

# Gender Inequalities and Motherhood Penalties across French and German Local Labor Markets

Sander Wagner<sup>1,2</sup> , Andreas Filser<sup>3</sup> , Pascal Achard<sup>4</sup> ,  
and Inga Marie Amend<sup>3</sup>

## Abstract

This data visualization examines the relationship between motherhood earnings penalties and gender earnings gaps across local labor markets in France and Germany. Drawing on harmonized administrative data, the authors document a strong positive association: regions with larger motherhood penalties tend to exhibit wider gender earnings gaps. This pattern holds across all Nomenclature of Territorial Units for Statistics second-division regions, where a 1 percent increase in the motherhood penalty corresponds to a 0.3 percent higher gender earnings gap. The relationship is even stronger within countries, with the average association rising to 0.7 percent. These findings suggest that regional differences in gender earnings inequality are strongly associated with the magnitude of motherhood penalties.

## Keywords

gender, motherhood, earnings, labor market, fertility

Motherhood penalties are routinely framed as being primary contributors to gender disparities in labor market outcomes (England et al. 2016; Gangl and Ziefle 2009; Polachek 2006; Waldfogel 1997). Recent analyses conclude that persistent gender gaps in rich countries' earnings and labor market participation largely stem from penalties incurred following childbirth (Kleven and Landais 2023; Kleven, Landais, and Sogaard 2019). However, other studies challenge the centrality of motherhood by pointing to the emergence of gender wage gaps even before parenthood (Combet and Oesch 2019).

If motherhood penalties are indeed the primary driver of gender earnings gaps, we should observe larger gaps in labor markets where these penalties are larger, both across and within countries. Demonstrating such an association would reinforce the argument that efforts to reduce gender inequality must address the earnings impact of motherhood, particularly given the considerable variation in penalties across national and regional contexts (Budig, Misra, and Boeckmann 2016; Kleven Landais, Posch, et al. 2019).

Drawing on newly harmonized administrative data (Filser et al. 2025), we examine the relationship between motherhood penalties and gender earnings gaps across Nomenclature of Territorial Units for Statistics second-division (NUTS-2)

regions in France and Germany. Both countries have large, corporatist welfare states (Esping-Andersen 1990) that invest heavily in family policy (OECD 2023), yet they differ sharply in their approach to supporting maternal employment. France has long facilitated full-time maternal employment through short maternity leaves, extensive early childcare provision, and a 35-hour workweek aligned with school and childcare schedules (DREES 2002). Germany, by contrast, subsidizes long parental leaves and only recently expanded early childcare, often only starting at age three, while continuing to exhibit high rates of part-time employment among mothers (Zoch and Hondralis 2017). Despite some convergence after the countries' reunification, East Germany and West Germany remain distinct: East Germany

<sup>1</sup>Leverhulme Centre for Demographic Science, Nuffield Department of Population Health, University of Oxford, Oxford, UK

<sup>2</sup>Nuffield College, University of Oxford, Oxford, UK

<sup>3</sup>Institute for Employment Research (IAB), Nuremberg, Germany

<sup>4</sup>Université Paris Dauphine – PSL, Paris, France

## Corresponding Author:

Sander Wagner, Leverhulme Centre for Demographic Science, University of Oxford, 42-43 Park End Street, Oxford OX13UQ, United Kingdom  
 Email: [sander.wagner@demography.ox.ac.uk](mailto:sander.wagner@demography.ox.ac.uk)



retains a more gender-egalitarian legacy, with more extensive public childcare, less traditional gender norms (Lietzmann and Frodermann 2021), and higher rates of full-time maternal employment (Rosenfeld, Trappe, and Gornick 2004; Zoch and Hondralis 2017). Accordingly, we analyze East Germany and West Germany separately.

The visualization presents motherhood earnings penalties, gender earnings gaps, and their association at the NUTS-2 level (French *régions* and German *Regierungsbezirke*). Estimates derive from harmonized administrative data covering 1997 to 2019: German Integrated Labour Market Biographies (SIAB; vom Berge et al. 2021) and French Social Security Declarations linked to the Permanent Demographic Sample.

To aid interpretation, we briefly summarize our harmonization strategy, sample selection criteria, and analytical approach; full details are provided in the supplement. In both countries, we exclude the small group of tenured public servants (Beamte in Germany and Fonction Publique d'État in France) because of their absence from the German SIAB data. Motherhood penalties are estimated separately for each NUTS-2 region on the basis of women who were employed in the year prior to their first childbirth between 1997 and 2014. This allows us to observe earnings trajectories for 5 years after birth. Penalties are calculated using an event-study design (Kleven, Landais, and Søggaard 2019) that estimates the effect of entering motherhood, via first birth, on subsequent earnings. The analysis is restricted to previously employed women since the SIAB only covers employed individuals and hence does not allow us to identify births among those not participating in the labor force. The resulting penalties are likely larger than what would be observed among all mothers, as earnings among previously not employed women can, by definition, only increase.

Gender earnings gaps are likewise estimated separately for each NUTS-2 region and obtained via the coefficient for gender in log earnings regressions that control for education, age, and year, among all employed individuals aged 18 to 59 years with nonzero earnings, regardless of parental status. Importantly the two measures and samples were constructed independently, following conventions from the respective literatures, to avoid introducing spurious relations.

The restriction to first-birth mothers results in substantially smaller regional samples for estimating motherhood penalties, ranging from 304 to 7,414 mothers per region, compared with the much larger samples used for estimating gender earnings gaps, which range from 10,654 to 427,713 individuals per region.

Panels I and III in Figure 1 present the motherhood earnings penalties. Panel III shows region-specific estimates

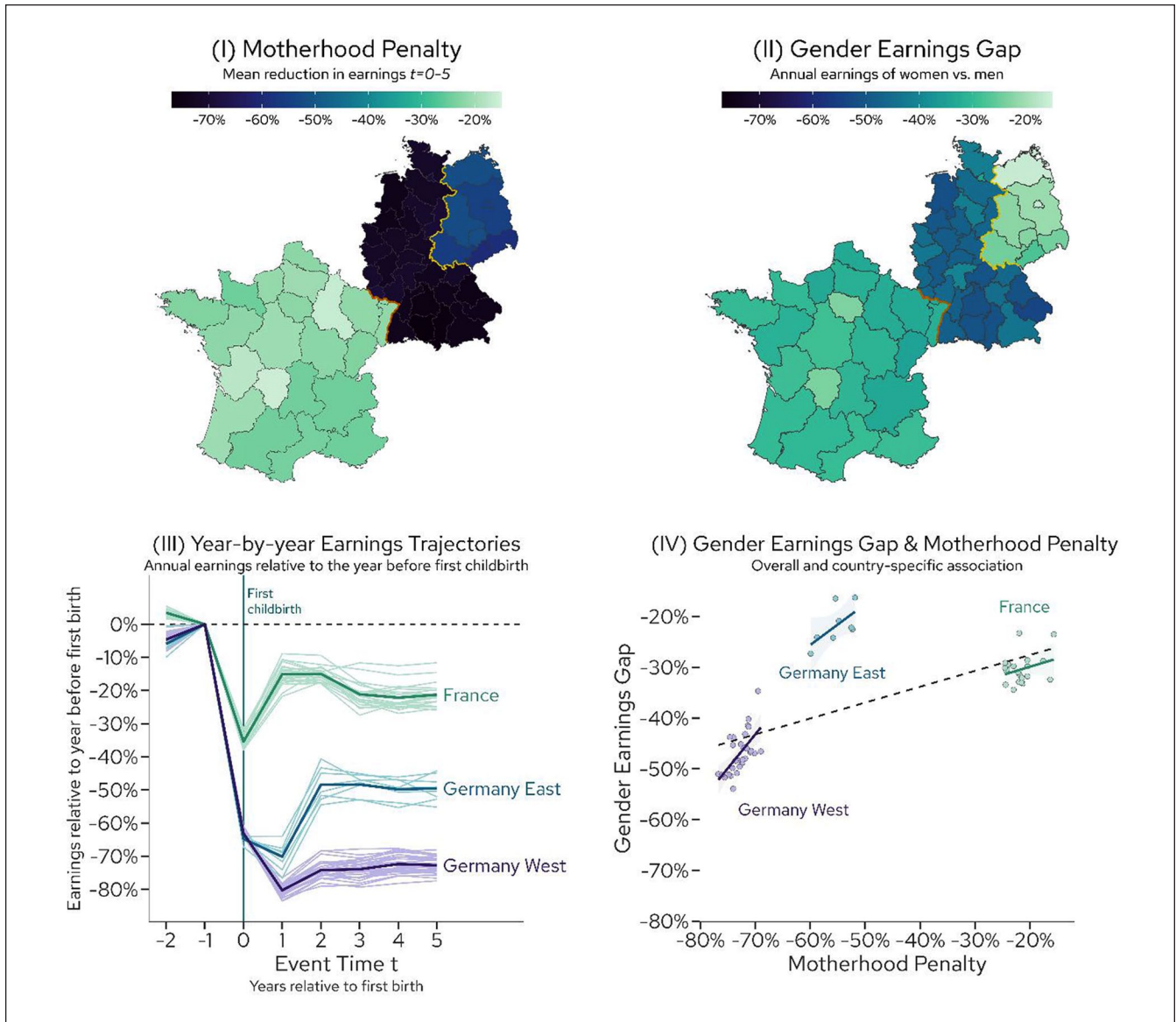
from the event-study model, which traces year-by-year earnings losses relative to the year of first childbirth (event time  $t=0$ ). Each line represents a NUTS-2 region; thick lines show the country average, while faint lines represent individual regions. We aggregate the year-specific penalties over the year of birth and the first 5 years after birth to calculate the average penalty, which is mapped in Panel I. Consistent with earlier cross-national research (Budig et al. 2016; Filser et al. 2025), France exhibits the smallest penalties, followed by East Germany, with West Germany showing the largest.

Panel II in Figure 1 displays the estimated gender earnings gaps according to the gender coefficients from the log earnings regressions. Here, too, East Germany shows the smallest gender earnings gaps, followed by France and then West Germany.

Panel IV depicts the relationship between gender earnings gaps and motherhood penalties, both across all NUTS-2 regions (black dotted line) and within France, West Germany, and East Germany. The slope of the association is 0.31 ( $p < .001$ ) when pooling all regions and increases to 0.77 ( $p < .001$ ) after accounting for average differences between France, West Germany and East Germany. This implies that within countries, a doubling of the motherhood penalty is associated with a 77 percent increase in the gender earnings gap (see Table S2 in the supplement). The relationship is strongest in West Germany, where penalties are also highest, followed by East Germany and then France.

Our results support the view that differences in motherhood earnings penalties are closely linked to differences in gender earnings gaps. As the cross-national pattern is based on only two countries—or three, if East Germany and West Germany are considered separately—it invites further cross-country investigation. The within-country evidence, however, is strong: across regions, variations in motherhood penalties are closely linked to differences in gender earnings gaps. This relationship is especially pronounced in West Germany, where regional policymakers have historically exercised autonomy over family-related policies, such as childcare provision.

Documenting the central role of motherhood penalties in shaping gender earnings inequality highlights the importance of work-family policies. Parental leave, which differs substantially between France and Germany, has been shown to influence both motherhood penalties and gender earnings gaps (Hook and Li 2025). Differences between West and East Germany, which have the same parental leave policy, further suggest that factors such as access to childcare (administered at the state level in Germany), prevailing gender norms, and workplace practices also play an important role. Showcasing the potential of administrative data to explore meaningful differences in regional motherhood







**Figure 1.** Gender earnings gaps and motherhood penalties by Nomenclature of Territorial Units for Statistics second-division (NUTS-2) region. Panel I displays the motherhood earnings loss in the first 5 years after the onset of motherhood, estimated using an event study model of logged annual earnings. Darker colors indicate larger motherhood penalties. Panel II displays the gender earnings gap, defined as women's annual earnings relative to men's, by NUTS-2 region and adjusted for age, education, and year of observation. Darker colors represent lower earnings for women compared with men. The red line indicates the Franco-German border, while the border between West Germany and East Germany is highlighted in yellow. Panel III presents detailed earnings penalties by years since first birth for each NUTS-2 region. Thick lines indicate the mean year-by-year values, while faint lines represent individual NUTS-2 regions. Panel IV shows a scatterplot of gender earnings gaps and average motherhood penalties across NUTS-2 regions. Each dot represents a NUTS-2 region; the dashed line shows the overall regression line (corresponding to model 1 in Table S2), and colored lines represent separate regressions for France, West Germany, and East Germany (corresponding to models 3–5 in Table S2). All results are based on French Social Security Declarations linked to the Permanent Demographic Sample and German Integrated Labour Market Biographies data.

penalties and gender earnings gaps offers a foundation for future research to further broaden the investigation of subnational drivers of gendered labor market outcomes.

### Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research reported in this paper was supported by the grant “ANR-DFG French-German Collaboration for Joint Projects in Social Sciences” from the German Research Foundation (DFGgrantFR3840/4-1) and the French Research Foundation (ANR-20-FRAL-0007) as well as by the Leverhulme Trust grant RC-2018-003.

### ORCID iDs

Sander Wagner  <https://orcid.org/0000-0002-1294-1612>  
 Andreas Filser  <https://orcid.org/0000-0001-5530-3621>  
 Pascal Achard  <https://orcid.org/0000-0002-5660-4458>  
 Inga Marie Amend  <https://orcid.org/0009-0000-9878-3784>

### Supplemental Material

Supplemental material for this article is available online.

### References

- Budig, Michelle J., Joya Misra, and Irene Boeckmann. 2016. “Work–Family Policy Trade-Offs for Mothers? Unpacking the Cross-National Variation in Motherhood Earnings Penalties.” *Work and Occupations* 43(2):119–77.
- England, Paula, Jonathan Bearak, Michelle J. Budig, and Melissa J. Hodges. 2016. “Do Highly Paid, Highly Skilled Women Experience the Largest Motherhood Penalty?” *American Sociological Review* 81(6):1161–89.
- Esping-Andersen, Gosta. 1990. *The Three Worlds of Welfare Capitalism*. Princeton, NJ: Princeton University Press.
- Filser, Andreas, Pascal Achard, Inga Marie Amend, Corinna Frodermann, Ida Gaede, and Sander Wagner. 2025. “Harmonizing French and German Administrative Data on Maternal Employment: A Practical Guide How to Create Comparable Data Sets from DADS-EDP and SIAB.” SocArXiv. Retrieved August 31, 2025. [https://osf.io/preprints/socarxiv/rcsng\\_v1](https://osf.io/preprints/socarxiv/rcsng_v1).
- Gangl, Markus, and Andrea Ziefle. 2009. “Motherhood, Labor Force Behavior, and Women’s Careers: An Empirical Assessment of the Wage Penalty for Motherhood in Britain, Germany, and the United States.” *Demography* 46(2):341–69.
- Hook, Jennifer L., and Meiyang Li. 2025. “National Work-Family Policies and Gender Earnings Inequality in 26 OECD Countries, 1999 to 2019.” *Socius*. doi:10.1177/23780231251360042.
- Kleven, Henrik, and Camille Landais. 2023. “Compensating Wage Differentials and the Motherhood Wage Gap: A Comparative Analysis.” *Journal of Current Research and Review* 14(6): 102726.
- Kleven, Henrik, Camille Landais, Johanna Posch, Andreas Steinhauer, and Josef Zweimüller. 2019. “Child Penalties across Countries: Evidence and Explanations.” *AEA Papers and Proceedings* 109:122–26.
- Kleven, Henrik, Camille Landais, and Jakob Egholt Sogaard. 2019. “Children and Gender Inequality: Evidence from Denmark.” *American Economic Journal: Applied Economics* 11(4):181–209.
- Lietzmann, Torsten, and Corinna Frodermann. 2021. “Gender Role Attitudes and Labour Market Behaviours: Do Attitudes Contribute to Gender Differences in Employment in Germany?” *Work, Employment and Society* 09500170211011318.
- OECD. 2023. “OECD Family Database.” <https://www.oecd.org/els/family/database.htm>.
- Polachek, Solomon W. 2006. “How the Life-Cycle Human-Capital Model Explains Why the Gender Wage Gap Narrowed.” *The Declining Significance of Gender* 1102:102–24.
- Rosenfeld, Rachel A., Heike Trappe, and Janet C. Gornick. 2004. “Gender and Work in Germany: Before and After Reunification.” *Annual Review of Sociology* 30(1):103–24.
- vom Berge, Philipp, Corinna Frodermann, Alexandra Schmucker, Stefan Seth, Tobias Graf, Stephan Griesemer, and Steffen Kaimer, et al. 2021. “Weakly Anonymous Version of the Sample of Integrated Labour Market Biographies (SIAB)—Version 7519 v1: Version v1.” Nuremberg, Germany: Forschungsdatenzentrum der Bundesagentur für Arbeit im Institut für Arbeitsmarkt- und Berufsforschung.
- Waldfogel, Jane. 1997. “The Effect of Children on Women’s Wages.” *American Sociological Review* 62:209–17.
- Zoch, Gundula, and Irina Hondralis. 2017. “The Expansion of Low-Cost, State-Subsidized Childcare Availability and Mothers’ Return-to-Work Behaviour in East and West Germany.” *European Sociological Review* 33(5):693–707.

### Author Biographies

**Sander Wagner** is a research associate at the Leverhulme Centre for Demographic Sciences at University of Oxford. His research is focused on the interplay of demographics and socio-economic outcomes, with a particular focus on labor-market consequences of motherhood, how demographics and the distribution of wealth interact and the use of large registry datasets for comparative research. His research also focuses on causal inference and computational sociology. He was the principal investigator of the Labour Market Consequences of Motherhood project, concerned with making German and French registry data comparable and using them to measure labor market consequences of childbirth.

**Andreas Filser** is a researcher at the Research Data Center of the Institute for Employment Research. His work sits at the intersection of demography and sociology, focusing on the labor market consequences of parenthood and how demographic structures shape individual social outcomes. He earned his PhD in sociology from the University of Oldenburg in 2022. In addition to his research, he contributes to the development of Research Data Center data products and advises external researchers on their use. He also teaches

undergraduate and PhD-level courses in statistics and programming (Stata and R) at universities and research institutes.

**Pascal Achard** is an applied microeconomist with a primary focus on labor economics. His research explores topics in family economics, immigration, intergenerational mobility, and the economics of culture. He completed his PhD in economics at the European University Institute in December 2019. Following his doctoral studies, he held postdoctoral positions at Tilburg University and CREST. In September 2025, he joined Université Paris Dauphine – PSL as a tenured assistant professor in economics. His work has been published in leading academic journals, including the *Economic Journal*,

the *Journal of Public Economics*, the *Journal of Human Resources*, and the *Journal of Economic Surveys*.

**Inga Marie Amend** studied sociology (BA) at the University of Bremen from 2018 to 2022. From 2022 to 2024 she completed the master's program "Sociology and Social Research" (MSc) at Utrecht University. Since October 2024, she has been a scholarship holder of the Institute for Employment Research graduate program and a research assistant at the Research Data Center of the Federal Employment Agency at the Institute for Employment Research. Her research focuses on quantitative sociology, particularly gender and family sociology.