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The evolution of the earnings gap within couples and the role of parenthood – a life-course perspective across three German cohorts

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Article

Abstract

Objective: This article investigates for different cohorts how earnings inequalities evolve with the duration of cohabiting couples' relationships and after childbirth.

Background: Germany has undergone a paradigm shift in its family policies and so presents ideal contextual conditions to examine whether institutional change is reflected in a decrease in within-couple inequality overall and across cohorts.

Method: Using a sample of 3161 couples from the Socio-Economic Panel (SOEP) from 1992 to 2023 we estimate growth curve models and fixed-effects panel regression. We differentiate three cohorts and given continued differences in gender norms analyze East and West Germany separately.

Results: Our findings suggest that children substantially increase earnings inequalities within couples, and that the gap does not return to pre-birth levels over time. We also find differences across cohorts: the impact of children on the partner earnings gap has notably reduced in West Germany over time with younger cohorts experiencing lower penalties than older ones, but the earnings gap still remains substantial. In East Germany we could not find a pattern of decreasing inequality across cohorts.

Conclusion: While there is some evidence that earnings inequalities between couples have reduced in our West German sample, during a time marked by paradigmatic change in German family policy, the earnings gap in couples persists and remains strongly related to the birth of children.

Key words: couple earnings inequality, children, institutional change

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1. Introduction

Our paper contributes to a growing literature on income and earnings inequalities within couples. The strengthened focus on empirical assessments of the micro and macro-level mechanisms affecting relative income within couples (Andersen 2018; Angelov et al. 2016; Bianchi et al. 1999; Dieckhoff et al. 2019; Dotti-Sani 2015; Lundberg & Rose, 2000; Musick et al. 2020; Nylin et al. 2021; Stier and Mandel 2009) is important for understanding inequality dynamics within families. It is also relevant since we know that the extent of the partner earnings gap has important repercussions for female partners' future labor market behavior and outcomes: women who earn substantially less than their male partners are more likely to transition into part-time employment (Dieckhoff et al. 2016 for Germany) or to leave the labor market altogether (Shafer 2011 for the US).

Our study aims to contribute to this body of literature in several ways: First, we examine descriptively how earnings inequalities within couples evolve over the duration of cohabiting relationships and compare couples who become parents during the observation window with couples who remain childless throughout. Second, we directly measure the impact of childbirth on the earnings gap and its evolution post-birth. Third, we compare the trajectories of within-couple earnings inequalities and the role of childbirth across cohorts, with the expectation that earnings inequalities and the impact of children have decreased for younger cohorts as a result of changing family policies and gender ideology in Germany. Indeed, the transformation of Germany's family policy has been described as a "paradigm shift" (Bundesregierung 2006; Fleckenstein & Seeleib-Kaiser 2011; Gülzau 2020; Seeleib-Kaiser & Toivonen 2011;) moving from a traditional male breadwinner model to a dual-earner/dual-care-taking model. We are the first to address couples' earnings gaps across cohorts to understand the implications of the paradigm shift in German family policy for earnings inequality dynamics within couples. For this purpose, we differentiate three cohorts: couples where women are born between 1961 and 1970 (cohort 1); between 1971 and 1980 (cohort 2) and between 1981 and 1990 (cohort 3). Fourth, given that, more than 30 years after re-unification, East and West Germany still differ in their terms of their gender ideology (Zoch 2021), we conduct separate analyses for East and West Germany. Our comparative analysis across cohorts thus integrates a separate investigation of East and West German couples providing us with a particularly fruitful setting to consider the interaction of gender ideology with family policy and change therein (Zoch and Schober 2018).

The paper draws on micro level longitudinal data from the German Socio-Economic Panel Study (SOEP) covering more than 30 years from 1992 to 2023. The data allow us to examine how within-couple earning inequalities unfold with the duration of the cohabiting relationship, while at the same affording us with the possibility to study the implications of policy change for these inequality dynamics.

2. Background

2.1 Previous empirical evidence and our contribution

Previous work has consistently shown that women in heterosexual couples earn considerably less than their partners, and this gap varies by institutional context (Dieckhoff et al. 2019; Dotti Sani 2015; Gash & Plagnol 2020; Haupt & Strauss 2021; Stier 2009). Cross-national comparative research has found larger earning gaps in countries with longer maternity leave and a high share of female part-time work, both of which promote women's role as secondary breadwinner, while smaller gaps are found in contexts with high rates of childcare coverage for young children (e.g. Dotti Sani 2015; Stier 2009). The findings by Dieckhoff et al. (2019) of a lower earnings gap and significantly less pronounced child effects in East Germany compared to West Germany attested to the important role of cultural norms and childcare coverage. Based on a repeated-cross-sectional design covering the period from 1992 to 2016 their work further revealed that the extent of within-couple earnings inequalities did not decline over time (ibid.). Haupt & Strauss (2022) used German micro-census data from 1978 to 2011 to examine the partner income gap, comprising analyses of both earnings and income transfers. Their analyses revealed a substantial decline in the partner income gap since the 1970s, and while the majority of the decline was due to increases in women's labor market participation, the second biggest driver was due to increases in transfer income for mothers (ibid.). While

the analysis underscores the importance of state transfers for women's financial position within households, it still found a sizable partner income gap of 40% at the end of the observation period suggestive of ongoing inequalities. Some recent studies on earnings inequality within couples have taken a more dynamic approach with a more explicit focus on parenthood examining the temporal development of these inequalities around childbirth. Musick et al. (2020) investigated the partner earnings gap post birth in a cross-nationally comparative perspective, comparing Germany, the US and the UK (using the PSID, SOEP and BHPS focusing on births in the 1990s and 2000s). Their main focus was on cross-national comparison rather than macro-level temporal change (which is a central focus of our contribution). Musick et al.'s findings suggested sharp declines in women's relative contribution to household income following first births in all three countries. They found that Germany - East and West Germany were not analyzed separately in their study- exhibited by far the biggest increase in the partner pay gap post birth, with the UK taking an intermediate position and the US exhibiting the smallest declines (and fastest recovery) (ibid.: 654). The authors attributed Germany's position to its emphasis on the male breadwinner model with extended maternity leaves and insufficient childcare offers – importantly though their analyses and the data window used address the time period before the transformation of Germany's family policy. The authors argued that American women's better and quicker recovery was driven by their (re-) entry to full-time employment whilst in Germany and the UK, women tended to keep reductions in their paid labor hours over time (ibid.).

Using Swedish register data from 1986 to 2008, Angelov et al. (2016) found parenthood to increase both earnings and income gaps in couples. Moreover, they found the gaps to remain over fifteen years after the birth of the first child. Nylin et al. (2021), also using Swedish register data spanning the time period from 1987 to 2007, examined the temporal development of couple inequalities from 2 years before to 8 years after birth, and crucially investigated how these inequality trajectories differ across parent cohorts. Yet, despite their period of analysis coinciding with growth in childcare provision as well as the incremental introduction of daddy quotas (parental leave months which are reserved for fathers), they only found rather small improvement across cohorts towards more gender equality after first birth (ibid. 359). In separate analyses for men and women, they presented evidence that the small improvements towards increased equality within couples were driven by temporary losses in fathers' earnings (due to leave taking) rather than gains in mothers' post birth earnings (ibid: 360).

2.1.1 Our contribution

We aim to build on and extend this strand of work concerned with the earnings trajectories of couples and the role of institutional and cultural context in shaping these dynamics. While Musick et al. (2020) focused on cross-national variance, we aim to examine the implications of policy change. Our separate analyses of East and West German couples provide us with the additional possibility to study how cultural norms and family policy change interact. Moreover, in contrast to Nylin et al. (2021), who studied changes across cohorts in an already gender egalitarian context, our analysis explores how within couple-inequality has changed over time in a country which has experienced a fundamental change in its family policy. Finally, we are not exclusively focusing on the impact of childbirth on within-couple inequality trajectories, but also comparatively study earnings trajectories of couples who become parents with those who stay childless.

2.2 Theoretical considerations

Broadly, there exist competing accounts that seek to explain couple-level dynamics in the distribution of paid and unpaid work and the resulting earnings and income inequalities within couples. Neoclassical economic theory understands specialization – with the partner with higher earning potential specializing in paid work, while the other specializes in unpaid home and care work – as a utility maximizing strategy to achieve a high household income (Becker 1991). According to this theory women's innate capacity to bear children and breastfeed babies entails that specialization brings a comparative advantage for couples with these biological differences potentially already affecting decisions on human capital investments before childbirth and determining that the female rather than the male partner interrupts employment upon childbirth (ibid.). Any initial specialisation implies a comparative advantage for further or continued specialisation in subsequent years, with women more likely either to remain inactive, to work part-time or, even if working full-time, to choose mother-friendly jobs with lower earnings and career potential (Becker &

Moen 1999; Killewald & Gough 2013). Initial specialization during early parenthood will therefore still show in mothers' earnings profiles long after their life-course phase as carer is over. Household Bargaining models (Breen & Cooke 2005; Lundberg & Pollak 1996; Manser & Brown 1980), by contrast, conceptualize couple dynamics to be driven by power differentials and self-interest. Couples negotiate over who does (more of the) attractive paid work and who has to focus on the unpaid work within the home. Because men traditionally had higher earnings potential, they tended to be the winners of these negotiations, which then result in further exacerbated earnings and income inequalities over time. A third group of theoretical accounts emphasizes social norms and gender ideologies which continue to see mothers as carrying the main responsibility for care and housework and fathers as being the main breadwinner (Shelton & John 1996; West & Zimmermann 1987) to explain the division of paid and unpaid work and the resulting within-couple earnings inequalities.

Especially bargaining models have been challenged and very recent accounts suggest that gender ideology trumps bargaining power in explaining gender differences in household work: in couples with traditional believes on gender roles there is no adjustment to housework contribution even if she out earns him (Nitsche et al. 2025). Becker's specialization theory has also been challenged by some. Daly & Groes (2017), for example, have shown that relative earnings in couples have very little implication for the time allocated to child-rearing. Obviously, the dynamics any of the above theoretical accounts assume are shaped by and interact with institutional and cultural context. Policies, such as the expansion of public childcare and parental leave arrangements, which entitle leave takers to return to their former position after the maternity leave or which encourage fathers' leave taking, would attenuate specialization and equalize bargaining power resulting in better prospects not only for dual earning but also for dual equal earning. At the same time, family policy and gender role ideology interact in important ways (see Zoch & Schober 2018: p. 1024-26 for a detailed discussion as well as Zoch & Heyne 2023: p. 1071/2). Policy change can also alter societal expectations about working motherhood and societal acceptance of formal childcare for very small children (Bicchieri 2017). At the same time, family policy can also have direct effects on the social role identification of young mothers. The non-availability of childcare could result in post-birth re-traditionalization of women with previously progressive attitudes in an effort to avoid cognitive dissonance (Baxter et al. 2015; Schober & Scott 2012). Availability of public childcare could then prevent such reversion to traditional gender role attitude. Gangl & Ziefle (2015) provided causal evidence of norm-setting effects of policy change showing that increased duration of parental leave entitlements can lead to reduced work commitment of young mothers. Zoch & Schober (2018) studying public-childcare expansion and gender ideology in Germany, found that family policy reform can have rather immediate (though modest) effects on gender role attitude and "may facilitate ideology change not only across cohorts but also during the life-course" (ibid: 1035).

Family policy can thus be understood as moderating specialization and the distribution of bargaining power within couples in important ways, while at the same interacting with gender ideology. Family policy and change therein are therefore likely to have important repercussions on earnings inequalities within couples and can be understood as moderating specialization and the distribution of bargaining power within couples in important ways, while at the same forming gender norms.

While all of the aforementioned theoretical mechanisms and the moderating effect of family policy first and foremost shape couple dynamics during the family planning and childrearing phase, they have long-term implications for women's labor market outcomes (as certain career choices as well as human capital losses during long leaves and part-time employment consolidate women as secondary earners even in older couples). This is inter alia shown by Worts et al. (2016), who found women's labor market behavior in younger years to predict labor market trajectories in older years (especially in Germany).

However, the linkages between family policy, cultural norms and female labor market outcomes are complex. While country studies tend to find positive effects of family policies on female employment, micro studies find positive effects primarily for short leave durations and child care support for young children (see Olivetti & Petrongolo 2017). In the following we discuss German family policies in more detail.

2.3 German family policy over time

German family policy has undergone substantial change providing an ideal case for studying the implications of policy change for inequality dynamics within couples. Before the re-unification in 1989/90, East and West Germany differed substantially regarding their family policy and gender norms. While East

Germany was strongly de-familiarized with short maternity leaves and full-time employment for mothers institutionally encouraged, West Germany was a traditional breadwinner model which strongly supported familialism. With reunification, the legal framework and West German family policies were extended to East Germany (Trappe et al. 2015). Although this brought about some notable convergence, differences in childcare coverage and norms regarding maternal employment remained and continue to this day (Zoch 2021).

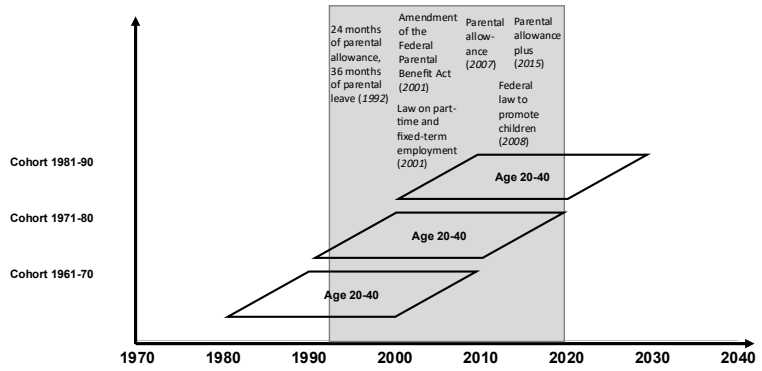
Re-unification marked the beginning of a period in (West) Germany's transition from a traditional male breadwinner model (he works full-time, she cares full-time) to a modified (or modernized) breadwinner model (where she is still the primary care-giver and dependent on the male, primary breadwinner, but participates in the labor market on a part-time basis). In response to the combined pressures of women's increasing labor market participation rates and insufficient formal childcare provision, parental leave was first extended from 10 to 18 months in 1990 and then from 1992 all parents were allowed to take job-protected parental leave for up to thirty-six months (e.g. Trappe et al. 2015). The parental allowance was low – a lump-sum related to household income paid up to 24 months (Blum & Erler 2013). This extension of leave, however, has been shown to reduce young mothers work commitment (Gangl & Ziefle 2015), an effect that was also shown by Olivetti & Petrongolo (2017) in a cross-country comparison. An important policy in the transition from the male breadwinner to the modified breadwinner model, was the "Teilzeit and Befristungsgesetz" (in effect as of 2001) which promoted part-time employment and relaxed rules for fixed-term employment. Importantly, this law entailed the right to part-time employment (Trappe et al. 2015). The Hartz reforms (introduced stepwise between 2003 und 2005) also have to be seen as a policy change encouraging a departure from the male breadwinner model (Trappe et al. 2015). These reforms substantially changed the eligibility for unemployment benefits making reliance on a single breadwinner a riskier strategy for families than before.

Further paradigmatic shifts took place from the mid-2000s onwards towards a dual-earner/dual-carer-model (Fleckenstein & Seeleib-Kaiser 2011). Importantly, these changes were likely to be perceived as a true paradigm shift for young mothers and families socialized in West Germany while this was likely less the case for those socialized in Eastern Germany or by East German parents after re-unification. The parental leave reforms in 2007 entailed major changes: it shortened the duration of paid leave from 24 to 12 months, while replacing the low lump sum income benefits with generous income replacement dependent on prior earnings (e.g. Spieß & Wrohlich 2008). As cross-country research has shown, this is likely to affect employment rates (Olivetti & Petrongolo 2017), with higher benefits in the first year potentially keeping women out of work during that time but increasing the incentive to return to work when income replacement runs out. If each parent takes at least two months of leave, a couple is entitled to 14 months of paid leave. Effectively, the reform thus introduced two "daddy months". While the right to job-protected leave of up to thirty-six months remained untouched, the reform set clear incentives for mothers to return to work after 12 months of leave as well as for fathers to also take-up parental leave. This occurred in tandem with considerable growth of public childcare services starting with the day care expansion law (Tagesbetreuungsausbaugesetz) which was enacted in 2005 with the goal of achieving a 17 percent coverage rate of children below three years of age by 2010 in West Germany. In 2008 the federal law to promote children (Kinderförderungsgesetz) stipulated a legal claim to childcare for all children aged 1 year and above by 2013 (Bauernschuster et al. 2016, Zoch & Schober 2018). The parental leave reform in conjunction with the massive expansion of childcare starting in the mid 2000s was considered to be "de-familializing" (Ostner 2010: 219) and to "break with traditional family policy" (Fleckenstein 2011: 553). In 2015 parental leave was further reformed with the introduction of "Parental Allowance Plus" (Elterngeld Plus). These reforms were also intended to address the low fertility rates among highly-educated young women (Bundesregierung 2006; Raute 2019). With the replacement level adjusted accordingly – the entitlement period could be doubled for parents who chose to return to work part-time during their leave. Up to four additional "couple months" were paid to couples who returned to part-time work during their leave simultaneously (Samtleben et al. 2019). A further encouragement for dual earning and caring in couples.

Summarizing, Germany is an example of a country where general retrenchment of the welfare state went hand in hand with increasing family policy measures, providing incentives for employment and shifting the economy towards the dual earner model (see Ferragina 2019 for a discussion of these policies in the context of 23 OECD countries). Figure 1 presents the chronology of the evolution of German family policies discussed above and their interaction with the fertility window of our three cohorts. It shows 1.) how contextual conditions have progressively become more conducive to combining work and care and

then also to equal dual-earning and caring and 2.) the three cohorts were exposed to quite different policy contexts during their fertility window. While the substantial parental leave extension of 1992 – even though aimed at addressing women's increased labor market participation – in fact reduced employment commitment of mothers, the law on part-time and fixed term employment was considered an important step towards a modified breadwinner model as it increased employment possibilities for dual earning. The parental leave reform of 2007 together with the federal law to promote children of 2008 then were the crucial policies to mark the turning point to encourage equal dual earning and caring. While our first cohort (1961-1970) had very little exposure to policies promoting equal dual earning and caring, the middle cohort (1971-1980) already had good (though not full) exposure to the parental allowance reform of 2007. But the federal law on the promotion of children (stipulating a legal right to public childcare by 2013) only affected part of this cohort - particularly younger women within this cohort and those who give birth rather late. Our latest cohort (1981-1990) had the greatest exposure to those policies encouraging equal dual caring and earning.

Figure 1: Legislative changes



Note: Own figure.

2.4 Research questions and expectations

Our analysis aims to investigate the temporal dynamics of earnings inequalities within couples the role of children in these dynamics. We explore whether there are cohort-specific changes in these inequalities within couples in light of substantial transformation in German's family policy. Given the continued differences in gender ideology between East and West Germany (Zoch 2021), the higher levels of public childcare in the East as well as structural differences of the labor market, we provide a separate analysis for East and West Germany. Our study aims to address the following sets of questions:

(1) How do earnings inequalities within couples evolve over the duration of the relationship and how do these trajectories differ between couples who become parents and those who remain childless? For this first research question, we take a descriptive approach following couples from the beginning of their cohabitation for more than a decade. To capture the role of children in these long-term trajectories, we compare earnings trajectories of those that stay childless throughout and those that become parents during this time. The expectation is that earnings inequalities will be larger and grow more steeply in couples who become parents.

(2) What is the direct impact of children on the earnings gap and on its temporal development for up to five years post-birth?

(3) What scope is there for change? Are the later cohorts more egalitarian and is the impact of childbirth weaker in these cohorts?

(4) How does the gap in partner earnings and their trajectories and the impact of childbirth vary across East and West German couples and have differences between East and West changed over time?

Summarizing, we employ the cohort comparison to explore whether the changes in family policy resulted in more equal long-term earnings trajectories of couples who became parents (research question 1) and in a less pronounced effect of childbirth on these trajectories (research question 2). As discussed earlier, Nylin et al. (2021) in a similar study found only very modest indication of reduced earnings inequality after parental leave reform and childcare expansion. However, the Swedish reforms took place in an already gender egalitarian context. By contrast, Germany has experienced substantial transformation of its family policy and we can therefore expect declining earnings inequalities and declining penalties associated with childbirth across cohorts. Specifically: we expect inequalities (and the impact of childbirth) to be less pronounced in the middle cohort than the first cohort, while the smallest gap is expected in the latest cohort. While the middle cohort had good but not full exposure to the 2007 parental leave reform and incomplete exposure to the massive expansion in childcare, the latest cohort enjoyed full exposure to both the parental leave reform as well as the new childcare entitlement. Akin, to the temporal comparison, the comparison of East and West German couples pertains to both the descriptive analysis of earnings trajectories as well as the impact of childbirth on these trajectories. Broadly, we expect that the couple earnings gap (and the impact of childbirth) would be less pronounced in the East compared to the West due to different gender norms and we expect that the policy change will entail convergence as inequality in West German couples will decline.

3. Data and method

3.1 Our sample

We use the German Socio-Economic Panel (SOEP), a representative, multi-cohort yearly survey for the 30-year period from 1992 to 2023 for which information on East and West Germany is available (Brücker et al. 2014; Goebel et al. 2019; SOEP 2025). Because the same households and their off-spring are surveyed every year, it is possible to track cohabiting couples, their economic development and important life course events like childbirth.

We make the following selections: First, we drop all SOEP samples that include single households only as well as the LGB sample (due to issues with the number of observations we analyze heterosexual couples only, for work that has addressed earning inequality in same-sex relationships (Moberg et al. 2025). Second, we only keep women with cohabiting partners. As we investigate the interdependencies within young couples, we chose to only include first partnerships where the starting age of the woman is less or equal to 35 years. This leaves us with a sample of 13,385 couples (83,086 observations). The beginning of cohabitation is defined as the first year in which the partner is 'present' in the household. This is an approximation, as there is no full information available on the history of cohabitation. Actually, the SOEP couple history file (BIOCOUPLY) includes only those respondents who have answered the biography questionnaire in wave 28 or later and those who have been observed since the age of 17. Hence, our first observation period for a couple may not always coincide with the exact beginning of their cohabitation, depending on when the couple enters the survey. Restraining the sample to those with full information in the BIOCOUPLY file, would severely reduce our sample size. Sensitivity checks based on strict cohabitation measures have shown that our approximation strategy does not lead to substantially different results (please see Appendix B).

To measure the impact of children on earnings differentials within couples we select couples without children at the beginning of our observation period (cohabitation) which reduces the sample to 5,348 couples (32,167 observations) of which 3,934 belong to our three birth cohorts (1961-70; 1971-80; 1981-90). After further deleting observations with missing information on income we end up with a sample of 3,161 couples (24,243 observations) for our descriptive study and our fixed effects models (see Table 1). A similar table, alongside relative frequencies and number of observations for East and West and our different birth cohorts can be found in Appendix Tables A1-A2. With the restrictions applied and 1992 being our first data point, women in our first cohort are on average somewhat older than the middle and the latest cohort by design. In our Western sample women in the first cohort are on average 27.9 years of age compared to 25 and 26.3 years in our middle and latest cohort (see Appendix A, Tables A 1.a). In our Eastern sample, the first cohort is 26. 3 years of age compared to 24.3 and 25.6 years of age in our middle and latest cohort (see

Appendix A, Tables A 1.b). Naturally, also by design, women in the first cohort tend to be older *at first birth* than other women who belong to the same birth cohort but were not included in our analytic sample (as they already experienced first birth before the beginning of our observation window). The older age of the first cohort and their postponed fertility could entail that they are a more select sample than our middle and latest cohort. We therefore compared women of the first cohort who made it into our sample to those who did not. Our descriptives based on observables do not suggest a clear pattern of selectivity, if any than rather that those who start with child and are therefore excluded from our analysis are slightly older *when they are first observed together* in our sample (Appendix Table A1.a and b compared to Appendix Table A.1c and d).

Table 1: Selection

	Number of Observations	**Number of couples**
Original Sample 1992-2023	725,859	119,095
Keep only women	379,514	60,161
Keep only women with partner (and partner id)	221,882	33,997
Keep if age of women at the starting point <35	83,086	13,385
Only first partnerships	80,321	13,385
Drop if there are children at the starting period	32,167	5,348
Only if belonging to relevant cohort: (1961-70; 1971-80; 1981-90)	28,185	3,934
Only with valid information on income	24,243	3,161

Note: Own calculations based on SOEP 1992-2023.

3.2 Statistical modelling

We follow Brüderl et al. (2019) and distinguish two different methods to measure the earnings gap within couples over time, that complement each other, starting with descriptive random effects growth curve models before estimating transition-centered fixed effects panel models.

Equation (1) presents our growth curve model which allows us to show how earnings gaps (or individual earnings by men and women) change on average with relationship duration and to describe typical patterns for those couples who become parents and those who stay childless throughout. We estimate the following random effects panel regression:

$$(1) \quad PEG_{i,t} = \alpha_i + \beta_1 duration_{it} + \beta_2\, duration_{it}^2 + \sum_{n=1}^{2} \gamma_n\, childcat_n + \sum_{n=1}^{2} \delta_n\, childcat_n \cdot duration_{it} + \sum_{n=1}^{2} \tau_n\, childcat_n \cdot duration_{it}^2 + \varepsilon_{it}$$

The dependent variable is the partner earnings gap (*PEG*), defined as the difference in monthly labor earnings (earnings of the male partner – earnings of female partner), which implies that a positive partner earnings gap is associated with his earnings being higher than her earnings. We use gross earnings (see also e.g. Angelov et al., 2016; Nylin et al. 2019, Musick et al. 2020) because our analysis aims at measuring the impact of children on labor market outcomes, with gross earnings gaps being a good indicator for long term labor market careers of partnered women (see Dieckhoff et al. 2016; Shafer 2011). In case of no labor earnings, we set the earnings value equal to 0, so we include all couples irrespective of labor market status. To eliminate the effect of inflation we deflate earnings with the consumer price index (reference year 2015). The constant α_i is a couple specific random effect. We include relationship duration (*duration*) in linear and quadratic terms and use a dichotomous variable (childcat) to distinguish between couples who remain without children during our observation window and those who start off childless and then have at least one child during our observation window. The model is estimated separately by region, East and West. The distinction of East and West is a regional indicator indicating geographic location. But importantly, for most respondents, this is also the region where they were born (70 percent for East German respondents; 98.8 percent of West German respondents) and socialized. Equation (2) extends the model to differentiate between different birth cohorts. These are defined based on the birth year of the female partner: 1961-1970, 1971-1980 and 1981-1990 respectively and included in the growth curve model as follows:

$$(2)\quad PEG_{i,t} = \alpha_i + \beta_1 duration_{it} + \beta_2\, duration_{it}^2 + \sum_{n=1}^{2} \gamma_n\, childcat_n + \sum_{M=1}^{3} \delta_m\, cohort_m + \sum_{m=1}^{3} \tau_n\, cohort_m\, duration_{it} + \sum_{m=1}^{3} \varphi_n\, cohort_n \cdot duration_{it}^2 + \varepsilon_{it}$$

Finally, Equation (3) presents our fixed-effects panel models with robust standard errors clustered within couples to analyze directly the effect of the event of childbirth on the earnings gap within cohabiting couples. Importantly, these models allow for a time-varying impact of children as a dummy-impact function (see Brüderl et al. 2019):

$$(3)\quad PEG_{i,t} = \alpha_i + \beta_1 childbirth_{it} + \beta_2\, furtherchildren_{it} + \beta_3\, duration_{it} + \beta_4\, married_{it} + \beta_5\, education_{it} + \sum_{t=1}^{n} \gamma_t\, period_t + \varepsilon_{it}$$

The constant α_i is a couple specific fixed effect. A dummy variable indicates the birth of the first child (*childbirth*) that turns to '1' in the year of the birth of the first child, *furtherchildren* is a continuous variable that measures the number of subsequent children born, *married* is a time-varying dummy variable measuring marital status and *education* measures relative education controlling for educational differences between partners. The models are estimated separately for East and West, again distinguishing the three different birth cohorts.

4. Results

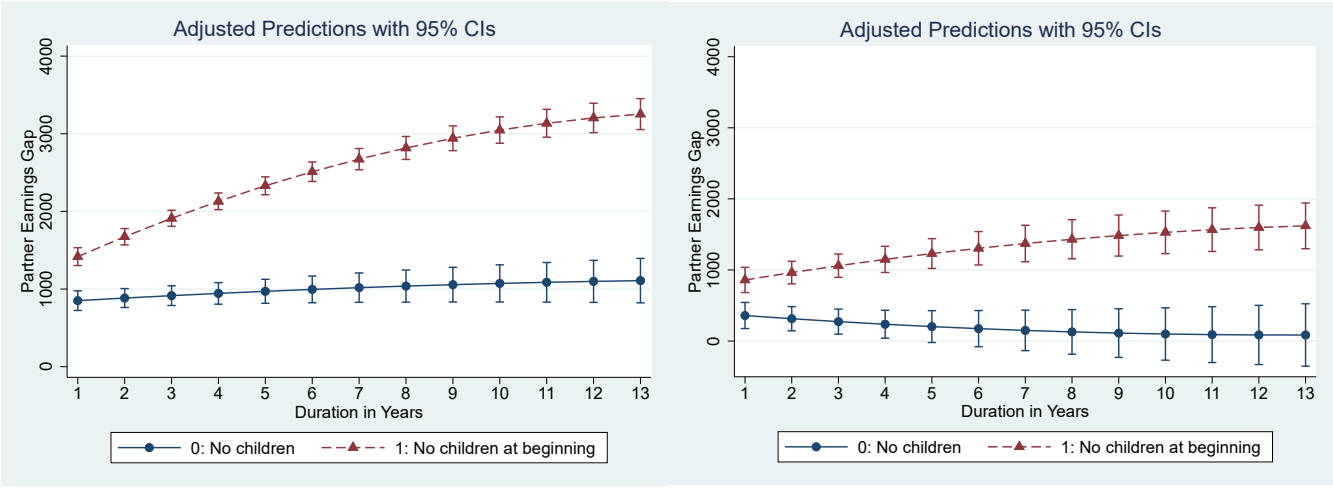
4.1 The evolution of earnings inequalities within couples (random effects growth curve models)

Figure 2 presents our random effects growth curve models to describe the evolution of the earnings gap between partners over the duration of the relationship. The figure differentiates East and West Germany and further distinguishes between couples who are initially childless and then become parents and those who remain childless over the course of the thirteen-year observation window (addressing research questions 1 & 4). As expected, parenthood plays a central role in explaining earnings inequality dynamics in couples. At the beginning of the observation period, women earn less than their partners in both types of couples, but the difference is much smaller in childless couples. Moreover, childless couples exhibit a slightly widening gap in West Germany, while we observe a slight narrowing of the average earnings gap in East Germany over time. However, large confidence intervals in the case of East Germany prevent us from over-interpreting this development. For couples who become parents, the earnings gap increases strongly and steadily over the duration of the relationship, as was expected. The share of women who become mothers increases with each year of relationship duration, which explains the steady growth of the earnings gap in this group. While this is the case in both East and West Germany, women in East Germany start from a lower level of earnings inequality and the increase is also much less pronounced than in the West as had been predicted.

We sought to test whether the differences we observe between East and West may not be (at least not exclusively) caused by a different evolution of women's earnings in the two regions. Since earnings in the East are still lower on average than in the West, we tested whether the differences between East and West could simply be caused by a decline in men's earnings in the East. To this end, we estimated growth curves for individual earnings (see Appendix Figures A1 and A2). We find that for men, the level and development of earnings are relatively independent of parenthood in both East and West Germany: earnings increase over time, although the earnings of those without children remain below the level observed for men who become fathers. The situation is different for women, where both income levels and income trends differ markedly between those with children and those without. While in West Germany women who remain childless experience considerable income growth over time, those who have children experience a decline in income. In East Germany the picture is again different: regardless of childbirth, women experience an

increase in earnings, but the earnings of women who become mothers remains below that of women who remain childless.

Figure 2: Development of the partner earnings gap over relationship duration

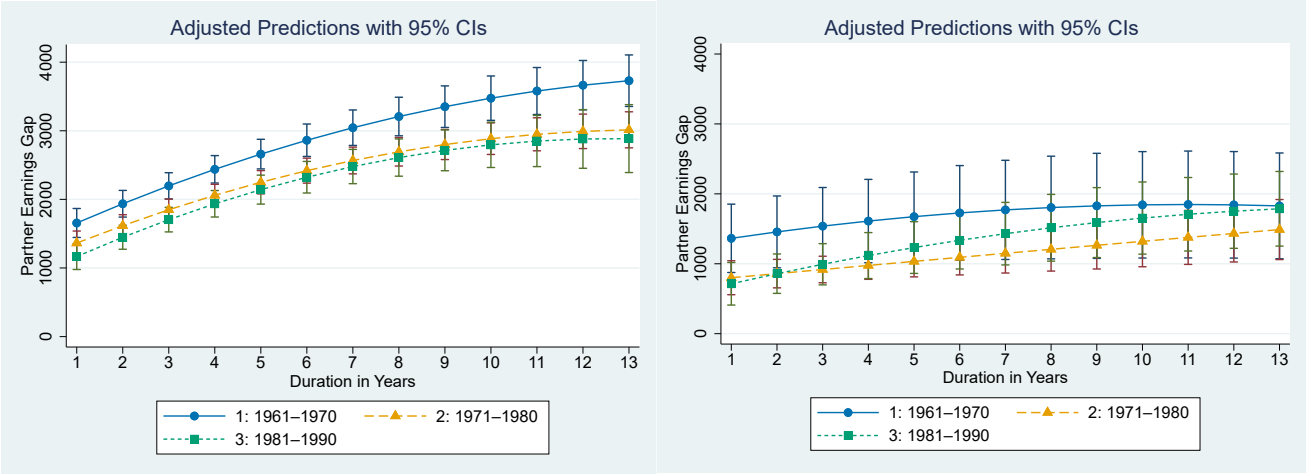


a. West Germany b. East Germany

Note: Own calculations based on SOEP 1992-2023. Random effects models. Women with cohabiting partner only. Dependent variable: Earnings gap between partners. Covariates: cohabiting relationship duration in linear and quadratic terms interacted with the two categories *no children* and *starting off childless and at least one child born during the observation window*. The models also control for the SOEP sample categorical variable.

Figure 3 extends the analysis to distinguish between different birth cohorts to address research question 3 and explore whether the significant transformation of German family policy is mirrored in different levels of earnings inequalities in couples. As discussed above, we expect inequalities to decline across cohorts: while our first cohort (1961-1970) had little exposure to policies encouraging equal earning and caring, the middle cohort (1971-1980) had good (though not full) exposure to these policies, and the latest cohort (1981-1990) had strong exposure to policies encouraging equal caring and earning. The analysis focuses on those couples who were childless at the beginning of the relationship and then had children. Turning first to West Germany, we see that contra to our expectation of strong differences by cohort given considerable policy transformation, the growth curve of the earnings gap by relationship duration does not differ markedly by cohort. In particular, the middle and the latest cohort look almost identical. While we see that the initial gap is higher in the first cohort and that it continues to grow (whereas it comes to a halt towards the end of the observation window in our latest cohort) the increase over our observation window is almost the same. In the East, we observe some differences between cohorts, but no clear pattern. The initial gap is much higher for the first cohort (around 1360 Euro versus 800 Euro for the middle cohort and 710 Euro for the latest cohort), but the increase of the earnings gap with relationship duration is strongest for the latest cohort.

Figure 3: Development of the partner earnings gap by cohort (only couples who become parents)



a. West Germany b. East Germany

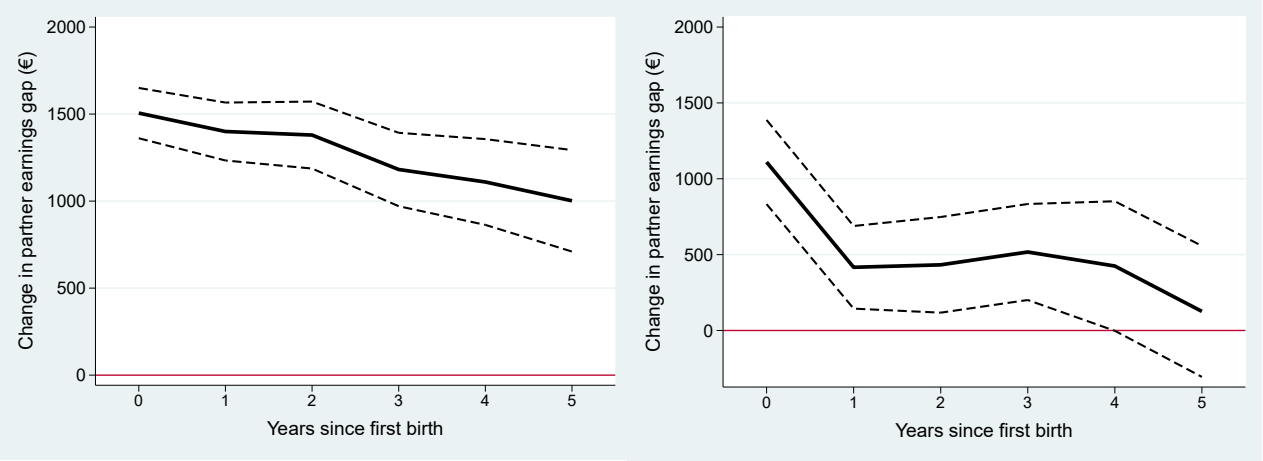
Note: Own calculations based on SOEP 1992-2023. Random effects models. Women with cohabiting partner only who start off childless and have at least one child during the observation window. Dependent variable: Earnings gap between partners. Covariates: cohabiting relationship duration in linear and quadratic terms interacted with birth cohorts of women. The models also control for the SOEP sample categorical variable.

4.2 *The impact of children on earnings inequalities within couples (a transition-centered approach using fixed effects panel models)*

We analyze the effect of birth on the earnings gap within cohabiting couples using models with distributed fixed effects (Brüderl et al. 2019). These models, which pertain to research question 2, allow us to measure the impact of having a child on the earnings gap and how this impact evolves over time by specifying a dummy-impact function (ibid.). The unit of observation is, as before, all observations of a couple since they moved in together. Cohabitation episodes are censored in the last year of the survey or due to non-response. The dependent variable is, as was the case in the random effects models, the earnings gap between partners. The central explanatory variable is time since childbirth. These models also control for relationship duration, the arrival of additional children, and education. The reference period is the years before the birth of the child. In effect, these models allow us to determine the change in the partner's earnings gap in the relevant year (one, two, ... five years after the birth) compared to the average gap prior to the arrival of the child.

Figure 4 shows the results for East and West Germany to explore whether child birth has a smaller impact on future earnings trajectories in the East compared to the West (research question 4) as was predicted above. The plotted line can be interpreted as the change in the partner earnings gap in the relevant year as compared to the average gap prior to childbirth. Here we see that the earnings gap between men and women in West Germany increases by more than 1500 Euros on average with the arrival of a child and then decreases more or less continuously. Still, even five years after the birth of a child, the gap is 1000 Euros higher than before the arrival of the child. In East Germany, the initial increase in the earnings gap after childbirth is on average 1110 Euros. In the fifth year after childbirth, it decreases to only 125 Euros. So not only is the initial penalty notably lower than in the West, but there is also a much quicker and stronger recovery.

Figure 4: The effect of childbirth on the earnings gap



a. West Germany b. East Germany

Note: Own calculations based on SOEP 1992-2023. Fixed effects models with robust standard errors clustered within couples. Women with cohabiting partner only. Dependent variable: Earnings gap between partners. Covariates: childbirth, number of further children born, marital status, educational differences. The models also control for the SOEP sample categorical variable.

To examine whether the paradigm shift in German family policy towards a dual-earner/dual-care-taking model, that took place from the mid-2000s onwards, had an effect on the earnings gap caused by childbirth, we estimated the fixed-effects models separately for three different cohorts (research question 3). We expected the impact of childbirth on earnings inequality to decline across cohorts. Considering first, Figure 5a, which presents results for West Germany, we see that for our first cohort the earnings gap between partners increases by 1850 Euros on average with the arrival of the child. We then observe that the impact of having a child on the earnings gap decreases only slightly and very slowly over time to 1440 at the end of the observation window. For the middle cohort (those born between 1971 and 1980), the initial penalty is much lower - 1360 Euros. We then observe the impact of having a child on the earnings gap decline over time - this decline is most pronounced between the first year in which the child is observed (t=0) and one year after birth (t=1). This is likely almost entirely attributable to some partnered women re-entering the labor market during this period and this – in comparison to the first cohort – swift recovery may be (at least partly) due to the parental leave reform. Thereafter, we observe a continuous decline, yet the partner earnings gap does not return to its pre-birth level, instead, it is still 780 Euros at the end of our post-birth observation. For our latest cohort, the initial penalty is similar in size (1330 Euros), we also see a notable dip between t=0 and t=1, but the decline in earnings inequality thereafter is somewhat steeper than for the middle cohort. At the end of the observation window, however, the partner earnings gap is still 510 Euros higher than before the birth, but this is nonetheless the lowest remaining "penalty" among the three cohorts. We performed Wald tests, to check whether the slopes of the dummy impact estimations are indeed significantly different. The association between years since first birth and the partner earnings gap are found to differ significantly between the first and the last cohort in Germany ($F=3.27$ with a p value of $p=0.006$). However, there is no significant difference between the middle and the last cohort ($F=0.4$ with a p value of $p=0.847$). The reduction in the initial child penalty for the middle and the latest cohorts and the notably higher recovery rate occurred at the time when policies were starting to encourage a departure from the male breadwinner model. Although the earnings gaps observed 5 years post-birth for the younger cohorts also do not return to pre-birth levels, the reduction can be understood as a modest shift towards greater equality within couples.

Figure 5a: The effect of childbirth on the earnings gap by cohort - West Germany

Note: Own calculations based on SOEP 1992-2023. Fixed effects models with robust standard errors clustered within couples. Women with cohabiting partner only. Dependent variable: Earnings gap between partners. Covariates: childbirth, number of further children born, marital status, educational differences. The models also control for the SOEP sample categorical variable.

We now turn to our results for East Germany (presented in figure 5b), where we expect a smaller earnings gap than in our West German sample. Due to the relatively small sample of couples in our first cohort confidence intervals are unfortunately very large, leading to statistically insignificant results. Consistent with this, the Wald tests are also insignificant (F=1.41 and p=0.220 for the test between the first and the second cohort; F=1.28 and p=0.271 for the test between the first and the third cohort). Recall that our first cohort is older by design than the other cohorts when we first start observing them and that we condition on them being initially childless. This problem is more pertinent in our Eastern sample not only because the East German sample is much smaller in the SOEP, but also because East German women tend(ed) to have their children substantially earlier than West German women. In any case, we see a much lower initial penalty of 1170 Euro and a very clear decline in the partner earnings gap which was not the case for the West German women in that cohort (at the end of the observation window, the earning gap is back to pre-birth level). The middle cohort also has a much lower initial penalty than its West German counterpart – at 1010 Euros. Its recovery between t=0 and t=1 is also much steeper. Even though we do not observe continuous decline thereafter, the child penalty towards the end of our observation window is relatively small at roughly 230 Euros. Finally, the initial penalty of the latest cohort in East Germany is slightly higher than that of the middle cohort (1250 Euros), however the initial decline is somewhat sharper and steeper, reaching a penalty close to 0 by year 2 post-birth, but then there is a notable increase with a penalty of 340 Euros by the end of the observation. Yet our Wald tests suggest no significant difference in East Germany between cohorts. This suggests that despite considerable family policy change we find little evidence of an improvement in the child penalty in Eastern Germany.

Figure 5b: The effect of childbirth on the earnings gap by cohort - East Germany

Note: Own calculations based on SOEP 1992-2023. Fixed effects models with robust standard errors clustered within couples. Women with cohabiting partner only. Dependent variable: Earnings gap between partners. Covariates: childbirth, number of further children born, marital status, educational differences. The models also control for the SOEP sample categorical variable.

5. Discussion & conclusion

Our analysis used the German Socio-Economic Panel (SOEP) from 1992 to 2023 to examine how the earnings gap evolved with the duration of cohabitation of heterosexual couples and also directly explored the impact of childbirth on these inequalities. We examined changes across three German cohorts, as we expected that recent changes in family policies, especially from the mid-2000s onwards, that attempted to support equal-earning after childbirth would have direct implications for couples' employment decisions and thus on the partner earnings gap. This paradigm shift in family policies – from a traditional male breadwinner model to a dual earner/dual caregiver model (see Fleckenstein & Seeleib-Kaiser 2011; Gülzau 2020; Seeleib-Kaiser & Toivonen 2011) – provided us with the ideal contextual conditions to examine whether institutional change is reflected in different levels of earnings inequality within couples across cohorts and in a changing impact of childbirth on these inequalities. In recognition of continued differences in gender ideologies between East and West Germany (see Zoch 2021, Zoch & Schober 2018), we differentiated our analysis by German region.

We first described the evolution of the average earnings gap between partners over the duration of the relationship by using growth curve modelling, distinguishing between couples without children who remain childless and couples who are initially childless and then become parents over the course of the thirteen-year observation window. On average, men were found to out-earn their female partners from the very beginning of their cohabiting relationships. This was even the case amongst our last cohort, whose initial conditions did not vary that much from the middle cohort. Moreover, in West Germany we also found that even in couples that remained childless, earnings inequalities grew with time, albeit only modestly. For couples who became parents, we saw that the earnings gap increased very strongly and steadily with the duration of the relationship which is a function of the fact that at each point in time a larger number of women in this group had become mothers. For East Germany, by contrast, we found some indication that inequalities declined with time in continuously childless couples but given large confidence intervals these findings should be treated with caution. Couples who had a child in our observation window experienced an increase in the earnings gap, but they started from a lower level, and the increase was much less pronounced than in the West. These differences can likely be attributed to the still persisting variation in gender norms and the ensuing differences in the extent of mothers' (full-time) labor market participation in East and West Germany (Barth et al. 2020).

While we found hardly any differences in the evolution of the average earnings gap in long-term partnerships in West Germany between our three different cohorts, we observe substantial differences between cohorts in East Germany. Here, the initial gap was substantially higher for the first cohort, but the growth rate of the income gap in the last cohort more than doubled that of the first, which we find hard to explain. The last Eastern German cohort has spent part of their formative years in reunited Germany – and as argued and shown by Zoch (2021) – holds more traditional views than the older cohorts. This could be part of the explanation for the observed pattern. In any case, these descriptive accounts would suggest that the paradigm change in German family policy does not seem to have resulted in noticeable "improvements" in terms of earnings inequality trajectories within couples. In the next step, we then moved from the holistic approach of growth curve models to fixed effects models with dummy impact specification which allowed us to directly model the impact of children on the partner earnings gap and its temporal development. Modelling the direct impact of having a child on the earnings gap over time and under different institutional settings for the three different cohorts, we showed that the policy change appeared to have reduced the size of the immediate child penalty and also contributed to a substantially better recovery for West German mothers. As the family policy reforms increased fertility of highly educated and high earning women (Raute 2019), this improvement could also be due to selection. However, additional analyses (available upon request) constrained to highly educated women, showed the same pattern across cohorts. The improvements we observe for the younger cohort thus seem to exist net of compositional effects. This notwithstanding, due to the tertiarization of education, the selectivity of highly educated women becomes less of an issue in later cohorts. Nevertheless, policy change has not been successful in enabling couples to earn equally: six years after the arrival of the first child, the earnings gap between partners is still 667 Euros higher than before the arrival of the child for our last West German cohort (born between 1981 and 1990) and we only found significant differences in the penalty between our last and first cohort, even though our middle cohort benefited from considerable family policy investments. For Eastern Germany, the picture was quite different. While the initial child penalty was somewhat higher in the first cohort, this cohort recovered 100 percent of the losses by year 5, the middle cohort 71 percent, and the last only 27 percent. While the differences in the impact functions were not significant at conventional significance levels, we have to emphasize (as also noted earlier) that our East German sample is small leading to high standard errors and difficulties reaching thresholds of statistical significance.

Comparing East and West Germany, the regional differences were most pronounced between the first cohorts, and notably weaker between the two younger cohorts. The older cohorts have experienced different socialization in East and West Germany and even though they were exposed to the same institutional framework when they became mothers, due to historical reasons, there was substantially better coverage of childcare in the Eastern region. Notable differences between our first two cohorts in East and West Germany were thus expected. As pointed out above, the younger cohorts also experienced different socialization in East and West, though our last Eastern German cohort was socialized in both regimes (with resulting trends modest of re-traditionalization, see Zoch 2021). At the same time, when the younger cohorts transitioned to parenthood, they were exposed to policies becoming increasingly supportive of working mothers (and as part of reform process, childcare coverage for under-three-year-olds in the Western region kept expanding, though still not reaching levels akin to that in the East). As argued earlier, for West German women and families these changes constituted a paradigm shift which likely also resulted in the modernization of their gender ideologies. That observed differences between East and West German women are somewhat weaker among the younger cohorts was therefore also to be expected. And the differences we observe across cohorts within each region (declining inequalities in the West and potentially increasing in the East) may also be partly explained by these differences in gender role attitudes and their interaction with family policy change.

Aside from these differences between East and West German women, the important finding was – at least for West Germany where implications of the paradigm shift in family policy can be studied in a more straightforward manner – that inequalities in couples have reduced for the latest cohort, but they still remained substantial. We can thus speak of a partial success story. Although we observed a positive trend for the younger cohorts, we can conclude that there was a persistent earnings gap that increased with the duration of the relationship and was strongly associated with the birth of children. These findings can be interpreted as demonstrating how hard it is for policy to change long-lasting social norms. An interpretation Nylin et al (2021) also put forward in the conclusion of their study of couple earnings inequalities over time in Sweden. Our findings could also suggest that changes in family policies have simply not gone far enough

to significantly influence social norms in changing family and labor market dynamics. Expansion of childcare is an important step to facilitate dual earning, but most parents believe that it is not good for children (especially small ones) to spend long hours in non-parental care. So, for young mothers to work full-time or a big part-time job with possibilities of career advancement, they need partners that are also willing to scale down work and to share market work and care equitably – in a context where ideal worker norms are only slowly and partially changing (Lott & Klenner 2017). Parental leave of fathers is one instrument to change attitudes to paternal care work. Bünning (2015) has shown based on panel data and fixed-effects estimation that even short leaves have a negative effect on father's future working hours. Her results also indicated, though, that longer leaves and solo leaves (no parallel leave take-up with the female partner) resulted in significantly stronger effects. While time spent with children changed irrespective of leave duration and type of leave (solo/joint), housework hours only changed for fathers with long and solo leaves (ibid). While the rate of fathers who take up leave has been growing over time and is now at 43 percent, most of these fathers only take the 2 daddy months (i.e. those months exclusively reserved to one parent) or less (c. two thirds of all paternal leaves) and a parallel take up with the mother is very common (Brehm et al. 2022). Family policy that wants to encourage equal dual caring and careers will thus have to go further. A first (re-)action in this direction has already happened: the possibility of parallel take up has been modified in 2024 and been reduced to one month. Further steps would be to extend the number of months reserved for each parent. This was a measure suggested by the expert panel which compiled the ninth "Family Report" alongside increased income replacement rates for seven months per parent in order to further incentivize equal dual caring and earning within couples (BMFSFJ 2020). Another important pathway would be a change of the currently tax legislation – in its current form it still posits incentives countervailing the egalitarian goals of the family policy reforms.

Our study has some limitations. One is that some of our analyses for East Germany were hampered by small sample size and these effects therefore had to be interpreted with great caution – especially those analyses that separate the sample into cohorts. We still believe that our separate analyses of East and West Germany were important given the continued differences in norms and that these analyses helped to shed some additional light into contextual moderating effects and the interaction of gender role orientation and policy change, but fully acknowledge the sample size constraints. Second, sample size issues – especially in the fixed-effects analyses by cohort – also prevented us from further disaggregating the analyses by women's education as well as by hypo- or hypergamy which would have provided deeper insights into the underlying mechanisms. Third, when considering our findings on change across cohorts, it has to be borne in mind that, by design, our first cohort had a somewhat higher average age and may thus be a more select sample -at least based on unobservables- than the middle and latest cohort. This raises the possibility that the decline in earnings inequality across cohorts may be somewhat understated in our analysis. Despite these limitations we argue that our study provided some novel and important insights into the temporal dynamics of within-couple earnings inequalities in the context of substantial policy change and also, though not tested directly, some indication of the importance of gender roles and their resilience in understanding within-couple earnings inequalities and their trajectories. Our analyses show that while policies were able to reduce earnings inequalities in couples to some extent, the earnings gap persists, grows with cohabitation duration and is strongly associated with the birth of a child. These findings underscore the fact that the latest policy changes aimed at facilitating work-life reconciliation were unable to resolve earning inequalities between couples. Policy makers could take these findings as an encouragement to, inter alia, further reform parental leave implementing stronger incentives for an equitable distribution of leave between fathers and mothers.

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Data availability statement

The SOEP data is available via the following Research Data Center:
https://www.diw.de/en/diw_01.c.678568.en/research_data_center_soep.html

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Information in German

Deutscher Titel

Die Entwicklung von Einkommensunterschieden in Paarbeziehungen und die Rolle der Elternschaft – eine Lebensverlaufsperspektive anhand von drei deutschen Kohorten

Zusammenfassung

Fragestellung: In diesem Artikel wird für verschiedene Kohorten untersucht, wie sich Ungleichheiten im Erwerbseinkommen innerhalb von Paarbeziehungen und insbesondere nach der Geburt eines Kindes entwickeln.

Hintergrund: Der Paradigmenwechsel in der deutschen Familienpolitik bietet ideale Rahmenbedingungen, um zu untersuchen, ob sich der institutionelle Wandel in einem Rückgang der Ungleichheit innerhalb von Paaren in den jüngeren Kohorten widerspiegelt.

Methode: Anhand einer Stichprobe von 3.161 Paaren aus dem Sozioökonomischen Panel (SOEP) von 1992 bis 2023 schätzen wir Growth-Curve-Modelle und Fixed-Effects-Panelregressionen. Wir unterscheiden drei Kohorten und analysieren angesichts anhaltender Unterschiede in den Geschlechternormen Ost- und Westdeutschland getrennt voneinander.

Ergebnisse: Unsere Ergebnisse deuten darauf hin, dass Kinder die Ungleichheiten im Erwerbseinkommen innerhalb von Paaren erheblich verstärken und dass sich die Kluft im Laufe der Zeit nicht wieder auf das Niveau vor der Geburt zurückbildet. Wir stellen zudem Unterschiede zwischen den Kohorten fest: In Westdeutschland hat sich der Einfluss von Kindern auf das Einkommensgefälle zwischen den Partnern im Laufe der Zeit deutlich verringert – die Ungleichheit ist in den jüngeren Kohorten weniger groß. Dennoch bleibt das Gefälle im Erwerbseinkommen weiterhin erheblich. In Ostdeutschland konnten wir kein Muster einer abnehmenden Ungleichheit über die Kohorten hinweg feststellen.

Schlussfolgerung: Zwar gibt es Hinweise darauf, dass sich die Einkommensungleichheiten zwischen Partnern in unserer westdeutschen Stichprobe in einer Zeit, die von einem Paradigmenwechsel in der deutschen Familienpolitik geprägt war, verringert haben, doch besteht das Einkommensgefälle in Paaren weiterhin und steht nach wie vor in engem Zusammenhang mit der Geburt von Kindern.

Schlagwörter: Einkommensungleichheit in Paaren, Kinder, institutioneller Wandel

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