

Parenthood and the gender pay gap in The Netherlands

abstract:

Although gender convergence has been substantial in the recent decades, a sizeable gender wage gap still exists in most countries and is persistent. In this paper, motherhood will be looked at as one of the big contributing factors to the remaining of the gender wage gap. The income of individuals drops considerable after the birth of a child. Using a Dutch household survey with data from 1996 till 2018, a ‘child penalty’ of 14 percent is found in the Netherlands for both men and women, with an additional penalty of 2 percent for women.

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1. Introduction

Gender convergence in pay and labor participation has been substantial in the Netherlands since the 1950's. Female participation in the labor force has grown to more than 65 percent and women are now just as well-educated as men. Although anti-discrimination policies and equal chances in education have influenced gender convergence in pay and labor participation, a large wage gap remains. A reason why the wage gap is still so persistent and not likely to disappear over time is the effects children have on the careers and income of parents. The 'child penalty' can be defined as the percentage by which parents fall behind due to having children. The drop-in income due to childbearing are large and consistent for women compared to men (Budig & England, 2009). Although women with small children in the Netherlands are stimulated by the government to participate in the labor force, they still do so less than men. The benefits of caring for a child diffuse widely, but the cost of bringing up a child are born most by mothers (Budig & England, 2009).

In this paper, the importance of motherhood is considered for the consistency in the wage gap that is still present in many countries. Although other determinants of the gender income gap, like the difference in education levels and discrimination against women, have declined in importance in the recent decades, the child penalty seems to be consistent.

Andresen & Nix (2019) find that the 'relative child penalty', the difference in the child penalty for fathers compared to mothers, has increased in Norway in the last two decades. Kleven et al. (2018) showed that the relative child penalty in Denmark accounts for 40 percent of the gender wage gap in 1980 while it increased to 80 percent in 2013. Parenthood has not only influenced women in the top of the income distribution, but across the whole earnings spectrum.

In this paper, the short and long-term effects of entering parenthood on income in the Netherlands are estimated. The focus lies on the income trajectories of parents before and after the birth of the first child. To estimate the wage and income trajectories of parents a fixed effects model is used to estimate the effect.

Looking at the effects of the child penalty on wages is relevant because it looks at the larger issue of gender inequality. Four out of five women have children in the Netherlands (CBS, 2007), and women do most of the upbringing of a child. If raising a child doesn't affect fathers as much as mothers, it will contribute to gender inequality. For single mothers, the motherhood penalty contributes to the gap in poverty rates between households headed by a single woman and those containing an adult male (McLanahan, 2006). Studying the magnitude of the child penalty is also relevant for public policy in the Netherlands, the child

penalty could explain a big part of the still remaining wage gap between woman and men. Men are usually unaffected in earnings by the birth of a child, the earnings of men in Sweden even increase after the birth of a child (Angelov, 2013). Kleven (2018) estimates that more than 75 percent of the total of gender inequality in earnings is due to child related inequality in Denmark, this figure is likely to be similar in the Netherlands, because of similar tax structures and family policies. Kleven (2018) uses an event study methodology by comparing the wages of women to men using tax data from 1980 till 2008. Studying the child penalty in the Netherlands could help policy makers identify the underlying causes of the gender wage gap and help with more effective solutions.

This paper extends on the rich literature on gender inequality in the labor market such as (Altonji, 1999) and (Angrist, 1996). More specifically, this paper relates to various literature on the role of parenthood in the labor market. Anderson, Binder & Kraus (2002) finds a wage gap of about 15 percent per child from 1968 till 1988 in the United States with a fixed-effects model. The empirical strategy is closest related to this paper, using a similar fixed effects model.

Angelov (2013) finds in Sweden that 15 years after the birth of the first child, women's income drop with 32 percent compared to men comparing to the pre-child difference. The authors study the wage trajectories of women to those of their male partners before and after parenthood. They use panel data from 1990 till 2008 from the tax office in Sweden to estimate the effect. Kleven (2018) finds that the gender gap in Denmark is around 20% in the long run compared to the pre-child difference. Kleven (2018) and (Kleven et al., 2019) use an event study methodology, measuring the impact first children have on the wages compared to year before the birth of the first child.

Kleven et al. (2019) find that Scandinavian countries have a long-term gap of 21-26%. For Sweden the authors combined data from 1997 and 2011 from fiscal statistics and registry data. For Denmark the results from Kleven (2018) were copied.

German-speaking countries have a gap as high as 51-61%, using data from 1986 till 2016 from the Socio-Economic Panel in Germany and data from 1980 and 2017 from the Austrian Central Social Security Register in Austria (Kleven et al., 2019). Although a lot of research has been done in European countries, the magnitude of the child penalty has not been studied in the Netherlands. This can be relevant for the literature because there's a difference between the countries in Europe.

The paper has the following structure. In section 2 and 3, the sources of the child penalty and the gender gap and labor participation of the last few decades in the Netherlands will be

discussed. In section 4 is the data section, where the data and the descriptive statistics are presented. Section 5 contains the methodology section where the empirical strategy is outlined. Section 6 contains the main results. Section 7 concludes the paper.

2. Sources of the relative child penalty

The child penalty for women can have several different sources, of which the most prominent ones are outlined in this section. Firstly, time spend raising children limits the time that could be spent at work. This cause is related to the different preferences for women and gender norms that still exist today. Another reason is that women lose job experience because of their pregnancy. Mothers could also be choosing to get ‘mother-friendly’ jobs. These types of jobs are defined as easier to combine with raising children, but typically have lower salaries. Lastly, discrimination against mothers by employers could be attributing to the relative child penalty.

2.1 Raising children

The most obvious reason for the relative child penalty is that having a child limits the time that can be spent working, as that time is now being spent raising the child. Most mothers lose at least some employment time when bringing up children (Klerman & Leibowitz, 1999). A neoclassic theory of this process is that couples allocate their effort to either the household or their job to maximize their well-being and the family income (Becker, 1991). In this line of thinking, women pay a wage penalty, because they chose to work less. Women could get a different employment contract, working fewer hours and thus also a lower income.

2.2 Preferences and gender norms

Andresen & Nix (2019) find that the main contributing factors contributing to the child penalty is preferences and gender norms. One example of different preferences is that women in the Netherlands are less ambitious than their partners and care more for household chores (CPB, 2018). Other examples are that housewives in 28 countries tend to be happier than women who work full-time (Treas, van der Lippe, & Tai, 2011). The study also finds that housewives tend to be less happy than women who work part-time. Andresen & Nix (2019) compare same-sex couples to heterosexual couples. They find that same-sex couples split household chores and childcare in general more evenly. In line with these findings, the authors find a 13 percent drop in the income of the partner who gives birth for same-sex couples in Norway. While the partner experiences an initial income drop of 5 percent (Andresen & Nix, 2019). The partner who gives birth has a larger drop in income but catches

up after only two years. The entirety of the child penalty disappears after only four years, while for heterosexual couples the child penalty in some countries doesn't disappear in a period of 20 years after the birth of a child. The main explanations given in their paper for the quick disappearance of the child penalty for same-sex couples is that household chores are more evenly divided. Moreover, the hours spend at work are also more evenly divided in same-sex couples compared to heterosexual couples (Andresen & Nix, 2019).

2.3 Job experience

Other reasons include that mothers earn less than other women because having children causes them to lose job experience (Budig & England, 2009). If women work less hours than their coworkers, they are less experienced which leads to lower productivity levels that in their turn lead to lower salaries compared to coworkers. It is hard to estimate the effect of the experience that is lost due to mothers having children. First off, experience is hard to define in itself, it could be defined as the actual hours worked, but in some studies it is defined in an other ways (Budig & England, 2009). Women could also be less productive due to the fact they worry about their children at work, call them at work or take care of their children in any other way at work (England, 2005). Other loss in productivity can arise when parents must take care of their children after work or do more household work than parents without children. People without children can spend their time off work in other, less stressful ways. There have been no studies that have directly measured the productivity difference between mothers versus non-mothers, so it is impossible to draw a conclusion on the magnitude of the productivity loss due to motherhood.

2.4 Mother-friendly jobs

Women could trade-off higher wages for 'mother-friendly jobs' (Budig & England, 2009). These could be jobs that are easier to combine with raising children, often these jobs are because of the easier conditions 'compensated' by lower pay. Characteristics of these jobs are flexible hours, evening work or on-site day care for children. If women are more interested in family friendly jobs, they could trade-off wage for the other perks of these types of jobs. Research showed that these 'mother friendly jobs' pay less than their counter male jobs, controlling for skill level (England, 2005).

2.5 Discrimination against mothers

Another possible explanation for the child penalty could be that mothers are discriminated against by employers (Budig & England, 2009). Mothers could be treated differently by employers, they could be less promoted, getting fewer rewarding jobs or be paid less for the same job. This is different from sex discrimination that assumes that most women will have children in the near future (England, 2005). Although sex discrimination will create a gender pay gap, it doesn't create a gap between mothers and women without children. Up until the 1950's, women who were married were banned from working in big companies in the United States (Goldin, 1990). This bears a lot of resemblances with policies in the Netherlands, where women were banned up until 1956 from working in the government when they got married. Although firing people or not hiring due to marriage is now forbidden in the U.S or the Netherlands, discrimination against married women or mothers could still play a contributing role to the gender gap in income.

3. Gender gap and labor participation in the Netherlands

This section contains a brief discussion of the gender income gap and labor participation in the Netherlands from an international perspective. It is important to look at these topics from a historical perspective to better understand the contributing factors of the child penalty in the Netherlands and the differences between European countries.

3.1 Gender roles

Fewer than one in three working women has a full-time job, and in no other European countries do women work as much part-time as in the Netherlands (SCP, 2019). In a way, the traditional gender roles, that were customary in the 40's, 50's or 60's are still present today. The 'traditional Dutch housewife' was for centuries long a self-conscious and proud archetype. The traditional Dutch housewife originated centuries ago, when the Netherlands formed a capitalistic society early on (Koek, 2009). Farmers families specialized in certain types of products and were not self-sufficient as in other countries. In these types of families, the men worked on the farm to produce goods, while the women worked in the house. These types of traditional roles were present till the later part of the last century, but these gender roles began to change as early as the 50's. But the Dutch Social and Cultural Planning Office finds that women today still feel primary responsible for household chores and or care tasks and women who just started on the labor market have lower ambitions than their male counterparts (SCP, 2018).

3.2 Changes since the 50's

The gender wage gap and the labor participation in the second part of the 20th century have changed substantially in European countries. In figure 2 in the appendix the labor participation rate in six European countries from 1971 till 2018 can be seen. What's striking is that the Netherlands had the lowest participation rate from these six countries in 1971. Only in the last three decades the participation rate has begun to catch up to the neighboring countries. What is also clear from the data is that the Nordic countries have had a relatively high participation rate since the seventies. The figures are high but seem to have been relatively constant over the last decades. The same could be said for the last ten years in the Netherlands. The female labor participation was only 57 percent in 1971, a contributing factor for this were the conservative labor laws in the Netherlands. Only in 1956 the law 'Wet handelingsonbekwaamheid' got abolished. The law meant that married women weren't allowed to work, they couldn't open a bank account and they couldn't travel without the approval of their husband. Other European countries rectified similar laws much earlier, or never had them in the first place. It is no wonder in this case that the participation rate in The Netherlands was lower during that time than in neighboring countries, see figure 2 in the appendix. This law could have influenced participation years perhaps decades after it was abolished. Traditional family roles are hard to change, and it seems unlikely that women were able to change their labor status directly because of the new laws. Kleven (2018) shows that child penalties are transmitted through generations, from parents to daughters. Women who grow up in traditional families with a male breadwinner and a female homemaker incur larger child penalties when they become mothers (Kleven, 2018). Up until 1971 the law in the Netherlands said that the husband was always 'the head of the couple' and the spouse owed him 'obedience'. In 1975 a law passed in parliament for equal pay for women and men.

3.3 Parental leave system

Parents in the Netherlands have only had parental leave since 1989, when a new law was introduced. Mothers could now leave their job, unpaid, for the first months after their child was born. This was a big change for mothers as they could now have time off after the birth of a child, without quitting or losing a job. Up until 2009 parents could take maximally 13 weeks off work, after that period parents could leave work up until 26 weeks. In the 1989 the government also ruled out a new program for childcare for children from zero till four, this made it easier for women to work, while someone else was taking care of their children. In the recent year's childcare is heavily subsidized by the government. The government guarantees quality and safety of all the childcare facilities in the Netherlands. Next to that, the

government is also giving childcare allowance to parents. If parents have a lower income than €23.870 the government reimburses 94 percent of childcare cost. If the cost for childcare is relatively low due to the government allowance, it gives parents an incentive to adjust their labor participation and work more. All these reforms in government policy contributed to female participation in the labor force and closing of the wage gap.

Today, the parental leave system has changed a lot since it was first introduced in 1989. Mothers get parental leave for 26 times the number of workdays in a week, for a 40-hour work week this will mean that the parent can get 130-day leave, which cannot be refused but is also unpaid. The partner can get 5 days off, this is still substantially lower than in other European countries. Fathers in Norway get a 4-week period for parental leave, Germany has 8 weeks, Ireland has 14 weeks.

In the second half of the twentieth century the female participation rate more than doubled, from just 30% in 1975 to 70% in 2011 in the Netherlands. The gender pay gap is 17% in 2017, which is the difference between median earnings of men and women relative to median earnings of men, see figure 1 in the appendix. For the OECD countries the averages lie on 16%. Nearly half of the gender pay gap can be explained by the gender difference in working hours. The difference in working hours can partly explain the lack of women in management functions or board positions, 28% of people with a supervisory role is female and 5% of board function of publicly listed companies is female. What's striking is that the gender pay gap seems to diverge between the countries. In Scandinavian countries the gap was decreasing in the seventies but in getting flatter in the most recent decades while other countries only caught up later, see figure 1 in the Appendix. The differences in education between men and women is disappearing and female labor participation is rising. This suggest that something other is causing the remainder of the gender pay gap.

4. Data

4.1 Data source

The data used in the analysis is a panel data set from the DNB Household Survey. The survey collects annual economic data on the from household. The households in the data set are followed for over time. The data is collected through the CentERpanel, which collects data from roughly 2.000 household every two weeks. The households who are in the panel are randomly selected based on their address. The survey covers the household in the Netherlands from 1996 till 2018. There're 4.353 unique households in the data from 1996 till 2018. This number is higher than the 2.000 households that the DNB Household Survey strives for

because households tend to drop out of the survey over time. This can have a variety of reasons beyond the control of the DNB. This leaves us with 60.737 observations, containing different data entries for the members of each household and entries for the different years. After taking the birth dates from the children, they are removed from the data, leaving us with 29.901 observations. Although the data set covers 20 years, most of the households don't stay in the survey for the entirety of this period. Because we have 4.353 unique households, it follows that the average household stays in the survey for less than 10 years. And because the households are already in the data set before the birth of a child, we can't follow their income for the long-term. In our main analyses, the income effects of parenthood will be looked at up till 6 years after birth, because the sample of parents comes smaller and smaller after those years. In total there're 668 births during the period where the families are tracked. The goal of the paper is to study the income effects of the first child, but other children could influence earnings as well. To account for the effect that other children may have on earnings they are controlled for in the analyses. The households without information on income are removed from the sample for obvious reasons. The data contain information about sex, age, birthdays, education, earnings and family relations. There's also a lot of information about earnings such as taxes, profit from earnings, loans, mortgages, savings and labor earnings. The children that are born are linked with their parents, the dates of birth are known, and the order of the children is also known. There is no direct measurement of the hours worked in the data.

4.2 Outcome variable

The outcome variable is the yearly earnings defined as the yearly labor income as reported to the tax authorities. This is total yearly individual pre-tax income. The individual income included profits from a small business, this could be profits from a 'Eenmanszaak' or 'Vennootschap onder firma'. The pre-tax income does not include tax reductions. The data of multiple years allows for an analysis of the gender difference in income over the different years after the birth of a child. With the data from the panel the short-term and long-term income effects of entering parenthood can be examined.

4.3 Descriptive statistics

Table 1. Descriptive statistics of all key variables measured in the year of birth.

Measures	<i>M</i>	<i>SD</i>	Range
Father age	35,1	5,60	23-65
Mother age	32,2	4,82	20-60
Age difference (father- mother)	2,9		
Income father (€/year)	55.838	33.872	3900 - 284.840
Income mother (€/year)	31.519	20.028	1500 -179.995
Income difference (€/year)	22.319		
Number of couples	186		

In table 1 the summary statistics of the key variables used in the analyses are displayed in the year of birth of a first child. In the table the means, standard deviation and the range of the individuals is displaced, as well as the difference between the couples. From the table we can see that the age at which parents have children differs between men and women. In this sample, men are on average 2,9 years older than their counterparts. What is striking is that the income for men is almost twice as large as for women. Multiple studies have shown that the child penalty is biggest in the year of the birth (Angelov, 2013), (Kleven, 2018). So, it isn't a total surprise that the income differences are so big. One thing to note is that in the table, there is no control for factors such as age, education or other factors that could be important for determining wages. Because of these factors, the difference in income cannot be interpreted as the wage penalty for motherhood. But it does illustrate the huge difference in income between men and women in the year of birth. What is also notable are the big standard deviations when looking at the incomes for both men and women. This means the income scale is very broad in the sample, in the sense that there're big differences in income between couples. To see the initial wage difference between the father and the mother the sample has been restricted to parents who have a positive income two years before the birth of a child.

The education levels can be viewed in table 1 and 2 in the appendix. The education level differs a lot in the sample, but there doesn't seem to be a big difference between men and women. Most people in the sample have completed junior or senior vocational training, which is a secondary education that prepares people to work as a technician or in various jobs such

as a trade or a craft. In the Netherlands this is also called ‘MBO’ or ‘middelbaar beroepsonderwijs’. This is also the most popular form of education nationwide. All the other values seem to be equal to the nationwide levels of education. It would have been preferable to see the years of education instead of the level because it is easier to compare between men and women and between different groups, now it is hard to notice the difference between gender, but it seems that the education levels are more or less the same. Education is also controlled for in the main analyses.

5. Methodology

To fully understand the effects of children on the earnings of mothers the empirical approach relies on the changes in the income of woman relative to men around the time of birth of a child. This effect should be the strongest around the birth of the first child. Through this approach the individual variation between couples can be used to study the full trajectory of the effects after the birth of a child. To study the income changes due to motherhood, a fixed-effects regression model is used to analyze the Dutch parents.

5.1 Assumptions

The choice of having a child is not exogenous, the timing is almost always planned, and the partner is also chosen. One of the assumptions of this method is that the choice of having a child is not based on expected income difference between the couple, in absence of a child. If couples make the decision to have a child based on expected income difference, the results could be biased and come from other sources than the motherhood. It is however unlikely that couples would take their expected future income differences into account when making a big life-changing decision as having children. Changes in the outcome variable, difference in earnings, seem to only occur after birth of a child. There seem to be no change in income before the birth, as for men as woman. This identification assumption could fail if parenthood is for example pushed forward when a men is expecting a promotion when a woman doesn't have the same opportunity. The assumption could also fail if women choose to have children when they expect to lose their job or expect to move to a lower paying job, regardless of the birth of a child. If these decisions are taken longer before birth, it should already reflect in their income and so there's no bias. So, if these shocks occur before the birth of a child, the information is in the data and is thus controlled for.

5.2 Fixed effects

To analyze the data from Dutch household a fixed-effects regression model is used. The units of analyses are the individuals i in periods t . The fixed effects are couple fixed effects and calendar year fixed effects. Couple fixed effects account for the differences between couples that are unobservable and that have additive effects. These could vary from preferences for bringing up a child, life cycle plans, as well as other unobserved couple specific characteristics. Calendar year effects control for the economic environment or general economic up or downturns, which can influence earnings but also on the decision to have children. The main advantages of this method are that couple fixed effects allow to control for everything that is specific for couples that would cause differences in both income and the decision to have children, including unobserved characteristics of the couple. For different individuals, variables for individual characteristics are used. These characteristics can vary for individuals within couples, as opposed to the couple fixed effects. Gender, age, occupation, education and the birth of other children are all controlled for. Income tends to rise with experience, thus also with age. This means that the age could also influence the decision to get children. It is important to control for the birth of other children because it can have a great impact on income. Intuitively, it makes sense that the child penalty would be more severe if women have more children.

5.3 Fixed effects model

To estimate the effects of parenthood, the following regression model is estimated:

$$Y_{it} = b_0 + pT_{ti} + \alpha_c + \gamma_c + b_1X_{it} + e_{ti}$$

Where Y_{it} is the dependent variable, which is the natural logarithm of income for an individual i in period t . By taking the natural logarithm of the earnings we get the percentage difference in earnings. This way, we get the effect of the child penalty in a percentage drop, instead of a raw number in earnings, which are more interesting than the absolute numbers, which are harder to compare between countries or other groups.

t denotes the period before or after childbirth, with 1 the year of birth. The magnitude of the child penalty in the term pT_{ti} . Where p is the treatment effect or the child penalty in percentages. T_{ti} is a treatment dummy that is 1 in the period the birth has taken place. To adjust for couple specific factors the term α_i exist. The term α_i contains all the couple specific

fixed effects. The calendar year fixed effects are denoted in the term γ_c , to control for the different years in sample. The term b_1X_{it} denote the individual control variables which can vary over time. Gender, age, occupation, education and the birth of other children are all controlled for. The error term is denoted as e_{ti} .

To look at the gender specific magnitudes of the child penalty, a new term is introduced that captures the child penalty for women and for men separately. The same model is used as described as above but the new term is added:

$$Y = b_0 + pT_{it} + b_1G_{it} + \alpha_c + \gamma_c + b_2X_{it} + e_{it}$$

Where b_1G_{it} is the added term to see the gender specific results. G_{it} denotes the year after birth for either men or female. For example. $G_{it} = 1$ for the year of birth of a child for female parents, while being 0 for male parents. The rest of the model is the same as described above.

5.4 standard errors

Couple specific clustered standard errors are used to account for the heteroskedasticity across the couples. These standard errors are used because the errors in the outcome variable are potentially related within couples, so using robust standard errors potentially gives the wrong standard errors. Using clustered standard errors can lead to problems when the number of clusters is very low, but because there're a lot of couples the data, this doesn't cause a problem.

5.5 Graphical analyses

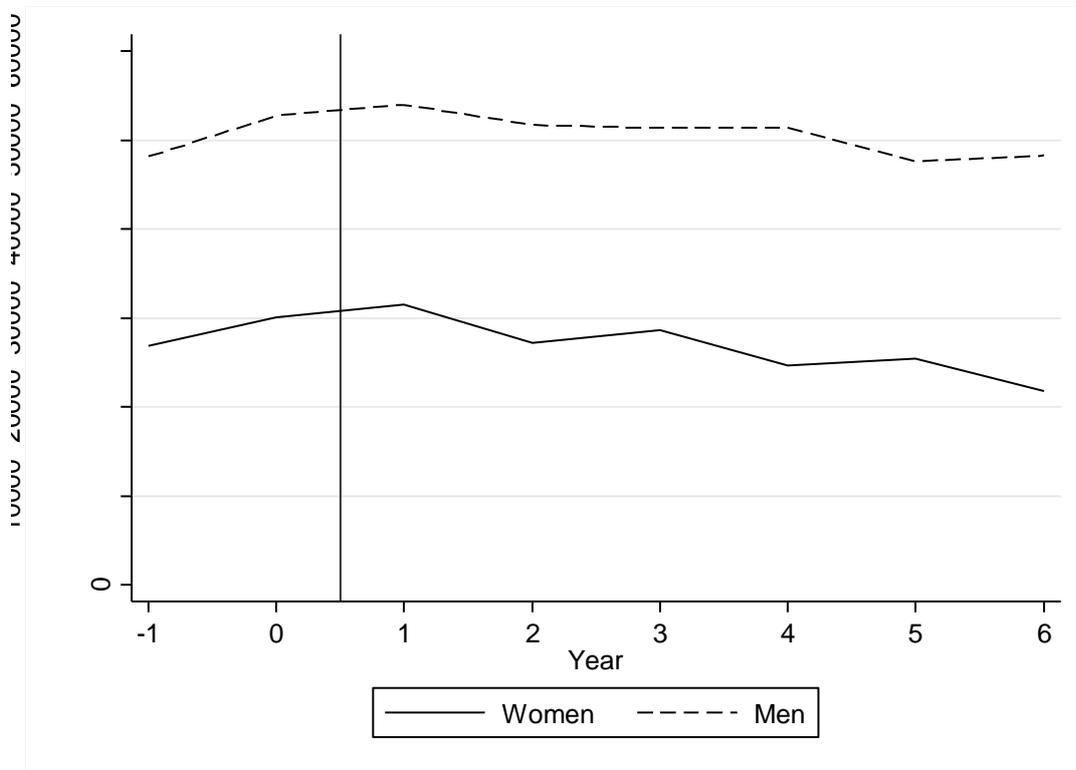
Before returning to the formal analyses as presented in the methodology section, it is beneficiary to look at a graphical analysis of the data. In figure 1, see page 15, the average pretax incomes in Euro's for men and women before and after birth are presented. $T = 1$ is the year of birth of the child, $t = 0$ is the year before birth etc. Although there are not many years before the birth of a child takes place, we see in figure 1 that the trends following the income trajectory are similar for both genders in the years before the birth of a child. It seems from figure 1 that the income trajectories from men and women seem to go the same way, meaning no gender specific trends, although it cannot formally be tested in this case. From the year after birth, men and women seem both to drop in earnings. What's striking from the graph is the huge initial difference between men and women. Two years before the birth of a child the average income for women is € 31.519 while their male counterparts have an average income of almost € 55.838. It's clear from these numbers that the women in the

sample earn below the average in the Netherlands (€37.000), while men earn more than the average income in the Netherlands before parenthood becomes a factor. An explanation for this difference in income is that the men in the sample are on average 2,9 years older than women.

In the year before birth there's not yet a clear drop in income for women. This could mean that women are not yet affected by spending less time at work due to their pregnancy or they are compensated in other ways. In figure 1 there's a small increase in the average income for women in the year before birth. There's clearly no wage penalty for being on parental leave. This is primarily due to the generous parental leave system in the Netherlands. When pregnant, women receive maternity leave pay that is equal to 100 percent of their previous wage. Women go usually on maternity leave from work only 4 till 6 weeks till the birth of their child. These factors can contribute to the income effects that are not visible in the data the year before birth. There also doesn't seem to be a drop in the year of birth, which is surprising considering parents usually work less in the first year after birth.

The average income for women before the birth of a child is below the average income in the Netherlands. This could indicate that these women work different jobs and hours than the average women. They are also young, on average 32,2 years old, which is also attributing to the fact they earn less than the average person. The sample of women with children is small, this can also contribute the fact that the sample is not quite representative for women in the Netherlands. Further analyses in the next section must clarify the exact magnitude of the child penalty for in the Netherlands.

Figure 1. The average income for men and women in the years before and after birth. In the year 1 the child is 0, so the birth of the child takes place between year 0 and 1.



6. Results

In this section the effects of children on income trajectories of parents are presented. The models presented are fixed effects models with yearly fixed effects, couple fixed effects and a set of controls for individual characteristics. In the first column, the results for the long-term penalty, up till five years, can be viewed. In the second column, the different years after birth are split up, meaning that ‘Penalty year 1’ gives the penalty in year 1 etc.

Table 2. The effects of the birth of a first child on income in the years 1 till 6 after birth.

Constant	Natural log of yearly income	
Penalty	-0.136*	
	(0.077)	
Penalty year 1		-0.146 (0.093)
Penalty year 2		-0.155 (0.173)
Penalty year 3		-0.404** (0.202)
Penalty year 4		-0.424* (0.245)
Penalty year 5		-0.207 (0.346)
Penalty year 6		-0.348 (0.387)
Age	0.035 (0.037)	0.026 (0.032)
Gender	-1.359*** (0.214)	-0.884*** (0.192)
Education	0.004 (0.085)	-0.081 (0.071)
Other Children	0.011 (0.129)	0.121 (0.091)
Occupation	-0.365 (0.348)	-0.111** (-0.054)
Constant	11.372*** (1.788)	11.058*** (-1.421)
Observations	385	385
R-squared	0.651	0.614

*Table 2. The effects are estimated with ordinary least squares. The outcome variable is natural logarithm of income. The full set of controls consists of calendar year fixed effect, couple fixed effects and individual control variables as described above. Using clustered standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

The results in table 2 are presented with for the long-term as well as for different years after birth. The results are presented with fixed effects for different calendar years, couple specific fixed effects and individual control variables. It is important to control for economic shocks that can impact incomes of men and women differently (Angelov, 2013). Therefore, a calendar year fixed effects is part of the second and third row in table 2, this is especially important because the data covers a lot of different year. The coefficients ‘penalty’ gives the effect of the birth of a first child on the natural logarithm of income for an individual. When looking at the first column, we see the long-term income effect of having a child is drop of 14% in income due to parenthood. This result is significant at the 10 percent level. It is not yet clear from this result if the child penalty is mainly driven by women or that men are affected as well. To examine the gender specific effects a gender term is included in section 5,2 of the results.

From table 2 we find that adding a gender term does not imply that the penalty is driven by women, men seem to be affected in the same way. If we take an individual with the average income in the Netherlands, which is €37.000 euros before taxation takes place. According to the estimates in table 2, income would drop with €5.032 every year after birth takes place. In the second column of table 2, the child penalty for individuals for different years after birth can be viewed. Because the magnitude of the child penalty can vary much in the different year, it is also important to not only look at the total effect, but at the penalty for different years as well.

The penalty in year 1 is 15 percent for an individual in the year of birth of a child. This means the income would drop 15 percent due to parenthood. This result is not significant, however. When we look at the second year the child penalty seems to drop to 16 percent loss in income, this effect is also insignificant. The effects seem to increase in the years following the first two years. In the years following the drop in income seems to increase to 40% and 42% in year 3 and 4 respectively. The results are significant at the 5 percent level for year 3 and significant at the 10% level for year 4. A slow decrease occurs in year 5, with a drop in income of 21%, in the last year the income drop is 35%. The results in the last two years are not significant, however. What is clear from the second column at that the child penalty becomes more severe after the first two years after birth. This phenomenal has some possible explanations. Possibly, childcare and parental leave systems in the Netherlands could help parents in the first two years financially. If childcare is in big parts paid for by the government, parents can work and earn more. Or parents realize only later that raising

children is hard to combine with having a full-time job. What also seems visible is that the child penalty seems to decrease after four years. A possible explanation is that parents ‘catch up’ four years after birth, focusing more on their careers than family. It is important to note that other studies have not found a similar result. Kleven et al. (2018) find that the child penalty in Denmark is most severe in the year after birth. Angelov (2013) finds that this is also the case for women in Sweden.

6.2 Child penalty for mothers

To look at the gender specific magnitudes of the child penalty, a new term is introduced that captures the child penalty for women separately. In table 6 the new term is introduced as described in the methodology section 5.3. The term essentially captures the drop in income women experience due to motherhood, apart from the penalty for individuals, regardless of gender.

Table 5. The effects of the birth of a first child on income in the years 1 till 6 after birth, with a gender specific treatment dummy.

Constant	Natural log of yearly income
Penalty	-0.071 (0.059)
Penalty year 1	-0.251** (0.113)
Penalty year 2	-0.165 (0.166)
Penalty year 3	-0.555*** (0.203)
Penalty year 4	-0.356 (0.229)
Penalty year 5	-0.350 (0.335)
Penalty year 6	-0.446 (0.417)
Female penalty	-0.023 (0.074)
Female penalty year 1	0.285 (0.281)
Female penalty year 2	0.009 (0.311)
Female penalty year 3	0.424 (0.331)
Female penalty year 4	-0.494 (0.499)
Female penalty year 5	0.429 (0.330)

Female penalty year 6		0.242 (0.420)
Age	0.021 (0.031)	0.028 (0.032)
Gender	-0.873*** (0.223)	-1.017*** (0.305)
Education	0.036 (0.052)	0.123 (0.093)
Other Children	-0.353 (0.336)	-0.402 (0.312)
Occupation	-0.112** (0.054)	-0.107* (0.043)
Constant	11.240*** (1.419)	11.169*** (1.529)
Observations	383	383
R-squared	0.663	0.68

*Table 6. The effects are estimated with ordinary least squares. The outcome variable is natural logarithm of income. A dummy for gender is used to obtain the gender specific child penalty. The full set of controls consists of calendar year fixed effect, couple fixed effects and a set of individual control variables. Using Clustered standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

In the first column gives the results for the long-term child penalty for mothers, with fixed effects for calendar years, couple fixed effects and individual control variables. The penalty for individuals is still persistent, the drop in income due to parenthood is 7 percent over the long-term. The long-term additional penalty for women is very small, the drop in income is an additional 2 percent, this effect is insignificant however. In the second column the results are presented for different years after birth. The individual drop in income due to parenthood is in all the year negative, varying from 25 percent in year 1 to 45 percent in year 6. When looking at the gender term, it becomes clear that there's no pattern when looking at the gender gap over the years. All the coefficients are insignificant and vary a lot. We can conclude that the gender gap in income due to parenthood is a drop of 2 percent, it is insignificant, however. What becomes clear is that there's also a penalty for men for Dutch households. This penalty does not differ much from the penalty women experience. This is contrarily to what other studies such as (Angelov, 2013) or (Kleven et al., 2019) find in this field. They find that Scandinavian countries have a long-term gap of 21-26% and German-speaking countries have a gap as high as 51 till 61%. One explanation why there doesn't seem to be a gender gap due to parenthood could be that child policies in the Netherlands vary a lot from neighboring countries. Another reason could be that by using a household survey, the representation of the

data for the whole population is limited. Because we can't observe the incomes of families over the very long run, it is hard to say if or when parents recover financially from giving birth long-term. This is primary because households do not stay in the household survey for their whole life. On average they stay in the survey for 6 years, so it's often impossible to look for very long-term labor effects.

7. Conclusion

Gender income inequality is still persistent in almost all countries today. While other factors contributing to the gender pay gap have decreased over time, the child penalty for motherhood is persistent over recent decades in European countries. As family responsibilities are not equally shared between men and women, the gender pay gap is unlikely to close in the upcoming decades. Female labor participation rate is now one of the highest in history, but the difference in working hours can be a big obstacle in achieving equality in pay.

In this paper, the short- and long-term average effects of childbirth on the gender income gap have been estimated. The focus lies on the drop in individual income as a result of the birth of a child. The main finding is that childbirth affects both women and men, there's a substantial child penalty for parents in the Netherlands. Parents experience a 14 percent drop in income due to parenthood. This is the long-term gap that was found for up till six years. We can't look at results beyond those years, as the amount of observations drops substantially after a few years after the birth of a child. This is mostly because there's either no income data after those years or households drop out of the household survey. Secondly, we find that the child penalty increases after the years after birth. Three years after the birth of a child, the penalty is more severe than in the year of birth. Thirdly, we find a gender specific penalty of 2 percent for women up till 6 years after the birth of child, this effect is insignificant, however. A possible reason for the lower gender gap in the Netherlands, compared to other European countries, is that child policies differ greatly in the Netherlands. Another reason could be that the data from the household survey is not entirely representative for the whole country. Future research can look into long run child penalties up to twenty years and if individuals recover from the drop in income due to motherhood in the Netherlands.

The data used in this paper have a few problems. Firstly, household survey's in general suffer from some issues. Such as measurement errors, which can be substantial in a survey that has been running for over 20 years, this shouldn't be a big concern in this paper as long as the errors don't affect women more than men or vice versa. A second concern for the external

validity of the research is the limited amount of observation the survey offers. Although there're roughly 2.000 household who are questioned every year, there're only a limited amount of people who have children. When the data set is modified for the purposes in this paper, a fraction of the original observations is left. Other studies have used tax records for their analyses of the child penalty. Using this sort of data has a lot of advantages, as there's no question on how representative the data are. And there are (almost) no measurement problems. This type of data is unfortunately not available for the Netherlands.

The difference in the child penalty between European countries is remarkably big. Kleven et al. (2019) find that the Scandinavian countries have a long-term gap of 21-26 percent, while the German-speaking countries have a gap as high as 51 till 61 percent. The main finding of this paper is that long-term income gap in the Netherlands is 14 percent, meaning that the gap is lower than in other European countries. However, the methodology used in this paper is different from the event study methodology used for other European countries such as Kleven et al. (2019). Note that the penalty for the Netherlands is for both men and female, while the other studies mentioned above only find a penalty for mothers.

While only an additional 2 percent drop is found for mothers. Because of differences between countries, it is not possible to say anything meaningful about the results beyond the borders of the Netherlands. Furthermore, the huge differences between countries signals that the pay gap due to motherhood is determined by country specific factors, such as national culture or country specific policies. The child penalty differences in these countries are related mostly to different government policies, such as taxes, transfers, parental leave systems or childcare policies. Cultural factors are also important in determining magnitude of national child penalties. The Dutch Social and Cultural Planning Office finds that women still feel primary responsible for household chores and or care tasks, which makes them more likely to take care of their child as opposed to their partner. Kleven (2018) finds that child penalties are transmitted through generations, from parents to daughters. These findings suggest that the child penalty is also determined by cultural factors.

So, what could be done to limit the child penalty in the future? Andresen & Nix (2019) studied two policy measures in Norway and their role in reducing the gender pay gap due to motherhood. Parental leave for fathers is today a more common policy in European countries. Fathers in Norway get a 4-week period for parental leave, in Germany fathers get 8 weeks, Ireland has 14 weeks. In the Netherlands fathers only get 5 days of parental leave. Using a policy reform in Norway, Andresen & Nix (2019) find that paternity leave does not cause

fathers to parent more equally with mothers, at least not in a way that mothers experience less severe child penalties. Another family friendly policy measure often used is stimulating or subsidizing childcare. The authors use an instrumental variable to find that a full year of childcare reduces the child penalty by 25 percent. Supporting childcare seems the most promising policy tool to reduce the child penalty, although more research can be done to other policy measures.

A lot research has been done to study the income effects due to childhood for women. For both North America and most of Europe the child penalty has been studied in the recent years. Future research into the topic can focus on the underlying mechanism causing the child penalty. Another important aspect of the child penalty are the policy implications. Future researchers can focus on possible policy measures to lower the pay gap due to motherhood. In the Netherlands, a lot of new policies have been introduced in the recent years that impact the earnings of parents, but their effects on the child penalty have not been studied yet.

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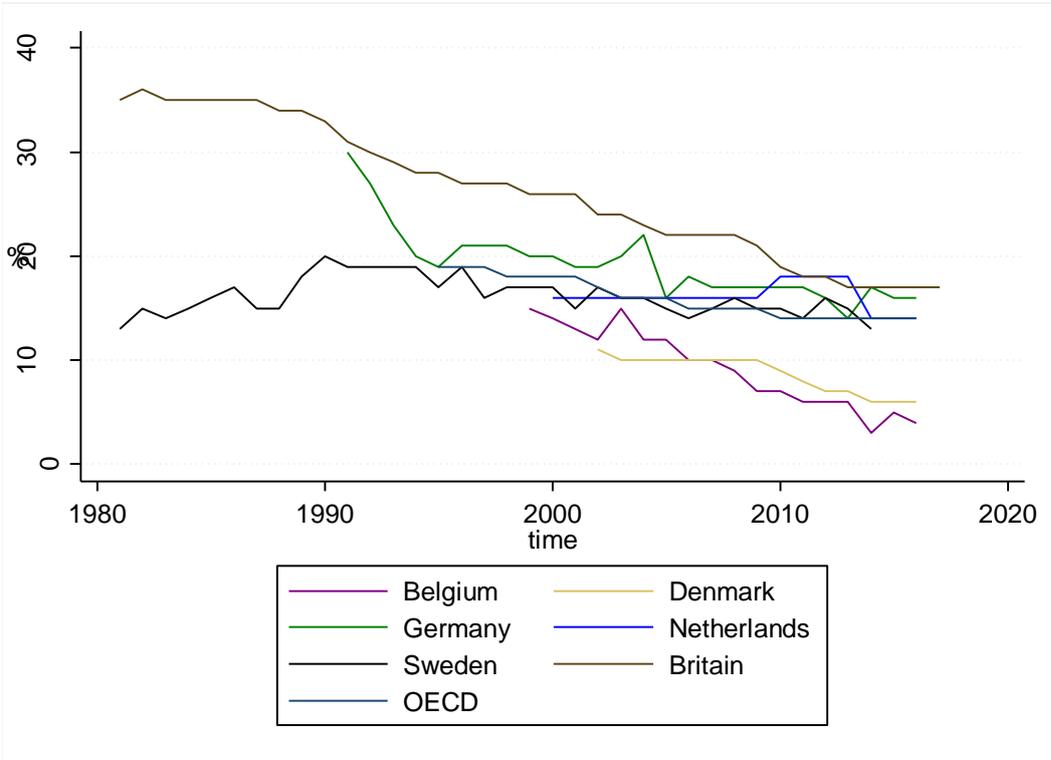
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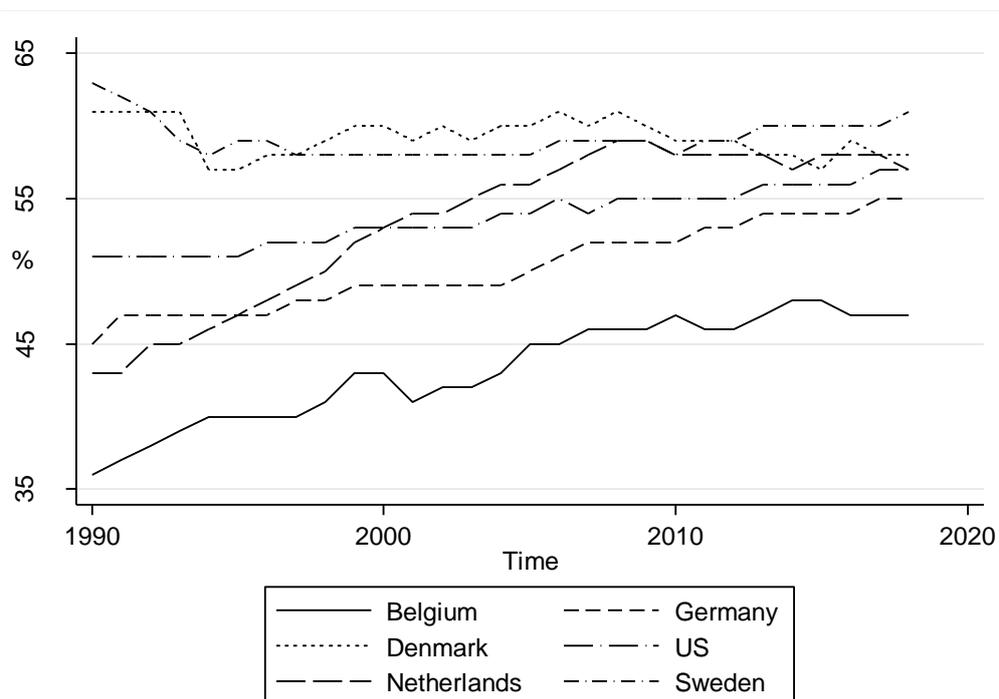
Appendix

Figure 1: Gender wage gap in European countries and OECD countries from 1980 till 2017.



Notes: The time series in figure 2 are drawn from OECD.org. The gender wage gap is defined as the difference between median earnings of men and women relative to median earnings of men. Data refer to full-time employees on the one hand and to self-employed on the other.

Figure 2. The labor participation rate in percentage in six European countries from 1990 till 2018.



Notes: The time series in figure 2 are drawn from OECD.org. The labor force participation rates are calculated as the labor force divided by the total working-age population. The working age population refers to people aged 15 to 64.

Table 1. highest level of education completed for men

	<i>Freq.</i>	<i>Percent</i>
Kindergarten/primary education	7	1,64
Continued special (low-level) education	6	3,83
Pre-university education [HAVO, VWO, At	15	3,28
Junior vocational training	25	8,2
Senior vocational training	54	29,51
Vocational colleges	44	24,04
Vocational colleges	3	1,64
University education	12	6,55
Vocational training through apprenticeship	5	2,73
Other sort of education/training	2	1,09
No education	2	1,09

Table 2. highest level of education completed for men

	<i>Freq.</i>	<i>Percent</i>
Kindergarten/primary education	1	0,61
Continued special (low-level) education	5	3,03
Pre-university education [HAVO, VWO, At	13	7,88
Junior vocational training	25	15,15
Senior vocational training	23	13,94
Vocational colleges	43	26,06
Vocational colleges	36	21,82
University education	2	1,21
Vocational training through apprentice	11	6,67
Other sort of education/training	1	0,61
No education	1	0,61