

Children and Gender Inequality

Evidence from Switzerland

Term Paper

Faculty of Economics and Management

University of Lucerne

submitted by

Lucas Tschan

passed, spring 2018

Luzern, 2019

DOI Lucerne Open Repository LORY: <https://doi.org/10.5281/zenodo.2608742>



Dieses Werk ist lizenziert unter einer Creative Commons Namensnennung 4.0 International Lizenz

I. Abstract

Despite significant international initiatives, the gender wage gap seems to persist and in the more recent past has even shown effects of reinforcement. While traditional factors such as education, at least in developed countries, seem to play a negligible role, more modern influences such as the division of labor, mostly based on the birth of children, are having an impact on wage discrepancies between men and women. Using data from the Swiss Household Panel, this paper analyses if this so-called motherhood wage penalty for women exists in Switzerland and what its effects are. The findings from the event-driven regression method show, that depending on the years since the birth of the first child, women earn between 20 and 40% less than men, controlling for characteristics such as age, education and labor-related features. According to the analysis, most of the motherhood wage penalty is due to a significant reduction in women's workload compared to men's, which also results in lower career opportunities. Furthermore, findings from robustness checks show that even when controlling for full-time individuals, there seems to be a motherhood wage penalty, as women's wages tend to grow at slower rate than men's after the birth of the first child.

II. Table of contents

| | |
|--|----|
| I. Abstract..... | 2 |
| II. Table of contents..... | 3 |
| III. Table of figures | 3 |
| IV. List of tables..... | 4 |
| 1. Introduction | 5 |
| 1.1. Starting position..... | 5 |
| 1.2. Goal of the term paper..... | 5 |
| 1.3. Methodological approach..... | 6 |
| 1.4. Structure of the term paper..... | 6 |
| 2. Literature review | 6 |
| 2.1. The early days of wage discrimination | 6 |
| 2.2. Introducing the motherhood child penalty | 7 |
| 2.3. The Swiss labor market and its impact on the gender wage gap..... | 9 |
| 3. Research design | 10 |
| 3.1. Database and data | 10 |
| 3.2. Econometric model and estimation method | 11 |
| 4. Results | 13 |
| 4.1. Main results | 13 |
| 4.2. Robustness checks | 16 |
| 5. Conclusion..... | 17 |
| V. List of references | 19 |
| VI. Annex..... | 20 |

III. Table of figures

| | |
|---|----|
| Figure 1: Degree of employment of women and men in Switzerland 1991 and 2017. Source: BfS (2018)..... | 9 |
| Figure 2: Distribution of main and control variables according to gender. Own calculations with data from the Swiss Household Panel (2017)..... | 13 |
| Figure 3: Development of the mean of the logarithmic income for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). | 15 |
| Figure 4: Development of mean yearly net income (in CHF) for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). | 20 |
| Figure 5: Development of mean hours worked per week for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017)..... | 20 |
| Figure 6: Development of mean hours per week for housework for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). | 21 |
| Figure 7: Development of mean wage rate for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017)..... | 21 |
| Figure 8: Development of yearly net income in logs for fulltime working men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). | 21 |

Figure 9: Development of yearly net income in CHF for fulltime working men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). 22

Figure 10: Development of the mean of the logarithmic income for single and married women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). 22

Figure 11: Development of the mean of the logarithmic income for Swiss and foreign women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). 22

Figure 12: Development of the mean of the logarithmic income for women working in private and public sector in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017). 23

IV. List of tables

Table 1: Set of conditioning variables chosen for the econometric model..... 13

Table 2: Descriptive statistics of selected control variables..... 13

Table 3: Regression results of main econometric model. Own calculations with data from the Swiss Household Panel. 14

Table 4: Regression results of econometric model adjusted with the yearly net income in CHF as dependent variable. Own calculations with data from the Swiss Household Panel. 24

Table 5: Regression results of econometric model adjusted with the wage rate in logs as dependent variable. Own calculations with data from the Swiss Household Panel. 25

Table 6: Regression results of robustness check 1 comparing women with a first child and women without a first child. Own calculations with data from the Swiss Household Panel. 26

Table 7: Results from OLS regression of main explanatory variable and control variables on dependent variable. Own calculation with data from the Swiss Household Panel. 27

1. Introduction

1.1. Starting position

Despite strong efforts from governments and increasingly also private companies, the gender pay gap seems to persist. In many countries it is constitutional illegal to discriminate people with comparable education, age and background based on their gender. According to Arrow (1973), discrimination is often mentioned in economic literature when characteristics are used to evaluate a worker that are not related to their productivity. However, according to the World Economic Forum [WEF] latest Gender Gap Report (2017), the gender pay gap is rising, because men are still being paid much more than women and their earnings are increasing more rapidly. Reasons for this discrepancy are numerous and academic research is eager to shed some light on it.

One specific research topic is the wage penalty for motherhood. Due to biological reasons, women are meant to carry out the child and are accompanied by social norms that lead to an ex-ante or ex-post wage decline. Kleven et al. (2017) presented results of the effect of the arrival of a first child on wages using Danish administrative data from 1980-2013 in an event study approach. They found that the arrival of children creates a gender gap in earnings of around 20 % in the long run, driven in roughly equal proportions by labor force participation, hours of work, and wage rates and that the fraction of gender inequality caused by child penalties has increased dramatically over time. Therefore, it would be interesting to see, if the same phenomenon exists in Switzerland.

1.2. Goal of the term paper

This term paper aims to reproduce the results from Kleven et al. (2017) using data from the Swiss Household panel to research the question if the first child penalty described in the study is also relevant for the gender wage gap in Switzerland. According to the Swiss Federal Statistical Office (Bundesamt für Statistik [BfS]) (2017), women on average earned 17.5 % less than men based on the 2014 wage structure survey¹. 58 % of this difference (or 10.1 percentage points) can be explained, because women and men differ in their objective characteristics, i.e. in terms of qualification, personal characteristics, professional position and profession, company size, sector, region and other wage-relevant characteristics. However, 42 % (or the remaining 7.4 percentage points) cannot be explained through any equipment attributes. Therefore the goal of this term paper is to research, if the birth of the first child has a significant negative effect on wages for women (compared to men) and could be used as an explanatory

¹ The Swiss Wage Structure survey is conducted every two years and grasps 1.6 million wage payments from 32,000 public and private companies.

variable, the so-called motherhood wage penalty, for the inexplicable share that women earn less than men over the short to medium-run.

1.3. Methodological approach

The term paper contains a mix between extensive literature research on the topic, as well as a comprehensive data regression and analysis section. The literature review will lay the ground by introducing the topic of gender wage gap and gender wage discrimination, followed by a review of existing articles regarding motherhood penalties from different countries. The quantitative part of this term paper will use data from the Swiss Household Panel, a dataset with longitudinal data to study social change, being backed by representative surveys executed every year, to estimate the regression model using wage as the dependent variable and the birth of the first child as the main explanatory variable.

1.4. Structure of the term paper

The term paper will start with a broad overview of the past and current academic literature regarding wage discrimination and the gender wage gap. The focus will be to first see different argumentations about the question if there is a gender wage gap in the first place. Afterwards, different theories which explain the gender wage gap are highlighted. The academic review closes with evidence about motherhood penalties from different countries, as this topic will be the subject of the quantitative analysis of this term paper, as well as a short introduction into the Swiss labor market and the signs of wage discrimination based on gender. Chapter 2 will explain the research design of this term paper. After a short introduction into the database from the Swiss Household Panel and descriptive statistics, the econometric model and estimation method used will be discussed. Chapter 3 presents the results of the econometric regression and allows for further robustness checks. Chapter 4 will conclude this term paper with a summary of the qualitative and quantitative findings made and critically reviews them. Last but not least, the term paper will touch upon the question of further research.

2. Literature review

2.1. The early days of wage discrimination

Academic findings suggest, that the question around the gender wage gap should not be if it really exists but what factors can explain it. Empirical evidence is just too numerous to argue the topic away. Academic literature can be divided into two main parts: In the early days, literature tried to explain the gender wage gap with traditional factors influencing the labor market, for example education and active discrimination at the workplace. However, after many important reforms on many levels and regulatory efforts to prevent gender discrimination when it comes to wages, the gender wage gap persisted and academia tried to focus on more less obvious factors.

The early literature on gender inequality in the labor market focused on the role of human capital and discrimination (see for example Aigner & Cain (1977) or Altonji & Blank (1999)). Amongst these, labor force participation rates were amongst the main factors influencing the gender wage gap. Decades ago, women were generally underrepresented in the labor market. Socio-economic developments, which occurred after the end of World War II, led to a higher female participation rate in the labor market and rising wages for women (Blau & Kahn, 2007). Furthermore, other factors such as greater availability of market substitutes for home work and improvements in household technology made it possible for women to slowly enter the labor market in large proportions (Greenwood et al., 2005). However, already in this phase of rapid convergence of wages, that traditional key variables such as key wage and income variables, could not fully explain the observed increases (Blau & Kahn, 2007).

Education used to be another explanatory factor regarding the gender wage gap in the past (Blau & Kahn, 2016). However, since the 1980s and socio-economic changes like birth-control, women have surpassed men in almost every education level, in most developed and increasingly also in developing countries (Becker et al., 2010). Also, an ancient myth, that lower mathematic and natural sciences skills could be explanatory factors, has been debunked: For example, Fortin (2008) showed, that differences in mathematic scores for US-based high school graduates, explained below 1 % of the gender pay gap.

Socio-economic changes, investments in education facilities and many regulatory efforts as the implementation of anti-discrimination policies should have laid the ground for women to earn the same wages as men. And it seemed to have been fruitful at first: According to Blau & Kahn (2008), especially in the 1980s there was a convergence of wages of men and women. However, the trend seems to have stopped: According to the World Economic Forum [WEF] latest Gender Gap Report (2017), the gender pay gap is rising, because men are still being paid much more than women and their earnings are increasing more rapidly. Therefore, academia focused on researching less obvious factors which influenced wages of women and men differently. In doing this, it became obvious that children are a main explanatory factor when it comes to wage discrimination.

2.2. Introducing the motherhood child penalty

The division of labor in the individual family has been identified as one of the remaining major factors influencing the gender wage gap. Under a traditional division of labor by gender in the family, women will anticipate shorter and more discontinuous work lives as a consequence of their family responsibilities; they will thus have lower incentives to invest in on-the-job training than men. Their resulting smaller human capital investments and reduced labor market experience will lower their relative earnings (Blau & Kahn, 2016). Human capital depreciation during workforce interruptions will further lower the wages of women upon their return to market

work. Women are also expected to choose occupations for which human capital investments are less important and in which the skill depreciation that occurs during time spent out of the labor force is minimized (Polachek 1981).

Naturally, the main factor influencing the labor division in a family are children. The causal chain between children and women's earnings has many excrescences and has become to be known as the motherhood wage penalty. For example, once a child is born, more women than men decide to stay at home or reduce their degree of employment. The OECD Labour Force Statistics (2017) shows, that in OECD countries only 44.4 % of women are currently employed, compared to 55.6 % of men. Furthermore, for the employed population, four out ten women work part-time but only one out of ten men, and the female share of aggregated part-time employment in 2016 was 68.8 %. Part-time employment has a direct effect on wages, as average hourly earnings are lower than for full-time employees (Hirsch, 2005). Furthermore, the birth of children increases the likelihood that women interrupt their careers and thus accumulate less tenure and work experience than they would have without children (Gangl & Ziefle, 2009). Less work experience and being employed part-time decreases the incentive for mothers – and their employers – to invest in training and further education (Polavieja, 2012 or Blau & Kahn, 2016). As a result, motherhood may slow down the growth in job-specific skills and lead to flatter career trajectories, resulting in lower wage expectations (Oesch et al., 2017). Moreover, working mothers can be discriminated only because of having a child: In a survey-based research paper, Oesch et al. (2017) also showed that that Swiss recruiters assign wages to mothers that are 2 % to 3 % below those of nonmothers. According to the study, this results from prejudices, assuming that women with children are less productive than women without children. Similar findings were made in Shelley et al. (2007), which conducted a laboratory experiment, letting participants evaluating application materials for a pair of same-gender equally qualified job candidates who differed on parental status. They found, that that mothers were penalized on a host of measures, including perceived competence and recommended starting salary.

Therefore, it comes with no surprise, that considerable empirical evidence indicates a negative relationship between children and women's wages, commonly known as the motherhood wage penalty (Sigle-Rushton & Waldfogel, 2007). Kleven et al. (2017) suggest that 80 % of the remaining, inexplicable wage difference between men and women in Denmark can be explained by child penalties faced by women and not by men. Fitzenberger et al. (2013) used a dynamic treatment approach to find that a child causes a sizeable employment loss for women in Germany. Buligescu et al. (2008) estimated a child wage penalty for women resulting from maternal leave of 10 to 14% in Germany, using panel data methods designed to address problems of sample selectivity, unobserved heterogeneity and endogeneity. Cristia

(2008) used a sample of women from the National Growth (NSFG) in the United States, who sought help to become pregnant, to address the issue of endogeneity. His results using this estimation procedure, showed that having a first child younger than one year old reduces female employment by 26 percentage points, therefore being consistent with traditional OLS estimations and empirical evidence.

2.3. The Swiss labor market and its impact on the gender wage gap

Before introducing findings regarding the motherhood child penalty with data from the Swiss Household Panel in this term paper, it is important to understand the functioning of the Swiss labor market. According to Oesch et al. (2017) the Swiss labor market is characterized by a strong reliance on vocational education, close links between education and employment, collective bargaining at the industry level, and low unemployment. In terms of family policy and public support, Switzerland is not very supportive for parents and mothers in special. Swiss legislation only provides for 14 weeks of paid maternity leave (compared to the OECD average of 18 weeks), and there is no statutory right to either parental leave for fathers or subsidized childcare. Institutional childcare is expensive and covers a minority of children below 4 years. These factors may contribute to the differences in Swiss employment: The employment rate for men in Switzerland is significantly higher than for women: 76 % of the male and 61 % of the female population aged 15 and over are employed or looking for a job. The employment rate of women aged 30 to 45 and over and 55 years is significantly lower than that of men (BfS, 2013). Furthermore, Switzerland is amongst the OECD countries with the highest share of women being employed part-time (OECD 2017). According to the BfS (2018), currently, six out of ten employed women work part-time, but only 1.7 out of ten men, as the figure below shows:

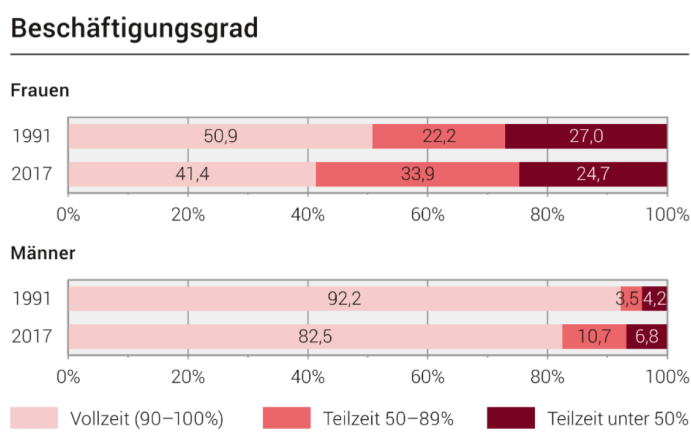


Figure 1: Degree of employment of women and men in Switzerland 1991 and 2017. Source: BfS (2018).

Comparing ratios between 1991 and 2017 it can be seen, that less women and men are working full-time, and more women and men are working part-time, but the part-time ratio is still

skewed heavily towards women. According to the BfS (2013), the degree of employment for women aged between 30 and 45 is significantly lower than for men in the same age. These statistics suggest, that many women decide to reduce their degree of employment or quit their job at least temporary, as soon as a child is born.

Combining these statistics and academic findings related to the gender wage gap, it comes with no surprise, that women in Switzerland on average earn less than men. According to the BfS (2017), women on average earned 17.5 % less than men based on the 2014 wage structure survey. 58 % of this difference (or 10.1 percentage points) can be explained, because women and men differ in their objective characteristics, i.e. in terms of qualification, personal characteristics, professional position and profession, company size, sector, region and other wage-relevant characteristics. However, 42 % (or the remaining 7.4 percentage points) cannot be explained through any equipment attributes. Detailed analysis show, that the gender wage gap fluctuates strongly between sectors, but it persists (BfS, 2013).

The next section will therefore combine the methodological approach from Kleven et al. (2017) regarding the motherhood wage penalty occurring from the birth of the first child and Swiss data from the Swiss Household Panel to show if there exists a motherhood wage penalty in Switzerland.

3. Research design

3.1. Database and data

To measure the motherhood wage penalty occurring from the birth of the first child for Swiss women, data from the Swiss Household Panel is used. As the name suggests, data is obtained in panel format. The original dataset contains information on a total of 226,117 person-year observations in the time period between 1999 and 2016. The survey always takes place in a temporal rhythm with the same households or persons, i.e. always with the same panel.

To obtain comprehensive results, the dataset has to be adjusted in several ways. In a first step, all surveyed persons without an occupation are removed from the data set, as the intention is to measure the effect of the birth of a first child on wages, which are only paid out to employed people. In doing so, the survey is left with 92,396 person-year observations with an active occupation and 45,446 person-year observations are deleted from the data set as they are labelled as unemployed or not being part of the workforce (e.g. because they are studying full-time or retired). Furthermore, all non-parents have to be removed from the database and time indicators for the birth of the first child have to be created separately for men and women. As every respondent can be identified with an identification number throughout the entire time period, this allows for the exact determination of the year of the birth of the first child and therefore also for the time period of 5 years before and 10 years after. In doing so, 83,509

observation are deleted from the database, leaving us with 8,887 observations, which had a first child in the selected time period. These observations are distributed over 911 individuals (491 men and 420 women) who had a first child in the observed time frame. Please keep in mind, that this database cleaning means less data, which will, amongst other restrictions, result in weaker robustness checks as well as broader confidence intervals when testing the hypothesis.

3.2. Econometric model and estimation method

The goal of this section is to find a model, that estimates the effect of the birth of the first child separately for women and men and has adequate control variables. To do so, the term paper will follow an event driven approach, with the birth of the first child being the specified event and the cofounder variable. The unique identification number of every respondent and the determination of the year of the birth of the first child (using the existing variable “new baby” in the dataset and the total number of kids reported in the survey), are used to create time indicator variables for men and women. For each parent, in the data $t = 0$ determines the year in which the individual has his/her first child and index all years relative to that year. The baseline specification explained in the section above, considers a balanced panel of parents which are observed every year between 5 years before having their first child and 10 years after, and so event time t runs from -5 to +10. This approach will allow to observe if there is indeed a motherhood wage penalty in Switzerland, as the wages for men and women can be observed before and after the birth of the first child.

Critics may argue, that fertility choices are not exogenous and therefore the model and estimation method is biased by endogeneity. However, according to Kelven et al. (2017), the event of having a first child generates sharp changes in labor market outcomes that are arguably orthogonal to unobserved determinants of those outcomes as they should evolve smoothly over time. Furthermore, the chosen event study approach has the additional advantages of tracing out the full dynamic trajectory of the effects, and of being very precise as it exploits individual-level variation in the timing of first births.

In addition, adequate and relevant control variables are needed, to rule out other reasons which might affect earnings and create a gender wage gap. Based on the literature review, the following control variables have been chosen:

- The causality between **age** and earnings is well-known: In general, the older people are, the more experience they have and the higher wages they are paid. However, at a certain higher age, wage starts to increase at decreasing rate, as people become older and they will not be so healthy to work as before. At some point the wage does not grow anymore, as it has reached the optimal wage level and then starts to fall, especially after retirement. This indicates a negative U-shaped function. Therefore, adding the **squared value of age** adds non-linearity to the model.
- As described in the literature, after giving birth to a child, women are more likely to work part-time than men. Evidence for this phenomenon is strong, especially in Switzerland. Therefore, a dummy variable to control for the effects of **full-time employment** is introduced.
- The literature review has shown, that **education** used to be strong explanatory factor for the gender wage gap. Furthermore, findings from economics of education suggest that education has a positive influence on earnings. Running a simple regression of education on yearly income for the Swiss household panel shows a significant positive effect.
- Important factors influencing the working career and therefore also earnings are if the person is charged with **supervisory** tasks or/and involved in the **decision making**. Both variables are associated with positive effect on earnings. Furthermore, literature suggests that most of these jobs are still predominately done by men.

The use of these control variables is justified by the results of a simple regression of them against the dependent variable yearly net income in logs (regression 1) compared to the regression not using them (regression 2). In both regressions, the main explanatory variable remains “female”.

As it can be seen from table 7 in the annex, all control variables have the expected effect on the dependent variable, are entirely significant at the 1 % level and reduce the gender wage gap significantly. However, already controlling for several factors, there remains a gender wage gap of about 20 % for women compared to men. Therefore, combining the generated time indicators for the birth of the first child for each gender and the control variables, the econometric model to estimate the motherhood wage penalty looks as follows:

$$LN(Y_{it}) = \beta_0 + \beta_1 TIME + \beta_2 CONTROLS_{it} + u_{it}$$

The dependent variable on the left-hand side of the equation remains the yearly income in logs. The main independent variables are the described time indicators on the right-hand side of the equation and are completed with control variables, as well as the error term. To conclude, table 1 presents a summary of the set of control variables chosen, table 2 some descriptive statistics of the control variables (excluding the dummy variables described above) and figure 2 the percentage distribution of the selected variables already based on the reduced database. As a remark, figure 2 confirms what we have seen in the literature review: women are much more likely to work part-time compared to men and are also less represented in

“important” jobs (measure with the supervisory tasks and decision-making variables). The distribution of new born children over the reduced dataset is equal, an advantage for our analysis.

| Variable | Description |
|-------------|--|
| Age | Age in numbers of the respondents in the year of the interview |
| Age squared | Age in numbers (squared) of the respondents in the year of the interview |
| Fulltime | Dummy variable to indicate if the person works fulltime or not |
| Education | Years of Education based on ISCED Classification |
| Supervisor | Dummy variable to indicate if the person has a job with supervisory tasks |
| Decision | Dummy variable to indicate if the person has a job with participation in decision making |

Table 1: Set of conditioning variables chosen for the econometric model

| Variable | Observations | Mean | Standard Deviation | Min. | Max. |
|----------------------|--------------|--------|--------------------|--------|---------|
| Net income (in logs) | 8,361 | 10.852 | 0.8184 | 4.8675 | 14.7034 |
| Age | 8,887 | 34.878 | 7.6622 | 14 | 83 |
| Education (in years) | 8,887 | 14.772 | 3.1037 | 8 | 21 |

Table 2: Descriptive statistics of selected control variables

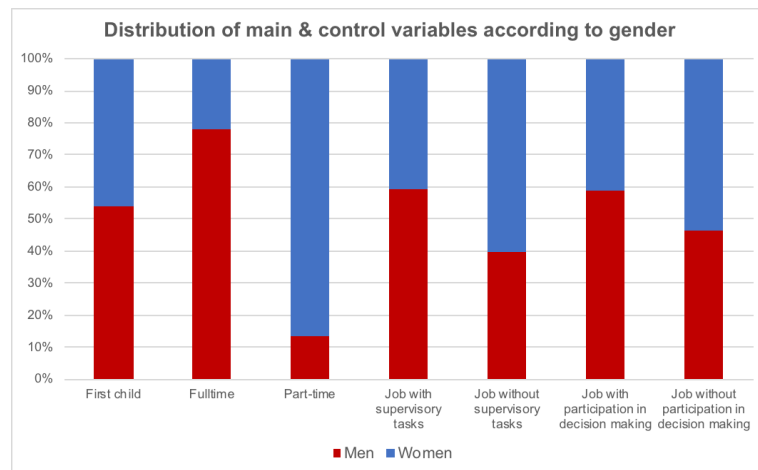


Figure 2: Distribution of main and control variables according to gender. Own calculations with data from the Swiss Household Panel (2017).

4. Results

4.1. Main results

Table 3 presents the results from the main regression model, showing separately the effects of the time indicator variables before and after, as well as in the exact year of the birth of the first child for men and women. The data already shows, that while the coefficients for men are positive and all significant on the 1 % level, coefficients for women are also positive (but not significant) in the time period before the birth of the first child, but negative (and significant on the 1 % level) in the year and in the time period after.

Children and Gender Inequality:
Evidence from Switzerland

| Regressors | (1) |
|---|----------------------------|
| Time indicator men, 2-5 years before birth of first child | -0.12899*** (0.02964) |
| Time indicator men, 1 year before birth of first child | 0.13302*** (0.03712) |
| Time indicator men, in the year before birth of first child | 0.20537*** (0.02993) |
| Time indicator men, 1 year after birth of first child | 0.24321*** (0.03099) |
| Time indicator men, 2-5 years after birth of first child | 0.23412*** (0.02903) |
| Time indicator men, 6 years and more after birth of first child | 0.26467*** (0.03127) |
| Time indicator women, 2-5 years before birth of first child | 0.00967 (0.02462) |
| Time indicator women, 1 year before birth of first child | 0.02735 (0.03844) |
| Time indicator women, in the year before birth of first child | -0.21636*** (0.04182) |
| Time indicator women, 1 year after birth of first child | -0.39734*** (0.04846) |
| Time indicator women, 2-5 years after birth of first child | -0.40042*** (0.03168) |
| Time indicator women, 6 years and more after birth of first child | -.43926*** (0.02827) |
| Age | 0.10878*** (0.01046) |
| Age squared | -0.00115*** (0.00014) |
| Fulltime employment | 0.58847*** (0.01724) |
| Education in years | 0.05040*** (0.00207)*** |
| Decision making tasks | 0.10397*** (0.01233) |
| Supervisory tasks | 0.14732*** (0.01273) |
| Constant | 7.2486 (0.16756) |
| Observations | 7,366 |
| R-squared | 0.5464 |

Dependent variable: Yearly net income in logs

Robust standard errors in parentheses.

*significant at the 0.10 level, ** significant at the 0.05 level, ***significant at the 0.01 level

Table 3: Regression results of main econometric model. Own calculations with data from the Swiss Household Panel.

Furthermore, the impact on the earnings is relatively high. For better illustration purposes, figure 3 shows the development of the mean of the logarithmic yearly net income for men and women separately:

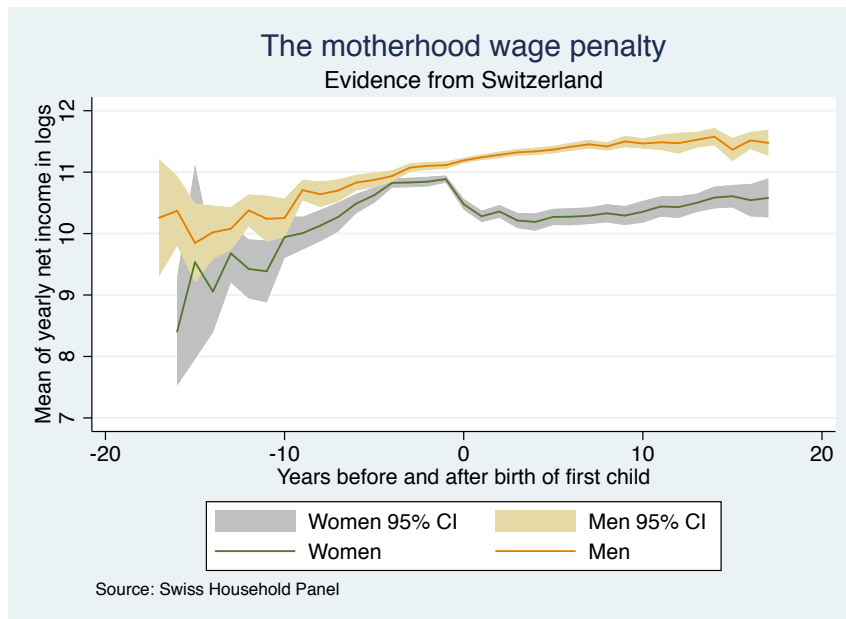


Figure 3: Development of the mean of the logarithmic income for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

As it can be seen from the figure above, the mean of logarithmic yearly net income for men and women tend to develop upwards and in parallel, although with a persisting gap, which is an indicator for a gender wage gap independently of the birth of a child. Interestingly the gap seems almost be closed right before the year when the birth of the first child occurs. What happens next, is similar to the findings from Kleven et al. (2017). While mean logarithmic yearly net income for men continue to develop upwards, mean logarithmic yearly net income for women fell drastically. Actually, in the year of the birth of the first child, the effect on the mean of women's earnings compared to men's is -20 %, in the year after -39 % and in the years after -40 %. In addition, figure 4 in the annex shows the development on the real mean income, which states a significant drop on the median of yearly net income for women of CHF -9,250 in the year of the birth of the first child and end to be almost CHF 20,000 lower compared to men in the years 1 to 5 after the birth of the first child (see table 4 in the annex for details).

The natural question arises, where does this effect come from? A logical explanation would be that women reduce their workload and start to work part-time after the birth of the first child. As the literature review and statistics from the Swiss labor market have shown, women tend to work more part-time than men. This also applies for the sample, as it can be seen in figure 2. To check if the choice to work part-time is connected to the birth of the first child, the model is adjusted so that Number of hours worked per week becomes the dependent variable. Evidence shown in figure 5 in the annex is striking: In the year of the birth of the first child, the mean of hours worked per week for women drops from slightly below 40 hours per week to slightly above 20 hours per week – almost a halving – while the mean of hours worked for

men remains constant around the norm of 42 hours per week. Furthermore, even several years after the birth of the first child, the mean hours worked per week for women do only increase slightly again, but not reaching the level before, not even ten years later. Compared to results from Kleven et al. (2017) the motherhood penalty on hours worked per week seems to be stronger in Switzerland than in Denmark, which would be in line with statistics from BfS (2018). Furthermore, as figure 6 in the annex shows, women exchange paid work in the labor market for unpaid housework at home.

Following Kleven et al. (2017), the effect of the birth of the first child on wage rates may also be a contributing factor to the motherhood wage penalty. The wage rate is calculated by dividing the (logarithm) yearly net income by 12 (number of months per year) and 4.34 (average working weeks calculated by dividing total weeks of a year by total months of year). Figure 7 in the annex shows the development of the mean wage rate for women and men separately. Again, before the birth of the first child, the logarithmic wage rate seems to rise in parallel, with an almost not existing gender gap. After the birth of the first child, women's wage rates seem to stagnate, while men's wage rates continue to rise upwards, creating a wider gap. However, as the regression output in table 5 shows, all of the coefficients for women and most for men are not significant, therefore the interpretation regarding the impact of the wage rate has to be made cautious.

4.2. Robustness checks

This section contains three robustness checks, in which the database is adapted to see if the results change significantly compared to the main estimation results above. First, to account for the strong effect of the reduction in workload, the sample is further reduced to fulltime working observations only. In doing so, the number of person-year observations is further reduced to 4,331. As figure 8 in the annex shows, the pattern is slightly different as for the full sample, but the outcome seems to be the same. First, the distribution of yearly net income in logarithm is narrower than in the full sample, which is understandable as part-time employed people earning significantly less are excluded from the sample. Second, the gender wage gap before the birth of the first child is wider than in the full sample, indicating a stronger discrimination of women in fulltime and often better paid jobs. Third, even though there seems to be a drop in wages for women (which might be due to the construction of the time variables which summarize the years 2 to 5 after the birth of the first child in one dummy), there is actually a slightly upward trend compared to the year 0 (which indicates the year of the birth of the first child). Nevertheless, the combination of the wider gender pay gap before the birth of the first child and the stronger increase of wages for men after the birth of the first child (compared to the full sample) also produce a motherhood wage penalty for fulltime working women. The second part of the argumentation becomes even clearer if the development of the yearly net

income in CHF is compared to the development for the full sample (see figure 9). Coefficients in both regressions are statistically significant.

The second robustness check contains a comparison of the development of wages for women without kids throughout the same time period in which another part of the women gives birth to her first child. As it can be seen from table 6 in the annex, even though the results for women without a first child in the later years are not significant, the previous results are (for women with a first child all results are significant at least on the 10 % level). It can be seen, that women with a first child (meaning at least one child during their entire lifetime) suffer from a motherhood wage penalty compared to women who never have any children.

The third robustness check will look at socio-economic differences in the sample. Here it makes sense to compare women with women only, to control for specific socio-economic attributes. The selected attributes are civil status, nationality and form of employer (private or public). To do so, new control variables which function as dummy variables are created to indicate if a woman is married or not, Swiss or foreign and with a low respectively high social status. Results are displayed in figures 10-12 in the annex. Unfortunately, the reduction to female samples (the already reduced sample is again halved) only leads to mostly insignificant results in regression results. Furthermore, the observable effects are smaller compared to the effects described in the main results. Therefore, the insights from the robustness checks are limited to the fact, that the birth of the first child has negative consequences for wages for all controlled socio-economic factors (e.g. it does not matter if a woman is married or not, her wage will go down after the birth of the first child) and given the low significance values of the regression outputs, causes must be attributed to the reasons highlighted in the main results.

5. Conclusion

As this paper has shown, despite significant international initiatives, the gender wage gap seems to persist and in the more recent past has even shown effects of reinforcement. While traditional factors such as education, at least in developed countries, seem to play a negligible role, more modern influences such as the division of labor, mostly based on the birth of children, are having an impact on wage discrepancies between men and women. This paper had the goal to reproduce the methodological approach of Kleven et al. (2017), which showed that the motherhood wage penalty in Denmark is significant, with data from the Swiss Household Panel. The main model shows a significant negative impact of the birth of the first child on wages for women, while wages for men remain unaffected by the same event. In numbers, women experience a loss of over 20% (or CHF 9,200) of mean yearly net income compared to men's mean yearly net income in the year of the birth of the first child and 39% (or CHF 17,000) in the first year after the birth of the first child. Furthermore, the medium-run analysis

shows that women are not able to close this gap created by the birth of the first child. According to the decomposition of the results, the cause for this income loss is mostly due to the reduction of workload (mean data shows that women tend to halve their workload compared to men after the birth of the first child). Data also shows that women do not catch up in terms of workload even ten years after the birth of the first child, which might be a key take-away from this study. Another cause, even though with smaller effects, is the reduction in the hourly wage rate, which for women is growing more slowly compared to men's after the birth of the first child. Furthermore, the most interesting insight from the robustness checks calculations, is that even when controlling only full-time women and men (to control for the effects of workload reduction) there seems to be a motherhood wage penalty, as wages for women after the birth of the first child start to increase at a more decreasing rate than the wages for men. This might be an indicator for active discrimination at the working place (as for example shown in Oesch et al., 2017) or for the decision of women to apply for less paying jobs after the birth of the first child. This also becomes relevant looking at the results comparing women with and without a first child, where women without a first child do not suffer a motherhood wage penalty. Nevertheless, it must be stated that the results obtained in most of the robustness checks are not significant and therefore have limited explanatory power.

This paper has shown, that there exists a motherhood penalty in Switzerland. The causality behind this "phenomena" is difficult to explain with the obtained results. It seems clear, that a significant portion of the loss in mean wages is attributed to the reduction in workload for women. However, the question remains, looking at the relevant dataset, why women across all population groups tend to reduce their workload so drastically and take into account a significant, life-long loss in income? This question should be considered if further research is being conducted on this topic. Furthermore, it would be interesting to research more deeply the dynamics behind the career choices of full-time working women with children, compared to men, as this paper has shown that there also exists a motherhood wage penalty for full-time working women. Last but not least, further work should highlight the consequences for welfare and future generations of girls, who are raised up in what still seems to be a very traditional environment of labor division.

V. List of references

- Aigner, D. J. & Cain, G. G. (1977). Statistical Theories of Discrimination in Labor Markets. *Industrial & Labor Relations Review*, 30(2), p. 175–187.
- Altonji, J. G. & Blank, R. M. (1999). Race and Gender in the Labor Market. Chap. 48, pages 3143–3259 of: Ashenfelter, O., & Card, D. (eds), *Handbook of Labor Economics*, vol.3. North Holland: Elsevier Science Publishers.
- Arrow, K. (1973). The Theory of Discrimination. In: Ashenfelter, O. & Rees, A. *Discrimination in Labor Markets*, New Jersey: Princeton University Press.
- Becker, G. S., Hubbard, W. H. J., & Murphy, K. M. (2010). Explaining the Worldwide Boom in Higher Education of Women. *Journal of Human Capital* 4(3), p. 203–41.
- Blau, F. D. & Kahn, L. M. (2016). The Gender Wage Gap: Extent, Trends, and Explanations. *NBER Working Paper No. 21913*.
- Blau, F. D. & Kahn, L. M. (2008). Women's Work and Wages. In *The New Palgrave Dictionary of Economics*, 2nd ed., edited by Durlauf, S. N. & Blume L. E., 762– 772. London: Palgrave Macmillan.
- Blau, F. D. & Kahn, L. M. (2007). Changes in the Labor Supply Behavior of Married Women: 1980–2000. *Journal of Labor Economics* 25(3), p. 393-438.
- Bundesamt für Statistik [BfS] (2018). Teilzeitarbeit. <https://www.bfs.admin.ch/bfs/de/home/statistiken/wirtschaftliche-soziale-situation-bevoelkerung/gleichstellung-frau-mann/erwerbstaetigkeit/teilzeitarbeit.html> [29.07.18]
- Bundesamt für Statistik [BfS] (2017). Analyse der Löhne von Frauen und Männern anhand der Lohnstrukturerhebung 2014. Bern.
- Bundesamt für Statistik [BfS] (2013). Auf dem Weg zur Gleichstellung von Frau und Mann. <https://www.bfs.admin.ch/bfs/de/home/statistiken/kataloge-datenbanken/publikationen.assetdetail.349118.html> [29.07.18]
- Fitzenberger, B., Sommerfeld, K. & Steffes, S. (2013). Causal effects on employment after first birth — A dynamic treatment approach. *Labour Economics*, 25, p. 49-62.
- Fortin, N. M. (2008). The Gender Wage Gap Among Young Adults in the United States; The Importance of Money Versus People. *Journal of Human Resources* 43(4), p. 884–918.
- Greenwood, J., Seshadri, A. and Yorukoglu, M. (2005). Engines of Liberation. *Review of Economic Studies*, 72(1), p. 109–133.
- Hirsch, B. T. (2005). Why Do Part-Time Workers Earn Less? The Role of Worker and Job Skills. *Industrial & Labor Relations Review*, 58(4), p. 525-51.
- Kleven, H. J., Landais, C. and Søgaaard, J. E. (2017). *Children and gender inequality: Evidence from Denmark*. Working Paper 24219, National Bureau of Economic Research.
- OECD (2017). OECD Labour Force Statistics. https://read.oecd-ilibrary.org/employment/oecd-labour-force-statistics-2017_oecd_lfs-2017-en#page1 [20.07.18]
- Oesch, D., Lipps, O. & McDonald, P. (2017). The wage penalty for motherhood Evidence on discrimination from panel data and a survey experiment for Switzerland, *Demographic Research*, 37, p. 1793-1824.
- Polachek, S. W. (1981). Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure. *Review of Economics and Statistics*, 63(1), p. 60–69.
- Polavieja, J. (2012). Socially-embedded investments: Explaining gender differences in job-specific skills. *American Journal of Sociology*, 118(3), p. 592–634.
- Shelley, J. C., Benard, S. & Paik, I. (2007). Getting a Job: Is There a Motherhood Penalty?, *American Journal of Sociology*, 112(5), p. 1297-1338.
- Sigle-Rushton, W. & Waldfogel, J. (2007). Motherhood and Women's Earnings in Anglo- American, Continental European, and Nordic Countries. *Feminist Economics*, 13 (2), p. 55–91.

World Economic Forum [WEF]. The Global Gender Gap Report 2017. <https://www.weforum.org/reports/the-global-gender-gap-report-2017> [20.07.18]

VI. Annex

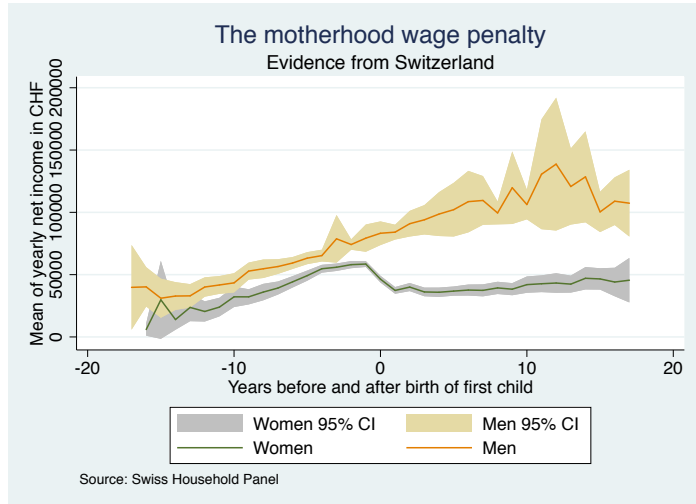


Figure 4: Development of mean yearly net income (in CHF) for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

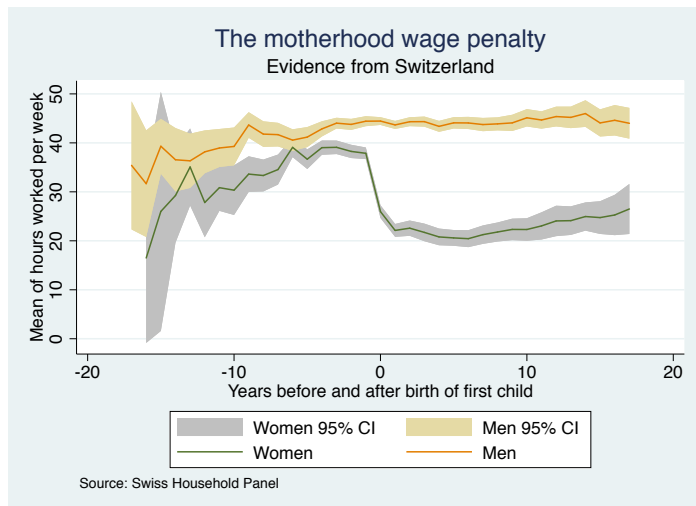


Figure 5: Development of mean hours worked per week for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

Children and Gender Inequality: Evidence from Switzerland

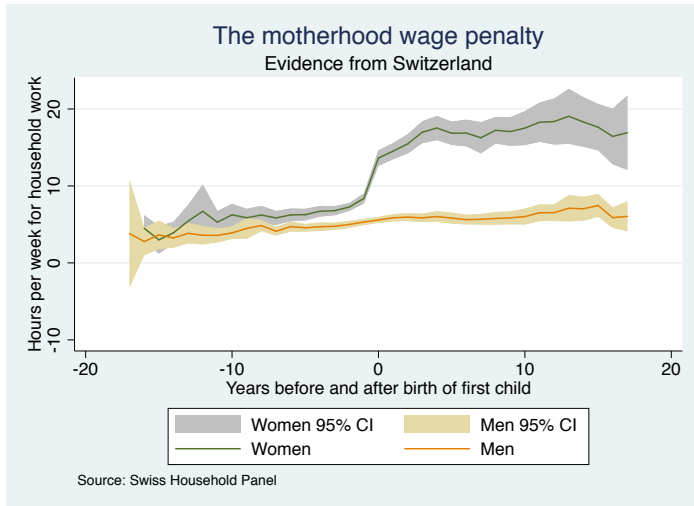


Figure 6: Development of mean hours per week for housework for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

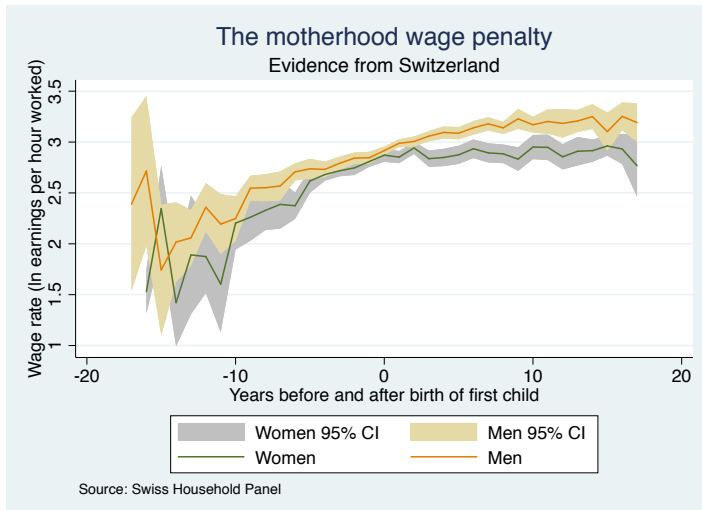


Figure 7: Development of mean wage rate for men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

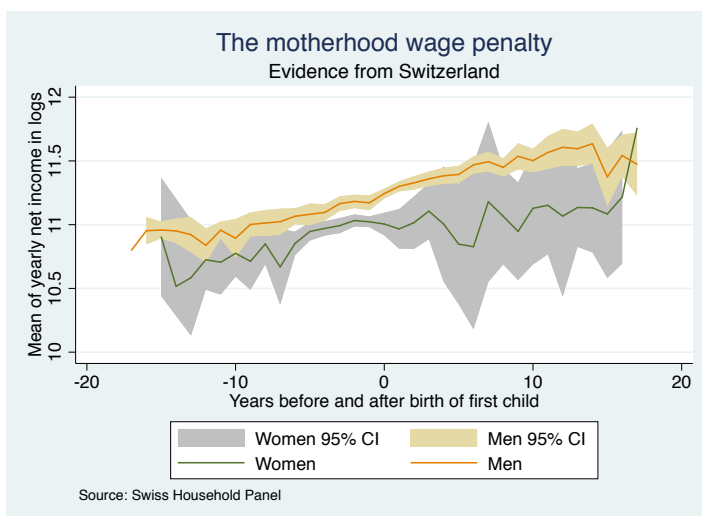


Figure 8: Development of yearly net income in logs for fulltime working men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

Children and Gender Inequality: Evidence from Switzerland

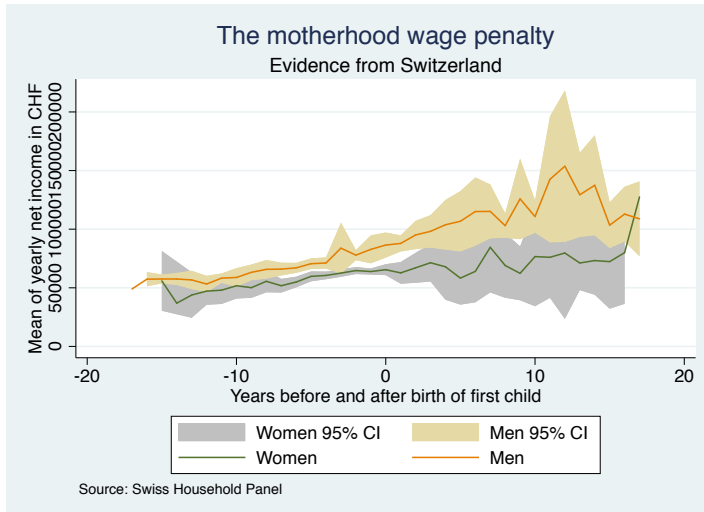


Figure 9: Development of yearly net income in CHF for fulltime working men and women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

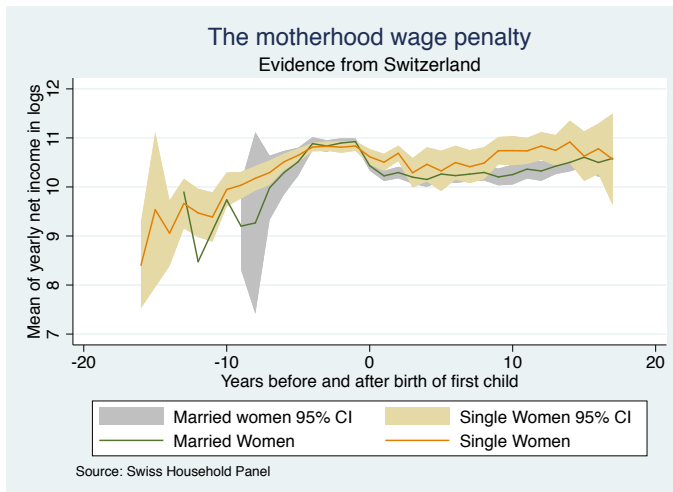


Figure 10: Development of the mean of the logarithmic income for single and married women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

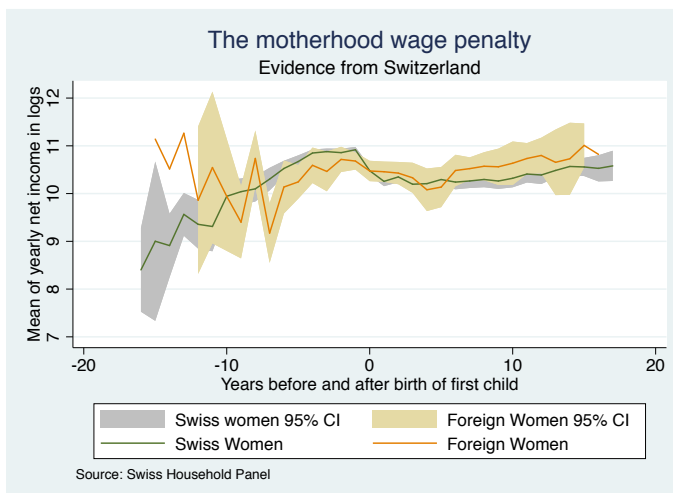


Figure 11: Development of the mean of the logarithmic income for Swiss and foreign women in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

Children and Gender Inequality: Evidence from Switzerland

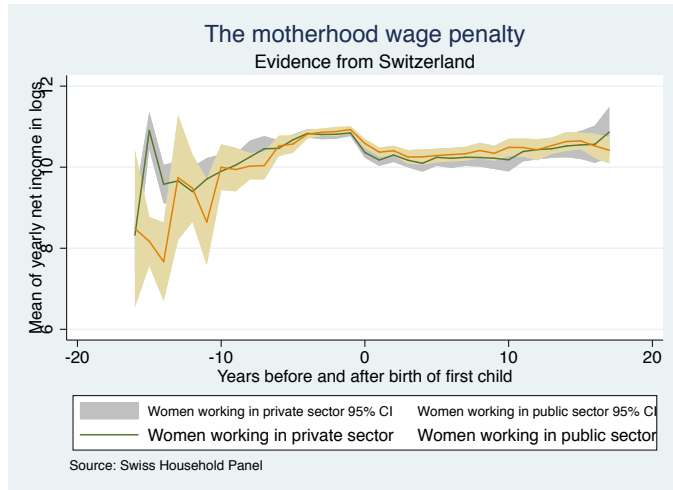


Figure 12: Development of the mean of the logarithmic income for women working in private and public sector in selected time periods before and after the birth of the first child. Own calculations with data from the Swiss Household Panel (2017).

Children and Gender Inequality:
Evidence from Switzerland

| Regressors | (1) |
|---|------------------------------|
| Time indicator men, 2-5 years before birth of first child | 8916.316 (3889.429) |
| Time indicator men, 1 year before birth of first child | 13233.64* (6773.345) |
| Time indicator men, in the year before birth of first child | 11967.55*** (3488.655) |
| Time indicator men, 1 year after birth of first child | 14031.4*** (3692.364) |
| Time indicator men, 2-5 years after birth of first child | 14417.55*** (3193.536) |
| Time indicator men, 6 years and more after birth of first child | 17257.74*** (4023.184) |
| Time indicator women, 2-5 years before birth of first child | -6557.289 (2863.981) |
| Time indicator women, 1 year before birth of first child | -9368.16 (6048.756) |
| Time indicator women, in the year before birth of first child | -9250.991*** (2355.719) |
| Time indicator women, 1 year after birth of first child | -17006.43*** (2426.899) |
| Time indicator women, 2-5 years after birth of first child | -19446.48 *** (2695.745) |
| Time indicator women, 6 years and more after birth of first child | -27666.84*** (2617.01) |
| Age | -2748.186 (3546.882) |
| Age squared | 60.86066 (51.92395) |
| Fulltime employment | 25847.87 *** (1497.811) |
| Education in years | 3586.882*** (358.9683)*** |
| Decision making tasks | 9706.211*** (1333.473) |
| Supervisory tasks | 7209.087*** (637.5058) |
| Constant | 2862.873 (49969.57) |
| Observations | 7,366 |
| R-squared | 0.2992 |

Dependent variable: Yearly net income in CHF

Robust standard errors in parentheses.

*significant at the 0.10 level, ** significant at the 0.05 level, ***significant at the 0.01 level

Table 4: Regression results of econometric model adjusted with the yearly net income in CHF as dependent variable. Own calculations with data from the Swiss Household Panel.

Children and Gender Inequality:
Evidence from Switzerland

| Regressors | (1) |
|---|----------------------------|
| Time indicator men, 2-5 years before birth of first child | -0.06294 (0.028327) |
| Time indicator men, 1 year before birth of first child | 0.07911 (0.03719) |
| Time indicator men, in the year before birth of first child | 0.1210722*** (0.02909) |
| Time indicator men, 1 year after birth of first child | 0.15325*** (0.03099) |
| Time indicator men, 2-5 years after birth of first child | 0.14595*** (0.02810) |
| Time indicator men, 6 years and more after birth of first child | 0.17325*** (0.03000) |
| Time indicator women, 2-5 years before birth of first child | 0.03006 (0.02311) |
| Time indicator women, 1 year before birth of first child | 0.04875 (0.03814) |
| Time indicator women, in the year before birth of first child | 0.09332 (0.03742) |
| Time indicator women, 1 year after birth of first child | 0.02385 (0.03444) |
| Time indicator women, 2-5 years after birth of first child | -0.0026152 (0.02338) |
| Time indicator women, 6 years and more after birth of first child | -0.072456** (0.02282) |
| Age | 0.11228*** (0.01010) |
| Age squared | -0.00122*** (0.00013) |
| Fulltime employment | 0.10420*** (0.01511) |
| Education in years | 0.03883*** (0.00185)*** |
| Decision making tasks | 0.05357*** (0.01062) |
| Supervisory tasks | 0.04297*** (0.01094) |
| Constant | -0.28552 (0.16528) |
| Observations | 7,032 |
| R-squared | 0.3506 |

Dependent variable: Wage rate in logs

Robust standard errors in parentheses.

*significant at the 0.10 level, ** significant at the 0.05 level, ***significant at the 0.01 level

Table 5: Regression results of econometric model adjusted with the wage rate in logs as dependent variable. Own calculations with data from the Swiss Household Panel.

Children and Gender Inequality:
Evidence from Switzerland

| Regressors | (1) |
|---|-----------------------------|
| Time indicator women with first child, 2-5 years before birth of first child | -0.03823* (0.02251) |
| Time indicator women with first child, 1 year before birth of first child | -0.04842 (0.03181) |
| Time indicator women with first child, in the year before birth of first child | 0.24283*** (0.04629) |
| Time indicator women with first child, 1 year after birth of first child | 0.37289*** (0.04959) |
| Time indicator women with first child, 2-5 years after birth of first child | 0.40085*** (0.03352) |
| Time indicator women with first child, 6 years and more after birth of first child | 0.460065*** (0.033681) |
| Time indicator women without first child, 2-5 years before birth of first child | 0.10398*** (0.02564) |
| Time indicator women without first child, 1 year before birth of first child | 0.108435** (0.040531) |
| Time indicator women without first child, in the year before birth of first child | 0.09520** (0.040775) |
| Time indicator women without first child, 1 year after birth of first child | 0.23216** (0.103302) |
| Time indicator women without first child, 2-5 years after birth of first child | 0.23145 (0.16319) |
| Time indicator women without first child, 6 years and more after birth of first child | 0.17749 (0.12072) |
| Age | 0.131736*** (0.00963) |
| Age squared | -0.001388*** (0.000135) |
| Fulltime employment | 0.59499*** (0.01762) |
| Education in years | 0.048767*** (0.00210)*** |
| Decision making tasks | 0.105904*** (0.012445) |
| Supervisory tasks | 0.15727*** (0.012732) |
| Constant | 6.93066 (0.15882) |
| Observations | 7,366 |
| R-squared | 0.5430 |

Dependent variable: Wage rate in logs

Robust standard errors in parentheses.

*significant at the 0.10 level, ** significant at the 0.05 level, ***significant at the 0.01 level

Table 6: Regression results of robustness check 1 comparing women with a first child and women without a first child. Own calculations with data from the Swiss Household Panel.

Children and Gender Inequality:
Evidence from Switzerland

| Regressors | (1) | (2) |
|-----------------------|---------------------------|------------------------------|
| Female | -0.73591*** (0.016629) | -0.2062095*** (0.0148841) |
| Age | | 0.1025875*** (0.009324) |
| Age squared | | -0.0010698*** (.00013) |
| Fulltime employment | | 0.6714647*** (0.0156836) |
| Education | | 0.0534149*** (0.0021052) |
| Decision making tasks | | 0.1050276*** (0.0124952) |
| Supervisory tasks | | 0.1502429*** (0.0129304) |
| Constant | 11.1768 (0.009369) | 7.437203 (0.1570584) |
| Observations | 8,361 | 7,366 |
| R-squared | 0.1993 | 0.5322 |

Dependent variable: Yearly net income in logs

Robust standard errors in parentheses.

*significant at the 0.10 level, ** significant at the 0.05 level, ***significant at the 0.01 level

Table 7: Results from OLS regression of main explanatory variable and control variables on dependent variable. Own calculation with data from the Swiss Household Panel.