

Child Penalties Across Countries: Evidence and Explanations*

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Abstract

This paper provides evidence on child penalties in female and male earnings in different countries. The estimates are based on event studies around the birth of the first child, using the specification proposed by [Kleven *et al.* \(2018\)](#). The analysis reveals some striking similarities in the qualitative effects of children across countries, but also sharp differences in the magnitude of the effects. We discuss the potential role of family policies (parental leave and child care provision) and gender norms in explaining the observed differences.

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1 Introduction

Despite considerable gender convergence over time, substantial gender inequality persists in all countries. Recent work highlights the importance of parenthood for the persistence of gender inequality in labor market outcomes. [Kleven *et al.* \(2018\)](#) estimate the impact of children on the labor market outcomes of women relative to men — child penalties — in Denmark. They show that the long-run child penalty in earnings is about 20% and that this can explain most of the remaining gender inequality. Research on other countries suggests that this is a pervasive phenomenon.

The main contribution of this paper is to estimate child penalties in different countries using the same empirical approach, specification and sample selection. We consider six countries that span a wide range of policies and norms: two Scandinavian countries (Denmark and Sweden), two German-speaking countries (Germany and Austria), and two English-speaking countries (United Kingdom and United States). The analysis reveals some striking similarities in the qualitative effects of children, but also some sharp differences in the magnitude of the effects. We end the paper with a discussion of likely explanations for these differences.

2 Child Penalties: Methodology

We estimate the impact of children on the labor market trajectories of mothers and fathers using event studies around the birth of the first child. This approach requires high-quality panel data with information on labor market outcomes and children. For the Scandinavian countries and Austria, we leverage the availability of administrative registers for the full population over many years. For the other countries, we use surveys with sufficiently large sample sizes and long time series: the GSOEP in Germany, the PSID in the US, and the BHPS in the UK. We consider individuals who have their first child between the ages of 20 and 45, and who are observed in each year between 5 years before and 10 years after child birth.¹

¹For the PSID and BHPS, we relax the latter restriction in order to increase sample size, focusing on individuals who are observed at least 8 times over the event study window as well as at least once before birth and once after birth.

We adopt the event study specification proposed by [Kleven *et al.* \(2018\)](#). For each parent in the data, event time t is indexed relative to the year of the first child birth. Denoting by Y_{ist}^g the outcome for individual i of gender g in year s and at event time t , we run the following regression separately for men and women

$$Y_{ist}^g = \sum_{j \neq -1} \alpha_j^g \cdot \mathbf{I}[j = t] + \sum_k \beta_k^g \cdot \mathbf{I}[k = \text{age}_{is}] + \sum_y \gamma_y^g \cdot \mathbf{I}[y = s] + \nu_{ist}^g. \quad (1)$$

The first term on the right-hand side includes event time dummies, the second term includes age dummies (to control for life-cycle trends), and the third term includes year dummies (to control for time trends). We omit the event time dummy at $t = -1$, implying that the event time coefficients measure the impact of children relative to the year just before the first child birth. We are able to identify the effects of all three sets of dummies because, conditional on age and year, there is variation in event time driven by variation in the age at which individuals have their first child. [Kleven *et al.* \(2018\)](#) discuss the identification assumptions underlying this approach, compare its results to alternative approaches in the literature, and provide evidence of its ability to identify the causal effect of parenthood.

Our main outcome variable is gross labor earnings, excluding taxes or transfers, specified in levels.² We convert the estimated level effects into percentages by calculating $P_t^g \equiv \hat{\alpha}_t^g / \mathbb{E}[\tilde{Y}_{ist}^g | t]$ where \tilde{Y}_{ist}^g is the predicted outcome when omitting the contribution of the event dummies.³ Having estimated the impacts of children on women and men separately, we define the *child penalty* at event time t as $P_t \equiv \frac{\hat{\alpha}_t^m - \hat{\alpha}_t^w}{\mathbb{E}[\tilde{Y}_{ist}^w | t]}$. This measures the percentage by which women are falling behind men due to children.

3 Child Penalties: Results

Figures 1-3 show the effects of parenthood on earnings in the different countries. The results confirm that the existence of large child penalties is a pervasive phenomenon. In each country,

²We specify equation (1) in levels rather than in logs to be able to keep the zeros in the data (due to non-participation). In the online appendix, we present separate results on the extensive margin impacts of children.

³To be precise, we define $\tilde{Y}_{ist}^g \equiv \sum_k \hat{\beta}_k^g \cdot \mathbf{I}[k = \text{age}_{is}] + \sum_y \hat{\gamma}_y^g \cdot \mathbf{I}[y = s]$. Hence, P_t^g captures the year- t effect of children as a percentage of the counterfactual outcome absent children.

the earnings of men and women evolve similarly before parenthood — after adjusting for lifecycle and time trends — but diverge sharply after parenthood. Women experience a large, immediate and persistent drop in earnings after the birth of their first child, while men are essentially unaffected. Ten years after child birth, women have not recovered and at this point the series have plateaued.

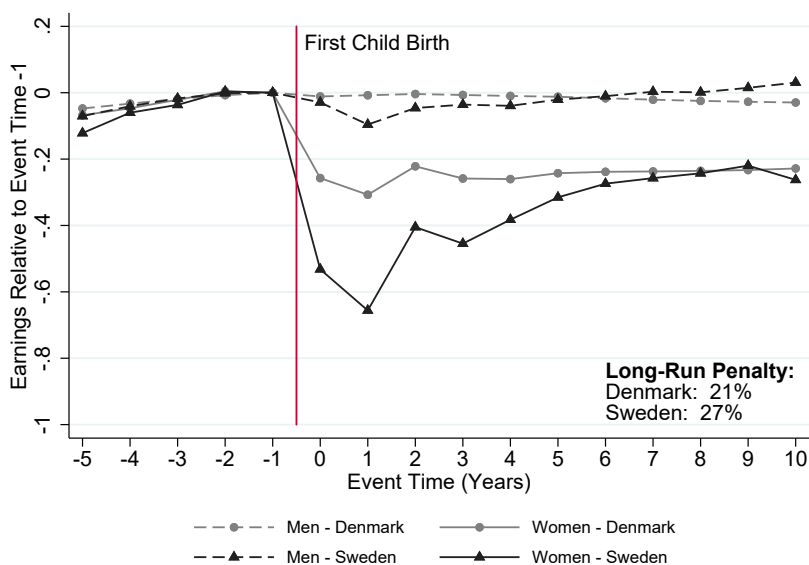
Despite these similarities, the graphs also reveal some striking differences. First, the size of the long-run child penalty (defined as the average penalty from event time 5 to 10) differs substantially across countries. The Scandinavian countries feature long-run penalties around 20-30%, the English-speaking countries feature penalties around 40%, while the German-speaking countries feature penalties as high as 50-60%. Second, the short-run dynamics of child penalties show some interesting differences. For example, while the Scandinavian countries are broadly similar in the long run, the short-run child penalty is about twice as large in Sweden as it is in Denmark. It takes Swedish mothers about eight years to catch up with Danish mothers.⁴ Sweden is also the only country where child birth is associated with a small short-run effect on men, although there are no long-run consequences. When considering the US and the UK, we see that these countries feature less dramatic short-run effects, but that the effects are growing over time.

In general, the earnings penalties can come from three margins: the extensive margin of labor supply (employment), the intensive margin of labor supply (hours worked), and the wage rate. In the online appendix, we provide evidence on child penalties along the extensive margin. While parenthood reduces female employment everywhere, the importance of this margin varies across countries. In the Scandinavian and Germanic countries, the extensive margin effects are significantly smaller than the earnings effects, implying that a substantial fraction of the earnings penalty is driven by the intensive margin and wage rate effects. In the US and the UK, the employment penalty is much closer in magnitude to the earnings penalty, suggesting that the extensive margin is a key driver of penalties in those countries.⁵

⁴Angelov *et al.* (2016) estimate child penalties for Sweden using a different event study specification. An advantage of implementing the same specification across countries is that it allows for direct comparisons. The fact that Denmark and Sweden are so different is *a priori* surprising. We discuss possible explanations below.

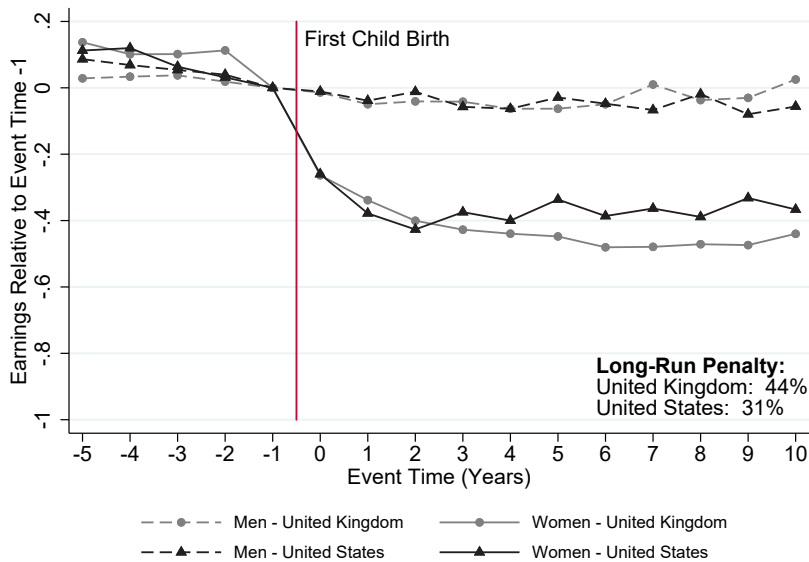
⁵Since we do not condition our samples on having only one child, the long-run child penalties will include the effects of subsequent children and therefore depend on total fertility. However, differential fertility is unlikely to drive the variation in child penalties across countries. For example, the German-speaking countries exhibit the largest penalties despite being characterized by the lowest realized fertility at event time 10. The average age and year of first child birth are also similar across the six samples.

Figure 1: Child Penalties in Earnings in Scandinavian Countries



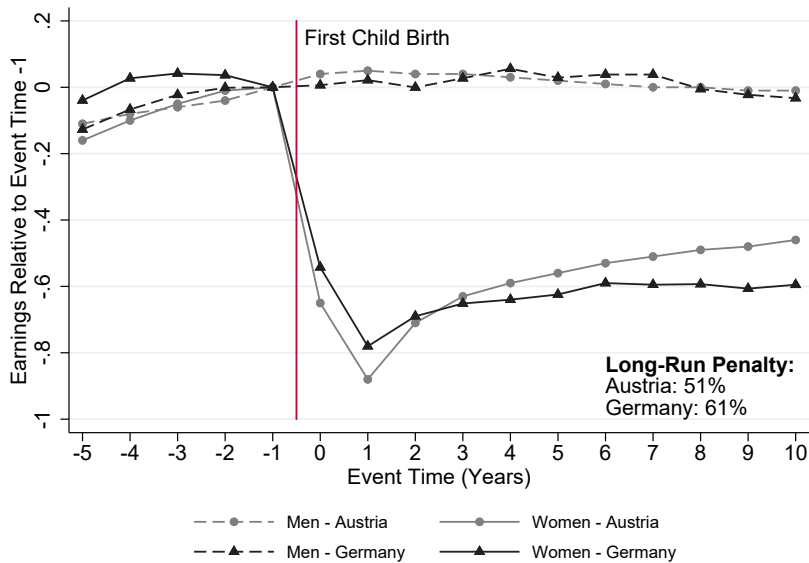
Notes: The figure shows percentage effects of parenthood on earnings across event time t for each gender g , i.e. P_t^g defined above. The figure also displays long-run child penalties, defined as the average penalty P_t from event time 5 to 10. Earnings are unconditional on employment status and the effects therefore include both the extensive and intensive margins.

Figure 2: Child Penalties in Earnings in English-Speaking Countries



Notes: See the notes to Figure 1.

Figure 3: Child Penalties in Earnings in German-Speaking Countries



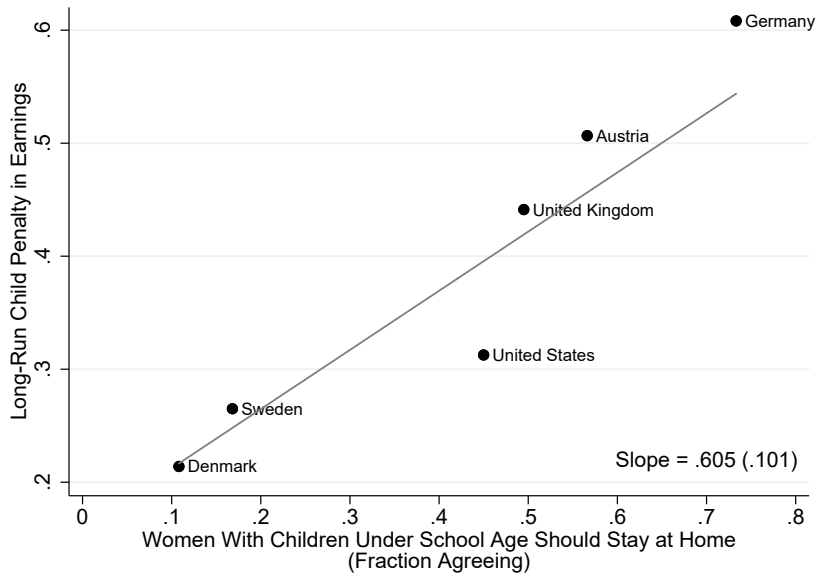
Notes: See the notes to Figure 1.

4 Child Penalties: Explanations

One set of explanations for the differences in child penalties focus on government policies. These include taxes, transfers, and family policies such as parental leave and child care provision that directly affect mothers' incentive to work. There is a voluminous literature on the impact of such policies on female labor supply and gender gaps (see [Olivetti & Petrongolo 2017](#) for a review). Of particular relevance, [Kleven *et al.* \(2019\)](#) consider the impacts of parental leave and public child care on the dynamics of child penalties. Their setting is Austria, a country where the combination of rich administrative data and a series of parental leave reforms and child care expansions allow for compelling quasi-experimental analyses of these questions.

They find that, in the long run, parental leave and child care policies have little or no effect on child penalties. They do find short-run effects of parental leave, however. Increasing the duration of paid and job-protected leave implies larger short-run child penalties in both earnings and employment. This suggests that some of the cross-country variation in short-run child penalties may be explained by variation in parental leave schemes, especially considering that the duration and generosity of these schemes vary greatly across countries. For example, the larger short-run child penalty in Sweden relative to Denmark may be related to the longer and more generous parental

Figure 4: Estimated Child Penalties vs Elicited Gender Norms



Notes: The figure plots our estimated long-run child penalties in earnings against elicited gender norms from the International Social Survey Program (ISSP). We focus on responses to a ISSP question of whether women with children under school age should work outside the home (full-time or part-time) or stay at home. The figure plots child penalties against the fraction of respondents who agree that women should stay at home.

leave offered in Sweden. Moreover, the small dip in the earnings of Swedish fathers following child birth could be explained by the presence of earmarked paternity leave in Sweden, as opposed to maternity leave or generic parental leave. In any case, despite these short-run effects, the main take-away from [Kleven et al. \(2019\)](#) is that child penalties are not driven primarily by public policies.

If policies cannot explain the large differences in long-run child penalties across countries, then what is the explanation? A natural candidate revolves around gender norms and culture, but it is hard to provide conclusive evidence on the importance of such mechanisms (see [Bertrand 2011](#) for a review and [Steinhauer 2018](#) for a recent application). In their study of Denmark, [Kleven et al. \(2018\)](#) show that child penalties are transmitted through generations, from parents to daughters (but not sons). That is, girls growing up in families with a more traditional division of labor between the parents incur larger child penalties when they themselves become mothers. These findings are consistent with an influence of the family environment in the formation of women’s preferences over family and career.

For the full set of countries studied here, [Figure 4](#) provides evidence on the relationship be-

tween child penalties and elicited gender norms. The norm variable is taken from the International Social Survey Program (ISSP), focusing on a question of whether women with children under school age should work outside the home (full-time or part-time) or stay at home. The figure plots our estimated long-run child penalties in earnings against the fraction of respondents who think women should stay at home. The correlation between child penalties and gender norms is quite striking. The countries that feature larger child penalties are also characterized by much more gender conservative views. This evidence, while not necessarily causal, is consistent with a potentially important role for gender norms.

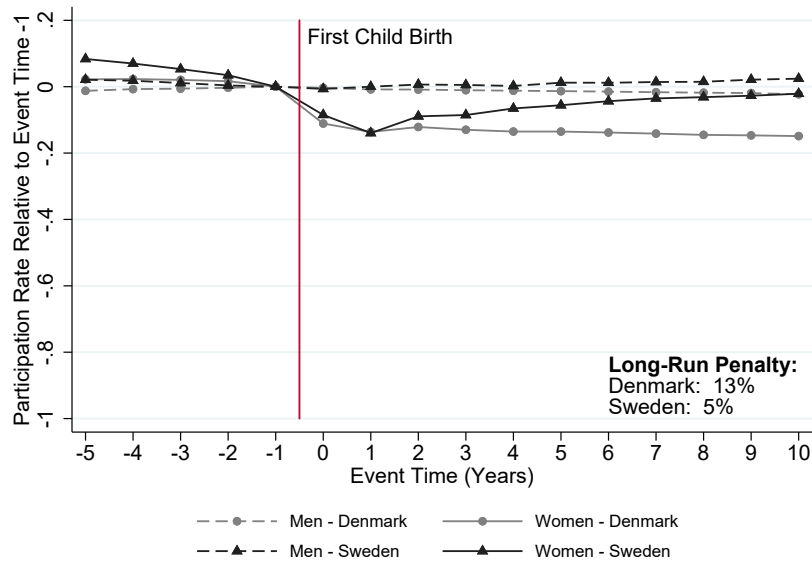
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Online Appendix

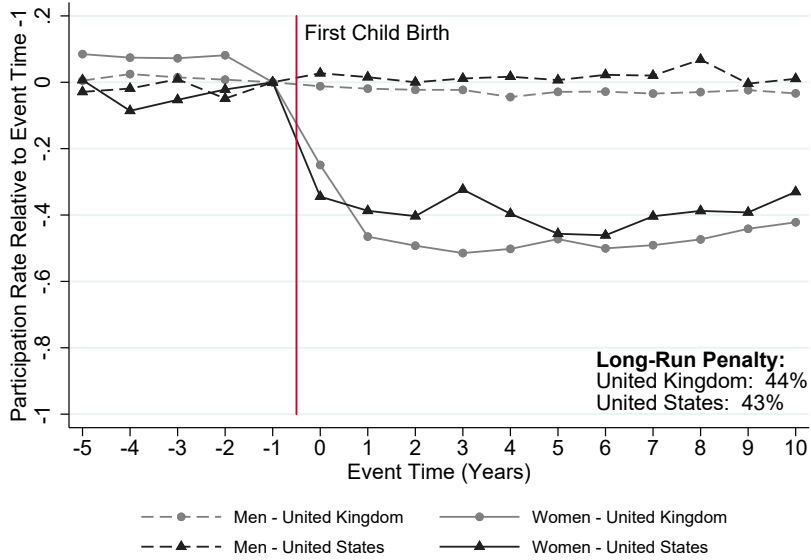
A Supplementary Figures and Tables

Figure A.I: Child Penalties in Participation Rates in Scandinavian Countries



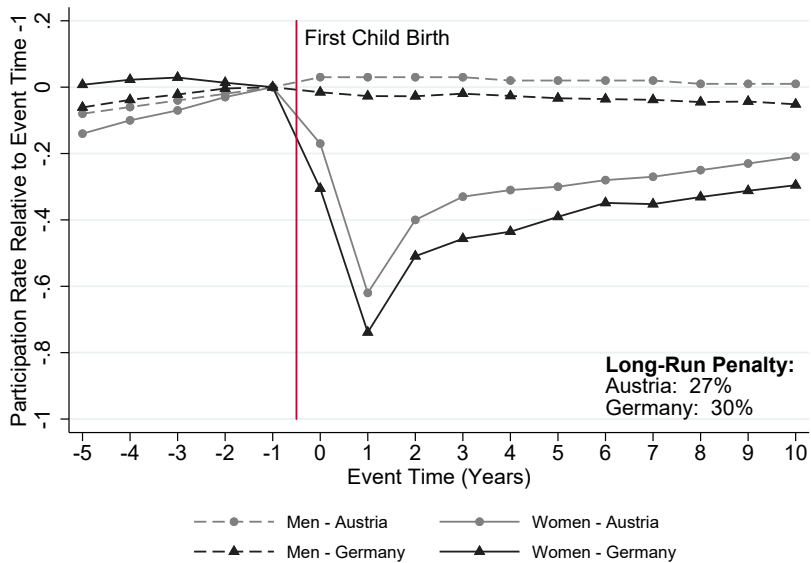
Notes: The figure shows percentage effects of parenthood on the participation rate across event time t for each gender g , i.e. P_t^g defined above. The figure also displays long-run child penalties, defined as the average penalty P_t from event time 5 to 10.

Figure A.II: Child Penalties in Participation Rates in English-Speaking Countries



Notes: The figure shows percentage effects of parenthood on the participation rate across event time t for each gender g , i.e. P_t^g defined above. The figure also displays long-run child penalties, defined as the average penalty P_t from event time 5 to 10.

Figure A.III: Child Penalties in Participation Rates in German-Speaking Countries



Notes: The figure shows percentage effects of parenthood on the participation rate across event time t for each gender g , i.e. P_t^g defined above. The figure also displays long-run child penalties, defined as the average penalty P_t from event time 5 to 10.