

# The Evolution of Motherhood Wage Penalties - A Cross-National Decomposition Exercise

Sander Wagner<sup>1</sup>, Pascal Achard<sup>2</sup>, Andreas Filser<sup>3</sup>, and Corinna Frodermann<sup>3</sup>

<sup>1</sup>University of Oxford

<sup>2</sup>ENSAE/CREST

<sup>3</sup>IAB Nürnberg

November 1, 2023

## Abstract

We combine large administrative data from four countries, France and Germany (included) and Denmark and the Netherlands (being prepared) to study the evolution of the motherhood penalty over time. Initially we look how the income loss associated up to five years after birth, associated with motherhood changed for employed mothers throughout the period 1997-2014. Then we study motherhood penalties in mothers employment, working time and hourly wages to understand the evolution of the different components of motherhood penalties over time. Initial results show that motherhood wage penalties in France and Germany are slowly shrinking, with increased employment after birth being a major driver. The shrinking of the penalties is however slowed down by an increasing propensity for mothers to transition to part-time work in both countries.

**Keywords:** labour economics, motherhood penalties

## Objectives

There is ample evidence that motherhood leads to a significant reduction in womens' incomes (Kleven et al., 2019; Waldfogel, 1997; Budig and England, 2001). Indeed, results suggest that for recent years in rich countries motherhood is maybe the most significant factor behind wage inequality in the labour market(Kleven et al., 2019). Nevertheless surprisingly little is known about the evolution of the motherhood penalty over time. Current studies on the topic, generally focus on a single country and tend to chose different outcome variables, models and controls. Results for the United States point to a stable mothehood penalty between

1975-1985 and 1986-1998 (Avellar and Smock, 2003) as well as to a stable motherhood penalty 1986-2014, with some indications that it may have worsened for mothers of one child Jee et al. (2019). Studies that did not control for labour market experience found some reduction in the penalty over time for the United States. (Weeden et al., 2016). Work on Norway showed a declining motherhood penalty between 1979-1996 (Petersen et al., 2014). Motherhood can affect earned income of mothers along 3 different channels or margins. At the extensive margin motherhood might affect a women’s decision to work or not. At the intensive margin, it will affect the labour supply of women, both in the form of switching to part-time work or continuing to work full-time and in the form of modulating working hours and overtime. Finally, the hourly wage of mothers might also change, as career progression might be slower or as changing to a less intensive work schedule might come with different tasks and pay. The goal of this paper is to calculate how penalties along these different margins evolved over time and hence jointly shaped the motherhood penalty in 4 countries, France, Germany, the Netherlands and Denmark. Results presented in this abstract are for France and Germany only, as results for Denmark and the Netherlands are still being prepared.

## Methods and Data

Our data is based on individual-level social security notifications for France and Germany that we harmonized for comparative analysis. The data for Germany derives from employment biographies comprised in the Sample of Integrated Labour Market Biographies (SIAB). SIAB is a 2% sample drawn from the population of individuals characterized by at least one of the following employment situations: employment subject to social security, marginal part-time employment, or receipt of social welfare benefits. In the SIAB data, information on childbirth is available based on employer notifications on maternity leave . The French data consists of census-based socio-demographic information in the EDP (Echantillon Démographique Permanent) in conjunction with the DADS (Déclarations Annuelles de Données Sociales), which combines annual payroll declarations by employers and the state payroll files. The panel DADS-EDP runs since 1967 and collects information on individuals born on the first four days of October. Prior to 2002, labour market data was only collected for individuals born in October of an even year. Data on fertility is incomplete for children of parents born on October 2 and 3. Therefore we follow individuals born on October 1 or 4 of an even year or an odd year if they are born after 2002. These individual-level data are linked to establishment-level information from the DADS-postes and DADS-establishments. Based on these two data sources, we retain 24,112 French and 74,258 German women who experience their first birth between 1997 and 2014 and have been employed for more than 6 months in the year before their first birth. Additionally we are currently preparing Dutch and Danish employment registries to analyze the evolution of motherhood penalties in the two countries for 1997 to 2014.

Our initial approach is to simply estimate the evolution of the total motherhood wage penalty as well as of the employment reductions both in total employment and in full-time or part time work following motherhood. Ideally we will apply this approach to hours worked as well, however the German data does not include hours worked so this approach will only be

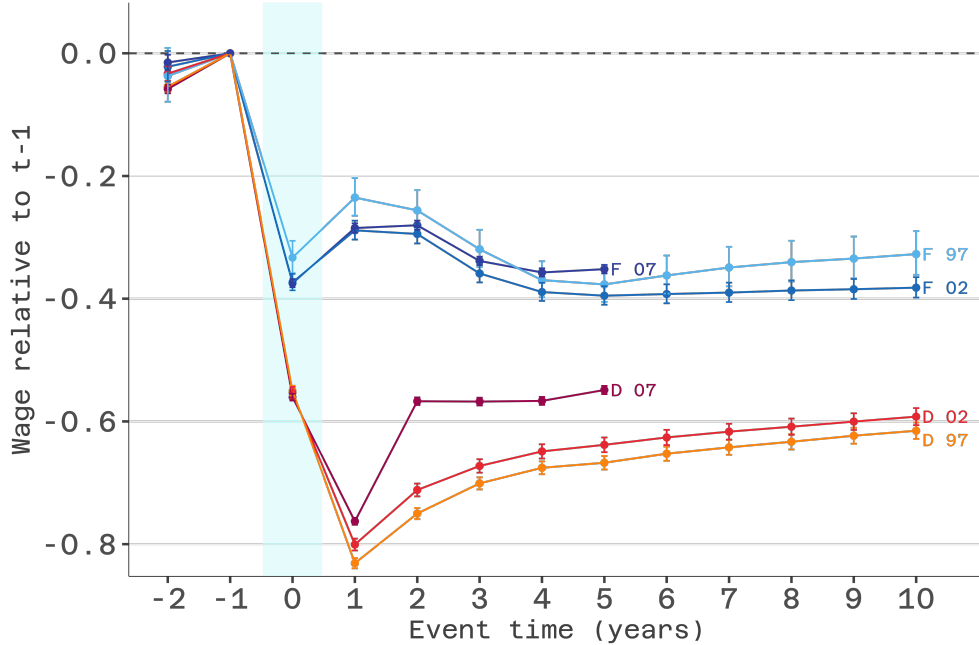


Figure 1: Wage reduction after birth ( $t=0$ ) for different cohorts of mothers in France and Germany

implemented for the other three countries. To estimate penalties associated with motherhood we follow the methodology of Kleven et al. (2019) and estimate:

$$Y_{iyt} = \sum_{j \neq -1} \alpha_j * I[j = t] + \sum_k \beta_k + I[k = y] + \epsilon_{iyt} \quad (1)$$

where  $Y$  can denote total wage, employment, the decision to work full-time or part-time or hourly wage (not possible in Germany) for individual  $i$  in year  $y$ . The parameter  $t$  denotes the event time, meaning how many years before or after her firstbirth, which is set to  $t = 0$  we are observing a mother. The parameter  $\alpha_j$  are thus event dummies that capture the effects of motherhood on wages. We control for year fixed effects. Estimations are done separately for three cohorts of first-births: 1997-2001, 2002-2006 and 2007-14. We will then use these estimates to calculate how much of the motherhood wage penalty is due to employment reductions along the intensive and extensive margin and hourly wage penalties for each country and in each cohort. We also plan to add fixed effects estimates allowing us to look at the effects of children born after the first child separately.

## Preliminary Results

Fig.1 provides estimates of the total wage penalty for France and Germany. It shows a significantly stronger wage penalty in Germany than in France, with mothers losing almost 80% of their income in the year after birth, compared to losses of around 40% in France. We see that in both countries the motherhood wage penalty is becoming smaller, with the decrease for the latest cohort being particularly strong in Germany. Fig.2 shows the reduction

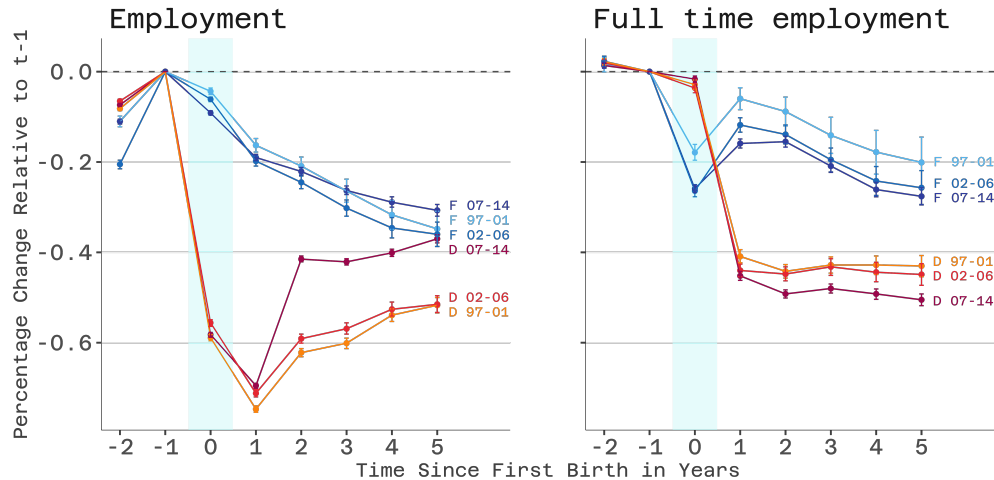


Figure 2: Left Panel: Reduction in active employment after birth. Right Panel: Reduction in full-time employment after birth

in active employment (this means mothers are not working, which comprises mothers that are still employed but taking maternity leave) on the left side and the share of mothers switching from full-time to part-time employment on the right side. The graphs implicate that the vast majority of the German motherhood penalty stems from employment reductions. In France on the other hand employment reductions happen continually in the years following firstbirth and initially only account for a small share of the motherhood penalty. The contribution of switching from full-time work to part-time work to reduced maternal income after birth is also more than twice as big in Germany than it is in France. We can see that both countries have similar trends in employment as well as in the tradeoff between part-time and full-time work. The tendency to reduce employment after birth is decreasing in both countries whereas there is an increased propensity for part-time instead of full-time work in both countries for later cohorts. Overall, these employment trends push the evolution of the motherhood penalty in opposite directions. Further work on hourly wages is needed to decompose the exact effect of each trend on the wage penalty, but our results are indicative that the tendency to stay in employment to a greater degree dominates the shift towards increased part-time work, resulting in a slowly shrinking motherhood penalty for both countries.

## References

- Avellar, S. and Smock, P. J. (2003). Has the Price of Motherhood Declined Over Time? A Cross-Cohort Comparison of the Motherhood Wage Penalty. *Journal of Marriage and Family*, 65(3):597–607. eprint: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1741-3737.2003.00597.x>.
- Budig, M. J. and England, P. (2001). The Wage Penalty for Motherhood. *American Sociological Review*, 66(2):204–225. Publisher: [American Sociological Association, Sage Publications, Inc.].

- Jee, E., Misra, J., and Murray-Close, M. (2019). Motherhood Penalties in the U.S., 1986–2014. *Journal of Marriage and Family*, 81(2):434–449. eprint: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/jomf.12543>.
- Kleven, H., Landais, C., and SØgaard, J. E. (2019). Children and Gender Inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, 11(4):181–209.
- Petersen, T., Penner, A. M., and Høgsnes, G. (2014). From Motherhood Penalties to Husband Premia: The New Challenge for Gender Equality and Family Policy, Lessons from Norway. *American Journal of Sociology*, 119(5):1434–1472. Publisher: The University of Chicago Press.
- Waldfogel, J. (1997). The Effect of Children on Women’s Wages. *American Sociological Review*, 62(2):209–217. Publisher: [American Sociological Association, Sage Publications, Inc.].
- Weeden, K. A., Cha, Y., and Bucca, M. (2016). Long Work Hours, Part-Time Work, and Trends in the Gender Gap in Pay, the Motherhood Wage Penalty, and the Fatherhood Wage Premium. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(4):71–102. Publisher: Russell Sage Foundation.