent substitutable either at home or at work. This can be displayed through two trends. First, introducing the paternity quota led affected fathers to be more present at home, but also to fall behind their peers in terms of wage development (Rønsen & Kitterød, 2014; Rege & Solli, 2013). Secondly, we also know that women's position in the workplace has improved over the last couple of decades, which may be partly due to the paternity quota (Rønsen & Kitterød, 2012). In other words, it seems that both mother and father are set back career-wise if they take long leaves of absence, and that the division of household work is more equal if the parental leave is more evenly split. This, however, will in turn mean that both parents are more substitutable at work, as colleagues without children will seem less likely to be absent due to family matters.

Our results indicate that the reduction of paternity quota has reduced mothers' participation in the work place. The patterns of substitutability might therefore be changed. To increase gender equality, policy makers should aim to even out the level of substitutability between male and female coworkers in the workplace. Today, there is not an even playing field between the genders when climbing the career ladder. If a father and a mother are equally likely to stay at

home with sick children or leave work early to pick up children at day-care, then the professional playing field might be leveled out.

9.2.2 Introducing and Reducing the Quota Yields Asymmetric Outcomes

Cools *et al.* (2015) did a study quite similar to ours. They studied the effect of introducing the paternity quota in Norway using a differences-in-differences approach on both parents' labor supply and income level. However, they used a limited sample of new parents, which is comparable to our small sample selection. While Cools *et al.* (2015) found insignificant results, we find effects on labor market outcomes for our extended sample, and fewer and weaker effects for our smaller sample.

The asymmetric impact the policy changes had on families could explain why find we find significant results, while Cools *et al*. (2015) did not. Statistics Norway (2017c) states that it was a significantly smaller number taking the quota of four weeks in 1993 than 10 years later. One can assume that the effect on society of introducing the quota would be smaller than the reduction. This is because the nudging effect on families' behavior simply may be more effective if a larger share of families is affected. We also know that fathers are more likely to take up leave if their peers do (Dahl, Løken, & Mogstad, 2014), so it is likely that peer effects are part of the explanation. The difference in number of fathers who responded to the policy change may contribute to explain the difference in results between Cools *et al.* (2015), and our study.

We Expect Sticky Adaptation Within Families

Several economic studies find that the implementation and removal of a policy measure may not have effects of the same magnitude (Harris & López-Valcárcel, 2007; Mocan & Bali, 2010). The paternity quota aims to alter family patterns and work place dynamics. Both family structures and corporate culture may be comparable to a rubber band when lasting changes has not been achieved. Trying to alter it by stretching it out requires effort, but removing the tension leads it to revert to its original form. The paternity quota may not yet have succeeded in changing corporate culture and reinforce women's position in the workplace. If so, reducing the quota would be like removing the tension of the rubber band, and the corporate culture would move back to its previous form.

9.3 Suggestions for Further Research

We propose the following areas for further investigation.

A long-run analysis of whether the level of paternity leave determines if one parent emerges as the primary caregiver would provide valuable insights into family dynamics and its effect on labor market outcomes for the entire household. It would also be interesting to further investigate the underlying reasons for the differences of the policy change in female and male dominated professions.

A considerable weakness of the data used in this thesis is the lack of information on men and their parental status. Therefore, using registry data to perform similar analyses to ours, on both men and women would give valuable insights on at least three topics. First, one could assess the employment outcomes of both mothers and fathers. We find that mothers work less after reducing the quota. To truly assess the gender equality effects, one needs to establish not only that one party changes behavior, but also whether the genders move in opposite directions. Second, to establish the equality effects of the paternity quota, it is useful to determine how wage and career development was affected for either gender. Analyzing long-term effects on families would also give valuable insights to this end. Third, estimating the magnitude of effects that the policy change has on society provides useful information for policy makers. It is particularly interesting to estimate the economic consequences of the reduced labor participation of mothers.

10. **Conclusion**

This thesis aims to answer the following research question:

How did the reduction of the paternity quota from 14 to 10 weeks in 2014 affect mothers' labor market outcomes in the short- and medium-term?

We find evidence indicating that the policy change has had a negative or inconclusive impact on several labor market outcomes for mothers. This indicates that the reduction in the paternity quota works in opposite direction of the quota's purpose – empowering women in the workplace. We argue that the paternity quota is still necessary if we want women to be able to "have it all".

To analyze the short- and medium-term effects on five outcome variables, we utilize data from the Norwegian Labor Force Survey. The outcomes are employment rate, planned and actual work hours, ratio of mothers attending seminars while working, and share of women holding leadership positions. These variables measure labor force participation and constitute proxies for career prospects. The outcomes are analyzed using a differences-in-differences model. We use mothers who gave birth after the quota was reduced as treatment group, and mothers who gave birth before the policy change as control group.

The analysis finds that the effect of reducing the paternity quota was a reduction of 9.1 hours and 21.1 hours worked per week in the short-term and medium-term, respectively. In the medium-term, the share of women employed decreases by 9.5 percentage points. In other words, mother's labor participation decreases as a consequence of the quota reduction. Further, we find that women are 20.2 percentage points less likely to attend seminars while working in the short-term and 25.5 percentage points less in the medium-term. This indicates that treated mothers are either less career oriented or to a smaller degree prospected as valuable assets for the employer, or a combination of both. While they are feasible, they indicate an unreasonably large change in mother's time allocation. They should therefore be interpreted with caution. Nevertheless, the trend is clear for all significant estimates. We find no significant effect on the share of women holding leadership positions and the number of planned work hours.

Previous research find that the introduction of the paternity quota has had a positive or insignificant effect on women's labor market outcomes. Our findings suggest that the paternity

quota affects labor market outcomes also when it is reduced. The negative or insignificant effects we find are symmetrical to previous results. In other words, women's position in the workplace has taken a hit.

The research on the effects of reducing the paternity quota is scant. Therefore, our findings contribute by uncovering several effects that, to our knowledge, has not been investigated earlier.

As this thesis is being written, the Norwegian National Assembly has instructed the government to increase the paternity leave policy. A return to a 14-week quota is expected during 2018. Our results provide an argument in favor of maintaining and increasing the paternity quota to promote gender equality. Historically, the parental benefit scheme has been subject to frequent changes, all of which largely impacts parents' decisions to allocate time between home and work. Our findings could be used as foundation for policy makers to design effective schemes, both for parental benefits, and other policies that aim to promote gender equality by increasing mothers' work participation. To this aim, further research into the underlying mechanisms behind the dramatic change in mother's behavior is needed.

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Appendix 1: Tables

Table A1: Summary Statistics of Treatment and Control Group in the Small Sample

	Control	Treatment	Mean Difference	T-statistic
Age	30.73	30.92	-0.19	-0.89
Number of Children Under 16 Years Old	1.70	1.62	0.08	2.05
Age of Youngest Child	1.57	1.63	-0.06	-0.65
Married/Living in Cohabitation	0.94	0.93	0.01	1.19
Compulsory School	0.15	0.14	0.01	0.54
Upper Secondary School	0.26	0.22	0.04	2.12
Higher Education	0.59	0.63	-0.05	-2.34
Employment Status	0.69	0.67	0.02	1.10
Employed in the Public Sector	0.54	0.56	-0.02	-0.70
Male Dominated Profession	0.13	0.17	-0.05	-2.67
Female Dominated Profession	0.46	0.49	-0.03	-1.22

Note: The table shows summary statistics for the treatment and control group (columns 1 and 2), and difference in means between the groups (column 3). T-statistics from a t-test for samples with unequal variances are listed in column 4. We use the Welch t-test as the samples are not equal in size, and thus have unequal variance (Keller, 2012). Wherever the group means are statistically different, asterisks annotate this according to the significance level. Source: (Statistics Norway, 2017b)
* $p<0.05$, ** $p<0.01$, *** $p<0$ .001

Table A2: Differences-in-Difference Regression Results Without Top and Bottom Percentiles for the Small Sample

	(1) Actual Hours Worked	(2) Planned Work Hours
Treated	0,517	0,98
	(1.330)	(0.985)
Post	-10.17***	0,744
	(1.250)	(0.661)
Treated × Post	-3.497*	-0,355
	(1.716)	(0.923)
Constant	19.62***	33.20***
	(0.945)	(0.670)
N	1811	1791
adj. R^2	0,117	0,002
Individuals	266	265
Controls Included	Yes	Yes

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Top and bottom percentiles of observations are removed. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. The pre-treatment period refers to the quarters before the mother give birth, and the post-treatment period is the time after delivery. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter are included.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

Table A3: Differences-in-Difference Regression Results Without Top and Bottom Percentiles for the Extended Sample

	(1) Actual Hours Worked	(2) Planned Work Hours
Treated	10.45***	0.736
	(1.249)	(0.865)
Post	4.424***	0.476
	(1.274)	(0.631)
Treated × Post	-16.69***	-0.926
	(1.747)	(0.925)
Constant	14.28***	33.53***
	(0.557)	(0.498)
N	3241	3209
adj. R^2	0.046	-0.000
Number of Individuals	514	513
Controls Included	Yes	Yes

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Top and bottom percentiles of observations are excluded. Estimates are unit changes from the average outcome, all else equal. The post-treatment period is defined as the time after July 1st, 2014. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

Table A4: Differences-in-Differences Regression Results Without the Secondary Industry in the Small Sample

	(1) Employment	(2) Actual Hours Worked	(3) Planned Work Hours	(4) Seminar Attendance	(5) Leadership Position
Treated	0.0244	-3.196	1.930	0.0465	-0.0294
	(0.0495)	(2.323)	(1.430)	(0.0546)	(0.0444)
Post	0.161***	-13.27***	1.484	-0.0215	-0.0247
	(0.0448)	(2.058)	(1.256)	(0.0425)	(0.0342)
Treated × Post	0.00386	-8.743**	0.959	-0.220***	0.0432
	(0.0537)	(2.682)	(1.397)	(0.0587)	(0.0356)
Constant	0.931***	74.11***	30.49***	0.220	-0.167
	(0.143)	(6.465)	(6.082)	(0.150)	(0.0917)
N	1213	1212	1209	1210	1213
adj. R^2	0.038	0.160	0.132	0.057	0.018
Individuals	222	222	222	222	222
Controls Included	Yes	Yes	Yes	Yes	Yes

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. Observations of individuals employed in the secondary industry is excluded. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Employment, seminar attendance and leadership position are dummy variables. Estimates on share of women employed, attending seminars and holding leadership positions are changes from the average level in percentage points, all else equal. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. The post-treatment period is defined as the time after July 1st, 2014. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

Table A5: Differences-in-Differences Regression Results Without the Secondary Industry in the Extended Sample

	(1) Employment	(2) Actual Hours Worked	(3) Planned Work Hours	(4) Seminar Attendance	(5) Leadership Position
Treated	0.00568	11.74***	-0.312	0.167***	-0.0143
	(0.0331)	(1.712)	(1.198)	(0.0430)	(0.0276)
Post	0.0139	13.08***	0.0338	0.168***	-0.0122
	(0.0333)	(1.676)	(0.772)	(0.0321)	(0.0138)
Treated × Post	-0.0939*	-21.27***	0.349	-0.276***	0.0251
	(0.0401)	(2.134)	(1.066)	(0.0521)	(0.0228)
Constant	1.286***	33.93***	20.01***	-0.102	-0.0363
	(0.0987)	(4.952)	(5.921)	(0.109)	(0.0674)
N	2222	2221	2218	2218	2222
adj. R^2	0.022	0.121	0.117	0.040	0.009
Number of Individuals	428	428	428	428	428
Controls Included	Yes	Yes	Yes	Yes	Yes

Note: Outcome variables are indicated in the column titles. Standard errors in parentheses. Observations belonging to individuals working in the secondary industry are excluded. The estimates are Intention-to-Treat effects of reducing the paternity quota on mothers who gave birth during their participation in the Labor Force Survey. Employment, seminar attendance and leadership position are dummy variables. Estimates on share of women employed, attending seminars and holding leadership positions are changes from the average level in percentage points, all else equal. Actual hours worked and planned work hours are numerical. Estimates are unit changes from the average outcome, all else equal. The post-treatment period is defined as the time after July 1st, 2014. We control for personal and professional characteristics. Personal characteristics include age and dummies for highest completed level of education (compulsory schooling, upper secondary school or higher education). Industry of occupation are dummies indicating whether the individual works in the primary, secondary or tertiary industry, as classified by Statistics Norway (Statistics Norway, 2009). Dummies for year and quarter is included. Q1 and year 2011 are the base, and are omitted.
+ p<0.1, * p<0.05, ** p<0.01, *** p<0 .001

Appendix 2: Figures

Figure A1: Mothers in Male Dominated Professions' Employment Rate

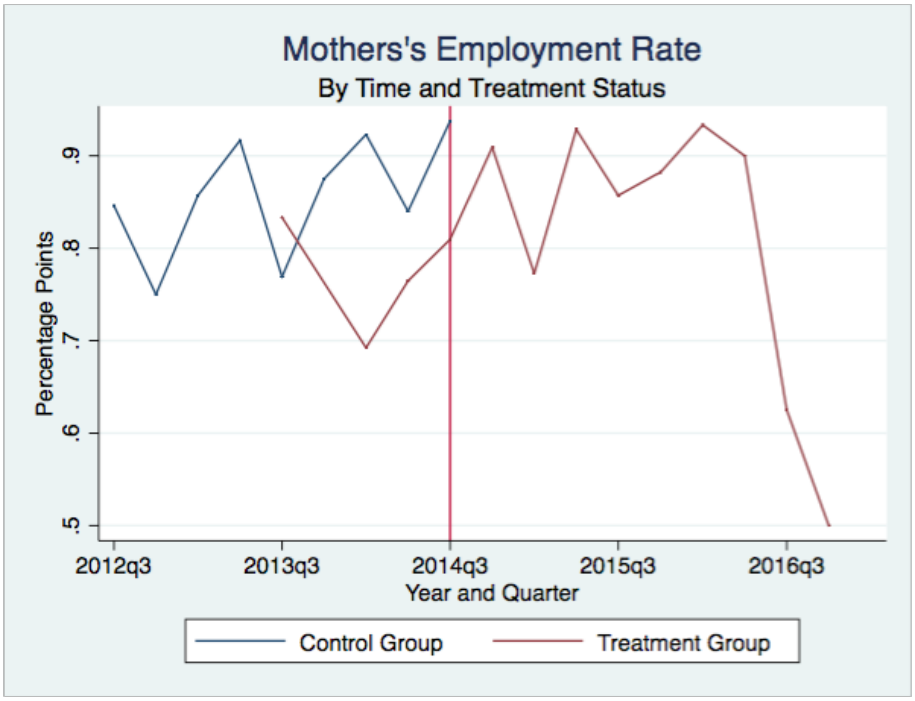

Figure A2: Mothers in Male Dominated Professions' Actual Work Hours

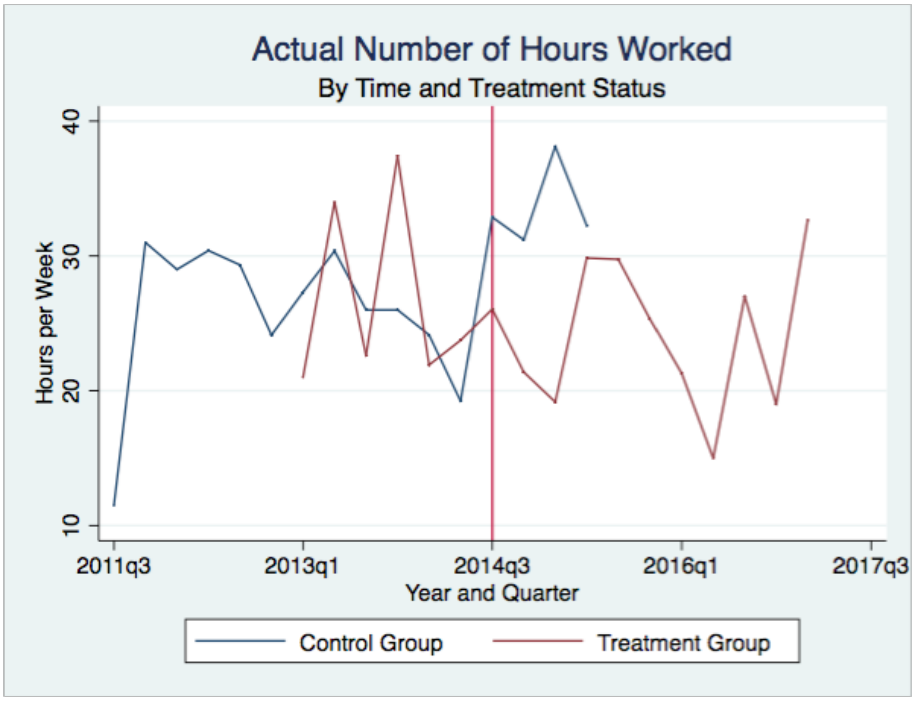

Figure A3: Mothers in Female Dominated Professions' Employment Rate

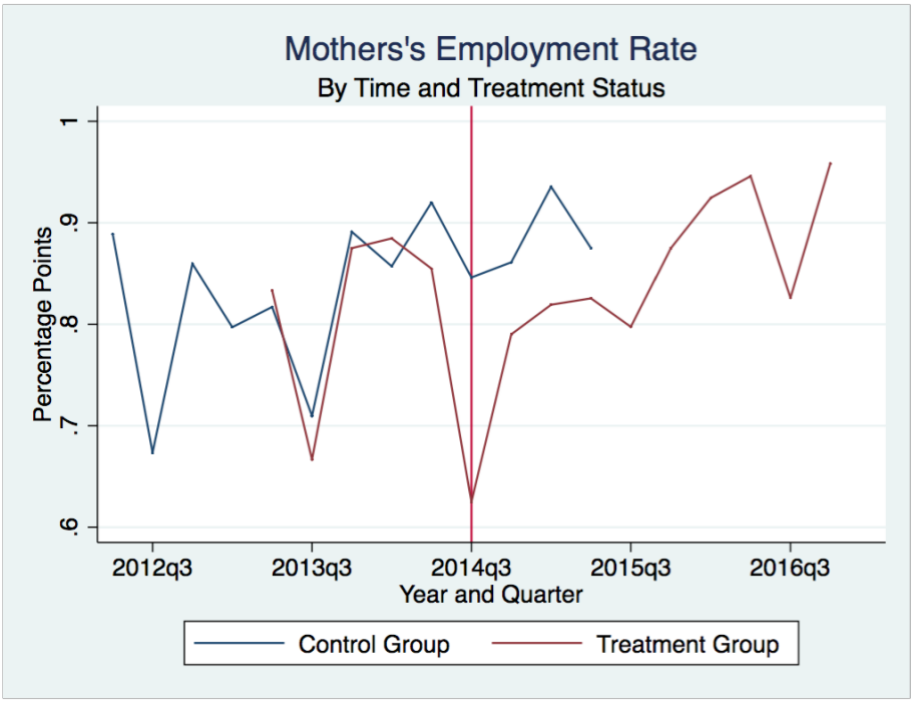

Figure A4: Mothers in Female Dominated Professions' Seminar Attendance

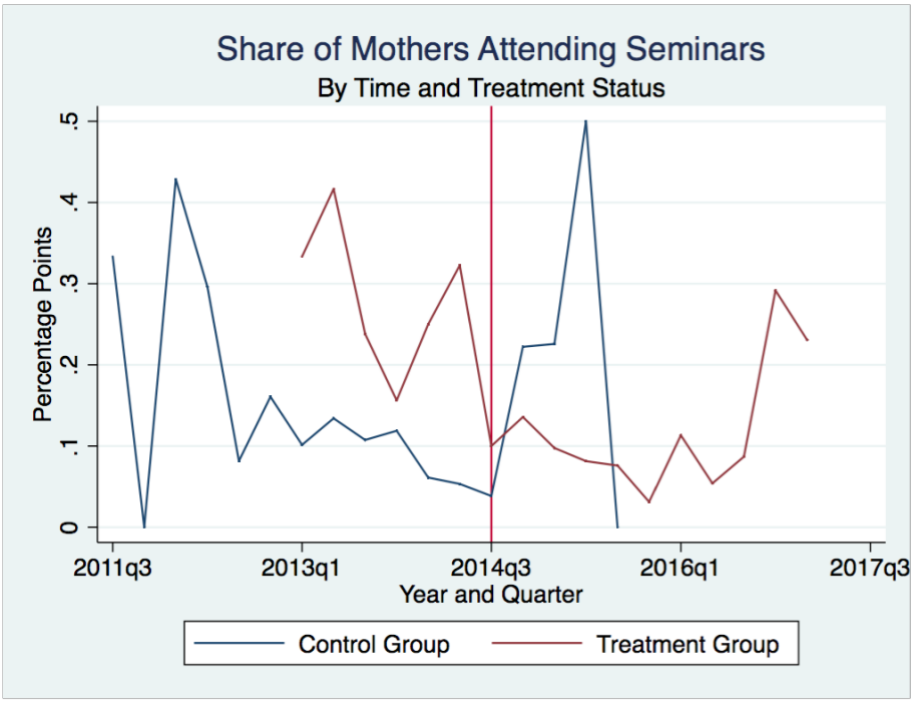

Figure A5: Mothers in Female Dominated Professions' Planned Work Hours