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Abstract

By studying mothers' labour earnings trajectories in Sweden and western Germany, this cross-national study reveals strengths and weaknesses in both countries' social policy setting when it comes to protecting women from adverse effects of separation. Using large scale register data, we follow women who gave birth between 1992 and 2014 from one year prior to the birth of their first child until ten years after. Utilizing OLS and fixed effects models, we calculate robust long-term estimates of the effect of separation on mothers' earnings trajectories. Results show that separation negatively affects mothers' earnings trajectories in Sweden while it positively affects them in western Germany. In Sweden, although earnings of separated mothers' lag behind those of partnered mothers, both groups are able to return to their levels of pre-birth earnings. In western Germany, however, both partnered and separated mothers' earnings remain far below pre-birth levels. Our findings for subgroups based on pre-birth earnings quartiles reveal that in both countries, mothers with lower pre-birth earnings positions face the most precarious situations following separation. Based on the findings, we would like to emphasise the importance of social policies that promote female economic autonomy throughout the life course while avoiding cuts in welfare support that run the risk of pulling away mothers' economic safety net as they would hit single-headed families in lower earnings positions the hardest.

Keywords: mothers' economic autonomy, parental separation, labour earnings, welfare policy, long-term earnings trajectories

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Introduction

Economic autonomy refers to the capacity to support oneself and one's dependents (Orloff, 1993). At a time when single parenthood has become increasingly common (Bernadi et al., 2017), mothers' capacity for economic autonomy is crucial as they frequently face a drop in equalized household income (Andreß et al., 2006; Bayaz-Ozturk et al., 2018; Hauser et al., 2016), increased poverty, and reliance on government assistance after separation (Nieuwenhuis & Maldonado, 2018). While there is relative consensus on measures that reduce the impacts of childbirth on women's employment, such as income-related parental leave and subsidised public childcare (Grimshaw et al., 2015; Halldén et al., 2016), there is less agreement on social policy measures that are effective in reducing the negative economic impacts of separation. It is generally believed that countries that effectively integrate women into the labour market are also better equipped to shelter them from the adverse economic effects of separation (Korpi et al., 2013; Uunk, 2004; Zagel & Van Lancker, 2022).

Single mothers in Sweden and Germany have higher poverty risks than those in other European countries (Nieuwenhuis & Maldonado, 2018), despite the various policy reforms both countries have undertaken over the years to increase women's labour force participation. Sweden began introducing reforms in the 1970s, while Germany only began in the early 2000s, modelling its policies after Sweden's. Given that the two countries are at different stages of progress in their efforts to increase women's labour market participation, they make ideal cases to examine the interaction between social policy and women's economic autonomy after separation.

Studies focusing on earnings trajectories after separation as a measure of women's economic autonomy are rare. Most of those that do exist are confined to single countries and have a short-term focus (Tamborini et al., 2015). In this paper, we compare long-term earnings trajectories of separated mothers and partnered mothers in Sweden and western Germany. We focus exclusively on women who were employed two years prior to the birth of their first child, as our interest lies in work-related adjustments following the transition to parenthood and separation. The two countries differ in their assumptions about mothers' economic independence and therefore also in their overall policy regimes supporting the combination of care and paid work. Although Germany has enacted major policy reforms in recent years, the male breadwinner model is still deeply rooted,

especially in western Germany (Geisler & Kreyenfeld, 2019). The recent reforms have resulted in modest increases in maternal full-time employment, but married mothers still mainly work part-time or in marginal employment (BMFSFJ, 2020). Sweden, in contrast, is known for its longstanding family policies that promote gender equality, the employment of both parents and the equal sharing of care work within couples (Ferrarini & Duvander, 2010). This has led to high female labour force participation rates, earlier re-entry of mothers into the labour market, and higher levels of full-time work after childcare breaks than in policy settings where women significantly reduce their labour supply after the birth of a child (Korpi et al., 2013).

While being widespread, parental separation is still understudied and deserves further attention due to the seriousness of the short- and long-term economic consequences, particularly for mothers. By comparing separated and partnered mothers' earnings trajectories in a cross-national setting, we study mothers' capacity for economic autonomy in two different social policy contexts. Using large-scale register data from the German pension insurance and Statistics Sweden along with OLS and fixed effects models, we produce robust estimates of the effect of separation on mothers' earnings trajectories over a period of ten years after first childbirth. Further, we shed light on subgroup variation based on pre-birth earnings quartiles. The analysis of subgroup variation within different policy settings reveals how social class differences interact with critical life-course events such as separation and point to the differing opportunities mothers might have within existing social policy contexts.

Determinants of separated mothers' labour market activity

Research has long highlighted efforts to increase earnings as one of the most important strategies to offset severe economic outcomes after a separation (Mortelmans, 2020). Hence, separation is possibly an important trigger for mothers to (re-)enter the labour market, increase working hours or seek for better-paying work (Jansen et al., 2009). Yet depending on women's labor market integration prior to separation, different mechanisms are likely to guide their labour market behaviour afterwards and thus, to affect their earnings trajectories. Financial needs may push separated women to increase earnings while other needs, such as the reconciliation of family and work life, may work in a constraining way.

Push factors

After separation, economies of scale are lost, living expenses increase, and the previously pooled household income is split. These factors are often especially detrimental to women and can act as push factors, encouraging women to increase their labour earnings. The economic need is most urgent in cases where the woman was previously a homemaker or part-time worker, since this would mean she was contributing less to the shared household income. Even for women who worked full-time or 'long part-time' prior to separation, losing access to the former partner's income may be detrimental. Women are often in the economically weaker position due to the wage gap between women and men, which is exacerbated by the often gendered division of labour after the birth of a child (Evertsson & Boye, 2016). In addition, children commonly reside with their mothers after separation. Part of the children's living expenses are covered by child maintenance paid by the non-resident parent. However, if child maintenance payments are low, or if the other parent fails to pay regularly, this may aggravate the precarious economic situation of the separated mother.

Another factor guiding the labour market behaviour of women after separation is the different legal contexts relating to civil status. In countries where the male breadwinner model is predominant, marriage tends to be coupled with legal benefits. For example, health care coverage is often provided to the entire household when just one member, usually the man, is employed. Before separation, 'marriage benefits' may keep women out of employment as they are covered within the household in their role as dependent spouse, while after separation, the loss of these benefits increases their financial needs and can push them to seek work or increase their earnings. In contexts where a dual-earner model is predominant, access to social security and health care is decoupled from civil status and depends instead on the individual's own labour market participation (Lewis, 1992).

Earlier studies support the idea that economic need is a mechanism pushing women to increase their labour market participation (Jenkins, 2008; Van Damme et al., 2009) and earnings (Bradbury & Katz, 2002; Smock, 1994) following separation. Economic need is also connected to socio-economic status, as shown among women in the United States (Tamborini et al., 2012) and mothers in Israel (Herbst & Kaplan, 2016): In both countries, women with the lowest earnings in the year prior to divorce achieve the greatest gains

afterwards, most likely as a result of switching from part- to full-time work. Moreover, separation has been found to have a positive impact on women's labour earnings in the long term, especially if women do not remarry (Couch et al., 2013; Tamborini et al., 2015).

Constraining factors

There are some studies that report long-term earnings penalties for women after divorce, contradicting the theoretical mechanisms outlined above. In Israel, women gain more stable employment following a divorce yet suffer long-term earnings penalties (Raz-Yurovich, 2013). In Sweden, separated mothers initially show stronger earnings increases in comparison to partnered women, but eight years after first birth their labour earnings show a lagged negative separation effect (Nylin, 2020). In Finland, research has found that single mothers have substantially lower annually measured mid-life earnings than married mothers (Jalovaara & Fasang, 2019). According to Jalovaara and Fasang (2019), their findings question whether 'family-friendly' policies are reducing gender inequalities and suggest that they may instead only be supporting individuals who adhere to normative models of the life course and maintain stable relationships. Selection effects into separation may play a part in explaining this, given the strong negative educational gradient in single parenthood (Härkönen & Dronkers, 2006). However, other mechanisms may be at play that constrain the employment and labour market success of separated mothers.

Mothers are often left with sole responsibility for their children after separation, as exemplified by the disproportionate share of children who live with their mothers (Bjarnason & Amarsson, 2011). The increased childcare obligations resulting from single parenthood can result in time allocation conflicts when trying to reconcile job and family. Research indeed shows that work-family conflict is high in settings like Sweden where mothers' labour market participation is taken for granted (Grönlund & Öun, 2010). Because of these constraints, mothers may lack the time and energy necessary to increase their earnings and move ahead in their careers after separation. Those who are already employed may even have to reduce their labour market activity. Reductions in working hours result in lower earnings and a higher long-run risk of human capital depreciation (Aisenbrey et al., 2009; Budig et al., 2012) and thus poorer earnings trajectories than would otherwise be the case.

The degree to which mothers are constrained from increasing their earnings arguably depends on the extent to which mothers are employed, i.e. the 'baseline situation' from which they start after separation in terms of time availability and socio-economic position. With regard to time availability, mothers who are already working full-time or 'long part-time' cannot increase their earnings as much by increasing their working hours. For them, the only available option is the challenging path to seek a better-paying job. Thus, in social policy settings that promote women's economic autonomy through family-friendly policies, mothers start from a different baseline situation after separation compared to mothers in policy settings where female economic autonomy is less common.

Women's labour market behaviour after separation is also related to their socio-economic position. One indicator of socio-economic position is education. Fewer years in education often correspond to a low socio-economic position and act as a constraint on (re-)entering the labour market or switching to a better-paying job to increase earnings. Mothers who were not fully integrated into the labour market before the birth of their first child are likely to face greater constraints after separation. Research has shown that in western Germany, earnings almost stagnated two years after divorce among mothers with low pre-divorce earnings, and increased mostly among mothers with higher pre-divorce earnings (Radenacker, 2020). In the latter group, despite this increase, earnings still averaged below levels of economic autonomy. In Sweden, earnings penalties eight years after separation were found to have the most severe impact on mothers with low socio-economic positions. Compared to partnered mothers, separated mothers with the lowest pre-birth earnings showed the weakest earnings trajectories over time, pointing to an additional disadvantage they experience due to separation (Nylin, 2020). In Sweden, children of parents with a lower socio-economic position more often live with their mothers after separation (SCB, 2014), adding to the constraints faced by these women.

Differences between Sweden and western Germany

Sweden and Germany have both passed reforms to increase women's labour force participation but have progressed to different degrees in achieving this goal. Sweden is considered to have an 'earner-carer' family model where both parents work full-time or close to full-time (Ferrarini & Duvander, 2010) and are encouraged to share care responsibilities (Lappegård et al., 2020). The parental leave system guarantees financial security, and

subsidised public childcare, which is universally used by all children starting at the age of two (Swedish National Agency for Education, 2021), enables both parents to work. Furthermore, parents with children under the age of eight have the right to reduce their working hours by up to 25% of normal hours (SCB, 2020b). Known as 'long part-time work' when applied to a 40-hour work week, this option is still mainly used by mothers.

Following Sweden's example, Germany has enacted major reforms over the last 15 years. Policies introduced since 2007 include earnings-related parental leave benefits to promote women's quicker return to the labour market, incentives for fathers to take a share of parental leave (Unterhofer & Wrohlich, 2017), as well as the expansion of public childcare available to children from age one, including a legal right to a childcare slot since 2013 (Bröckel & Andreß, 2015). Despite the reforms, access to public childcare is still limited, and western Germany is often described as a conservative country with policies that tend to support women's care work over their full-time employment. This traditional model is encouraged by the insurance system, in which married women are covered by their spouse's health insurance, and by the joint taxation scheme, which creates strong work disincentives for a second earner (Bröckel & Andreß, 2015). In contrast to Germany, Sweden has had a system of individualised taxation since the 1970s (Selin, 2014), which has helped to reduce the share of 'housewives' and women in marginal employment.

Although there has been an increase in joint physical custody arrangements in Sweden (SCB, 2014), most children reside with their mothers after parental separation, as is the case in Germany. In both countries, the non-resident parent is obliged to pay child maintenance. Whereas in Germany, the amount is determined by the court based on the non-resident parent's income, in Sweden, parents have been encouraged since the early 2000s to agree on the amount of child maintenance payments privately (ISF, 2019). In the Swedish system, spouses are as a general rule individually responsible for their livelihood following a divorce, while in Germany up to 2008, spousal maintenance was granted to the resident parent under the assumption that mothers were unable to work full-time before the youngest child reached age 15. A reform in 2008 radically changed this situation by assuming that women can be 'self-reliant' once the youngest child turns three (Geisler & Kreyenfeld, 2019).

In 2019, employment rates of mothers with children 0-14 years old were 73% in Germany and 86% in Sweden. It is important to note, however, that mothers in Germany work considerably fewer hours than mothers in Sweden. In Germany, 38% of mothers work part-time, meaning fewer than 30 hours per week, whereas in Sweden, only 9% of mothers work part-time, while the majority work full-time or 'long part-time' (OECD, 2020). In western Germany, young children are still an important factor inhibiting mothers from returning to work. This, in combination with the higher gender pay gap in Germany (OECD.Stat, 2021), means that women in Germany are still far from economic autonomy. Swedish women are in a more advantageous economic position as mothers, but employment rates in Sweden are lower among single mothers than partnered mothers (SCB, 2020a). In Germany, full-time employment is more common among single than partnered mothers (Destatis et al., 2021). There, the overall impact of the aforementioned reforms has been moderate, the main effect being an increase in employment levels among highly educated mothers (Zimmert, 2019).

Hypotheses

In the following, we outline how mothers' earnings trajectories may vary after separation by comparing the earnings trajectories of separated and partnered mothers in Sweden and western Germany. At the point in time when separation occurs, earnings trajectories of mothers in the two countries are likely to already differ, as Swedish mothers return to the labour market sooner after childbirth than German mothers. Starting from these different baseline situations, push factors and constraining factors will affect mothers' employment behaviour to varying degrees. Although mothers from Sweden and Germany are likely to be affected by both types of factors, we assume that German mothers are more affected by push factors and that Swedish mothers are more affected by constraining factors due to the respective policy contexts.

For Germany, we expect separated mothers to have steeper earnings trajectories than partnered mothers (H1a), as their imminent need to achieve economic autonomy as single mothers pushes them to increase their earnings. This need is intensified by the fact that marriage benefits such as health insurance are no longer available to them following separation, creating strong incentives to seek 'regular' employment or increase working hours.

In Sweden, push factors to increase earnings after separation are likely weaker, as women maintain their economic autonomy after the birth of a child by continuing to work full-time or 'long part-time'. Compared to partnered mothers, however, separated mothers have to face high levels of work-family conflicts alone while also bearing increased child-care obligations. Therefore, efforts to advance their careers may be constrained, and separated mothers may even be more prone to reduce their working hours. This could lead to direct reductions in earned income and have a long-run negative impact on future returns. For Sweden, we therefore expect separated mother's earnings trajectories to be flatter than those of partnered mothers (H1b).

Given that initial socio-economic positions are likely to determine future employment and earnings trajectories, we assume that the patterns described above for the two countries in H1a/b will be more distinct depending on the economic starting position of the mother. For Germany, we expect that the stronger the pre-birth earnings position of separated mothers, the stronger their earnings growth after separation compared to partnered mothers (H2a). For Sweden, we expect that the weaker the pre-birth earnings position of separated mothers, the weaker their earnings growth after separation compared to partnered mothers (H2b).

Data, variables, and analytical strategy

We use individual-level register data containing marital, fertility, and earnings histories for Sweden and Germany. The Swedish data cover the whole population and are provided by Statistics Sweden. The German data consist of a subsample from the public pension registers, the VSKT&VA-Statistics 2015. About 90% of all residents of Germany are covered by the public pension system, with the exception of certain occupational groups such as civil servants (Keck et al., 2020). The analysis is restricted to western Germany. As family behaviour differs significantly between eastern and western Germany, including the eastern German situation would have gone beyond the scope of this paper.
For comparability, we restrict the Swedish and German data to women who I) gave birth to their first child between the years 1992 and 2014, excluding women with multiple births, II) were born before 1985 and were aged 18 to 50 at the event of first childbirth, III) who were nationals (with Swedish or German citizenship) and residents of the

respective country in 2015 and, IV) had an income[1] two years prior childbirth. Restricting the data to women with labour earnings two years before the birth of their first child means that 30% of the original German and 11% of the Swedish sample is dropped, reflecting the varying degrees of labour market participation in the two countries. Women who become mothers without a partner or whose relationship ends within the year of childbirth are not the subject of this study. Therefore, we only follow women who were in a partnership at the end of the year in which the first child was born. We are able to follow 26,170 women (245,636 person-years) from western Germany and 688,713 women (7,075,656 person-years) from Sweden. Our observation window starts one year before childbirth and ends when the first child turns 10 years old, or in 2015 at the latest.

Dependent variable

The dependent variable is *annual gross labour earnings* from taxable employment. For both countries, earnings were converted into euros using 2014 as a reference year. Although earnings are often transformed to a log scale, we keep absolute euro amounts to capture all mothers over our 10-year observation window, even if they have no earnings in a given year.

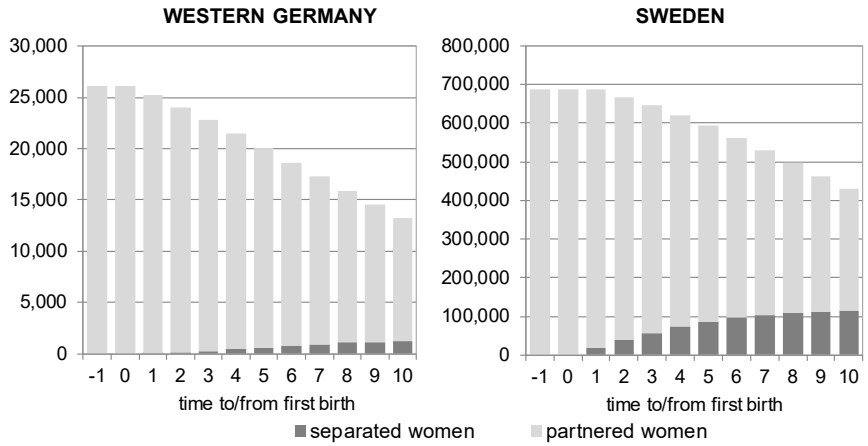
Independent variable

The main variable of interest is the time-varying measure of *separation*, which can occur from one year after birth until the child reaches the age of 10. For Sweden, the date of separation is defined as the year in which the previously co-resident partners move into separate households. This includes both married and cohabiting couples, as childbirth often precedes marriage in Sweden. Further, in Sweden, legal differences between divorce and union dissolution are small, while rights and benefits are the same for all parents regardless of civil status (Perelli-Harris & Gassen, 2012). Additional analysis of separations of married women versus separations of cohabiting women show that results are driven by separations of cohabiting women, which we will address again in the discussion. The German data only contain information on the dates when married couples filed for divorce. We therefore define separation as this date and cannot identify the separation dates of unmarried couples. However, this is a rather small fraction of the western German population, where non-marital birth ratios are low and where most cohabiting mothers

[1] Due to outlying earnings in the Swedish data, women who earned more than one million SEK during any given year in the study window were also excluded.

marry shortly after childbirth (Schnor, 2014). As shown in figure 1, more mothers separate in Sweden than in Germany, especially in the first years after birth.

Figure 1: Number of women by the age of the first child



Note: Scales differ in relation to the size of the respective datasets. Women who had their first child after 2005, cannot be followed for full set of 10 years why the number of women decrease over time.
Source: FamChange-database and VSKT-VA 2015; own calculations.

We use *pre-birth earnings quartiles* (Q1-Q4), measured two years before childbirth, as an exogenous factor to reduce the effect of selection into separation and to account for subgroup variation based on women's socio-economic position.[2] As this variable is formed on the earnings distribution in each country, cut-points differ for Sweden and Germany. Further we are interested in the *age of the first child*, measured in single years, as a time frame over which we follow the mother's earnings development. We also control for the *age of the mother at first childbirth* (categorical) and a time-varying covariate for whether a *second* or *third child* was born, as both are expected to impact the earnings development. Changes in *macroeconomic developments* are controlled for by annual national female unemployment rates (IAB, 2017; SCB, 2020a), and period effects such as economic recessions or policy changes are included by a categorical time period variable (1991-1999, 2000-2006, and 2007-2015).

Table A1 in the Appendix shows the average earnings and socio-demographic characteristics for the total sample as well as for each pre-birth earnings quartile at the start of our

[2] To ensure that pre-birth earnings quartiles reflect the economic position of mothers, they were also calculated at other time points (e.g., one year before), generating similar results.

observation window. Women's pre-birth earnings differ between the samples. German women have higher annual earnings on average (26,847 euros) compared to Swedish women (22,309 euros), which is due to the restriction of the samples to employed women. On average, women have their first child at age 29 in both countries, and separate when the child is around five years old in Sweden and six in western Germany. Likewise, the average age at birth increases from age 27 to 32 over the pre-birth earnings quartiles, pointing to longer participation in the labour market prior to birth and/or to a postponement of first birth. With regard to the timing of separation after childbirth, there are few to no differences between the women in the different pre-birth earnings quartiles. However, within the observation period, the share of women who separate decreases from Q1 to Q4 in both countries, and Swedish women tend to have more second and third childbirths than German women (Appendix, Figure A1).

Analytical strategy

We start with a descriptive analysis of average earnings over our observation window, comparing trajectories of separated and partnered mothers in Sweden and western Germany. Using separate OLS regression models for both countries, we first estimate the effect of separation on mothers' average annual earnings. We then interact separately the age of the first child and the pre-birth earnings with the separation variable to identify time trends and subgroup variation. In the next step, we conduct a three-way interaction of these variables to shed light on the long-term earnings developments of subgroups of separated and partnered mothers. Since our data contain repeated measures of earnings for each woman over time, we estimate robust standard errors that account for the clustering of individuals in our data. As a final step, we compare the main OLS results with estimations from fixed effects models as a robustness check to account for possible time-constant unobserved heterogeneity that may have biased the OLS regressions. All results of the full OLS and FE models can be found in the Appendix.

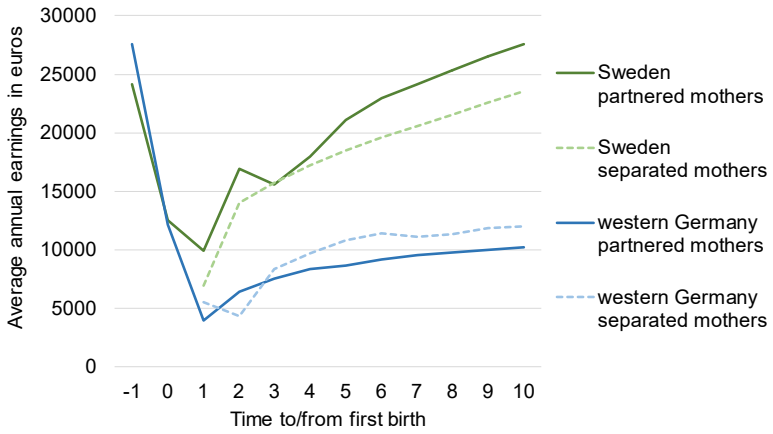
Empirical findings

Descriptive results

Our descriptive findings indicate large differences in women's earnings before and around childbirth in both countries (Figure 2). Although all mothers experience a sharp

decline in earnings around childbirth, the decline is much stronger in western Germany. After childbirth, most mothers increase their labour market participation, which shows up as a continuous increase in average earnings. The only exception is a second earnings dip among partnered mothers in Sweden. This dip may be due to the compressed timing of second births in the country. Ten years after childbirth, partnered and separated mothers in Sweden are able to return to the level of their pre-birth earnings, whereas German mothers remain far below their pre-birth earnings, reflecting the different labour market participation of mothers in the two countries. However, while separated mothers earn less than partnered mothers in Sweden, separated mothers in Germany earn more than their partnered counterparts over time.

Figure 2: Average annual labour earnings of partnered and separated mothers by the age of the first child



Source: FamChange-database and VSKT-VA 2015; own calculations.

Regression results

Similar to the descriptive statistics, our regression results show a clear negative correlation between separation and annual earnings for mothers in Sweden, but a positive correlation for mothers in western Germany (Table 1). The estimation of the effect of separation indicates that separated Swedish mothers earn on average 1,922 euros less per year than partnered mothers, while separated western German mothers earn on average 1,844 euros more than partnered mothers.

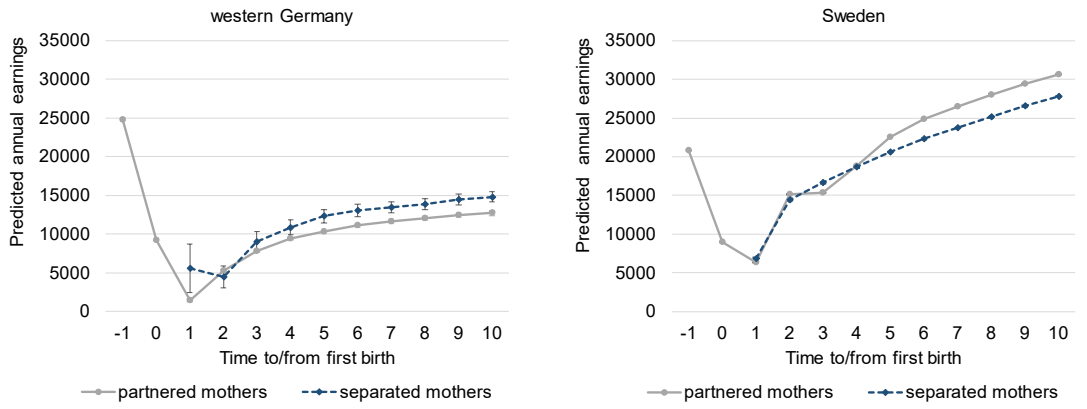
Table 1: OLS regression results with annual earnings as dependent variable

		western Germany	Sweden
Separation			
	No	ref.	ref.
	Yes	1 844***	-1 922***
Person-years		245 636	7 075 649
R-square		0.383	0.383

legend: * p<.1; ** p<.05; *** p<.01
Controlled for: age of the first child, age at first childbirth, birth order, pre-birth earnings quartiles, calendar year, national unemployment rate. Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

The results of the interaction models by age of the first child and pre-birth earnings quartiles are graphically presented by plotting the estimates of the average marginal effects. Figure 3 reveals that the observed effect of separation on earnings starts a few years after birth and seems to persist over time in both countries. After initially similar earnings trends for all mothers in western Germany, earnings trajectories diverge, with separated mothers having on average steeper earnings trajectories up to the end of our observation window, which is in line with H1a. It seems that separated mothers are either returning to the labour market or increasing their work hours more quickly, which is reflected in their stronger earnings growth, which, however, remains below pre-birth earnings. Swedish mothers show relatively rapid earnings increases after birth, exceeding their pre-birth earnings, reflecting the normally high maternal employment rate in Sweden. From four years after birth, partnered mothers' earnings are steeper, leaving separated mothers behind, as expected in H1b.

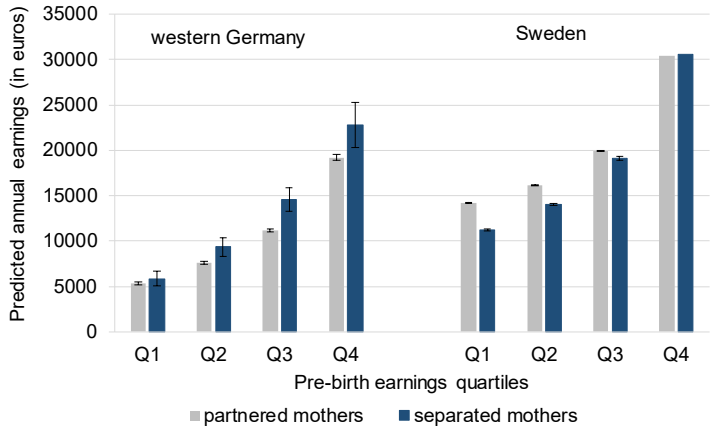
Figure 3: Predicted values from OLS regression; interaction models of age of the first child and separation



Controlled for: pre-birth earnings quartiles, calendar year, age at first childbirth, birth order, period and female unemployment rate.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Figure 4 shows the interaction effect of pre-birth earnings quartiles and the separation variable on mothers' annual earnings averaged over the study period. In both countries, results indicate that earnings increase with the level of pre-birth earnings, but that the increase differs between separated and partnered mothers. Separated mothers from western Germany show higher earnings in all four pre-birth earnings quartiles and the most pronounced increases in the two highest quartiles (Q3-Q4). However, there is no significant difference between partnered and separated mothers from the lowest pre-birth earnings quartile (Q1) in Germany. In Sweden, earnings are generally higher for partnered mothers, which is most evident in the two lowest pre-birth earnings quartiles (Q1-Q2). However, in the highest pre-birth earnings quartile (Q4), partnered and separated mothers show relatively similar earnings that are also substantially higher than earnings of all other mothers.

Figure 4: Predicted values from OLS regression; interaction model of pre-birth earnings quartiles and separation



Controlled for: age of first child, calendar year, age at first childbirth, birth order, period and female unemployment rate.
Source: FamChange-database and VSKT-VA 2015; own calculations.

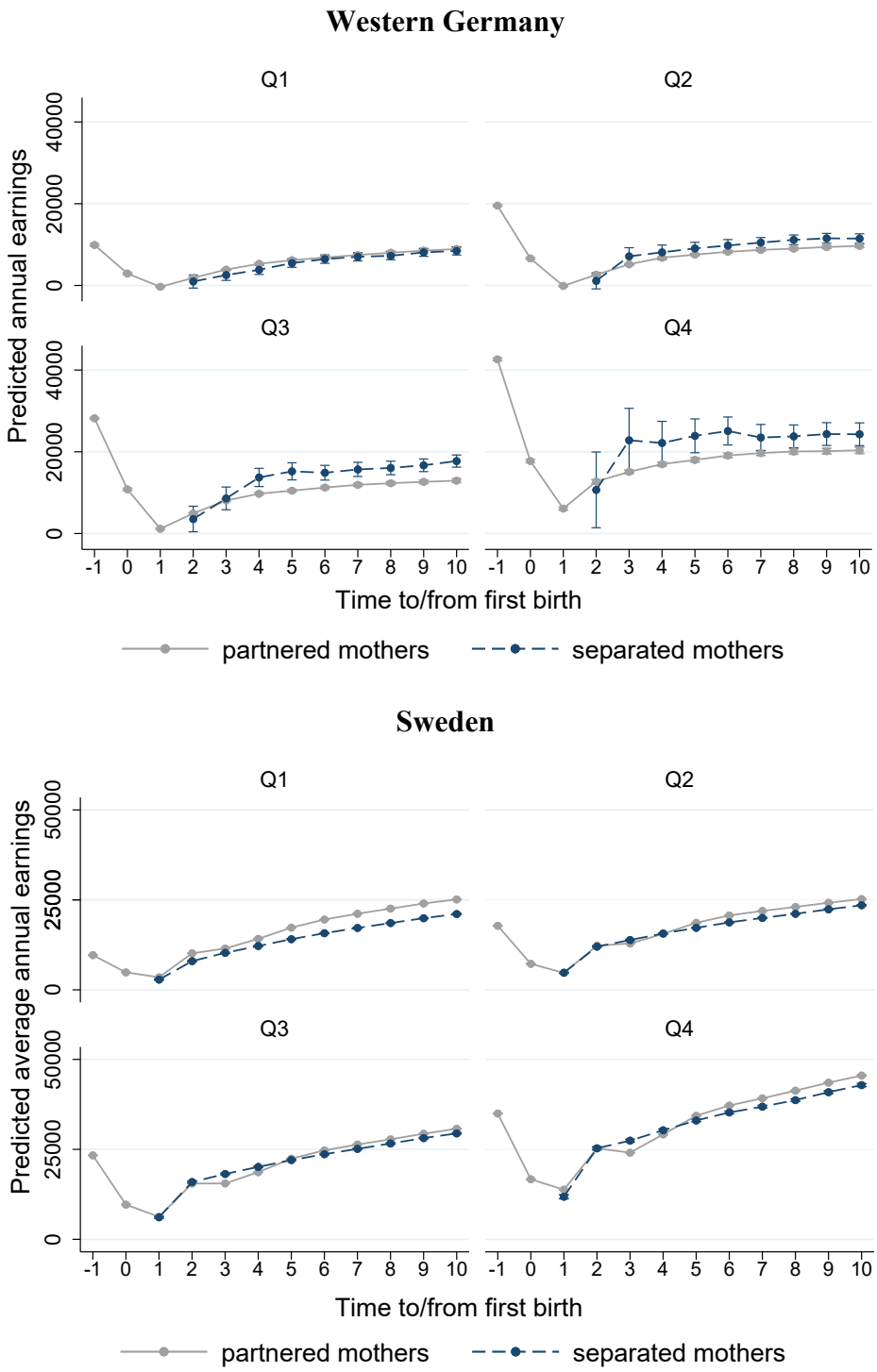
The results of the three-way interaction, shown in Figure 5, disentangle the subgroup variation by pre-birth earnings quartiles with respect to the observed trends shown in the previous interaction models. Looking at the subgroup-specific trajectories, the clear pattern of steeper earnings trajectories among separated mothers compared to partnered mothers in western Germany is only evident for those in the higher pre-birth earnings quartiles (Q3-Q4). Partnered and separated mothers in the lowest earnings quartile (Q1) both show equally flat earnings trajectories, indicating that women who already had a low economic position prior to the birth of their first child face greater difficulty increasing

their earnings afterwards. Since only separated mothers from the higher pre-birth earnings quartiles show steeper earnings growth than partnered mothers, while this is not the case for separated mothers from the lowest group, we find only partial support for H2a.

In Sweden, partnered mothers have higher earnings over time than separated mothers, even when distinguished by pre-birth earnings quartiles, although the difference is smaller than indicated by the two-way interaction results. The largest gap in earnings exists for separated mothers in the lowest earnings group (Q1). However, separated mothers in the highest pre-birth earnings group (Q4) also experience comparatively flatter earnings trajectories than the partnered mothers, at least starting at five years after birth. Thus, although we find partial support for H2b, as separated mothers coming from the lowest earnings quartile (Q1) have flatter earnings trajectories compared to partnered mothers, this support is challenged by the results for mothers in the highest earnings quartile (Q4). Finally, fixed effects models confirm the long-term patterns found between partnered and separated mothers for both countries (Appendix Table A9, Figure A2-A3). Overall, they estimate slightly higher earnings trajectories for all women in both countries.[3]

[3] Further sensitivity checks (e.g. sample restrictions, definition of separation variable) are available on request.

Figure 5: Predicted values from OLS regression; three-way interaction model of pre-birth earnings quartiles, separation, and age of the first child



Note: Scales differ for both countries. Separated mothers' estimates for the first year after birth are not presented for Germany due to the low case numbers.
Controlled for: calendar year, age at first childbirth, birth order, period and female unemployment rate.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Discussion

By comparing the effect of separation on mothers' earnings trajectories in western Germany and Sweden, we have shown how mother's capacity for economic autonomy differs between the two policy settings. In line with our expectations, we found that separation positively affects mothers' earnings in western Germany, but that the opposite occurs over time in Sweden.

Since separation takes away the possibility for women to rely on their partners' earnings, as practiced within male breadwinner policies, it means that women need to increase their labour market participation to secure their financial welfare. The stronger earnings trajectories that separated mothers display compared to partnered mothers in our results for western Germany support this mechanism. However, economic autonomy is far from achieved, as earnings remain considerably below pre-birth levels. Further, when the results are disentangled by pre-birth economic positions, post-separation earnings increases are limited to mothers with the highest earnings positions before birth. Still, the higher earnings of separated mothers do not match the support partnered women gain from their partners' earnings, given earlier research on household income (Bröckel & Andreß, 2015). Despite showing an earnings increase after separation, our results still highlight the importance and necessity of spousal and child maintenance, as well as social assistance to families headed by single mothers in western Germany – at least until policy measures succeed in better integrating women into the labour market.

In Sweden, thanks to family-friendly policies that encourage labour market participation, women have better opportunities to maintain their economic autonomy throughout the transition to parenthood and after separation. This is reflected in our results showing that both partnered and separated mothers surpass their pre-birth earnings over time. However, our results also show that the earnings trajectories of separated mothers lag behind those of partnered mothers at the end of our observation window. This is mainly of concern among mothers with the lowest economic positions pre-birth. As outlined above, push factors to increase earnings after separation may be less relevant in policy settings where mothers continue to engage in paid work but they also face greater difficulty increasing their earnings. In such settings, efforts to balance care work and paid work take centre stage. Resulting time allocation conflicts may negatively impact mothers' labour market behaviour and earnings, especially for those mothers starting from a lower economic position. Hence, due to the different baseline situations after separation, the question seems to be 'how much can I work' in Sweden compared to 'going back to work at all' in western Germany.

Building on previous research, we have outlined push factors and constraining factors in different policy settings that guide mothers' post-separation behaviour in the cross-section of care work and paid work. As previous research suggests, the lower earnings of separated mothers in Sweden could result from the time allocation problem these women face (Amilon, 2010; Roman, 2017), but we have unfortunately not been able to control for that. Future research disentangling separated mother's adjustments in working hours, job switches, and sick leave would offer valuable pieces to solve this puzzle. We already know that mothers trade wages for shorter work days as well as shorter commuting distances (Skora et al., 2020), but less is known about whether these strategies are used by separated mothers in particular. While we have relied on mothers' labour earnings to measure their economic autonomy, other studies have focused on household income. Future research should try to include and differentiate between detailed income types to fully understand the mechanisms that drive post-separation earnings. It is known that transfer reliance increases after separation (Nieuwenhuis & Maldonado, 2018) and that mothers from low-income households are often left to rely on welfare support as an alternative to employment when their children are very young (Konietzka & Kreyenfeld, 2005). Still, the question of how individual labour earnings interact with either income- or employment-related social policies and how this varies not only by economic position but also by policy setting needs further attention. For instance, the amount of child maintenance received by separated parents in Sweden is largely unknown: Transfers are often settled privately after separation, which could be an additional disadvantage for low-income mothers. Despite dissimilarities between Germany and Sweden, low-income mothers in both countries have a hard time increasing their earnings after separation, and separations are especially prevalent in this group. Keeping in mind that only women who were employed prior to birth are included in this study, the question of how mothers without prior labour market attachment fare is a pressing concern. Additional analysis for Germany showed that a large percentage of mothers in the lower income groups drop out of the labour market. For Sweden, the results indicate a high risk of in-work poverty, as other studies have pointed out as well (Nieuwenhuis & Maldonado, 2018). While the present work has focused mainly on work-related adjustments of mothers following separation, future research could examine what keeps some women out of the labour market in the first place.

A limitation of our study is that in the case of Germany, we can only examine the consequences of marital separation but not separation from cohabitation. Although non-marital childbearing ratios are low in western Germany, some mothers cohabit before separation, and since they are

indistinguishable from partnered mothers in our data, we do not know if their earnings trajectories differ. Sensitivity analyses have indeed shown that even in Sweden, where there are few legal differences between marriage and cohabitation, mothers who have experienced marital separation do better than mothers who have separated after non-marital cohabitation (Appendix, Figure A4). Although we included pre-birth earnings quartiles to address the social gradient in separations, selection into marriage seems to affect earnings trajectories.

This two-country comparative study indicates that social policy measures that facilitate the reconciliation of work and family life have a positive effect on the employment behaviour of mothers. Based on our results, we would like to emphasise the importance of social policies that promote female economic autonomy throughout the life course. The Swedish setting, which combines 'active labour market policies' with accessible and affordable public childcare, clearly allows mothers to continue to achieve upward earnings trajectories even after a separation. Still, as separated mothers' earnings lag behind those of partnered mothers over time, policies do not seem to be providing separated mothers the same opportunities as partnered mothers. This is of particular concern as the 'Scandinavization' of social policies across Europe has the downside of leading to general cuts in welfare support. The reforms of spousal alimony in Germany are an example of such cuts as they are based, among other things, on the assumption of increased female labour market participation. However, such cuts run the risk of pulling away a financial safety net that mothers often urgently need, even if they were previously in full-time employment.

The Swedish results pose the important question of why 'family-friendly' policies do not adequately protect all women, including mothers, from the adverse effects of separation, and what additional measures should be taken. As the Nordic countries' family policies often serve as a model for the rest of Europe, the disadvantage separated mothers face irrespective of their economic position pre-birth is striking and points to a structural problem. Broad sets of social policies are needed to address the specific needs and situations of separated mothers. Regulated child maintenance, social benefits, and assistance are essential to ensure the economic well-being of single-parent families, together with work arrangements and childcare support systems that ease time allocation problems while simultaneously enabling mothers to make a living. As it is now, given the results of this study, being a single 'earner-carer' in a 'dual-earner' context seems to lead inevitably to poorer economic outcomes for women.

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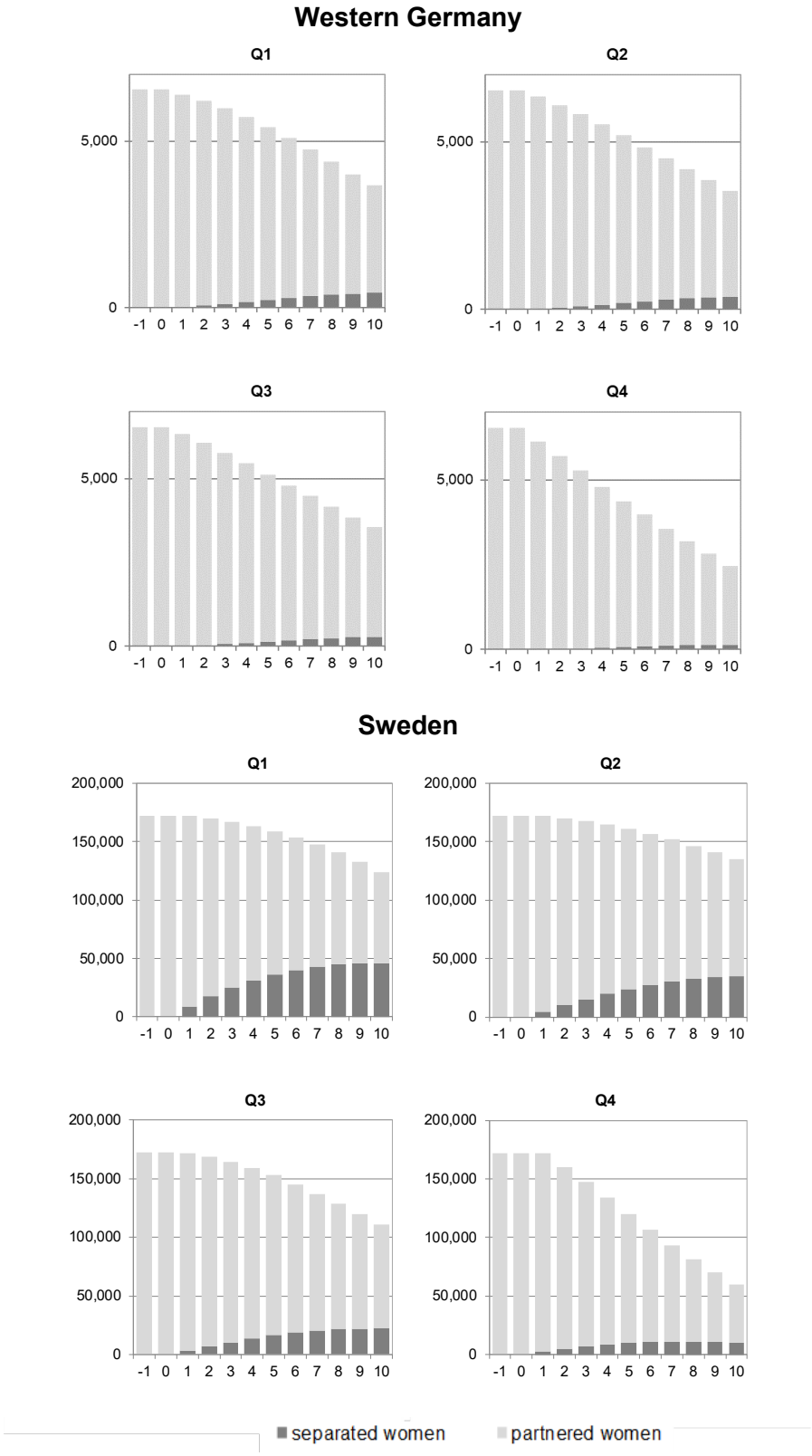
Appendix

Table A1: Sample statistics for the total sample and for each pre-birth earnings quartile at the start of the observation window

	total	Q1	Q2	Q3	Q4
Ø earnings two years prior birth					
western Germany	26 847€	8 716€	22 150€	30 822€	45 683€
Sweden	22 309€	6 058€	18 485€	26 011€	38 684€
Ø age of mother at first birth					
western Germany	29	27	28	29	32
Sweden	29	27	28	30	32
Ø age of first child at separation					
western Germany	6	6	6	6	6
Sweden	5	4	5	5	5
% of women according to birth order					
western Germany					
one child	43.3	40.6	42.1	42.1	48.3
two children	45.6	43.8	46.6	47.7	44.6
three children	11.1	15.6	11.4	10.3	7.1
Sweden					
one child	16.3	14.3	15.0	17.3	18.6
two children	59.9	54,4	60.0	63.1	65.4
three children	23.8	34,4	25.3	19.6	16.0

Note: In the Swedish registers, earnings are recorded in Swedish Krona. In the German pension registers, earnings are recorded as "pension points", with one pension point being equivalent to the average annual gross earnings in a given calendar year. Results rounded.
Cut-points for Germany: Q1>0; Q2> 16.852€; Q3> 26.703€; Q4> 35.180€; for Sweden: Q1>0; Q2>13.176€; Q3>22.342€; Q4>30.019€.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Figure A5: Number of partnered and separated mothers over observation window, for western Ger-many and Sweden (in person-years)



Source: FamChange-database and VSKT-VA 2015; own calculations.

Table A2: OLS regression results with annual earnings as dependent variable

	Western Germany	Sweden
Separation		
No	ref.	ref.
Yes	1844***	-1922***
Age of first child		
Pregnancy (year before birth)	ref.	ref.
Age 0	-15 559***	-11 840***
Age 1	-23 342***	-14 332***
Age 2	-19 553***	-5 517***
Age 3	-17 005***	-5 078***
Age 4	-15 367***	-1 745***
Age 5	-14 504***	1 795***
Age 6	-13 715***	4 029***
Age 7	-13 150***	5 566***
Age 8	-12 742***	6 990***
Age 9	-12 380***	8 425***
Age 10	-12 075***	9 635***
Birth order		
One child (including pregnancy)	ref.	ref.
Two children	-7 248***	-5 834***
Three and further children	-10 433***	-11 748***
Age of mother at first birth		
18-22	ref.	ref.
23-27	-67	2 165***
28-32	-578***	3 727***
33-37	843***	3 784***
38-42	1 223**	2 928***
43 +	-882	1 508***
Pre-birth earnings quartiles		
Q1	ref.	ref.
Q2	2 298***	2 092***
Q3	5 877***	5 952***
Q4	13 897***	16 462***
Calendar year		
1991-1999	-674***	-1 270***
2000-2006	ref.	ref.
2007-2015	1 601***	2 379***
National unemployment rate	-290***	163***
Constant	24 372***	13722***
Person-years	245 636	7 075 649
R-square	0.382	0.3831

legend: * p<.1; ** p<.05; *** p<.01
Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

INTERACTION BETWEEN AGE OF THE FIRST CHILD AND SEPARATION

Table A3: OLS regression with annual earnings as dependend variable and interaction effect between age of first child and separation

	Western Germany	Sweden
Age of first child * Separation		
Pregnancy (year before birth)*No	ref.	ref.
Age 0*No	-15 559***	-11 840***
Age 1*No	-23 345***	-14 402***
Age 2*No	-19 537***	-5 606***
Age 3*No	-16 997***	-5 392***
Age 4*No	-15 358***	-1 992***
Age 5*No	-14 509***	1 760***
Age 6*No	-13 720***	4 106***
Age 7*No	-13 145***	5 687***
Age 8*No	-12 736***	7 146***
Age 9*No	-12 398***	8 613***
Age 10*No	-12 098***	9 843***
Pregnancy (year before birth)*Yes	ref.	ref.
Age 0*Yes	.	.
Age 1*Yes	-19 239***	-13 887***
Age 2*Yes	-20 307***	-6 368***
Age 3*Yes	-15 752***	-4 175***
Age 4*Yes	-13 937***	-2 134***
Age 5*Yes	-12 487***	-197***
Age 6*Yes	-11 736***	1 509***
Age 7*Yes	-11 355***	2 949***
Age 8*Yes	-10 960***	4 341***
Age 9*Yes	-10 319***	5 757***
Age 10*Yes	-9 994***	6 991***
Birth order		
One child (including pregnancy)	ref.	ref.
Two children	-7 250***	-5 779***
Three and further children	-10 432***	-11 740***
Age of mother at first birth		
18-22	ref.	ref.
23-27	-67	2 176***
28-32	-578***	3 740***
33-37	843***	3 800***
38-42	1222**	2 949***
43 +	-883	1 534***
Pre-birth earnings quartiles		
Q1	ref.	ref.
Q2	2298***	2 097***
Q3	5877***	5 955***
Q4	13897***	16 471***
Calendar year		
1991-1999	-673***	-1280***

2000-2006	ref.	ref.
2007-2015	1600***	2380***
National unemployment rate	-290***	160***
Constant	24 372***	13 733***
Person-years	245 636	7 075 649
R-square	0.3820	0.3838

legend: * p<.1; ** p<.05; *** p<.01
Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Table A4: Average Marginal effects from the two-way interaction of age of first child and separation

Time to/ from birth	Western Germany		CI		CI	
	partnered mothers	separated mothers	partnered mothers		separated mothers	
-1	24 877		24 706	25 047		
0	9 232		9 071	9 393		
1	1 447	5 524	1 303	1 591	2 404	8 643
2	5 234	4 458	5 093	5 375	3 030	5 885
3	7 758	9 014	7 612	7 905	7 776	10 252
4	9 419	10 830	9 249	9 589	9 850	11 810
5	10 252	12 308	10 063	10 441	11 443	13 172
6	11 063	13 052	10 856	11 270	12 237	13 867
7	11 613	13 338	11 387	11 839	12 591	14 086
8	11 986	13 810	11 740	12 232	13 101	14 520
9	12 351	14 505	12 086	12 616	13 800	15 210
10	12 673	14 767	12 389	12 956	14 069	15 466
Time to/ from birth	**Sweden**		**CI**		**CI**	
	partnered mothers	**separated mothers**	**partnered mothers**		**separated mothers**	
-1	20 793		20 761	20 832		
0	8 956		8 920	8 993		
1	6 394	6 910	6 360	6 428	6 788	7 031
2	15 190	14 428	15 163	15 217	14 326	14 531
3	15 404	16 621	15 374	15 435	16 531	16 710
4	18 804	18 663	18 769	18 839	18 578	18 747
5	22 557	20 599	22 518	22 596	20 517	20 681
6	24 902	22 305	24 859	24 945	22 223	22 387
7	26 483	23 745	26 436	26 529	23 663	23 828
8	27 942	25 137	27 892	27 993	25 053	25 221
9	29 409	26 553	29 354	29 464	26 466	26 641
10	30 639	27 788	30 579	30 699	27 697	27 878

Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

INTERACTION BETWEEN PRE-BIRTH EARNINGS QUARTILES AND SEPARATION

Table A5: OLS regression with annual earnings as dependend variable and interaction effect between separation and pre-birth earnings quartiles

	Western Germany	Sweden
Pre-birth earnings quartiles * Separation		
Q1*No	ref.	ref.
Q2*No	2 255***	1 957***
Q3*No	5 793***	5 696***
Q4*No	13 826***	16 179***
Q1*Yes	472	-2 956***
Q2* Yes	3 974***	-205***
Q3* Yes	9 231***	4 898***
Q4* Yes	17 413***	16 351***
Age of first child		
Pregnancy (year before birth)	ref.	ref.
Age 0	-15 559***	-11 842***
Age 1	-23 343***	-14 332***
Age 2	-19 556***	-5 519***
Age 3	-17 009***	-5 082***
Age 4	-15 373***	-1 753***
Age 5	-14 511***	1 783***
Age 6	-13 726***	4 015***
Age 7	-13 160***	5 549***
Age 8	-12 754***	6 970***
Age 9	-12 394***	8 405***
Age 10	-12 090***	9 616***
Birth order		
One child (including pregnancy)	ref.	ref.
Two children	-7 240***	-5 830***
Three and further children	-10 413***	-11 738***
Age of mother at first birth		
18-22	ref.	ref.
23-27	-99	2 029***
28-32	-609***	3 592***
33-37	817***	3 651***
38-42	1 206.**	2 786***
43 +	-899	1 356***
Calendar year		
1991-1999	-678***	-1 309***
2000-2006	ref.	ref.
2007-2015	1 606***	2 366***
National unemployment rate	-288***	164***
Constant	24 435***	14 029***
Person-years	245 636	7 075 649
R-square	0.3822	0.3836

legend: * p<.1; ** p<.05; *** p<.01. Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Table A6: Average Marginal effects from the two way-interaction of pre-birth earnings quartiles and separation

		Margin		95 % conf.-interval			
		partnered	separated	partnered		Separated	
western Germany	**Q1**	5 382	5 854	5 208	5557	5 052	6 657
	Q2	7 637	9 357	7 477	7797	8 342	10 372
	Q3	11 175	14 613	10 991	11359	13 297	15 930
	Q4	19 208	22 796	18 874	19542	20 290	25 302
Sweden	**Q1**	14 225	11 268	14 182	14 267	11 177	11 359
	Q2	16 182	14 020	16 148	16 216	13 922	14 118
	Q3	19 920	19 122	19 886	19 955	18 994	19 251
	Q4	30 404	30 575	30 341	30 467	30 327	30 824

Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

INTERACTION BETWEEN AGE OF THE FIRST CHILD, PRE-BIRTH EARNINGS QUARTILES AND SEPARATION

Table A7: OLS regression with annual earnings as dependend variable and interaction effect between age of first child, separation and pre-birth earnings quartiles

	Western Germany	Sweden
Age of first child*Separation*Q1-Q4		
Pregnancy (year before birth)*No*Q1	ref.	ref.
Age 0*No*Q1	-6 996***	-4 853***
Age 1*No*Q1	-10 251***	-6 209***
Age 2*No*Q1	-8 068***	442***
Age 3*No*Q1	-6 038***	1 768***
Age 4*No*Q1	-4 619***	4 472***
Age 5*No*Q1	-3 737***	7 571***
Age 6*No*Q1	-3 070***	9 830***
Age 7*No*Q1	-2 456***	11 434***
Age 8*No*Q1	-1 896***	12 861***
Age 9*No*Q1	-1 395***	14 292***
Age 10*No*Q1	-997***	15 415***
Pregnancy (year before birth)*No*Q2	9 633***	8 089***
Age 0*No*Q2	-3 296***	-2 482***
Age 1*No*Q2	-10 022***	-4 996***
Age 2*No*Q2	-7 285***	2 585***
Age 3*No*Q2	-4 737***	3 171***
Age 4*No*Q2	-3 120***	5 840***
Age 5*No*Q2	-2 382***	8 924***
Age 6*No*Q2	-1 678***	10 973***
Age 7*No*Q2	-1 224***	12 219***
Age 8*No*Q2	-905***	13 341***
Age 9*No*Q2	-515**	14 489***
Age 10*No*Q2	-227	15 504***
Pregnancy (year before birth)*No*Q3	18 280***	13 615***
Age 0*No*Q3	894***	-70***
Age 1*No*Q3	-8 749***	-3 442***
Age 2*No*Q3	-4 994***	5 812***
Age 3*No*Q3	-1 835***	5 817**
Age 4*No*Q3	-175	8 959***
Age 5*No*Q3	572**	12 714***
Age 6*No*Q3	1 336***	15 024***
Age 7*No*Q3	1 991***	16 636***
Age 8*No*Q3	2 401***	18 082***
Age 9*No*Q3	2 730***	19 625***
Age 10*No*Q3	3 025***	21 022***
Pregnancy (year before birth)*No*Q4	32 710***	25 221***
Age 0*No*Q4	7 829***	6 985***
Age 1*No*Q4	-3 810***	4 084***

Age 2*No*Q4	2 799***	15 582***
Age 3*No*Q4	5 183***	14 371***
Age 4*No*Q4	7 054***	19 453***
Age 5*No*Q4	8 103***	24 637***
Age 6*No*Q4	9 175***	27 479***
Age 7*No*Q4	9 774***	29 481***
Age 8*No*Q4	10 158***	31 606***
Age 9*No*Q4	10 242***	33 838***
Age 10*No*Q4	10 436***	35 814***
Pregnancy (year before birth)*Yes*Q1		
Age 0*Yes*Q1		
Age 1*Yes*Q1	-7 726***	-6 878***
Age 2*Yes*Q1	-8 944***	-1 731***
Age 3*Yes*Q1	-7 375***	569***
Age 4*Yes*Q1	-6 086***	2 470***
Age 5*Yes*Q1	-4 433***	4 366***
Age 6*Yes*Q1	-3 465***	6 027***
Age 7*Yes*Q1	-2 894***	7 489***
Age 8*Yes*Q1	-2 659***	8 852***
Age 9*Yes*Q1	-1 813***	10 194***
Age 10*Yes*Q1	-1 464***	11 361***
Pregnancy (year before birth)*Yes*Q2		
Age 0*Yes*Q2		
Age 1*Yes*Q2	-9 101***	-4 933***
Age 2*Yes*Q2	-8 786***	2 288***
Age 3*Yes*Q2	-2 786***	4 142***
Age 4*Yes*Q2	-1 812**	5 955***
Age 5*Yes*Q2	-853	7 521***
Age 6*Yes*Q2	-138	9 037***
Age 7*Yes*Q2	576	10 275***
Age 8*Yes*Q2	1 240**	11 422***
Age 9*Yes*Q2	1 616**	12 668***
Age 10*Yes*Q2	1 553**	13 803***
Pregnancy (year before birth)*Yes*Q3		
Age 0*Yes*Q3		
Age 1*Yes*Q3	-9 178***	-3 579***
Age 2*Yes*Q3	-6 365***	6 232***
Age 3*Yes*Q3	-1 319	8 461***
Age 4*Yes*Q3	3 806***	10 417***
Age 5*Yes*Q3	5 299***	12 311***
Age 6*Yes*Q3	4 957***	13 943***
Age 7*Yes*Q3	5 770***	15 429***
Age 8*Yes*Q3	6 133***	16 919***
Age 9*Yes*Q3	6 780***	18 422***
Age 10*Yes*Q3	7 813***	19 735***
Pregnancy (year before birth)*Yes*Q4		
Age 0*Yes*Q4		

Age 1*Yes*Q4	6 943	2 131***
Age 2*Yes*Q4	760	15 583***
Age 3*Yes*Q4	12 900***	17 725***
Age 4*Yes*Q4	12 246***	20 605***
Age 5*Yes*Q4	13 981***	23 319***
Age 6*Yes*Q4	15 174***	25 553***
Age 7*Yes*Q4	13 571***	27 154***
Age 8*Yes*Q4	13 862***	28 979***
Age 9*Yes*Q4	14 418***	31 188***
Age 10*Yes*Q4	14 375***	33 148***
Birth order		
One child (including pregnancy)	ref.	ref.
Two children	-7 202***	-5 733***
Three and further children	-10 525***	-11 675***
Age of mother at first birth		
18-22	ref.	ref.
23-27	47	1 996***
28-32	-411**	3 540***
33-37	978***	3 599***
38-42	1 338***	2 774***
43 +	-844	1 374***
Calendar year		
1991-1999	-512***	-1 571***
2000-2006	ref.	ref.
2007-2015	1 460***	2 318***
National unemployment rate	-361***	108***
Constant	15 163***	8 822***
Person-years	245 636	7 075 649
R-square	0.4129	0.3967

legend: * p<.1; ** p<.05; *** p<.01
Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Table A8: Average Marginal effects from the three-way OLS interaction of age of first child, pre-birth earnings quartiles and separation

western Germany		Margin		95 % conf.-interval			
		partnered	separated	partnered		separated	
Q1	-1	9919		9648	10189		
	0	2923		2710	3135		
	1	-334	2193	-505	-163	-2515	6900
	2	1851	974	1656	2045	-635	2584
	3	3881	2544	3673	4089	1234	3854
	4	5300	3833	5071	5529	2682	4983
	5	6182	5486	5921	6443	4438	6534
	6	6848	6454	6565	7132	5417	7491
	7	7462	7025	7144	7781	6019	8032
	8	8022	7260	7675	8370	6297	8223
	9	8524	8105	8138	8910	7129	9082
	10	8922	8455	8508	9336	7454	9456
Q2	-1	19552		19341	19762		
	0	6623		6403	6843		
	1	-103	818	-277	71	-3165	4802
	2	2634	1133	2431	2836	-847	3113
	3	5182	7133	4973	5391	5033	9233
	4	6799	8107	6560	7038	6331	9882
	5	7537	9065	7274	7800	7576	10555
	6	8240	9781	7950	8530	8339	11223
	7	8695	10495	8382	9008	9264	11726
	8	9013	11159	8672	9355	9965	12352
	9	9404	11535	9035	9774	10332	12737
	10	9692	11472	9298	10086	10311	12634
Q3	-1	28199		28007	28391		
	0	10813		10553	11073		
	1	1169	741	953	1386	-5020	6502
	2	4924	3554	4674	5175	431	6676
	3	8084	8600	7826	8341	5820	11380
	4	9743	13725	9462	10025	11494	15957
	5	10491	15218	10186	10795	13124	17312
	6	11255	14876	10922	11587	13070	16681
	7	11909	15689	11553	12266	13958	17420
	8	12320	16052	11940	12699	14404	17701
	9	12648	16699	12243	13054	15153	18244
	10	12944	17731	12513	13374	16243	19219
Q4	-1	42629		42329	42930		
	0	17747		17373	18122		
	1	6109	16862	5735	6483	2302	31421
	2	12718	10679	12270	13166	1421	19936
	3	15102	22819	14651	15553	15005	30634
	4	16973	22165	16480	17465	16882	27448

		5	18021	23900	17490	18553	19763	28036
		6	19093	25093	18530	19657	21674	28511
		7	19693	23490	19089	20297	20291	26689
		8	20077	23781	19427	20726	20989	26573
		9	20161	24337	19467	20856	21544	27129
		10	20354	24294	19591	21118	21513	27075
Sweden								
	Q1	**-1**	9 712		9 658	9 767		
		0	4 859		4 811	4 908		
		1	3 503	2 834	3 459	3 547	2 708	2 961
		2	10 155	7 982	10 104	10 205	7 849	8 114
		3	11 480	10 281	11 428	11 533	10 158	10 405
		4	14 184	12 183	14 123	14 246	12 062	12 303
		5	17 283	14 078	17 213	17 354	13 957	14 199
		6	19 542	15 740	19 466	19 619	15 618	15 862
		7	21 146	17 202	21 063	21 230	17 079	17 325
		8	22 573	18 565	22 483	22 664	18 439	18 691
		9	24 004	19 906	23 905	24 103	19 776	20 036
		10	25 127	21 073	25 020	25 234	20 937	21 209
	Q2	**-1**	17 801		17 753	17 850		
		0	7 231		7 183	7 278		
		1	4 716	4 780	4 673	4 760	4 583	4 976
		2	12 297	12 001	12 253	12 342	11 823	12 178
		3	12 883	13 854	12 836	12 930	13 699	14 009
		4	15 553	15 668	15 499	15 606	15 523	15 812
		5	18 636	17 233	18 577	18 695	17 095	17 372
		6	20 685	18 749	20 623	20 748	18 613	18 885
		7	21 932	19 987	21 866	21 998	19 853	20 122
		8	23 053	21 134	22 983	23 123	20 999	21 269
		9	24 201	22 381	24 127	24 275	22 243	22 518
		10	25 217	23 515	25 138	25 295	23 376	23 654
	Q3	**-1**	23 328		23 287	23 368		
		0	9 642		9 594	9 691		
		1	6 271	6 133	6 226	6 316	5 853	6 414
		2	15 524	15 945	15 479	15 570	15 705	16 185
		3	15 529	18 174	15 479	15 579	17 972	18 376
		4	18 672	20 130	18 615	18 729	19 942	20 318
		5	22 426	22 023	22 365	22 488	21 842	22 204
		6	24 736	23 655	24 670	24 802	23 477	23 834
		7	26 349	25 141	26 277	26 420	24 961	25 321
		8	27 794	26 631	27 716	27 871	26 451	26 811
		9	29 338	28 134	29 253	29 423	27 949	28 319
		10	30 735	29 448	30 642	30 827	29 257	29 639
	Q4	**-1**	34 934		34 876	34 992		
		0	16 697		16 628	16 766		
		1	13 796	11 844	13 725	13 867	11 284	12 404
		2	25 294	25 295	25 219	25 370	24 860	25 731

3	24 084	27 438	24 000	24 168	27 063	27 812
4	29 166	30 317	29 070	29 261	29 969	30 665
5	34 349	33 031	34 245	34 453	32 693	33 369
6	37 191	35 266	37 077	37 306	34 927	35 604
7	39 193	36 867	39 066	39 320	36 518	37 215
8	41 319	38 691	41 176	41 461	38 335	39 048
9	43 550	40 901	43 388	43 712	40 522	41 279
10	45 526	42 860	45 341	45 711	42 454	43 266

Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

FIXED EFFECTS MODELS

Table A9: Comparison single effect of separation on the OLS and FE-model

	Western Germany		
	FE	**OLS**	**OLS (w/o pre-birth earnings control)**
Separation			
No	ref.	ref.	ref.
Yes	2 400***	1 844***	1 333
Person-years	245 636	245 636	245 636
R-square	0.2311	0.3820	0.2645

	Sweden		
	FE	**OLS**	**OLS (w/o pre-birth earnings control)**
Separation			
No	ref.	ref.	ref.
Yes	-1 089***	-1 922***	-2 537***
Person-years	7 075 649	7 075 649	7 075 649
R-square	0.1407	0.383	0.2645

legend: * p<.1; ** p<.05; *** p<.01
Controlled for: age of the first child, birth order, period, national unemployment rate. OLS additionally for pre-birth earnings quartiles, age at first childbirth. Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Table A10: Average Marginal effects from the two-way FE interaction model of age of first child and separation, separately by pre-birth earnings

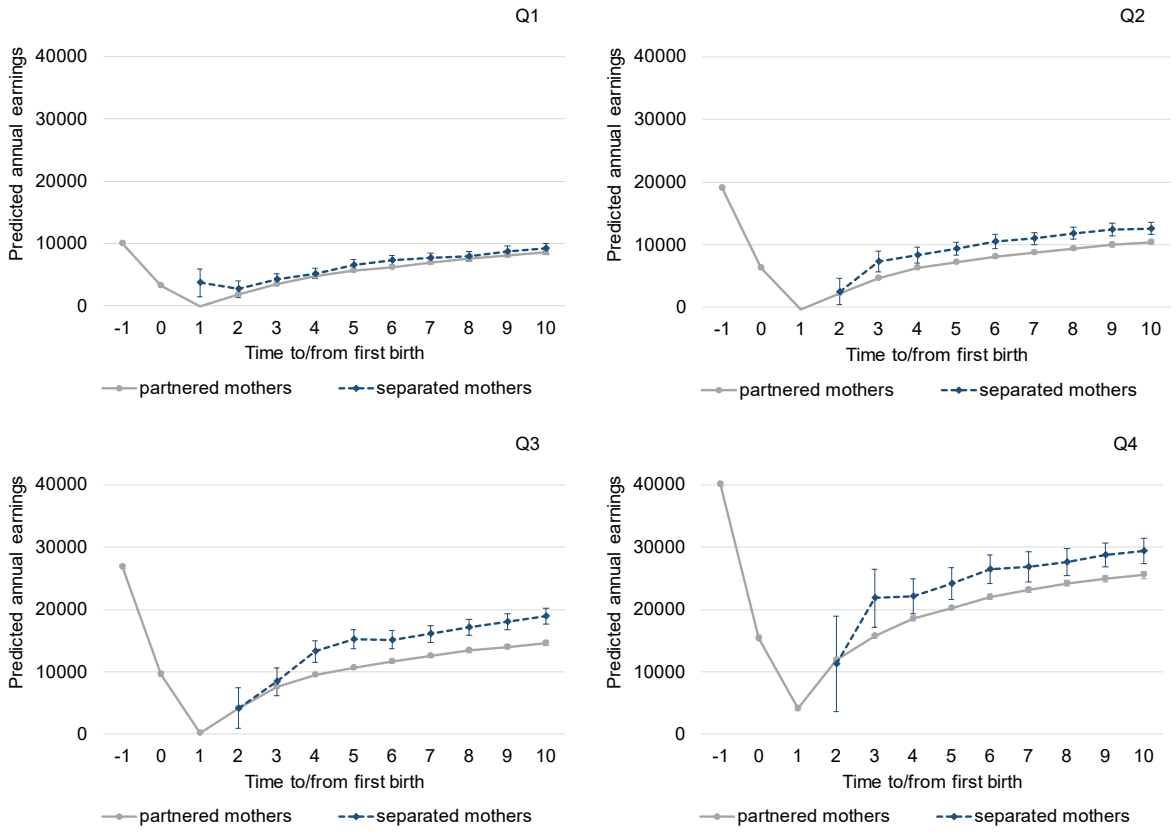
			Margin		**95 % conf.-interval**			
			partnered	**separated**	**partnered**		**separated**	
western Germany	**Q1**	**-1**	10 050		9 769	10 330		
		0	3 185		2 943	3 427		
		1	-89	3 732	-294	117	1 497	5 966
		2	1 795	2 687	1 635	1 955	1 346	4 027
		3	3 503	4 252	3 363	3 642	3 295	5 209
		4	4 760	5 188	4 615	4 904	4 385	5 991
		5	5 604	6 617	5 442	5 766	5 822	7 411
		6	6 237	7 307	6 050	6 424	6 554	8 060
		7	6 892	7 684	6 668	7 117	6 916	8 451
		8	7 532	7 996	7 272	7 792	7 230	8 762
		9	8 097	8 779	7 795	8 398	7 954	9 605
		10	8 592	9 205	8 262	8 922	8 382	10 028
	Q2	**-1**	19 035		18 764	19 305		
		0	6 314		6 039	6 590		
		1	-341	1 034	-558	-125	-2 657	4 725
		2	2 258	2 507	2 089	2 427	428	4 586
		3	4 705	7 306	4 560	4 850	5 624	8 989

		4	6 341	8 359	6 177	6 506	7 055	9 663
		5	7 186	9 351	7 007	7 365	8 306	10 397
		6	8 051	10 467	7 845	8 256	9 342	11 592
		7	8 767	10 955	8 539	8 995	9 968	11 942
		8	9 351	11 831	9 084	9 618	10 840	12 821
		9	9 971	12 424	9 676	10 266	11 437	13 412
		10	10 431	12 584	10 108	10 755	11 632	13 537
	Q3	-1	26 834		26 534	27 133		
		0	9 626		9 292	9 960		
		1	139	-3 585	-120	398	-14 519	7 348
		2	4 097	4 186	3 896	4 299	945	7 427
		3	7 549	8 451	7 372	7 725	6 203	10 698
		4	9 528	13 254	9 333	9 722	11 527	14 981
		5	10 575	15 219	10 369	10 781	13 711	16 727
		6	11 646	15 145	11 417	11 875	13 681	16 609
		7	12 604	16 106	12 351	12 857	14 762	17 451
		8	13 396	17 115	13 114	13 678	15 834	18 397
		9	13 987	18 070	13 673	14 301	16 783	19 358
		10	14 566	18 884	14 220	14 912	17 609	20 159
	Q4	-1	40 078		39 666	40 490		
		0	15 411		14 934	15 888		
		1	4 126	19 546	3 757	4 496	2 965	36 128
		2	11 935	11 293	11 649	12 221	3 621	18 964
		3	15 678	21 838	15 404	15 952	17 185	26 491
		4	18 497	22 075	18 204	18 790	19 260	24 891
		5	20 215	24 138	19 900	20 530	21 618	26 657
		6	21 961	26 434	21 614	22 309	24 137	28 731
		7	23 173	26 824	22 781	23 565	24 376	29 272
		8	24 161	27 574	23 712	24 609	25 456	29 692
		9	24 890	28 739	24 392	25 388	26 769	30 710
		10	25 498	29 375	24 931	26 066	27 327	31 423
Sweden	Q1	-1	6 559		6 506	6 613		
		0	2 115		2 065	2 166		
		1	986	3 929	938	1 034	3 745	4 112
		2	7 998	8 988	7 954	8 042	8 859	9 117
		3	9 714	11 293	9 671	9 758	11 185	11 402
		4	12 789	13 263	12 743	12 835	13 166	13 360
		5	16 229	15 192	16 180	16 277	15 102	15 282
		6	18 794	16 916	18 742	18 846	16 831	17 002
		7	20 805	18 629	20 749	20 860	18 545	18 712
		8	22 721	20 374	22 661	22 782	20 291	20 458
		9	24 489	21 917	24 424	24 554	21 833	22 002
		10	26 011	23 364	25 941	26 081	23 278	23 450
	Q2	-1	14 401		14 351	14 451		
		0	4 129		4 083	4 176		
		1	1 918	5 101	1 873	1 962	4 871	5 331
		2	10 281	12 297	10 242	10 321	12 141	12 453

	3	11 579	14 253	11 540	11 618	14 124	14 381
	4	14 757	16 147	14 716	14 797	16 034	16 259
	5	18 200	17 802	18 157	18 242	17 700	17 904
	6	20 592	19 392	20 548	2 063	19 297	19 487
	7	22 282	20 929	22 234	22 329	20 838	21 020
	8	23 905	22 510	23 853	23 957	22 421	22 600
	9	25 286	23 903	25 231	25 341	23 815	23 991
	10	26 571	25 260	26 512	26 630	25 172	25 349
Q3	-1	20 503		20 449	20 557		
	0	7 103		7 052	7 154		
	1	4 155	7 579	4 108	4 203	7 269	7 890
	2	14 758	17 338	14 716	14 800	17 126	17 550
	3	15 948	19 676	15 906	15 991	19 505	19 848
	4	19 810	21 825	19 766	19 854	21 675	21 975
	5	24 009	23 880	23 963	24 055	23 745	24 016
	6	26 708	25 738	26 659	26 757	25 611	25 865
	7	28 680	27 445	28 627	28 733	27 323	27 567
	8	30 516	29 242	30 458	30 574	29 123	29 362
	9	32 286	30 959	32 224	32 348	30 841	31 077
	10	33 902	32 489	33 836	33 969	32 371	32 607
Q4	-1	31 871		31 798	31 943		
	0	13 924		13 855	13 993		
	1	11 651	12 913	11 586	11 717	12 412	13 413
	2	25 758	27 497	25 699	25 817	27 147	27 846
	3	26 875	30 574	26 812	26 937	30 282	30 866
	4	33 145	34 184	33 077	33 213	33 923	34 446
	5	39 059	37 458	38 985	39 132	37 214	37 702
	6	42 480	40 348	42 399	42 560	40 114	40 583
	7	44 959	42 477	44 870	45 048	42 247	42 708
	8	47 523	44 796	47 425	47 621	44 564	45 027
	9	50 052	47 348	49 944	50 160	47 114	47 581
	10	52 278	49 651	52 159	52 397	49 413	49 890

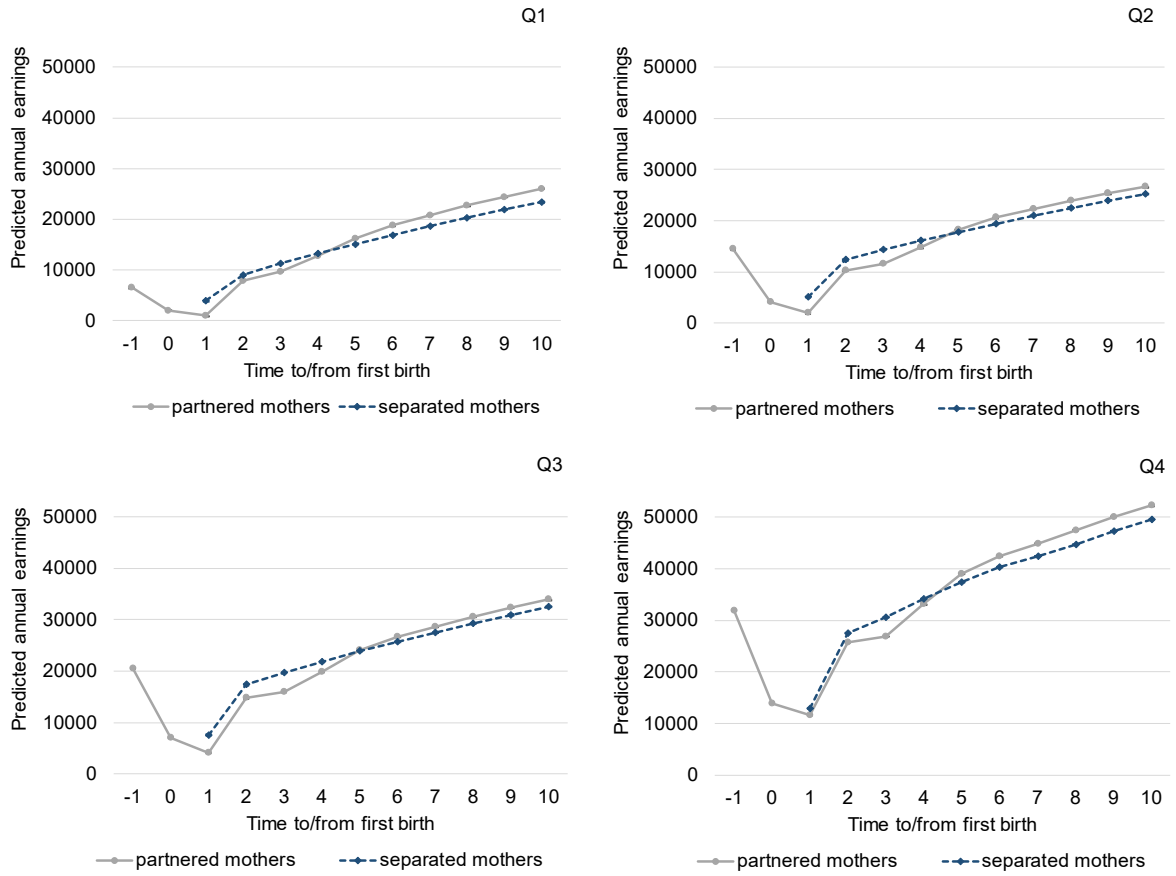
Results rounded.
Source: FamChange-database and VSKT-VA 2015; own calculations.

Figure A6: Predicted values from FE interaction model, by age of the first child and separation, for each pre-birth earnings quartile, western Germany



Note: Separated mothers' estimates for the first year after birth are not presented due to the low case numbers.
Controlled for: calendar year, birth order, period and female unemployment rate.
Source: VSKT-VA 2015; own calculations.

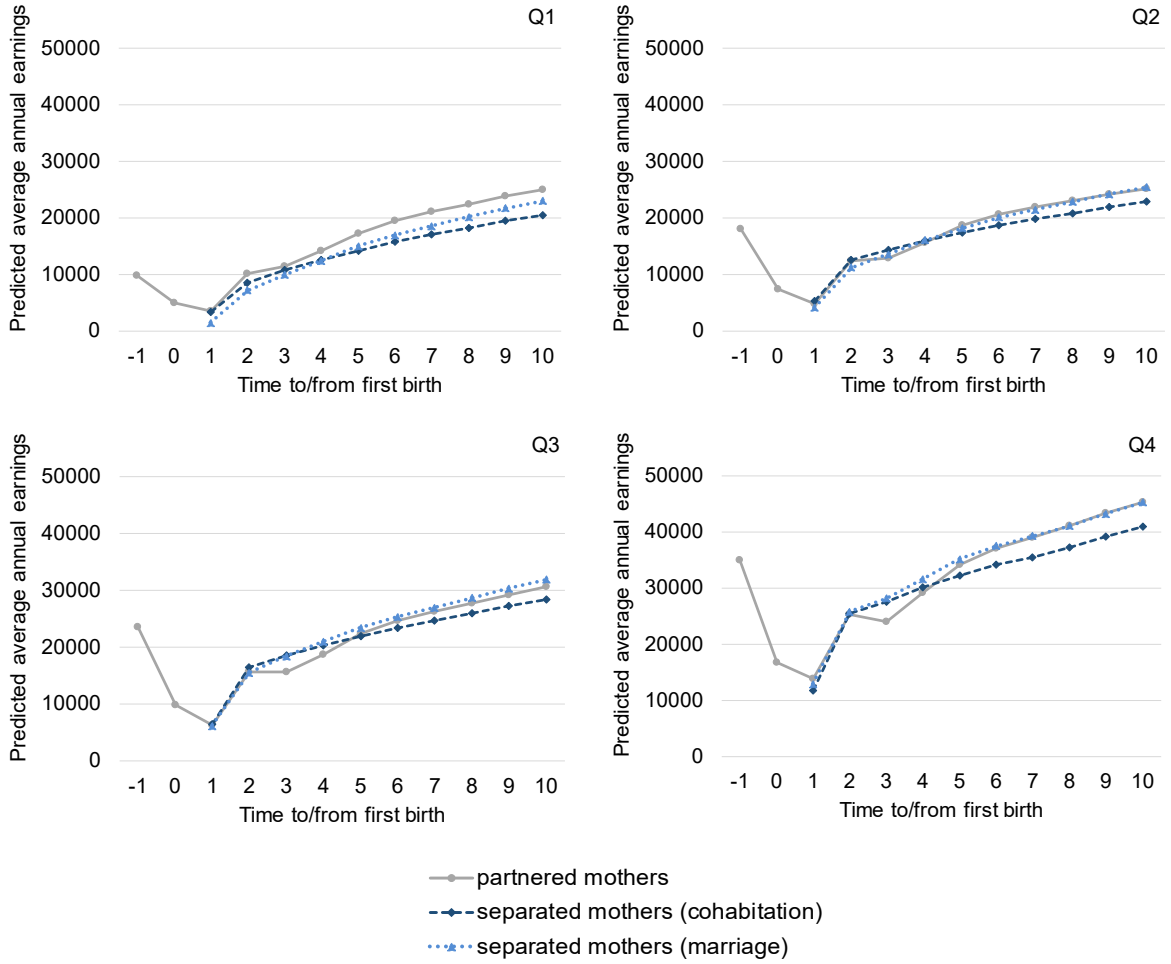
Figure A7: Predicted values from FE interaction model, by age of the first child and separation, for each pre-birth earnings quartile, Sweden



Controlled for: calendar year, birth order, period and female unemployment rate.
Source: FamChange-database; own calculations.

SENSITIVITY ANALYSIS

Figure A8: Predicted values from the OLS interaction model, by pre-birth earnings quartiles, separation (divided in separation from marriage and separation from cohabitation) and age of the first child



Note: As marriage is more common among partnered mothers and entered over time, marital status has been added as an additional control variable to make partnered mothers comparable to separating mothers who are now divided between those who separate from a cohabitation vs. marriage.
Controlled for: pre-birth earnings quartiles, calendar year, age at first childbirth, birth order, period, female unemployment rate and marital status.
Source: FamChange-database; own calculations.

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