HOUSEHOLD SPECIALIZATION, SOCIAL NORMS AND THE MODERN FAMILY

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CHAPTER 1

Household Specialization, Social Norms and the Modern Family - An Introduction

1.1 MOTIVATION

If one would compare the average German family in 2020 to one fifty years ago, the differences would be striking. **Modern families** are more diverse and less stable, marriage and fertility rates have fallen, most mothers work at least part time, and gender role attitudes are increasingly egalitarian (Lundberg and Pollak, 2007; Lundberg *et al.*, 2016; Greenwood *et al.*, 2017; Fortin, 2005). In Germany[1], the female age at first marriage (first birth) increased from 23 (24) in 1971 to 32 (30) in 2020 (Statistisches Bundesamt, 2021a). The share of children born out of the wedlock increased over the same time period from 8 to 33% (Statistisches Bundesamt, 2021b). While only 45% of all women aged 20 to 64 were part of the labor force in 1971, this share increased to 78% in 2019 (OECD, 2021). In 1991, 28% of the German population agreed that it is the task of the husband to earn money, whereas the wife should take care of the home (Diabaté, 2021). By 2018, this share had fallen to 11%.

This dissertation contributes to our understanding of the evolution of the modern family in Germany, and is guided by the following questions: How does structural change in the labor market impact family formation and employment choices within couples? Why are certain aspects of the family – like the division of unpaid work – persistently traditional? How do institutions contribute to the change in family structure and gender role attitudes? Answering these questions is vital given the relevance the family has in shaping society, be it for economic growth, child outcomes or income inequality (Greenwood *et al.*, 2017; McLanahan, 2004). These questions have become even more important during the Covid-19 pandemic, which has profound impacts on the care infrastructure and on the labor market more generally (Alon *et al.*, 2021). The effect on families are still unclear.

There are two main theoretical frameworks in the economic literature to analyze the evolution of the modern family. The first strand is based on the maximization of family utility subject to resource constraints. It was pioneered by Gary Becker (1981) in his book "*The Treatise of the Family*". In this framework, economic incentives for marriage arise from the **gains from household specialization** – one partner specializes in market work while the other specializes in home production – thereby exploiting the comparative advantage of each spouse. Other gains from marriage stem from joint consumption or joint investments – the prime example being children. Decreasing gains to household specialization can explain the employment and family structure patterns we see today. These could result, for example, from changes in the (relative) earnings potential of men and women, or from institutional reforms changing the costs of having children by improving the reconciliation of work and family life.

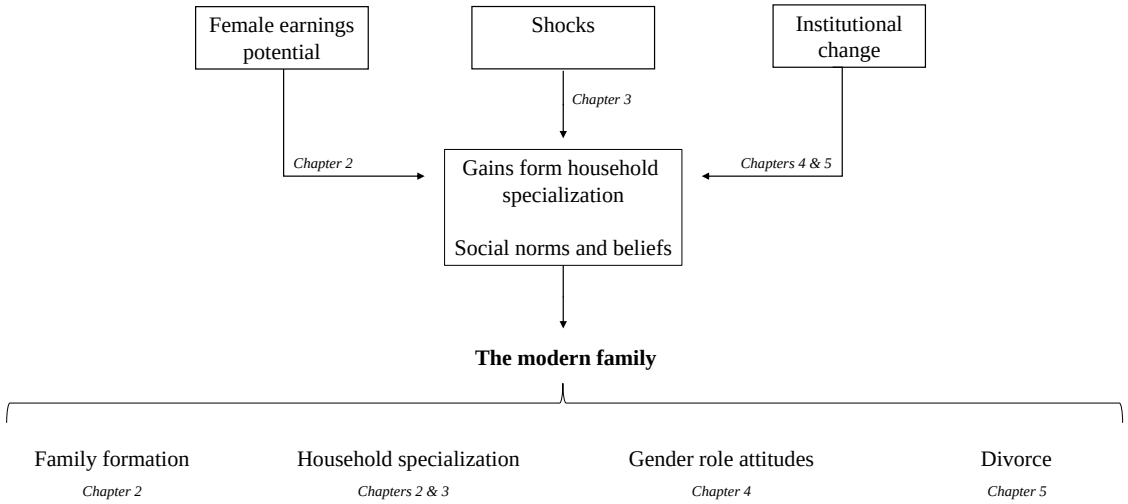
The second strand of the economic literature emphasizes the importance of **social norms and beliefs** and acknowledges that only part of the individual behavior can be explained by economic (monetary) incentives. In this framework, social norms and beliefs prescribe a certain form of behavior from which it is costly to deviate (Akerlof and Kranton, 2000). Hence, they can significantly affect the observed behavior of women, including family formation patterns, the division of domestic work, and economic outcomes (Fernández and Fogli, 2009; Bertrand *et al.*, 2015). But social norms

[1] Numbers up to 1990 refer to West Germany only.

and beliefs are not stagnant. They are shaped by institutions and policies (Zoch and Schober, 2018; Schober, 2014) and are transmitted within families (Fernández *et al.*, 2004; Nicoletti *et al.*, 2018), via peers (Dahl *et al.*, 2014), and neighbourhoods (Maurin and Moschion, 2009). In particular, gender norms can explain behavior which does not align with economic incentives. One example is the male breadwinner norm, which incentivizes couples to avoid a situation in which the woman becomes the primary earner (Bertrand *et al.*, 2015).

This dissertation provides new evidence on the drivers of the evolution toward the **modern family** and draws on both theoretical frameworks. All studies use quasi-experimental methods and focus on one specific aspect of the important question of why families changed so substantially over the past decades in Germany.

Figure 1.1: Connection between the different chapters



Source: Own illustration.

Figure 1.1 illustrates the connection between the chapters. This dissertation considers three underlying factors that shape families, which are depicted in the upper part of the figure: The role of the female earnings potential (Chapter 2), shocks (Chapters 3), and institutions like parental leave and care facilities (Chapters 4 & 5). Each of these factors impacts the gains from household specialization and social norms and beliefs, which are both outcomes and mechanisms of the evolution of the modern family. Each chapter then focuses on one aspect in which the modern family differs from the traditional family – family formation (Chapter 2), household specialization (Chapters 2 & 3), gender role attitudes (Chapter 4) and divorce (Chapter 5) – visualized in the lower part of Figure 1.1.

1.2 OVERVIEW AND SUMMARY

This dissertation consists of four self-contained, though related articles that empirically investigate how changes in the female earnings potential, shocks, and institutions impact families in Germany. I summarize the key features – the title, co-authors, the research question, the main finding, the data, and the empirical approach – in Table 1.1 and describe each chapter briefly in the following.

Table 1.1: Overview and summary of the following chapters

	Chapter 2	**Chapter 3**	**Chapter 4**	**Chapter 5**
Title	The Gender Pay Gap and Employment Choices within Couples	Suddenly a Stay-at-home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household	Cracking under Pressure? Gender Role Attitudes toward Maternal Employment in Times of Covid-19 in Germany	Parental Leave, Mothers' Careers and Divorce
Co-authors	Luisa Hammer	Juliane Hennecke	Natalia Danzer, Mathias Huebener, C. Katharina Spieß, Nico Siegel, Gert G. Wagner	–
Research question	How does an increase in the relative female-to-male wage impact employment choices in different contexts of gender inquality?	How does a paternal job loss impact the intra-household allocation of domestic work?	How does a pandemic induced loss of care impact gender role attitudes toward maternal employment?	How do parental leave entitlements impact the risk of divorce?
Main finding	Employment effects are larger in less gender-equal labor markets.	Paternal contributions to child care and housework increase only on weekdays in the short run.	Gender role attitudes of West German fathers become more traditional.	Longer periods of unpaid parental leave reduce the risk of divorce for mothers with a strong employment reduction.
Data	German Micro Census, Sample of Integrated Labour Market Biographies (SIAB), Qualification and Career Survey (BIBB)	German Socio-Economic Panel (SOEP)	German General Population Survey of the Social Sciences (ALLBUS), CoronaCOMPASS	Scientific Use File Statutory Pension Insurance Accounts (VSKT-VA)
Empirical approach	Shift-share	Event study	Difference-in-difference	Combined regression-discontinuity and & difference-in-difference

Source: Own illustration.

The starting point of Chapter 2 *The Gender Pay Gap and Employment Choices within Couples* is the observation that the convergence in female and male employment outcomes has recently stagnated (Goldin and Katz, 2002), despite structural change in the labor market which is favouring women (Black and Spitz-Oener, 2010; Anelli *et al.*, 2021). We hypothesize within a theoretical model of household specialization, that effects are smaller the higher the initial level of gender equality. To test this hypothesis, we exploit that female labor supply patterns and female relative to male wages are

historically different in East and West Germany, but are otherwise located in a common institutional framework. We study how a rising relative female-to-male wage affects partnership formation, female employment, and the gaps in working hours within couples. As the observed relative wage is correlated with regional characteristics and the outcome variables themselves, we construct a potential relative wage isolating task-based demand shifts within industries and combine data from the German Micro Census and the Sample of Integrated Labour Market Biographies (SIAB). We find that a higher relative female wage decreases partnerships and marriage for young women, increases female labor supply on the extensive and the intensive margin and reduces employment gaps within couples in West Germany. Effects are much smaller in East Germany, where the level of gender equality in the labor market is already high.

Chapter 3 *Suddenly a Stay-at-home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household* focuses on already formed families and the persistent gender differences in the allocation of unpaid work. In Germany, mothers still contribute roughly two hours more per day to child care and housework than fathers, despite increases in female and maternal labor force participation in recent years (Samtleben, 2019). This paper builds on rich longitudinal data from the German Socio-Economic Panel (SOEP). We investigate within an event-study framework how an exogenous shock on paternal availability – an involuntary job loss – changes the intra-household allocation of domestic work. We find that paternal child care and housework significantly increase in the short run on weekdays, while we do not see any similar shifts on weekends or in the long run. Looking into heterogeneous responses, we find that effects are positive and persistent for fathers who remain unemployed or have a working partner, but reverse after re-employment. Employed female partners respond to the change in paternal time allocation by persistently decreasing domestic time investments, while not employed female partners even increase the time allocated to child care and housework alongside their husbands. This results in an overall increase in cumulative household time investment in couples where both partners are at home due to the employment shock. We conclude that an involuntary job loss is not able to change social norms regarding the division of unpaid work, nor is the emotional bonding between father and child affected. These results are informative regarding the potential of paternity leave in reducing gender inequality.

While Chapter 3 analyzes the actual division of housework between partners over time, Chapter 4 *Cracking under Pressure? Gender Role Attitudes toward Maternal Employment in Times of Covid-19 in Germany* focuses on gender role attitudes toward female employment. Social norms have been shown to be, among others, predictive of female employment outcomes (Fortin, 2005). This chapter investigates whether gender role attitudes are responsive to institutional change, particularly if it reverses previous policies. We exploit that governments enacted daycare and school closures during lockdowns to contain the spread of Covid-19. These containment measures have already been shown to shift the allocation of housework and child care in the short term, with women carrying the main burden (Jessen *et al.*, 2021). We compare gender role attitudes of women and men with dependent children to those of women and men without children using data from the German General

Population Survey of the Social Sciences (ALLBUS) and the CoronaCOMPASS from 2008 to 2021. First-difference and difference-in-differences estimates show that fathers' egalitarian attitudes toward maternal employment dropped substantially one year after the outbreak of the pandemic. This drop is observed for men in West Germany, who showed a steady progression toward more egalitarian attitudes in the pre-pandemic period. Attitudes by women are not affected. The drop in men's attitudes is most pronounced for fathers of young children. These findings suggest that the pandemic not only affects employment patterns and time allocation outcomes, but also reverses previous changes in more egalitarian attitudes toward maternal employment in the short run.

Chapter 5 *Parental Leave, Mothers' Careers and Divorce* focuses on another facet of modern families – rising divorce rates – and the potential role of family policy. Policies like parental leave schemes impact families in terms of finances, time constraints and work incentives, particularly if behavioral responses in terms of employment are strong. This paper provides novel evidence on how parental leave policies interact with the risk of divorce in Germany. I analyze two parental leave reforms with opposite effects on maternal employment and administrative data from the German Pension Insurance. I use a combination of a regression-discontinuity and difference-in-difference approach. I find that both reforms did not change divorce rates on average, but affected subgroups differently. Heterogeneity analyses reveal that doubling the (unpaid) job protection period from 18 to 36 months reduces the divorce risk by 3 percentage points for mothers with medium pre-birth earnings. Looking into the mechanisms, I find that these mothers reduced their employment after giving birth and the spacing between the first and second child more strongly than mothers with low or high pre-birth earnings. A second reform paying higher benefits over a shorter time period and set in a more egalitarian norm environment had no adverse effects on marital stability.

1.3 CONTRIBUTION

Each chapter makes an independent contribution to the economic literature. While some contributions are more content-related, others are more related to the applied methodology or the use of data. As the individual contributions are discussed in detail in the individual chapters, I will briefly highlight the five contributions of this dissertation.

First, all chapters apply *econometric methods* to the field of family economics. Using quasi-experiments and econometric methods allows me to identify how different factors causally impact families. In order to make credible claims regarding the effects, the approaches include shift-share methods, event studies, regression-discontinuity and difference-in-difference estimations. Particularly Chapter 2 makes methodological contributions to the shift-share literature by exploiting variation in tasks within industries to construct the potential relative wage.

Secondly, understanding the effect of *policies* is highly relevant for the design of future institutions. In the context of daycare and school closures to contain the spread of Covid-19, it is crucial to understand how this affects families and their attitudes toward female employment (Chapter 4). If policies like parental leave impact not only maternal employment but also have unintended side ef-

fects on marital stability, this should be considered (Chapter 5). As it is not always possible to exploit policy changes in all settings, the identification of causal effects can be informative for policy as well. Understanding how monetary incentives shape partnership decisions and female employment patterns matters for the design of tax policy (Chapter 2). Using shocks on the paternal time availability helps to assess the potential of longer periods of earmarked paternity leave (Chapter 3).

Third, all articles go beyond the estimation of average effects. While it is challenging to understand the exact underlying channels within reduced form analyses, each chapter provides suggestive evidence on the *mechanisms*, and heterogeneity analyses. Furthermore, the analyses contain, if possible, not only short-run but also long-run effects (Chapters 3 & 5).

Fourth, this dissertation makes use of a variety of *datasets* to answer each research question. Survey data like the Socio-Economic Panel (SOEP), the German Micro Census, and the German General Population Survey of Social Sciences (ALLBUS) are rich on socio-economic characteristics and allow to analyze specific outcomes like time use and gender role attitudes (Chapters 2, 3 & 4). Administrative datasets, on the other hand, like the Sample of Integrated Labour Market Biographies (SIAB) and the Scientific Use File Statutory Pension Insurance Accounts and Divorce (VSKT-VA) allow for the precise estimation of treatment effects given their large sample size (Chapters 2 & 5). The use of data collected online (CoronaCOMPASS) is still in its infancy, but has tremendous potential to assess effects close to real time. In combination, these data sources allow to answer questions in more depths and accuracy.

Fifth, the *German context* constitutes an interesting case study. West Germany adhered to the traditional family model up to the reunification in 1990. In East Germany, the same period was characterized by increasing gender equality in labor market outcomes, growing shares of single parents, and egalitarian gender role attitudes. Now, both parts are unified under a common institutional and political framework, and child care coverage and parental leave schemes have been substantially reformed over the past 30 years. Analyzing policy changes and shocks in these two settings provides the opportunity to investigate differential responses (Chapters 2 & 4). Furthermore, while the analyses may be local in nature, the results may be informative beyond the German context, given the heterogeneity within Germany itself.

CHAPTER 2

The Gender Pay Gap and Employment Choices within Couples

This chapter (pp. 9–48) is based on joint work with **Luisa Hammer**.

2.1 INTRODUCTION

Over the past decades, female labor market outcomes have improved and gender gaps in pay narrowed (Blau and Kahn, 2007; Goldin and Katz, 2002; Olivetti and Petrongolo, 2016). Until today, ongoing technological change in the labor market is favoring women (Black and Spitz-Oener, 2010; Anelli *et al.*, 2021; Beaudry and Lewis, 2014; Rendall, 2018). Given improving female employment opportunities, we would expect female labor supply to further converge to male outcomes, eventually even closing the gender gap in working hours within couples (Bertrand *et al.*, 2010). Despite the increasingly favorable earnings potential of women, however, convergence has recently stagnated. This puzzling observation raises the question whether the scope for further advancement of female careers in the labor market has been exhausted. Multiple explanations have been brought forward why convergence has stalled. Much of the difference in female and male employment trajectories can be linked to the arrival of children (Kleven *et al.*, 2019) and the surrounding family policies (Olivetti and Petrongolo, 2017). Other explanations include disproportionate rewards of long and inflexible working hours (Goldin, 2014), gender norms (Bertrand *et al.*, 2015), discrimination in the labor market (Blau and Kahn, 2017), and gender differences in personality traits and preferences (Croson and Gneezy, 2009).

We approach the stalling convergence from a different perspective. An increase in the female relative to male earnings potential may generate substantial incentives for female employment when they occur in a setting in which the level of gender equality in terms of pay and employment is still very low. However, the positive effects may be substantially smaller if female earnings are already close to male earnings. In other words, the effect of a higher relative wage may differ depending on the degree of gender equality in the particular labor market. It has been shown, for instance, that female own-wage elasticities are larger in countries where female labor force participation is still comparably low, like in Ireland and Italy (Bargain and Peichl, 2016). Therefore, we hypothesize that in regions with very gender equal labor market conditions, be it through a high relative female-to-male wage or through high female labor force participation, further monetary incentives no longer play a substantial role in the female employment decision.

To answer the question of whether a rising relative wage always improves female employment outcomes, one would ideally examine the impact of higher female wages at different stages of gender equality, holding everything else constant. Hereto, Germany provides a unique setting, which we exploit in our paper. After being separated for 40 years, East and West Germany have been reunited in 1990 in the Federal Republic of Germany (FRG). Despite today's shared institutional and macro-economic surroundings important differences remain. Especially the degree of gender equality in the labor market and gender role attitudes diverges between the two regions. East Germany has a significantly higher female labor force participation, especially in terms of full-time employment, and a persistently higher relative female-to-male wage, which is approaching unity. It also exhibits more progressive gender role attitudes (Bauernschuster and Rainer, 2012; Danzer *et al.*, 2021; Lippmann *et al.*, 2020). In our empirical approach, we therefore estimate the effect of an increasing relative

wage on a number of female outcomes and investigate differences in the responses in East and West Germany. The underlying assumption is that East Germany represents a setting in which a crucial level of 'initial' gender equality in the labor market is (almost) reached.

Reactions of female employment, especially in partnerships, should also take into account the marriage decision since it determines a woman's financial incentives as well as the time constraints for employment. We build on work by Becker (1973, 1981), and Fernández *et al.* (2004) and illustrate within a simple theoretical model how the incentives for marriage, and the employment of single and partnered women change depending on the degree of gender equality. The relative female-to-male wage is a crucial determinant of spouses' comparative advantage in market work, and thus of their labor supply, but may become less relevant at very high levels of gender equality. Naturally, also the scope for a further increase in working hours of partnered women is limited if they already work (close to) full-time hours. We then form specific predictions on the response of women's labor supply, particularly within partnerships, to an increasing relative female-to-male wage for different degrees of gender inequality.

To investigate the theoretical predictions empirically, we estimate the differential effect of the relative female-to-male wage in East and West Germany on partnership formation and female employment. As the observed wages would also be driven by local characteristics and the outcome variables themselves, we construct an exogenous measure of the relative wage. It combines the differential wage growth across industries and occupation tasks with the regional segregation of men and women in different segments of the labor market (Aizer, 2010; Bertrand *et al.*, 2015; Shenhav, 2021). We exploit that task-biased technological change favors women, leading to higher wage growth in occupation tasks that are predominantly carried out by women (Black and Spitz-Oener, 2010). We therefore further refine the shift-share approach by Shenhav (2021) and account for the role of tasks within industries. The constructed relative *potential* wage serves as an indicator of women's earning opportunities relative to those of men in standard full-time employment (Aizer, 2010).

Our estimations show that a higher relative female-to-male potential wage does not impact partnership formation on average, but has a significantly negative effect on the probability that a young woman lives together with her partner or is married in West Germany. For labor market outcomes, we find positive and significant effects on female employment and working hours. For all women in West Germany, we find that a one percentage point increase in the relative female wage increases their probability of employment by 0.8 percentage points and their working hours by 0.26 hours. In contrast, the impact in East Germany is smaller, both in absolute and relative terms. In line with this evidence, we also find that within couples the difference in market hours falls, particularly in West Germany. Moreover, we show that the strong positive female employment effects are almost entirely driven by partnered women with children. The results are robust to a number of sensitivity checks. Altogether, our findings suggest that there is no linear relationship between the relative wage and female labor supply. In particular, we find that the more advanced women's integration into the labor market is, the lower the elasticity of female labor supply. Understanding this mechanism is particularly rele-

vant for policy and taxation attempting to improve female labor market outcomes. Low female labor supply elasticities imply that public policies focusing on labor market returns only have little scope to increase female labor supply further.

We contribute to the literature studying the link between female labor market opportunities and family formation and female employment. A few recent papers from the US exploit exogenous changes in the relative labor market opportunities to study the effects on labor supply and family outcomes, and generally find that men are hurt more by negative labor demand shocks, for example Autor *et al.* (2018), Kearney and Wilson (2018) and Anelli *et al.* (2021).[1] Close to our approach is a recent paper by Shenhav (2021) in which she estimates the effect of a higher female relative wage on marriage and labor market outcomes in the US. She finds that a higher relative wage reduces marriage rates, increases spousal quality and raises women's working hours. We are only aware of two similar studies from Europe: Giuntella *et al.* (2021) and Keller and Utar (2022).[2] We add to this literature by specifically investigating the differential effects for women depending on the initial degree of gender equality and complement the analysis with effects on employment gaps within couples.

Our approach also makes methodological contributions to the literature on shift-share approaches to estimate wage effects. We build on Aizer (2010), Bertrand *et al.* (2015), and Schaller (2016), who calculate industry-specific wage (or employment) growth rates that are interacted with local industry shares to predict either the wage or the employment rate. We refine these approaches by accounting for the role of occupation tasks in wage growth, similar to Shenhav (2021) who exploits occupational variation within industries. We argue that for Germany there is significant overlap between the broad industry and occupation categories, so we focus on the more relevant main tasks performed per occupation within industries instead. We show that there is substantial variation in the wage growth within industries by tasks and that women and men differ in their task composition within industries.

The remainder of the paper is structured as follows. In Section 2.2 we set up the theoretical model and derive predictions, in Section 2.3 we describe the differences between East and West Germany, in Section 2.4 we introduce the data and the empirical approach, in Section 2.5 we report our results, in Section 2.6 we discuss the underlying assumptions, and Section 2.7 concludes.

[1] Autor *et al.* (2018) use regional variation in the degree of Chinese import penetration to estimate the effect of falling male earnings on marriage and fertility outcomes. They find that shocks to male earnings reduce marriage and fertility. Kearney and Wilson (2018) exploit regional variation in the exposure to the fracking boom and find that increased wages and jobs for low-educated men increase marital and non-marital birth rates, while marriage rates are not affected. Anelli *et al.* (2021) find that the regional robot penetration results in lower gender gaps in income and labor force participation. They find evidence for an increase in divorce and cohabitation. While total fertility was not affected, non-marital fertility increased.

[2] Giuntella *et al.* (2021) investigate the effects of trade exposure on employment, fertility and marital behaviour in Germany. They find that individuals working in sectors affected by import competition have worse labor market outcomes and reduce fertility. Keller and Utar (2022) find that Danish women in their late 30s respond to employment losses induced by demand shocks from China by having a baby, resulting in an increase in gender inequality.

2.2 HYPOTHESIS DEVELOPMENT

Classic economic theory by Becker (1981) models marriage as a place for household specialization, which generates a marital surplus if one partner specializes in home production while the other specializes in market work.[3] Given the usually low relative female-to-male market wage, it predicts women to do more household chores, and men to specialize in market work. We employ a simple static model based on Bertrand *et al.* (2021) and Fernández *et al.* (2004) to derive specific hypotheses regarding marriage and labor supply behaviour of women.

2.2.1 The model framework

Within a marriage market, men and women match randomly, and we assume that only one match per person takes place. The matched partners then decide individually whether they want to get married or whether they prefer to stay single.[4] Only if both partners agree to get married, a marriage takes place. If two partners[5] get married, they can split their time between market work and household production, e.g. through children. Singles, on the other hand, remain childless and do not have any household production but work full-time in the market. When single, each individual i derives utility only from consumption through its labor income. Total time is normalised to 1 so that the utility (labor income) of singles simplifies to the wage rate: $V_i^{sgl}(w_i) = w_i$. When married, individuals derive utility from their own income, their partner's income, home production as well as from the match quality. The individual total time budget is split into household production t_i and market work $1 - t_i$. Household production is modelled as $b = \log[h(t_m) + h(t_f)]$, where $h(\cdot)$ is an increasing strictly concave function. Subscripts m and f indicate male and female, respectively. Household productivity is measured through β and is the same for both spouses. We assume that men can put different weights on their wife's career. Men with traditional gender role attitudes, for example, may experience some discomfort when their wife works. This implies that their utility increases at a lower rate than the female wage rate, so that the female labor income has to be weighted by the scaling parameter $0 \leq \alpha_m \leq 1$. In the most extreme case of $\alpha_m = 0$, the man dislikes his wife working so much, that he does not gain any utility through his wife's labor income. We assume that women place full value on their husband's career, i.e., $\alpha_f = 1$. The match quality perceived by individual i is captured by the parameter q_i.

We further assume that men earn higher wages than women, i.e. $w_m > w_f$ and that their wages are higher than their household productivity, i.e., $w_m > \beta$. Since men and women have the same household productivity β, the relative advantage in household versus market production is summarized through

[3] Other factors that contribute to the marital surplus include e.g. economies of scale, consumption-based benefits through the shared consumption of household goods or joint investments into children (Weiss, 1997).

[4] In principal, the stability and exit costs of marriage and cohabiting partnerships may differ. For simplicity, we abstract from that and apply the same predictions for a formal marriage as for the formation of a cohabiting partnership. We therefore also use the terms partnered and married synonymously.

[5] We consider in our model only heterosexual monogamous couples.

$\frac{w_f}{w_m} < \frac{\beta}{\beta} = 1$. Thus, men have a comparative advantage in market work and will fully specialize in market work and work full-time ($t_m = 0$). The utility of marriage for a women thus is:

$$V_f^{married}(w_m, w_f, q_f) = (1 - t_f) w_f + w_m + \beta \log[h(t_f)] + q_f \tag{2.1}$$

For married women, the time allocation decision is not as clear and depends on their labor market productivity. Let us distinguish three types of women – women with low, with moderate and with high labor market productivity.[6] Women who have a low labor market productivity have a relatively high productivity in the household, i.e., $\beta > w_f$, and will specialize fully in the household ($t_f = 1$). Women with a moderate labor market productivity such that $\beta < w_f < w_m$, on the contrary, will work part-time in the labor market ($1 - t_f = 1 - \frac{\beta}{w_f}$). Lastly, for women with a high market productivity the relative female-to-male wage (almost) reaches unity. Hence, they do not have a comparative advantage in home production and their housework time approaches zero:

$$\lim_{w_f \to \infty} t_f(w_f) = 0$$

Thus, high productivity women work full-time in the market and zero hours in the household. The model implies that in the case that the woman has a higher earning potential than her male partner, the man lowers his market hours.

For all individuals, the decision to get married is based on the individual marital surplus for a match, which compares the utility of a marriage with the utility of remaining single. The marital surplus takes into account the own and the partner's labor income as well as the quality of the match. For both men and women, the marital surplus differs depending on the market productivity of the wife. For men, a match with a low market productivity wife generates a surplus only through household production besides the match quality (see Table 2.A.1 and 2.A.2 in the Appendix). A match with a moderate / high market productivity wife also affects the surplus through her labor market income, which he evaluates depending on his gender role attitudes. For women, the marital surplus declines with a higher wage rate, i.e., with their market productivity and eventually does not react to a wage increase anymore.

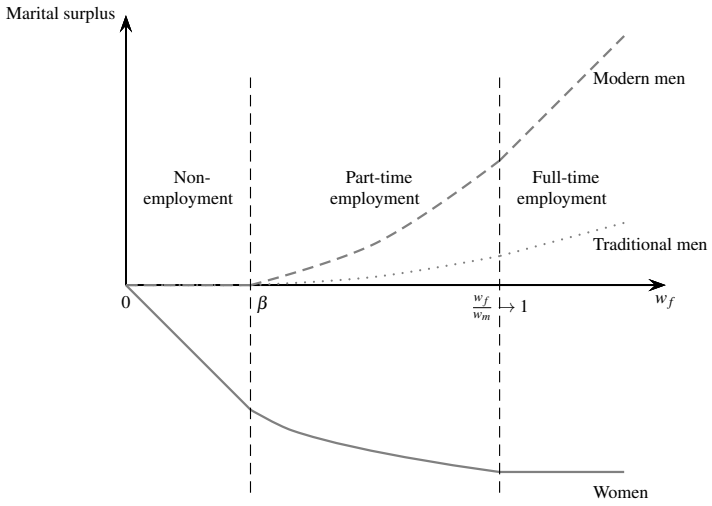
2.2.2 General predictions for a rise of the (relative) female wage

We now form predictions on how a rise of the female wage affects marriage probability, female employment and time allocation decisions within couples given our simple model.

Marriage If women's wages increase while men's wages remain constant, the pecuniary gain from marriage for women is reduced because they could now earn a higher income when single than before. Therefore, the marital surplus falls for low and moderate-productivity women which results in a lower incentive to get married, and thus a lower probability of marriage. The marital surplus of

[6] We do not include skill acquisition in our model and take labor market productivities as given.

Figure 2.1: Reaction of the marital surplus to the female wage



Notes: Own illustration based on the theoretical predictions for three different types of women. Women with low labor market productivity ($w_f < \beta$) are not employed, women with moderate market productivity ($\beta < w_f < w_m$) are in part-time employment, and women with a very high productivity ($\frac{w_f}{w_m} \to 1$) are full-time employed. Modern men have a norm parameter of $\alpha_m = 1$, traditional men of $1 > \alpha_m \geq 0$.

high-productivity women is unaffected since it only depends on the male partner's income and match quality. For a wage below β (low productivity), an increase in the female wage decreases the marital surplus linearly with $-w_f$. As soon as the wage exceeds β, married women work part-time (moderate productivity). In that case, they benefit from their own additional income in the marriage, i.e., through $\left(1 - \frac{\beta}{w_f}\right) w_f$, while household production $\beta h\left(\frac{\beta}{w_f}\right)$ decreases with a higher wage. For women with a very high market productivity, a rise of their wage does not affect the marital surplus anymore, since they earn the same income through full-time work both as single and married. These adjustments imply that for low-productivity women the marital surplus decreases linearly with a higher female wage, for moderate-productivity women it still decreases but at a lower rate, and for high-productivity women the marital surplus does not react anymore: $-w_f < -\frac{\beta^2}{w_f^2} \frac{h'(\frac{\beta}{w_f})}{h(\frac{\beta}{w_f})} < 0$.

For men, the marital surplus of a marriage with a household-specialising wife, i.e., a wife with $w_f < \beta$, remains unchanged. However, the likelihood that a woman's household productivity lies above the now higher market wage decreases. Therefore, the share of women who will fully specialize in household production while married shrinks. The marital surplus of a match with a working wife, on the other hand, increases as the monetary gains rise. If a man, however, holds very traditional gender role attitudes, the marital surplus increases at a lower rate.[7] The relationship between the marital

[7] Alternatively, one could interpret the parameter as measuring a strong preference of the man for home production carried out by the woman.

surplus and the female wage, and how it changes depending on the labor market productivity of the woman, is visualized in Figure 2.1.

Employment and time allocation Since we assume that men as well as single women work full-time in the market, the time allocation decision affects married women only. This implies that a decline in marriage leads to an increase in female employment through the higher number of single women. Moreover, a rise of the female wage potential could mean for women with a low labor market productivity that their market wage now trespasses their household productivity, encouraging them to withdraw from full household specialization and to work part-time instead. For married women with a moderate labor market productivity, we expect an unambiguous increase of market hours since their opportunity costs of household production increase. However, for high-productivity women we can think of the case that the relative female wage in a couple is already sufficiently high so that a further increase of the female wage does not provide enough incentive for the wife to supply more hours of market work. This becomes especially important when the female partner already works (close to) full-time hours. In this case, no employment effect on the extensive margin is possible, and if she already works full-time hours, no further increase of market hours will occur.

Table 2.1: Predictions for women depending on their labor market productivity

	Female labor productivity type		
	Low	Moderate	High
Characteristics			
Initial relative female-to-male wage*	Low	Moderate	Close to unity
Comparative advantage in home production	Large	Small	None
Initial labor supply	Zero	Part-time	Full-time
*Female reaction to a rising female wage**			
Incentive to get married (marital surplus)	$\downarrow\downarrow$	$\downarrow$	$-$
Female labor force participation	$\uparrow$	$-$	$-$
Female market hours	$\uparrow$	$\uparrow$	$-$
Within-couple gap in market hours	$\downarrow\downarrow$	$\downarrow$	$-$

*Notes: Depiction of the theoretical predictions of an increasing relative female wage depending on the initial relative wage of the woman. $\uparrow$ ($\downarrow$) indicates an increase (decrease) as a response, $\uparrow\uparrow$ a strong increase, and $-$ no response. *Assuming a constant average male wage and partner quality.*

Summary We summarize our predictions in Table 2.1. Altogether, our model predicts a negative effect of a rising female relative wage on the incentive to marry for women. For female employment, it predicts a positive effect on market hours of *married* women with a moderate or high market productivity as long as full-time employment is not reached, and a positive labor supply effect on the extensive and intensive margin of *married* women with a low market productivity. Moreover, by de-

creasing women's probability of marriage, there should be an additional positive labor supply effect for women who now remain single instead of marrying and thus work full-time. These employment adjustments of partnered women together with in extreme cases possibly contrary behavioural adjustments of the male partner, should lead to a lower degree of household specialization within couples. Especially the gap in market hours between the male and female partner should decline.[8]

2.3 EAST-WEST HETEROGENEITY

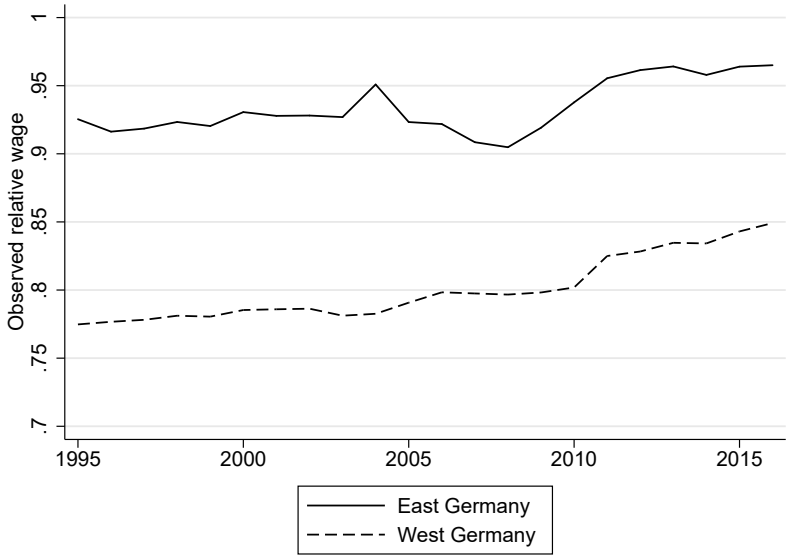
The main interest of our paper is to investigate how a rising female relative to male wage affects men and women differently in two regions of Germany, which differ greatly with respect to gender role attitudes and the level of gender equality in the labor market. Between 1949 and 1990 Germany was separated into two constitutional systems – the *Federal Republic of Germany* (FRG) in West Germany and the *German Democratic Republic* (GDR) in East Germany. The latter was exposed to socialist institutions as part of the eastern bloc of the Soviet Union. In 1990, both regions were reunified in the FRG, expanding the West German legal system to the whole country.[9] During separation, however, institutions, gender role attitudes, and, crucially, female employment patterns had diverged strongly and significant differences remain even thirty years after reunification. We therefore form predictions on marriage and female labor supply taking these differences into account.

During the 40 years of separation, both states put a different focus on female careers and family life. In the GDR, the *Mother and Child Care and Women's Rights Acts* from 1950 fostered female employment through a number of policies. The regulations included public services which were designed to enable mothers to work full-time, like the provision of public child care, free school meals, maternity leave, and additional days to care for sick children (Cooke, 2007). In contrast, West German institutions supported a conservative image of family life. The civil code stated that "*the wife is responsible for running the household. She has the right to be employed as far as this is compatible with her marriage and family duties"* (Civil Code, §1356) until 1977. Until today, the FRG tax code provides incentives for single earner households through income splitting. The same applies to the provision of free health insurance for the not-employed spouse, i.e., in most cases the wife (Rosenfeld *et al.*, 2004). The lack of public child care and halfday-primary schools fostered maternal non- and part-time employment in West Germany further. Since reunification, West Germany has undertaken

[8] Time allocation decisions may additionally be impacted by changes in female bargaining power. Even without changes in the number of working hours, an increase in the female wage increases her share in total income and hence her bargaining power, allowing her to contribute less to home production (Lundberg and Pollak, 1996; Lundberg, 2008). However, this channel cannot be incorporated in our model as we assume income pooling (the jointly generated income enters the utility functions of men and women similarly). For a review on models of household decision making, see e.g., Himmelweit *et al.* (2013).

[9] The monetary union took place in July 1990, the political reunion followed on 3rd of October 1990.

Figure 2.2: Observed relative wage



Notes: Relative female-to-male gross daily wage. The sample includes full-time dependent employees aged 18-64 years.
Source: Own calculations based on SIAB 1995–2016.

multiple policy changes in an attempt to improve the reconciliation of employment and family life for women.[10]

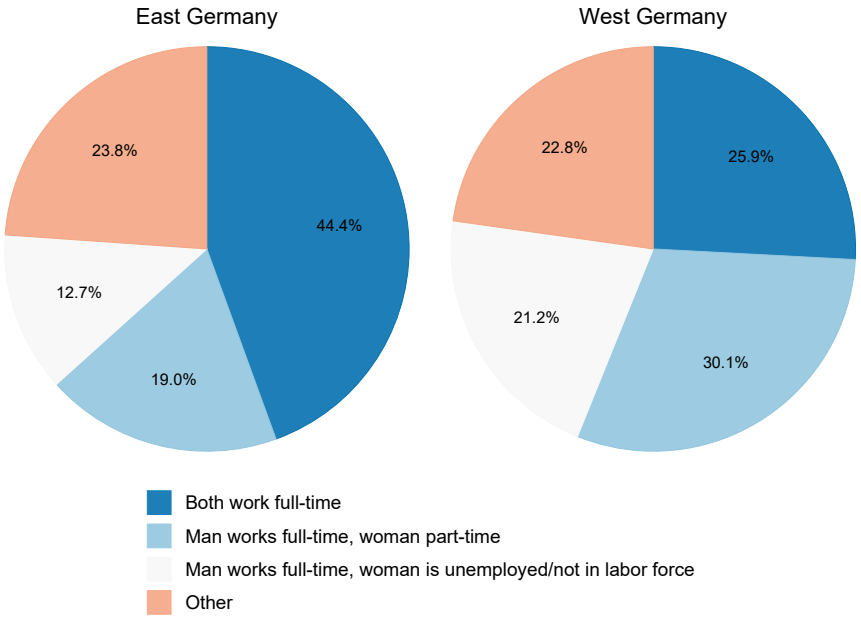
The female-friendly environment in the GDR's institutions is also reflected in persistently more egalitarian gender role attitudes in East Germany. Bauernschuster and Rainer (2012) show that persons who grew up in the GDR are significantly less likely to agree with the traditionalist view that "*It is better for all if the husband works and the wife stays at home taking care of the household and the children*". Such an understanding of marriage would align well with a male breadwinner family – the husband earns (mainly) the income, while the wife (fully) specializes in the household. Bertrand *et al.* (2015) suggest that in a traditionalist setting, a "violation" of the so-called male breadwinner norm, i.e., when the woman (potentially) earns more than the man, diminishes her marriage prospects and could also lead women to underestimate their earnings potential in order to comply with the male breadwinner norm. For Germany, Lippmann *et al.* (2020) show that exactly this happens in West German partnerships, however not in East German couples.

Until today, persistent differences in female employment patterns and in gender earnings inequality remain. Figure 2.2 plots the evolution of the relative female-to-male wage in East and West Germany. In 1995, the average relative female wage among full-time employees in West Germany

[10] These reforms include among others an increase in child care coverage, which is now almost universal for children above age three and was continuously expanded for younger children (Bauernschuster and Schlotter, 2015; Müller and Wrohlich, 2020), reductions in child care costs (Huebener *et al.*, 2020), parental leave reforms favoring a faster maternal return to employment (Kluve and Tamm, 2013; Kluve and Schmitz, 2018), and expansions in all-day schooling (Gambaro *et al.*, 2019).

amounted to only 77%. It improved, however, by almost 10 percentage points to 85% in 2016.[11] East Germany started already at a very high level when the relative wage in 1995 lay around 92% and it slightly increased to 96% over the subsequent 20 years.[12]

Figure 2.3: Employment patterns within couples



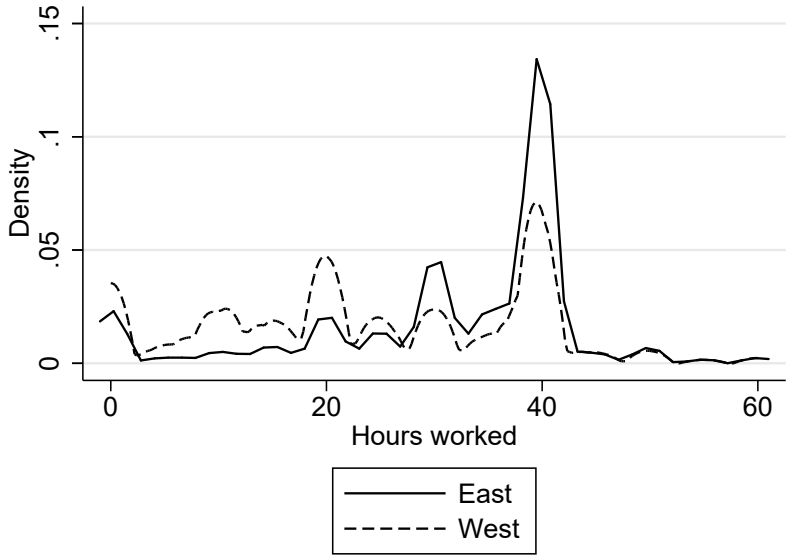
Notes: Combinations of non-, full-time and part-time employment in couples (both partners aged 22-60 years). The category "other" comprises combinations in which the man is either un- or not employed or works part-time, or in which the exact employment status of either of the two partners is unknown (7.6% in East, 10.7% in West Germany). Excluding city-state Berlin.
Source: Own calculations based on Micro Census 2005–2016.

Moreover, female employment patterns in East Germany are closer to male employment biographies, with a large share of women working full-time and with relatively short career interruptions after childbirth (Rosenfeld *et al.*, 2004). This is also reflected in the degree of household specialization within couples. In Figure 2.3, we plot the employment constellations of couples in East and West Germany. The share of couples who do not specialize at all, i.e., in which both partners work full-time, is almost twice as high in East Germany, where it is the most important employment combination. In West Germany, the predominant constellation is "partial household specialization", so that the man works full-time and the woman works part-time. Full household specialization, i.e., the woman is not

[11] For all employees, in 2016 (2006) the unadjusted gender wage gap in East Germany amounted to 7% (6%), while in West Germany women's wages were on average 22% (24%) lower than men's wages (Destatis, 2021).

[12] However, the East German economy experienced strong structural shifts after reunification. Hunt (2002) notes that behind the significant decrease in the gender wage gap in East Germany between 1990 and 1994, a crowding out of women, especially low-skilled ones, from employment is hiding.

Figure 2.4: Working hours of women partnered with a full-time working man



Notes: Distribution of contractually agreed working hours of women in a partnership with a man in full-time (hours >= 30) employment. Both partners are aged 22-60 years. Density plot based on epanechnikov kernel with a bandwidth equal to 1. Excluding city state Berlin.
Source: Own calculations based on Micro Census 2005–2016.

employed in the labor market but has a full-time working partner, is relatively rare in East Germany, but applies for more than a fifth of West German couples. Taking a closer look at the distribution of working hours of women who are partnered with a man who works full-time reveals again great disparities between East and West German couples. The large majority of East German women with a full-time working partner works at least 30 hours per week and less than 7% do not work at all. In West Germany, the share of non-working wives is higher with 10%. Moreover, the distribution of work hours of West German women is more concentrated along part-time hours (compare Figure 2.4).

These observations form the basis for the predictions from our theoretical model on how the relative wage affects marriage and female employment differently by region. The relative wage is persistently higher in East Germany and at the same time full-time work is common among East German women. In West Germany, we observe a positive time trend of the relative wage, but the gender gaps in wages and working hours remain at a high level. We thus expect that the share of women with only small or close to zero comparative advantage in home production is large in East Germany.

The high level of gender equality in the labor market in East Germany provides lower economic incentives for women to get married. In West Germany, the rising relative wage entails that the pecuniary gains from marriage decrease for women, whereas they increase for men. This decreases the marriage incentives for West German women unambiguously. For East Germany, we expect little effect of an additional increase of the relative wage, since women's economic position is already

sufficiently strong. As for employment and household specialization, we predict at most a small negative effect on market hours for men. For West German women, we expect that a rise of the relative wage leads to an unambiguous and strong substitution from household production to market work for partnered women. We expect that the positive employment effect is amplified through an increase in the number of single women. Since the initial degree of household specialization is high in West Germany, we also expect a significant negative effect on the gap in market hours within couples. For East German women, we expect that a rising relative wage only has a small effect since they are already close to their individual maximum.

2.4 EMPIRICAL METHODOLOGY

2.4.1 Data

For our empirical analysis, we combine data from two different German datasets. Our main analysis is based on the **German Micro Census** (RDC, 2021). This annual survey draws a representative sample of 1% of all German households. Participation is mandatory and only few questions are answered on a voluntary basis. The number of observations is large, and due to mandatory participation, selective non-response or attrition is not an issue. We use the scientific use file, a 70% random sample of the data and all waves from 2005 to 2016. The data includes detailed information on employment outcomes, such as the industry and working hours, education, the federal state, and socio-demographic information for all household members. Since we are interested in marriage and employment outcomes of persons who are in their prime employment and partnership phase, we restrict our sample to all women aged 22 to 51 following Bertrand *et al.* (2015). We provide descriptive statistics in Table 2.A.3 for all women, partnered women and their male partners. Overall, we see that female employment is lower for partnered women who also more often live together with a child up to age 18.

The German Micro Census does not contain information on the gross wage or the gross income. Hence we draw on data from the **Sample of Integrated Labour Market Biographies** (SIAB)[13] to calculate gross wages to study the development of female and male wages over time. The SIAB is a 2% random sample drawn from an administrative database which covers all dependent employees covered by social security.[14] In our sample period this corresponds to 85% of the German workforce (BA Statistik, 2021).

[13] This study uses the weakly anonymous Sample of Integrated Labour Market Biographies (Years 1975-2019). Data access was provided via on-site use at the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) and subsequently remote data Access. Data documentation: Frodermann *et al.* (2021).

[14] Civil servants and self-employed persons are not included.

2.4.2 Shift-share approach

We are interested in the effect of the ratio of female and male average wages per marriage market. We define the marriage market μ by state s[15], education level e[16], age group a[17], and year y. The observed relative wage in each marriage market, however, is likely correlated with state- or education-specific characteristics. Therefore, we use a Bartik (1991) type shift-share approach, which exploits labor demand changes across different labor market segments and the gender segregation in the labor market, to predict female and male wages in a marriage market. This approach is a popular tool for the estimation of gender-specific wages to reflect gender-specific labor demand changes and not other potentially endogenous characteristics (Aizer, 2010; Bertrand *et al.*, 2015; Katz and Murphy, 1992). It exploits that, historically, men and women tend to work in different industries and that the gender-specific industry composition differs by state. The local gender-specific employment share in industry j[18] (*share*) in a sufficiently lagged base year y_0 is multiplied with national wage changes by industry. A nation-wide change in industry-specific wages hence impacts regions very differently, depending on the historical gender-specific industry employment. Given the observed labor demand changes, the predicted wage is, thus, a measure of the potential wage in a standard full-time employment. The potential wage has been shown to be the relevant measure for family formation decisions (Pollak, 2005). The potential wage $\hat{w}_{esgy}$ per gender g and education group e in state s in year y[19] is then given as:

$$\hat{w}_{esgy} = \sum_{j} \frac{E_{jesg,y_0}}{E_{esg,y_0}} \times w_{jy,-s} \tag{2.2}$$

We then calculate the relative wage as the ratio between the predicted female wage and the predicted male wage. Figure 2.5 illustrates the industry composition in the base years 1995 and 1996 by gender and region. We see that there are differences between East and West Germany, but the main dividing line is between men and women. There is, for example, a substantially higher share of men working in production (especially in the West). Women, on the other hand, are concentrated in retail, education and health.

Aggregate wage growth does not only vary by industry, but also substantially within industries, for instance by task level and differential exposure to technological change. According to the hypothesis

[15] We group the German states into seven West German states (Schleswig-Holstein & Hamburg, Lower Saxony & Bremen, North-Rhine-Westphalia, Hesse, Rhineland-Palatinate & Saarland, Baden-Wuerttemberg, and Bavaria) and five East German states (Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, and Thuringia). We exclude the city-state Berlin since no clear distinction between East and West is possible.

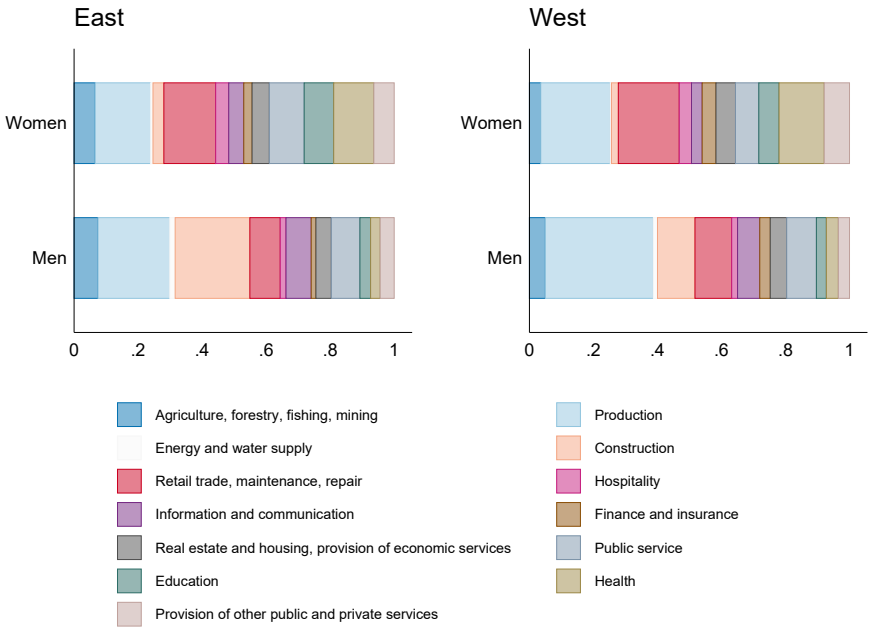
[16] We distinguish three education categories: no tertiary education, vocational training, and academic education.

[17] In line with Bertrand *et al.* (2015), we construct three age groups: 22-31, 32-41, and 42-51. Unlike Bertrand *et al.* (2015), we only focus on female outcomes. Still, we follow their approach to check how many women marry within their own marriage market. To do so, we define male age groups as 24-33, 34-43, 44-53. We move the male age boundaries up by two years as this corresponds to the average age gap between partners. We find that 56% of the individuals in our sample find their partner within their own marriage market, which is comparable to the 59% found by Bertrand *et al.* (2015).

[18] We distinguish 13 industries based on *Klassifikation der Wirtschaftszweige* (WZ 93) displayed in Table 2.A.4.

[19] Note that the predicted wage does not vary by marriage market (year, state, education and age) but only by year, state and education.

Figure 2.5: Industry composition by gender and region in 1995 and 1996



Notes: Industry composition by gender and region in 1995 and 1996 based on the classification in Table 2.A.4. Based on persons aged 18-64 with non-missing information on the relevant variables.
Source: Own calculations based on Micro Census 1995/96.

of task-biased technological change, non-routine tasks are not easy to replace by modern technology and benefit from above-average wage growth. For Germany, Black and Spitz-Oener (2010) show that men and women were differentially affected by these adjustments. As women are over-represented in non-routine analytical and interactive tasks, task-biased technological change benefited women, which eventually supported the catching-up of female wages. In order to capture this variation, we identify the main task per occupation code KLDB 1988 using the *Qualification and Career Survey* carried out by the German Federal Institute for Vocational Training (Bundesinstitut für Berufsbildung, BIBB, compare Jansen and Dostal, 2015). The dataset includes information on the activities regularly performed by employees on the job. We use data from the survey carried out in 1998 and 1999 which covers 30,000 respondents. In line with Black and Spitz-Oener (2010), we assign each activity to one of five categories (non-routine analytical, non-routine interactive, routine cognitive, routine manual, and non-routine manual) as defined in Table 2.A.5 and calculate the main task of each occupation. This classification is then added to both the German Micro Census and the SIAB data which enables the construction of industry-task cells.

We visualize how the distribution of main tasks varies by gender within the 13 industries in Figure 2.A.1 in the Appendix. For women, the share of non-routine interactive tasks is substantially higher.

This alone, however, does not make our approach superior to using industry variation alone. We additionally require that wage growth varies within industries by task. In Figure 2.A.2 we show how wage growth differs by tasks within industries. Overall, non-routine analytical tasks experience the largest wage growth. Hence, we exploit wage shifts by task t within industries j and also consider the initial industry-task employment compositions.[20] The potential wage is then given as:

$$\hat{w}_{esgy} = \sum_{j} \frac{E_{jesg,y^0}}{E_{esg,y^0}} \times \sum_{t} \frac{E_{tjesg,y^0}}{E_{jesg,y^0}} \times w_{tjy,-s} \tag{2.3}$$

While the first sum captures the *between-industry exposure*, the second sum captures the *within-industry exposure* generated through differences in the task composition within industries in the base year.

We choose a base year y_0 that is sufficiently distant to our estimation period 2005 to 2016, but which is also not too close to the drastic economic restructuring after German reunification. We therefore pool the years 1995 and 1996 of the German Micro Census to calculate gender-specific industry and industry-task distributions per state s and educational group e. We restrict the data to individuals who are aged 18 to 64 and have valid information on industry, occupation and working hours. The final sample for the computation of the employment shares consists of 531,913 individuals. The main advantage of this dataset is that the Micro Census includes civil servants and the self-employed, and contains reliable information on the highest educational degree. For the wage shifts per industry and occupation task we use the years 2005 to 2016 in the SIAB dataset. We focus on employees in the main working age of 18 to 64 years who work full-time and who are not in a traineeship, marginally employed or (partially) retired.[21] For the full sample period we have 18,614,009 person observations to construct the wage shifts in the 845 industry-task-year cells. The wage shifts are the national average excluding the state in which the individual resides $w_{jy,-s}$. This alleviates concerns of finite sample bias which arises if one included the own local observations (Goldsmith-Pinkham *et al.*, 2020).

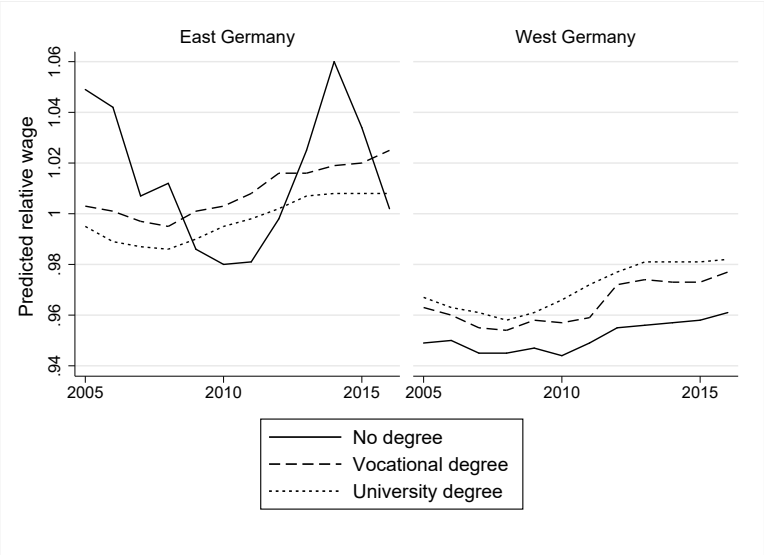
We plot the resulting predicted relative wage $\hat{w}_{esgy}$ in Figure 2.6 by region and educational group for the estimation period (2005-2016). The overall pattern follows the upward trend of the observed relative wage given in Figure 2.2. As we are only considering a part of the total variation in male and female wages, the predicted relative wage is higher than the observed relative wage and close to one, particularly in East Germany. Given the small sample of low-educated individuals in the East, the trend is less stable for this group. Overall, the correlation between the predicted and the observed female wage amounts to 83%, for the male wage to 70%, and for the relative wage to 50%.

In our set-up, the variation in the shift-share wages comes from the industry-task employment shares by gender, region, and education. Interacted with national wage shifts, this generates a differential exposure to a common shock. In line with Goldsmith-Pinkham *et al.* (2020), we need to ask

[20] Shenhav (2021) expanded the original approach by Bertrand *et al.* (2015) and included occupations within industries as an additional layer. We argue, that for Germany there is significant overlap between the broad industry and occupation categories, so we focus on the main tasks performed per occupation within industry instead.

[21] Given that we use the daily wages of full-time workers we additionally impose the restriction of a daily nominal wage of more than 20 Euros to reduce measurement error (in prices of 2015).

Figure 2.6: Predicted relative wage



Notes: This figure plots the predicted relative wage based on eq. (2.3) separately by region and education group.
Source: Own calculations based on Micro Census 1995/96, SIAB 2005–2016 and BIBB 1998/99.

whether the underlying assumption - *differential exposure leads to differential changes in the outcome* - is valid in our setting. Goldsmith-Pinkham *et al.* (2020) make several suggestions on how to increase the credibility of the research design. First, one can assess whether the employment shares correlate with other variables in the base year which could affect the outcomes directly, and irrespective of the shifts. In Table 2.A.6 we analyze the correlation of the industry-task shares with the share of persons with German citizenship, the share of individuals living in urban districts, and the female share per education-state-cell. All three factors are potentially correlated with partnership and employment outcomes. We focus on the largest industry-task combinations of men and women. We find that there is a correlation between the characteristics and the shares in all industry-task combinations. We account for this potential bias in a robustness check by controlling for all three variables as well as regional child care coverage rates in our regressions and report results in Table 2.A.7. Overall, results are unchanged, though point estimates become a little smaller. The second assumption is that the wage shifts are common for the whole country, with differential effects depending on the exposure. In our baseline specification, we construct national wage shifts. However, one could also argue that these shifts differ between East and West Germany. We investigate this argumentation in Table 2.A.7 and estimate region-specific wage shifts. Results are unchanged.

2.4.3 Estimation strategy

We want to investigate how the relative female wage impacts the marital status, employment, and household specialization differently in East and West Germany. Yet, our estimation strategy does

not exploit the German separation as a natural experiment.[22] Instead we identify differential local treatment effects of the relative wage in two regions which differ with respect to the degree of gender equality in the labor market and potentially with respect to gender role attitudes.

We collapse the Micro Census data on the level of the marriage market μ, i.e., by state s, education level e, age group a, and year y. We obtain 1,296 cells with an average size of 809 individuals.[23] We then regress outcome Y_μ on the relative potential wage $\widehat{RPW_{esgy}}$. In order to make sure that our estimates are not falsely capturing marriage market differences, we control for a number of fixed effects, i.e., for the federal state (γ_s), the age group (δ_a), and the level of education (ε_e). The education and age group fixed effects are allowed to vary by East-West-region. We further account for differential time trends by state (ζ_{sy}), age group (η_{ay}) and education (θ_{ey}). We estimate the following equation using Ordinary Least Squares:

$$Y_\mu = \beta\ \widehat{RPW_{esgy}} * East_\mu + \gamma_s + \delta_a * East_\mu + \varepsilon_e * East_\mu + \zeta_{sy} + \eta_{ay} + \theta_{ey} + X_{\mu y} + \upsilon_\mu \tag{2.4}$$

As we are interested in the differential effect of the relative wage potential in East and West Germany, we estimate separate effects by interacting $\widehat{RPW_{esgy}}$ with an East-West-indicator. The coefficient of interest β measures the effect of an increase of the relative potential wage by one percentage point (pp) in East and West Germany, respectively. All regressions are weighted by the population (cell) size of the respective marriage market.

Our outcomes of interest can be grouped into three main categories: (1) marital-status outcomes, (2) employment outcomes and (3) within-couple employment differences. For all outcomes, we take the female perspective.

2.5 RESULTS

2.5.1 Marital status

We begin by estimating eq. (2.4) for two marital status outcomes – living together with a partner in the same household (partnership) and living together while being married – and report the results in Table 2.2. Overall, we do not find a significant relationship between the relative potential wage and the marital status. Thus, contrary to our predictions we do not find a negative effect of a rising relative wage on partnership formation. The zero effects suggest that this channel is not relevant in the

[22] A number of papers exploit the German division as a natural experiment, e.g. Bauernschuster and Rainer (2012), Alesina and Fuchs-Schündeln (2007) or Lippmann *et al.* (2020). Recently, there has been some debate regarding the exogeneity of the German separation. Becker *et al.* (2020) raise concerns that the exact drawing of the border was not random, so that both regions differed well before the second world war, be it in terms of economic sectors, gender roles, or voting patterns, and were also differently affected by war destruction.

[23] We import the Micro Census data into the data environment of the Institute for Employment Research (IAB). Their data protection legislation prohibits the import of cells with a size smaller than three. As a result, we cannot import the total of 1,404 cells, but need to set roughly 100 cells to missing. As these marriage markets are small, the impact on the estimates should be limited, but may be particularly large for low-educated marriage markets.

German case (anymore). However, we show in our heterogeneity analysis by age in Section 2.6 that a higher relative wage significantly reduces the marriage probability of young women.

Table 2.2: Marriage outcomes

	Cohabiting / married	Married
Rel. Potential Wage × West	0.0033	0.0030
	(0.0033)	(0.0023)
Rel. Potential Wage × East	0.0015	-0.0009
	(0.0013)	(0.0016)
R2 adj.	0.94	0.96
N	1267	1267
Mean West	0.70	0.60
Mean East	0.70	0.53

Notes: Regressions based on eq. (2.4). The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.*

2.5.2 Employment

Next, we turn to the effect of the relative wage on the employment behaviour of *all* women in a marriage market, i.e., of partnered as well as single women. The employment of all women can be affected through two main channels: 1) the direct effect of the relative wage, which should raise the work incentives on the extensive and intensive margin, and 2) the indirect effect through marriage. The latter would imply that a decreasing rate of marriage for women in a market with a high relative wage increases female labor supply, because more single women are now available to work full-time. As we do not find evidence for a decrease of marriage, the main effect should work through the increased work incentives of partnered women. The outcome of interest on the extensive margin is an indicator for employment. On the intensive margin, we consider an indicator for full-time employment and the number of hours worked[24], for all women and conditional on being employed. Results are reported in Table 2.3.

We find substantial positive labor supply effects in West Germany, both on the extensive and on the intensive margin. A 1 pp increase in the relative wage increases the employment probability by 0.8 pp. On average, the share of women working full-time increases by 0.8 pp and the number of hours by 0.26 hours per week. Conditional on employment, effects are slightly smaller, as we abstract from extensive margin effects. Compared to these effects, the effect size is notably smaller in East Germany. There are no effects on employment. Conditional on employment, an increase in the relative wage by

[24] We measure working hours as the contractually agreed work hours.

Table 2.3: Female employment outcomes

		All		Cond. on employment	
	Employed	Full-time	Hours	Full-time	Hours
Rel. Potential Wage × West	0.008***	0.0079***	0.2567**	0.0061**	0.0860
	(0.0021)	(0.0030)	(0.1037)	(0.0028)	(0.0757)
Rel. Potential Wage × East	0.0004	0.0024**	0.0455	0.0028**	0.0414
	(0.0011)	(0.0012)	(0.0452)	(0.0013)	(0.0346)
R2 adj.	0.92	0.91	0.91	0.93	0.91
N	1291	1291	1291	1291	1291
Mean West	0.75	0.44	22.34	0.58	29.64
Mean East	0.78	0.63	26.78	0.81	34.35

Notes: Regressions based on eq. (2.4). The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.*

1 pp increases the share of women working full-time by 0.28 pp, which corresponds to an even smaller relative increase than in the West given the higher baseline.

In order to investigate which women are more responsive, we next focus on the employment behaviour of women who are in a partnership in Table 2.4. Overall, we find that the employment effects are larger when conditioning on living with a partner in the same household. Particularly in West Germany this is plausible, because the average employment rates and working hours are lower for women who are in a partnership than for single women. It also aligns well with the theoretical prediction that the relative wage impacts the employment decision of married women, but not necessarily the employment decision of single women, who should already be in (full-time) employment.

2.5.3 Employment differences within partnerships

Finally, we want to understand whether household specialization patterns in couples adjust to changes in the relative wage. Therefore, we look at the combined effects on female employment and the employment decision of the male partner. In the first column of Table 2.5, we find no significant effect on working hours of the male partner, though, interestingly, the point estimate is positive in the West and negative in the East. Since we do not find a significant effect on male employment but positive effects on female employment, we investigate whether this translates into a lower probability that the male partner works more hours. Indeed, we find that in West Germany it reduces the probability that the man works more once we condition on female employment, but not for all women. At the same time, it closes the within-couple difference in market work hours by roughly 0.3 hours in West Germany, thus reducing the gap by almost 2%. In East Germany we only find a significantly negative effect on the within-couple gap in working hours for all women. The effects are overall much smaller,

Table 2.4: Employment outcomes of partnered women

		All		Cond. on employment	
	Employed	Full-time	Hours	Full-time	Hours
Rel. Potential Wage × West	0.0102***	0.0113***	0.4023***	0.0105***	0.2232***
	(0.0023)	(0.0026)	(0.0947)	(0.0026)	(0.0684)
Rel. Potential Wage × East	0.0004	0.0024*	0.0414	0.0019	0.0179
	(0.0015)	(0.0015)	(0.0559)	(0.0016)	(0.0436)
R2 adj.	0.91	0.93	0.92	0.94	0.93
N	1249	1249	1249	1249	1249
Mean West	0.73	0.36	20.28	0.49	27.39
Mean East	0.81	0.65	27.81	0.80	34.32

*Notes: Regressions based on eq. (2.4) for all women who live with their partner in the same household. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

which is again plausible as the degree of gender equality in East German households is already much higher.

Table 2.5: Employment differences within partnerships

		All		Cond. on employment	
	Male hours	Man works more	Hours diff.	Man works more	Hours diff.
Rel. Potential Wage × West	0.0818	0.0005	-0.3206***	-0.0038**	-0.3495***
	(0.0604)	(0.0016)	(0.0902)	(0.0018)	(0.0791)
Rel. Potential Wage × East	-0.0891	-0.0016	-0.1115**	-0.0001	0.0504
	(0.0574)	(0.0012)	(0.0563)	(0.0015)	(0.0525)
R2 adj.	0.90	0.90	0.89	0.90	0.91
N	1296	1293	1296	1288	1296
Mean West	38.01	0.74	17.74	0.74	14.44
Mean East	35.85	0.55	8.04	0.56	6.66

*Notes: Regressions based on eq. (2.4) for all women who live with their partner in the same household. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The indicator variable "man works more" equals 1 if the male works strictly more market hours than the woman. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

2.5.4 Robustness

We conduct multiple robustness checks to support the validity of our empirical approach and report results in Table 2.A.7 in the Appendix. First, we account for the clustering structure on the state level and calculate *p-values* using wild-cluster bootstrapping procedures to account for the small number of clusters (Cameron *et al.*, 2008). Next, we construct region-specific wage shifts to account for differences in the wage structure between East and West Germany. While this may increase the correlation between the observed and the predicted wage, it may also result in a less exogenous wage measure. Third, we account for the introduction of the minimum wage in 2015 and drop the years 2015 and 2016 from our analysis. The introduction of the minimum wage impacted various demographic groups and industry sectors differently (Dustmann *et al.*, 2022). Thereby, the wage shifts per industry and occupation task may be biased in the years 2015 and 2016 and would not reflect demand driven wage changes anymore. In addition to that, we investigate whether the inclusion of time-varying local marriage market control variables – the share of females per marriage market, the share of individuals living in urban districts, the share of German nationals, and the availability of public child care – affects our estimation. Lastly, we test whether the inclusion of the lagged relative wage, and the contemporary and lagged mean female wage affects our coefficients of interest. This might be the case if the absolute rather than the relative wage would be the relevant determinant. The estimations show that our results are robust to the various sensitivity checks.

Another concern of our shift-share estimation strategy is reverse causation, which could occur if the employment shares are correlated with unobserved trends in partnership formation or female employment. To empirically test this channel, we follow Autor *et al.* (2013) and Shenhav (2021), and investigate whether future growth of the relative wage predicts changes in the outcomes in the past. Specifically, we test for a significant effect of changes of the relative wage in 2005, 2010, and 2015 on the first-difference of the outcomes from 1995 to 1996. Results in Table 2.A.8 provide no evidence for statistically significant reverse causation. Moreover, the estimates exhibit no clear pattern.

2.6 DISCUSSION

Our results provide robust evidence that the effect of an increasing female relative wage on partnership and employment depends on the level of gender equality by which a labor market is initially characterised. These conclusions, however, rest on a number of assumptions which we discuss in more detail in this section.

Our identification strategy argues that the main difference in gender inequality within Germany is determined by the East-West divide, so that the estimated heterogeneous effects measure responses to a rising relative wage depending on different initial levels of gender equality. This systematic East-West difference in gender equality is supported by a substantially lower level of the relative wage in 2005 in the West (see Figures 2.2 and 2.6). Others systematic factors which support a significant East-West divide are the differences in female employment patterns or in gender norms. However, one

could argue that the "true" divide between labor markets with high and low gender equality is merely defined by the female-to-male wage ratio. Therefore, we alternatively assign the group status based on the predicted relative wage in the year 2005. Hereto, we split our sample at the nationwide 75th percentile[25] of the wage distribution and estimate heterogeneous effects. Again we find that effects are substantially larger in marriage markets with a relatively low relative female wage (compare Table 2.A.9 in the Appendix). However, this approach has some drawbacks. First, *none* of the local marriage markets in East Germany has a relative wage below the 75th percentile, while less than 10% of West German markets lie above the 75th percentile. Hence, the distinction between markets with low and with high gender equality is again essentially an East-West divide. Secondly, using this definition results in a different composition of the two groups by education. For instance, in West Germany all low-educated marriage markets lie below the 75th percentile. Hence, the effect of a higher degree of gender equality is only estimated on middle and highly educated West German markets (and all East German markets). On the contrary, when we use the East-West distinction we have a balanced educational composition of marriage markets. We therefore believe that our East-West distinction provides a cleaner analysis, and that our effects are easier to interpret.

As already pointed out, East and West Germany differ on multiple dimensions, and particularly in terms of gender role attitudes (Bauernschuster and Rainer, 2012; Lippmann *et al.*, 2020). In the model outlined in Section 2.2, gender norms matter most for traditional men, who may experience some discomfort with a wife working (long hours). In that case they benefit less from their partner's labor income. Particularly if the female partner outearns the man, traditional gender norms may become important. Bertrand *et al.* (2015) and Bittman *et al.* (2003) show that this can result in lower female employment and / or higher female housework investments. Recently, Lippmann *et al.* (2020) demonstrated that once the wife earns more, she reduces her labor supply in order to comply with the *male breadwinner norm* in West German couples, but not in East German relationships. Given that this norm channel is present in West Germany, it should *dampen* the positive effects of a rising relative wage on female employment. Thus, our results in West Germany should be interpreted as representing a lower bound estimate, so that the pure relative wage effect would be even larger in the West in the absence of norms. Overall, this only strengthens our findings.

One of the most important determinants of female labor supply is fertility. Female and male employment patterns and earnings diverge primarily after the birth of the first child (Kleven *et al.*, 2019; Jessen, 2021). Economically, the decision to have children is linked to female employment opportunities as higher female wages increase the opportunity costs of having children (Feyrer *et al.*, 2008; Galor and Weil, 1996). We investigate the effects of the relative wage on fertility in Table 2.A.10. We find no significant effects on the probability to be living together with a child up to age six and up to age 18 nor on the total number of children. Point estimates, however, are negative in West Germany. But even in the absence of direct fertility effects it is plausible that mothers are more responsive to changes in their relative earnings opportunities, particularly given their low baseline employment.

[25] This definition corresponds roughly to the share of the East German population in Germany.

Childless women, on the other hand, are less restricted in their labor supply and thus likely to have already adjusted to their individual maximum. To investigate whether the relative wage is more or less relevant in the presence of children, we perform a heterogeneity analysis in Table 2.A.11. The results support the hypothesis that mothers are more responsive to changes in the relative wage. In fact, for childless women the relative wage appears to play no role at all. Hence, the significant positive effects of an increasing relative wage are driven almost entirely by mothers. In this context, constraints on the supply of public child care may also limit mothers' ability to adjust their labor supply. The robustness check in Table 2.A.7 shows, however, that the inclusion of regional child care coverage does not affect the estimated coefficients.

A limitation of our approach is that it relies on variation from the *current* relative wage. Yet, it is likely that the relative wage affects women differently at various stages of their life. We hypothesize that younger women respond more strongly to changes in the current relative wage. Choices made at a younger age regarding partnership, fertility, employment and household specialization, may have already created a path dependency. For instance, if a woman accumulated more or less (full-time) work experience, this affects her later career prospects. Therefore, even if the contemporary relative potential wage increases, it may have a smaller effect on older women who already made life-defining choices at an earlier stage of their life. Therefore, we carry out an heterogeneity analysis by age group (compare Table 2.A.12 in the Appendix). We find that the probability to be in a cohabiting or married partnership indeed decreases with a higher relative wage for young West German women. This is in line with our theoretical predictions. Only for older West German women the effect becomes positive. This may be explained through the described path dependency as well as through the lower variation of partnership rates at a higher age. For female employment, we find that the strong positive effects on employment and working hours in West Germany are driven primarily by young women. Also the negative effect on within-couple gaps stems mainly from young women, for whom the within-couple gap in working hours decreases by more than one hour. This effect is particularly large given the comparably low within-couple gap at this age. All effects decrease with age and eventually disappear altogether. Also in East Germany, the relative wage appears to be a significant determinant of partnership and employment only when women are still young. Above the age of 30 it hardly plays any role.

For older women the relative wage at an earlier stage of their life, for example ten or 20 years earlier or at age 25, may matter more for the behaviour. One solution would be to estimate the effect of the *lagged* instead of the current wage. Yet, this poses the question at which age the relative wage should be considered. Over cohorts, the age at first marriage rose. Hence, we may not be able to pinpoint the relevant time frame. Moreover, data constraints make it unfeasible for us to include long lags. Our Bartik instrument uses the years 1995 and 1996 as a base period since these years have first, an adequate distance to reunification in 1990, and are secondly, ten years away from our estimation period staring in 2005. Hence, it is not possible to lag wages adequately, particularly for the oldest age group. Nevertheless, in our robustness analysis we include in addition to the current relative wage

also the relative wage lagged by five years and show that our coefficients of interest remain robust (compare Table 2.A.7). We believe that a closer investigation would generate relevant insights, but leave this task to future research.

2.7 CONCLUSION

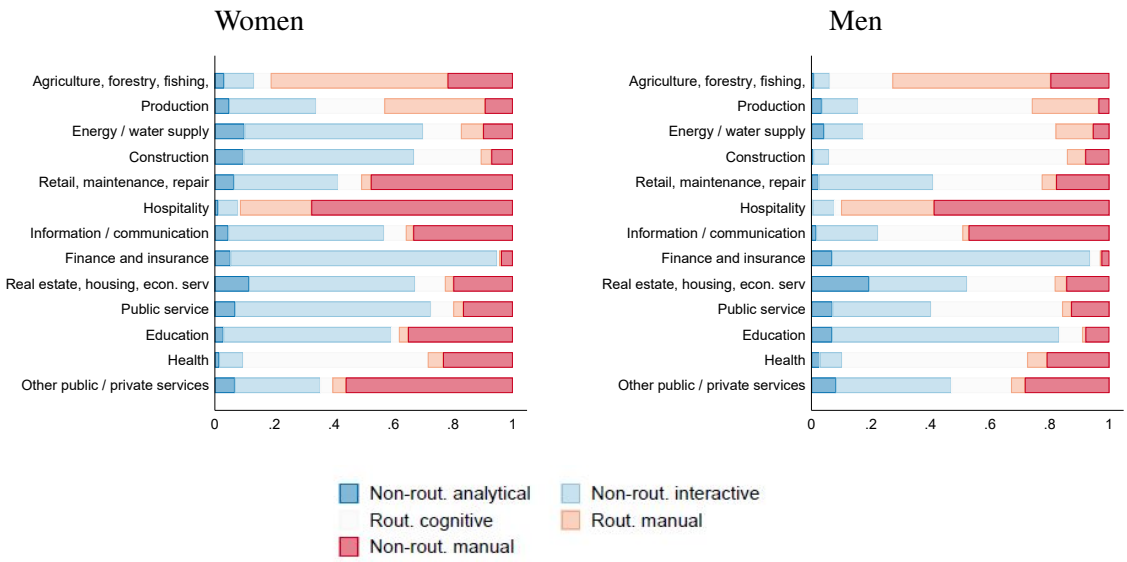
Over the past decades, female employment outcomes have improved and gender gaps in terms of earnings and employment narrowed. However, the convergence seems to have stalled, despite technological advances which tend to favor the skill set of women (Goldin and Katz, 2002). In this paper we analyze the effect of a higher relative female-to-male wage in two different gender inequality contexts, namely in East and West Germany.

We find that the relationship between the relative wage and household specialization is non-linear. While a higher relative wage increases female labor supply and reduces household specialization in less gender-equal labor markets, the effect is substantially smaller in more gender-equal settings. In West Germany, a 1 pp increase in the relative female wage increases female full-time employment by 0.8 pp and female working hours by 0.26 hours, while the within couple hours gap falls by 0.32 hours. In the East, the absolute effect size amounts, on average, to one third of the West-German effect and is often insignificant. We also show that the strong positive female employment effects are almost entirely driven by partnered women with children, especially at a young age. Our simple theoretical model shows that these results align well with the economic theory of the family (Becker, 1973, 1981).

Our results provide evidence why female labor supply elasticities may have fallen over time as gender equality has risen (Heim, 2007; Blau and Kahn, 2007). This is particularly relevant for public policy aiming to improve female labor market outcomes with tax incentives, as effects may be limited. Providing child care facilities at a low cost and more flexibility at the workplace may be more successful alternatives in achieving gender equality.

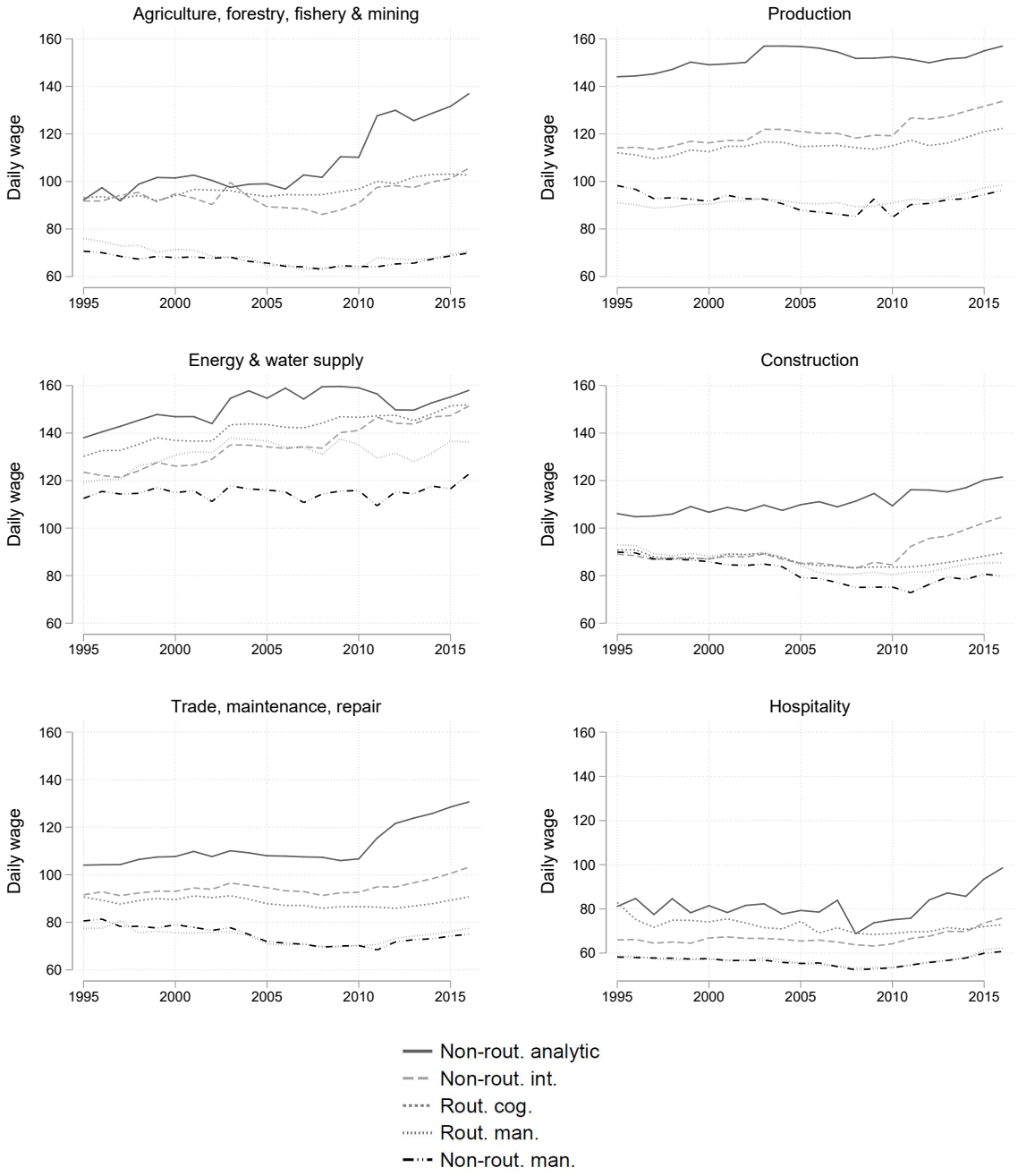
2.A APPENDIX

Figure 2.A.1: Task composition within industries in 1995 and 1996



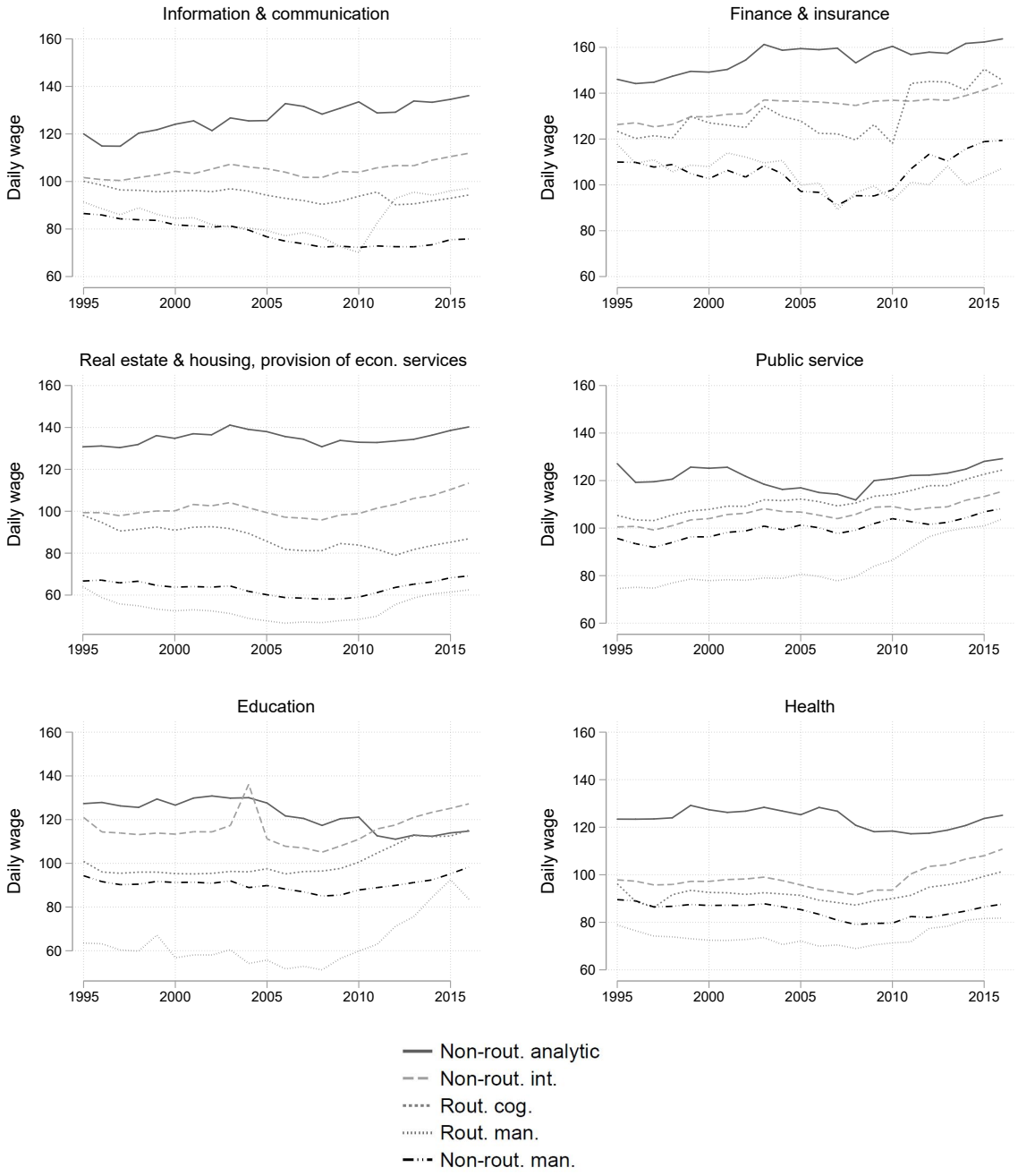
Notes: Main task composition within industries by gender in 1995 and 1996.
Source: Own calculations based on Micro Census 1995/96 and BIBB 1998/99.

Figure 2.A.2: Wage growth by industry-task combination



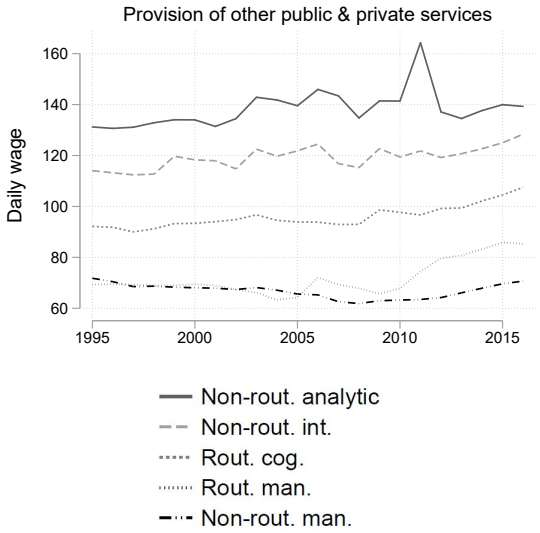
Notes: This figure plots the average observed wage by task within industries. In prices of 2015.
Source: Own calculations based on SIAB 1995–2016 and BIBB 1998/99.

Wage growth by industry-task combination cont.



Notes: This figure plots the average observed wage by task within industries. In prices of 2015.
Source: Own calculations based on SIAB 1995–2016 and BIBB 1998/99.

Wage growth by industry-task combination cont.



Notes: This figure plots the average observed wage by task within industries. In prices of 2015.
Source: Own calculations based on SIAB 1995–2016 and BIBB 1998/99.

Table 2.A.1: Marital surplus by female market productivity

Women with low market productivity $w_f \leq \beta$, i.e. household specialization	
Female marital surplus	$-w_f + w_m + \beta \log h(1) + q_f$
Male marital surplus	$\beta \log h(1) + q_m$
Women with moderate market productivity $w_f > \beta$, i.e. part-time work	
Female marital surplus	$\left(-\frac{\beta}{w_f}\right) w_f + w_m + \beta \log h\left(\frac{\beta}{w_f}\right) + q_f$
Male marital surplus	$\alpha_m \left(1 - \frac{\beta}{w_f}\right) w_f + \beta \log h\left(\frac{\beta}{w_f}\right) + q_m$
Women with high market productivity $\frac{w_f}{w_m} \to 1$, i.e. full-time work	
Female marital surplus	$w_m + q_f$
Male marital surplus	$\alpha_m w_f + q_m$

Notes: The marital surplus is defined as $V_i\left(w_m, w_f, q_m\right) - V_i^{sgl}$.

Table 2.A.2: Reaction of the marital surpluses to a rising female wage

*Women with low market productivity, i.e. household specialization**	
Female marital surplus	$\frac{d\,(-w_f + w_m + \beta \log h(1))}{d\,w_f} = -1$
Male marital surplus	$\frac{d\,(\beta \log h(1) + q_m)}{d\,w_f} = 0$
Women with moderate market productivity, i.e. part-time work	
Female marital surplus	$\frac{d\left((-\frac{\beta}{w_f}) w_f + w_m + \beta \log h(\frac{\beta}{w_f}) + q_f\right)}{d\,w_f} = -\frac{\beta^2}{w_f^2} \frac{h'(\frac{\beta}{w_f})}{h(\frac{\beta}{w_f})} < 0$
Male marital surplus	$\frac{d\left(\left(1 - \frac{\beta}{w_f}\right) w_f + \beta \log h(\frac{\beta}{w_f}) + q_m\right)}{d\,w_f} = \alpha_m - \frac{\beta^2}{w_f^2} \frac{h'(\frac{\beta}{w_f})}{h(\frac{\beta}{w_f})} > 0$
Women with high market productivity, i.e. full-time work	
Female marital surplus	$\frac{d\,(w_m + q_f)}{d\,w_f} = 0$
Male marital surplus	$\frac{d\,(w_f + q_m)}{d\,w_f} = \alpha_m$

*Notes: We assume that male wages stay constant. *We assume that for the low market productivity wife $\beta > w_f$ still holds.*

Table 2.A.3: Descriptive statistics

	Mean	s.d.
All women		
Age in years	37.79	8.67
No tertiary degree	0.15	0.35
Vocational degree	0.69	0.46
Academic degree	0.16	0.37
Married/cohabiting	0.68	0.47
Married	0.56	0.50
Cohabiting	0.12	0.33
Employed	0.76	0.43
Number of hours working (normally)	23.23	17.05
Fulltime (>= 30 hours)	0.47	0.50
Child up to age 6 in hh	0.22	0.41
Child up to age 18 in hh	0.49	0.50
East Germany	0.20	0.40
N	1,141,679	
Partnered women		
Age in years	39.25	7.91
No tertiary degree	0.15	0.35
Vocational degree	0.70	0.46
Academic degree	0.16	0.36
Employed	0.75	0.43
Number of hours working (normally)	21.67	16.57
Fulltime (>= 30 hours)	0.41	0.49
Child up to age 6 in hh	0.29	0.45
Child up to age 18 in hh	0.61	0.49
East Germany	0.19	0.39
N	749,542	
Male partners		
Age in years	42.47	8.88
No tertiary degree	0.11	0.31
Vocational degree	0.69	0.46
Academic degree	0.20	0.40
Employed	0.91	0.29
Number of hours working (normally)	37.67	14.84
Fulltime (>= 30 hours)	0.87	0.34
N	749,542	

Notes: The sample includes women between 22-51 years and with non-missing information on the relevant variables. The sample of partnered women and their male partners additionally requires full information on all relevant partner variables. The means of the binary variables refer to the shares.
Source: Own calculations based on Micro Census 2005–2016.

Table 2.A.4: Definition of industries

Industry name	WZ 93 code
Agriculture, forestry, fishery & mining	011-051, 101-145
Production	151-372
Energy & water supply	401-410
Construction	451-455
Trade, maintenance, repair	501-527
Hospitality	551-555
Information & communication	601-642
Finance & insurance	651-672
Real estate & housing, provision of economic services	701-748
Public service	751-753, 990
Education	801-804
Health	851-853
Provision of other public & private services	900-930, 950

Notes: Industry classification based on Klassifikation der Wirtschaftszweige 93 (WZ 93).

Table 2.A.5: Definition of tasks

Task measure	Activities
Non-routine analytical	Researching, analyzing, designing, sketching
Non-routine interactive	Negotiating, lobbying, coordinating, organising, teaching, training, selling, buying, advising customers, advertising
Routine cognitive	Calculating, bookkeeping, measuring length/weight/temperature
Routine manual	Operating or controlling machines, equipping machines
Non-routine manual	Repairing or renovating houses/machines/vehicles, restoring art/monuments, serving or accommodating

Notes: Task classification following Black and Spitz-Oener (2010) based on the Qualification and Career Survey.

Table 2.A.6: Correlation between industry-task shares and characteristics

	Female top 5 industry-task combinations				
	Educ. / non-rout. int.	Health / rout. cog.	Public / non-rout. int.	Trade / non-rout. man.	Prod. / rout. man.
German	0.05***	0.10***	0.06***	0.09***	0.07***
	(0.02)	(0.00)	(0.00)	(0.01)	(0.01)
Urban	0.09***	0.16***	0.10***	0.15***	0.11***
	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)
Female share	0.08**	0.17***	0.11***	0.17***	0.15***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
N	39	39	39	38	33
	Male top 5 industry-task combinations				
	Prod. / rout. cog.	Constr. / rout. cog.	Prod. / rout. man.	Educ. / non-rout. int.	Public / non-rout. int.
German	0.19***	0.13***	0.08***	0.02***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Urban	0.28***	0.21***	0.13***	0.04**	0.06***
	(0.04)	(0.02)	(0.02)	(0.01)	(0.01)
Female share	0.35***	0.23***	0.16***	0.03**	0.06***
	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)
N	39	39	38	35	39

Notes: This table reports the correlation between the shares of different industry-task combinations in 1995 and 1996 with other characteristics in the same years. German: share with German citizenship, Urban: share district size $>= 100,000$ *inhabitants.* * $p <$ 0.10, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on Micro Census 1995/96 and BIBB 1998/99.

Table 2.A.7: Robustness checks

	Marriage		Employment					Household specialization				
				All		Cond. on employment			All		Cond. on employment	
	Partnership	Married	Employed	Full-time	Hours	Full-time	Hours	Male hours	Man works more	Hours diff.	Man works more	Hours diff.
Baseline												
Rel. pot. wage × West	0.0033	0.003	0.008***	0.0079***	0.2567**	0.0061**	0.086	0.0818	0.0005	-0.3206***	-0.0038**	-0.3495***
	(0.0021)	(0.0023)	(0.0021)	(0.003)	(0.1037)	(0.0028)	(0.0757)	(0.0604)	(0.0016)	(0.0902)	(0.0018)	(0.0791)
Rel. pot. wage × East	0.0015	-0.0009	0.0004	0.0024**	0.0455	0.0028**	0.0414	-0.0891	-0.0016	-0.1115**	-0.0001	0.0504
	(0.0013)	(0.0016)	(0.0011)	(0.0012)	(0.0452)	(0.0013)	(0.0346)	(0.0574)	(0.0012)	(0.0563)	(0.0015)	(0.0525)
P-value wild-cluster bootstrap on the state level												
Rel. pot. wage × West	0.0033	0.003	0.008	0.0079***	0.2567***	0.0061***	0.086***	0.0818	0.0005	-0.3206**	-0.0038	-0.3495***
P-value	0.3203	0.6927	0.1251	0.0040	0.0060	0.0090	0.0070	0.4144	0.8248	0.0160	0.1331	0.0040
Rel. pot. wage × East	0.0015	-0.0009	0.0004**	0.0024**	0.0455 **	0.0028**	0.0414**	-0.0891	-0.0016	-0.1115	-0.0001	0.0504
P-value	0.2733	0.5606	0.0300	0.0210	0.0260	0.0280	0.0260	0.3734	0.3664	0.3814	0.9419	0.6386
Predicted wage based on East- / West-specific wage shifts												
Rel. pot. wage × West	0.0031	0.0028	0.009***	0.0082***	0.2631**	0.0065**	0.0797	0.1038*	0.0009	-0.3202***	-0.0045**	-0.3862***
	(0.0022)	(0.0025)	(0.0023)	(0.0032)	(0.1122)	(0.0029)	(0.081)	(0.0628)	(0.0017)	(0.0967)	(0.002)	(0.0846)
Rel. pot. wage × East	0.0015	-0.0003	0.0008	0.0021**	0.0546	0.0022**	0.0409	-0.0544	-0.0008	-0.091*	0.0005	0.0537
	(0.001)	(0.0013)	(0.0009)	(0.001)	(0.0365)	(0.001)	(0.0281)	(0.0488)	(0.001)	(0.0485)	(0.0013)	(0.0426)
Excluding 2015 / 2016 (Minimum wage introduction)												
Rel. pot. wage × West	0.0023	0.0017	0.0067***	0.0064**	0.1966*	0.005*	0.0524	0.0611	0.0011	-0.2906***	-0.0025	-0.3029***
	(0.0022)	(0.0025)	(0.0022)	(0.0031)	(0.1079)	(0.0029)	(0.0788)	(0.0595)	(0.0017)	(0.0947)	(0.0019)	(0.0821)
Rel. pot. wage × East	0.0021	0.0000	-0.0002	0.002	0.0221	0.0029**	0.0355	-0.1159*	-0.0028**	-0.1572**	-0.0005	0.0726
	(0.0014)	(0.0017)	(0.0013)	(0.0014)	(0.0521)	(0.0014)	(0.0384)	(0.0614)	(0.0013)	(0.0637)	(0.0018)	(0.0619)

Notes: Regressions based on eq. (2.4). The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Robustness checks cont.

	Marriage		Employment					Household specialization				
				All		Cond. on employment			All		Cond. on employment	
	Partnership	Married	Employed	Full-time	Hours	Full-time	Hours	Male hours	Man works more	Hours diff.	Man works more	Hours diff.
Controlling for urban, German citizenship, female share, child care coverage												
Rel. pot. wage × West	0.003	0.0028	0.0103***	0.0095***	0.009***	0.3335***	0.1641**	0.284***	0.0058***	-0.0755	-0.0008	-0.2243***
	(0.0022)	(0.0022)	(0.002)	(0.0028)	(0.0027)	(0.0964)	(0.0751)	(0.0659)	(0.0017)	(0.0889)	(0.0018)	(0.0762)
Rel. pot. wage × East	0.0012	-0.0013	0.0016	0.0033**	0.0029	0.0895	0.0606	-0.0998	-0.002	-0.1742**	-0.0006	0.0439
	(0.0015)	(0.0019)	(0.0014)	(0.0016)	(0.0015)	(0.0581)	(0.0401)	(0.0657)	(0.0015)	(0.0695)	(0.0019)	(0.0643)
Controlling for the lagged relative wage and the contemporary and lagged mean female wage												
Rel. pot. wage × West	0.0055	0.0051	0.0218***	0.0167***	0.0082**	0.7541***	0.2261**	0.6387***	0.006**	-0.0612	-0.0007	-0.0693
	(0.0036)	(0.0041)	(0.0033)	(0.0041)	(0.0039)	(0.1442)	(0.1011)	(0.0921)	(0.0028)	(0.156)	(0.0032)	(0.1378)
Rel. pot. wage × East	0.0012	-0.0002	0.0019	0.0029**	0.0022	0.0984**	0.0449	0.0499	0.0009	0.0117	0.0006	0.0838
	(0.0014)	(0.0018)	(0.0012)	(0.0013)	(0.0014)	(0.0493)	(0.0389)	(0.0617)	(0.0012)	(0.0573)	(0.0017)	(0.0595)

Notes: Regressions based on eq. (2.4). The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Table 2.A.8: Predictive power of future relative wage growth on earlier changes in outcomes

	Change in outcome from 1995 to 1996											
	Marriage		Employment					Household specialization				
				All		Cond. on employment			All		Cond. on employment	
	Partnership	Married	Employed	Full-time	Hours	Full-time	Hours	Male hours	Man works more	Hours diff.	Man works more	Hours diff.
Difference in relative wage 2004-2005												
Rel. pot. wage × West	-0.0062	-0.0026	0.0063	0.0104	0.0069	0.2917	0.1003	0.071	0.0059	0.0631	0.0057	0.0808
	(0.0063)	(0.0058)	(0.0084)	(0.0067)	(0.0083)	(0.2413)	(0.3087)	(0.3727)	(0.013)	(0.5909)	(0.0186)	(0.7099)
Rel. pot. wage × East	0.0083	0.0065	0.0029	0.0019	-0.0019	0.1344	0.0741	0.0205	0.0006	0.0479	-0.0033	-0.1348
	(0.0048)	(0.0048)	(0.0038)	(0.0045)	(0.0045)	(0.154)	(0.1136)	(0.1815)	(0.0065)	(0.2296)	(0.006)	(0.1316)
Difference in relative wage 2009-2010												
Rel. pot. wage × West	-0.0137	-0.0169	-0.003	0.0028	0.0127	0.1236	0.5152	0.5869	-0.0095	0.461	-0.0544**	-12696
	(0.0141)	(0.0143)	(0.017)	(0.013)	(0.016)	(0.5941)	(0.4988)	(0.652)	(0.018)	(0.7407)	(0.0257)	(0.8674)
Rel. pot. wage × East	0.0373	0.0388	-0.0047	-0.0204	-0.029	-0.9237	-1.4368**	-0.4982	0.0009	-0.7843	0.0195	0.4689
	(0.027)	(0.0269)	(0.0261)	(0.0297)	(0.0287)	(-1.0643)	(0.6015)	(0.9782)	(0.0408)	(-1.5169)	(0.0332)	(0.7729)
Difference in relative wage 2014-2015												
Rel. pot. wage × West	0.0902**	0.0928**	-0.0151	0.0402	0.0894	1.9561	4.2807**	1.6438	-0.0212	-1.6611	-0.0653	-2.5182
	(0.041)	(0.0354)	(0.0736)	(0.0619)	(0.0657)	(2.4547)	(1.9317)	(1.5217)	(0.0533)	(2.6304)	(0.0583)	(2.4181)
Rel. pot. wage × East	0.0013	-0.0002	-0.0002	-0.0013	-0.0025	-0.002	0.0151	0.0167	0.0033	0.0854	0.0021	0.0133
	(0.0023)	(0.0021)	(0.0021)	(0.0026)	(0.0026)	(0.0872)	(0.0764)	(0.1756)	(0.0046)	(0.1589)	(0.0024)	(0.0683)
N	108	108	108	108	108	108	108	108	108	108	108	108

Notes: First difference specifications described in Secton 2.5.4. The dependent variable is the difference in the outcome variable between 1995 and 1996. The explanatory variable of interest is the change in the future potential relative wage (2004-2005, 2009-2010, and 2014-2015) indicated in the panel heading. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Table 2.A.9: Heterogeneous effects by low vs. high initial wage

	Marital status		Female employment			Household specialization	
	Partnership	Married	Employed	Full-time	Hours	Man works more	Hours diff.
Rel. pot. wage × Low	0.0039*	0.0035	0.0089***	0.0088***	0.2929***	0.0016	-0.2439
	(0.0021)	(0.0025)	(0.0022)	(0.003)	(0.1051)	(0.0018)	(0.1032)
Rel. pot. wage × High	0.0009	-0.0018	-0.0011	0.0032**	0.0332	-0.0032**	-0.1924
	(0.0013)	(0.0016)	(0.0012)	(0.0016)	(0.0528)	(0.0014)	(0.0709)
R2 adj.	0,9374	0,9566	0,9168	0,9000	0,9141	0,8761	0,8625
N	1267	1267	1266	1266	1266	1265	1267

*Notes: Regressions based on eq. (2.4) for all women. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The marriage markets are assigned to low vs. high gender equality according to their potential relative wage in 2005 by being below or above the nationwide 75th percentile. The female working hours outcomes are unconditional on employment. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Table 2.A.10: Effects on fertility

	Child ≤ age 6	Child ≤ age 18	Number of children
Rel. pot. wage × West	-0.0021	-0.0033	-0.0085
	0.0036	0.0045	0.0121
Rel. pot. wage × East	-0.0016	0.0042	0.0080
	0.0021	0.0026	0.0056
R2 adj.	0.8493	0.8341	0.7360
N	1223	1223	1223

*Notes: Regressions based on eq. (2.4) for all women. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Table 2.A.11: Heterogeneous effects by fertility

	Women with children			Women without children		
	Employed	Full-time	Hours	Employed	Full-time	Hours
Rel. pot. wage × West	0.0127***	0.0126***	0.4959***	0.0021	0.0024	-0.0233
	(0.0021)	(0.0014)	(0.059)	(0.0031)	(0.0051)	(0.1839)
Rel. pot. wage × East	0.0021	0.0041***	0.0893	-0.0012	0.0012	0.0121
	(0.0013)	(0.0013)	(0.0478)	(0.0018)	(0.0021)	(0.0788)
R2 adj.	0.9551	0.966	0.9618	0.8129	0.7946	0.8076
N	1235	1235	1235	1227	1227	1227
Mean West	0.63	0.25	15.84	0.80	0.625	28.01
Mean East	0.67	0.51	22.10	0.74	0.61	26.13

Notes: Regressions based on eq. (2.4) for all women. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. Women with children live with at least one dependent child up age 18 in the same household. The female working hours outcomes are unconditional on employment. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.

Table 2.A.12: Heterogeneous effects by age

	Marital status		Female employment			Household specialization	
	Partnership	Married	Employed	Full-time	Hours	Man works more	Hours diff.
Relative potential wage × West							
Age 22-31	-0.0112***	-0.017***	0.0138***	0.0121**	0.3773**	-0.0138***	-1.1162***
	(0.0035)	(0.0037)	(0.0032)	(0.005)	(0.1714)	(0.0025)	(0.1468)
Age 32-41	0.0074***	0.0063***	0.009***	0.0116***	0.3946***	0.0003	-0.3334***
	(0.002)	(0.0022)	(0.0024)	(0.0028)	(0.1036)	(0.0017)	(0.0928)
Age 42-51	0.0102***	0.0144***	0.0031	0.002	0.0602	0.0074***	0.0636
	(0.0022)	(0.0025)	(0.0021)	(0.0027)	(0.0938)	(0.0019)	(0.0992)
Relative potential wage × East							
Age 22-31	0.0066***	0.004*	0.0032**	0.0073***	0.2169***	-0.0072***	-0.3495***
	(0.002)	(0.0023)	(0.0015)	(0.0019)	(0.0654)	(0.0018)	(0.0994)
Age 32-41	-0.004**	-0.0064***	0.001	0.004*	0.0617	-0.0004	-0.0786
	(0.0017)	(0.0021)	(0.0019)	(0.0021)	(0.0793)	(0.002)	(0.0787)
Age 42-51	-0.0009	-0.0027	-0.0038**	-0.0054**	-0.195**	0.0024	0.068
	(0.0017)	(0.0022)	(0.0019)	(0.0023)	(0.0829)	(0.0019)	(0.0953)
R2 adj.	0.94	0.96	0.92	0.91	0.91	0.91	0.90
N	1267	1267	1291	1291	1291	1293	1296
Mean West							
Age 22-31	0.51	0.34	0.70	0.52	23.34	0.71	17.63
Age 32-41	0.77	0.68	0.74	0.39	21.23	0.84	22.76
Age 42-51	0.77	0.71	0.78	0.41	22.57	0.83	21.04
Mean East							
Age 22-31	0.51	0.22	0.69	0.57	23.93	0.62	13.26
Age 32-41	0.76	0.58	0.80	0.64	27.35	0.66	12.44
Age 42-51	0.79	0.70	0.81	0.66	28.18	0.61	11.01

*Notes: Regressions based on eq. (2.4) for all women. The sample includes women aged 22 and 51 with non-missing information on the relevant variables in the years 2005-2016. The female working hours outcomes are unconditional on employment. The number of observations N refers to the number of marriage market cells. Robust standard errors in parentheses. Regressions weighted by cell size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Source: Own calculations based on Micro Census 1995/96 & 2005–2016, SIAB 2005–2016 and BIBB 1998/99.*

CHAPTER 3

Suddenly a Stay-at-home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household

This chapter (pp. 49–90) is based on joint work with **Juliane Hennecke** and has been published in *Review of Economics of the Household*, 20, 579–607, https://doi.org/10.1007/s11150-021-09582-7

CHAPTER 4

Cracking under Pressure? Gender Role Attitudes toward Maternal Employment in Times of Covid-19 in Germany

This chapter (pp. 91–118) is based on joint work with **Natalia Danzer**, **Mathias Huebener**, **C. Katharina Spieß**, **Nico A. Siegel** and **Gert G. Wagner**.

4.1 INTRODUCTION

The twenty-first century has witnessed significant increases in maternal employment in many Western societies. This progress was accompanied and facilitated by a substantial expansion of subsidized formal child care outside private homes, both in centres and licensed family daycare (from now on "daycare"). Moreover, several countries expanded all-day schooling, thus further contributing to an increase in maternal labor supply (e.g. Gambaro *et al.*, 2019). This process was accompanied by a continuous shift in societal attitudes from the traditional male breadwinner model (with fathers mainly engaging in paid work and mothers engaging in housework and child care) to attitudes favouring a more gender equal division of paid and unpaid work (e.g. Alesina *et al.*, 2013; Goldscheider *et al.*, 2015). The Covid-19 crisis and its related lockdown measures, including the closures of daycare and schools, led to a collapse of the essential care infrastructure, the main pillar enabling many families to reconcile work and family life. In most countries, the immediate adjustments led women, at least on average, to take over a larger share of the additional household work and child care than men. Jessen *et al.* (2021) find evidence for increased household specialization.[1] Moreover, studies show that employment losses were disproportionally large for women, a phenomenon now dubbed *Shecession* (Alon *et al.*, 2020, 2021). Overall, gender inequality in market work, housework and child care increased.

Beyond the short-term adjustments in employment, household work, and child care, the pandemic may also shift gender norms even after lockdown measures are removed and labor markets recovered with implications for gender inequality in the future. Gender role attitudes are part of individual identities, prescribing certain behaviour. Hence, they can significantly affect not just the economic outcomes of men and women but also the division of domestic work, both today and in the future (see Davis and Greenstein, 2009; Bertrand *et al.*, 2015; Akerlof and Kranton, 2000). However, gender role attitudes do not necessarily correspond to the actual division of domestic work. Although a deviation from one's own identity is costly, changes in gender role attitudes can shape the reallocation and division of domestic and market work (der Lippe *et al.*, 2011), contributing to modifications in the gender pay gap (Fortin, 2005). Previous research shows that the birth of a first child leads to a more traditional division of market work, housework and child care, while gender role attitudes of men and women are mostly unaffected (e.g. Wippermann and Wippermann, 2008). Nevertheless, in these cases, the reason for the change in the division of domestic and market work are individual events in the family. During the pandemic, we observe drastic changes in the care infrastructure for almost all families in Germany, which occurred suddenly and hardly any alternative care options.

This paper studies the effects of Covid-19 on gender role attitudes one year after the outbreak of the pandemic. Based on new representative data from Germany, we document gender role attitudes during the Covid-19 pandemic for individuals in households with and without dependent children.

[1] Schüller and Steinberg (2021) use variation in daycare and school openings across German states and find that while the drop in parental wellbeing is related to the overall restrictions, harmful parenting behavior increases with closures. In other countries, results are similar. Compare Sevilla and Smith (2020) for evidence from the UK and Del Boca *et al.* (2020) for evidence on Italy.

The COMPASS study is one of the few existing surveys of gender-role attitudes during the pandemic for Germany. Our main analysis is based on 7,795 individuals reporting their gender role attitudes in January and February 2021. The data also provides information on whether individuals were affected by daycare and school closures during the pandemic, on the degree to which they feel restricted by containment measures, and on the extent to which they can work from home. To assess the impact of Covid-19 on gender role attitudes, we use information on gender role attitudes *prior to the pandemic* from the General Population Survey of the Social Sciences (ALLBUS). We assess the impact of Covid-19 on gender role attitudes with before-and-after comparisons as well as difference-in-differences (DiD) methods using groups of individuals that were differentially affected by daycare and school closures (i.e., individuals with and without dependent children in the household). The comparison with an unaffected or less affected group accounts for changes in gender role attitudes that might be unrelated to the crisis, for example due to overall time trends or because different survey methods were used, as well as the general shift in gender role attitudes due to the crisis (i.e., for reasons not particular to parents). The resulting DiD estimates capture changes in gender role attitudes resulting from factors that affect parents only, principally the closures of schools and daycare centres.

Theoretically, different channels may be at work regarding the effects of Covid-19 on gender role attitudes. It is well established in the literature that institutions matter for maternal labor supply, but they also matter for gender role attitudes (e.g. Kotsadam and Finseraas, 2011; Sjöberg, 2004; Uunk, 2015).[2] With respect to daycare, Ellingsæter *et al.* (2017) show that the expansion of universal daycare with sufficient supply and low fees in Norway shifted attitudes regarding the best form of care for preschool-aged children significantly in favour of daycare services. Zoch and Schober (2018) show that the expansion of daycare for children below age three from 2005 onward made gender role attitudes of West German women more progressive.

Parental leave policies affect gender role attitudes directly in that they alter the allocation of child care time after childbirth, but also indirectly via family members and peers. For example, the introduction of parental leave explicitly devoted to fathers increased egalitarian attitudes toward female employment (e.g. Omidakhsh *et al.*, 2020; Schober, 2014; Wray, 2020). Unterhofer and Wrohlich (2017) show that it even affected the older generation of grandparents. The pandemic and related lockdown measures resulted in a significant loss of daycare and grand-parental care for many parents. With the consequential adjustments in household work and child care, they may be a primary driver of effects on gender role attitudes. This might be the case because individuals adjust their gender role attitudes toward their own lived circumstances (e.g. Bolzendahl and Myers, 2004; Corrigall and Konrad, 2007; Smith-Lovin and Tickamyer, 1978). Additionally, job losses and economic uncertainty may alter gender role attitudes on their own, with psychological reactions to non-employment varying between men and women (e.g. Forret *et al.*, 2010; Schmitt, 2012).

[2] Bauernschuster and Schlotter (2015) and Müller and Wrohlich (2020) show that the expansion of daycare slots significantly increased maternal employment in Germany. Reductions in daycare costs increased employment further on the intensive margin (Huebener *et al.*, 2020). Changes in parental leave legislation also directly impact the return to the labor market of mothers after child birth (Schönberg and Ludsteck, 2014).

We hypothesize that Covid-19 effects differ by the stability of egalitarian attitudes prior to the pandemic. Germany provides an interesting ground to test this hypothesis, because gender role attitudes differ significantly between East and West Germany for historical reasons. In West Germany, the increase in maternal employment and daycare coverage for small children has been recent and was accompanied by a significant upward trend in egalitarian gender role attitudes. In East Germany, however, gender role attitudes have been persistently more egalitarian and more stable over time, indicating a lower "attitude elasticity" (Jessen, 2021; Barth *et al.*, 2020; Bauernschuster and Rainer, 2012; Lippmann *et al.*, 2020). Thus, we would expect that egalitarian gender role attitudes are more susceptible to shocks in West Germany.

We would also expect that effects differ between women and men. The substantial increase in *paternal* egalitarian attitudes came along with increased *maternal* labor force participation and daycare availability. Fathers' own labor market participation always remained stable and high during this daycare expansion period. As women were more affected by labor market consequences of the pandemic (e.g. short-term work, reductions in working hours, see Bruckmeier *et al.*, 2020) and took a higher share of the additional care and housework, on average, we would expect men to be more likely to regress in their attitudes toward maternal employment. Even when men become unemployed or reduced working hours, while women's employment is unaffected, women tend to increase domestic work (der Lippe *et al.*, 2011; Hennecke and Pape, 2021; Solaz, 2005). While men with children tend to perceive labor market uncertainty and reductions in their employment as a threat, women with children are more likely to perceive labor market adjustments as a necessity or even as an opportunity (Forret *et al.*, 2010; Sullivan and Arthur, 2006).[3] Consequently, these differences in perceptions might result in stronger adjustments in gender role attitudes of men. With this argument, we could likewise anticipate that women's gender role attitudes do not change significantly.

Our study contributes to at least two strands of the literature. First, we shed new light on the impact of the pandemic on gender role attitudes and on gender inequality more generally using representative samples of respondents in Germany. Much of the existing work focuses on the gendered labor market impact as well as the division of housework and child care during the lockdown measures. Lockdown measures significantly increased the time constraints on households with dependent children, with women in these households taking-up the larger share of child care (e.g. Del Boca *et al.*, 2020; Heggeness, 2020; Jessen *et al.*, 2021; Sevilla and Smith, 2020; Zamarro and Prados, 2021).[4] How the pandemic and the change in institutions impact gender equality depends not only on short-run responses in time investments and working hours, but also on changes in attitudes (Davis and Greenstein, 2009). To the best of our knowledge, only two other research papers address these effects on gender role attitudes. Boring and Moroni (2021) use French data from May 2020. They find that during the first lockdown, gender norms became more traditional, particularly for fathers of young

[3] A related argument from psychology refers to the "conservative shift hypothesis", in which individuals increase their political conservatism as they become more exposed to threatening circumstances and economic uncertainty (e.g. Jost *et al.*, 2003).

[4] For Germany, Kreyenfeld and Zinn (2021) find evidence for a short-term increase in housework taken on by fathers, though Boll *et al.* (2021) show that this fades out in subsequent months.

children. Reichelt *et al.* (2021) use survey data from three countries in May and June 2020. They find that male attitudes became more egalitarian if men became unemployed while their partners worked. Unemployed women with a working partner became more traditional. In our analysis, we provide evidence on changes in gender role attitudes one year after the outbreak of the pandemic in Germany. We study a setting with stark differences in gender norms and their evolution between West and East Germany. Reductions in very egalitarian attitudes toward maternal employment are particularly strong for fathers in West Germany, in particular fathers of young children. This group also witnessed the largest increase in publicly funded daycare prior to the pandemic. We find no evidence for changes in female attitudes.

Second, our findings contribute to a better understanding of the determinants of gender role attitudes more generally. Several studies show that gender role attitudes are not just strongly determined by parents and peers (e.g. Farré *et al.*, 2020; Olivetti *et al.*, 2016; Schmitz and Spiess, 2021), but also by institutional changes that support families (such as daycare expansion and parental leave policies; see above). The before-and-after comparisons of gender role attitudes are similar to the DiD estimates, which isolate the effect of factors that are mostly applicable to parents of dependent children. We argue that daycare and school closures, alongside their consequences, are a major driver of less egalitarian gender role attitudes among fathers. More egalitarian gender role attitudes seem to depend on the ability to make use of a functional daycare infrastructure. When this support collapses, individuals may revert their attitudes to more traditional gender norms. The historical differences between East and West Germany also allow to shed some light on the persistence of gender norms that were altered by institutional adjustments. Attitudes appear more "shock resistant" when they are societally more established.

The remainder of this paper is structured as follows: Section 4.2 provides the institutional background of our research setting and relevant details on the evolution of Covid-19 and related containment measures in Germany. Section 4.3 outlines the two data sources used for our analysis. Section 4.4 describes our empirical strategy. Results, robustness checks, and heterogeneities in our findings are presented in Section 4.5. In Section 4.6, we discuss possible explanations for the observed patterns and conclude.

4.2 INSTITUTIONAL BACKGROUND

Germany provides a fruitful ground to study determinants of gender role attitudes. Maternal employment rates and gender role attitudes still differ significantly between East and West Germany, a consequence of Germany's division until 1989. While the traditional male breadwinner model was prevalent in West Germany, East Germany explicitly promoted maternal employment and offered a much higher supply of daycare. Before the pandemic, attitudes toward maternal employment were persistently more egalitarian in East Germany (e.g. Barth *et al.*, 2020; Bauernschuster and Rainer, 2012; Lippmann *et al.*, 2020; Jessen *et al.*, 2021).

In West Germany, the trend toward more egalitarian attitudes is relatively new and is associated with increasing maternal employment. Female labor force participation in Germany has substantially increased: while, in 1990, only 58% of all women aged 15 to 65 participated in the labor force, this proportion rose to 75% in 2019. This trend is even more pronounced among mothers of dependent children below age 12. In East Germany, mothers are still much more likely to work full-time and most of the increase in maternal employment in the West stems from part-time employment (see Appendix Figure 4.A.1, Panel A). The labor supply of fathers is persistently very high with most fathers working full-time (e.g. Huebener *et al.*, 2020).

The increase in maternal employment was facilitated by a substantial increase in publicly funded daycare since the 1990s. Starting with the introduction of a legal claim for a four-hour slot in 1996 for children aged three or older (Bauernschuster and Schlotter, 2015; Spiess, 2008), other subsequent reforms provided a legal claim for public daycare from age one onward. In sum, the proportion of children attending daycare increased substantially, especially in West Germany. For children below the age of three, daycare attendance increased from less than 5% in 1990 to about 35% in 2020, again with a strong East-West gradient (Statistisches Bundesamt, 2021c; Seils, 2013). While in 2020 more than 50% of all children below age three attended daycare in the East, the share was at 31% in the West. For children older than three, daycare enrolment has been almost universal since 2000. Still, all-day daycare is lagging behind and constraining maternal full-time employment. Only 20% of all children younger than three and 48% of children aged three to six attended all-day daycare in 2020. Moreover, grandparental care plays an important role as well. At least every third child younger than six is cared for by her or his grandparents on a regular basis; for children up to age three years mostly in addition to sole parental care and for older children in addition to daycare or school (Barschkett *et al.*, 2021).

The care system for dependent children in school age varies between East and West Germany as well. While East Germany has a long tradition of all-day schooling in the form of half-time schooling with the possibility to attend a *Hort* (afternoon programs for primary school children), this is not the case in West Germany. In the West, primary school children traditionally visit schools for a half-day. However, in the 2010s, even the West German states started expanding full-time care for school children. Thus, the share of children in all-day schools or related programs increased from 28% in 2005/06 to 68% in 2018/19 (Bildungsberichterstattung, 2020; Gambaro *et al.*, 2019).

With the first spread of Covid-19 in Germany in spring 2020, one central containment measure was closing almost all daycare centres and schools from March through mid-May 2020. Only families in systemically relevant occupations could claim emergency care. For most families, central care (and non-family educational opportunities) for their children were no longer available. At the same time, politicians advised against having grandparents provide child care due to the increased health risk for the elderly related to Covid-19. Since mid-May 2020, the scope of child care offered by daycare centres and schools started to gradually reopen, however, at a very slow pace. A return to regular operations was not scheduled in most of the 16 German federal states until after the 2020 summer

holidays (i.e., August to September, depending on federal state). Even then, important questions regarding how regular daycare and schooling would be organized under exceptional hygiene measures were unresolved. Regular operations was hampered due to lack of staff (caused by the pandemic) and quarantine measures. At the peak of the second infection wave, it was decided to suspend compulsory school attendance and to close daycare centres and schools again from December 16, 2020 onward. At the end of February 2021, schools were still partially closed and operated with alternating home-schooling and classroom teaching. The extent to which "emergency daycare" was provided was expanded if compared to the first daycare closures in Spring 2020, such that about 45% of children could still attend some daycare in January and February 2021. The focus of our analysis is on the period between January and February 2021, about one year after the onset of the pandemic, at the end of the second wave, when access to daycare and schools was still restricted (see Appendix Figure 4.A.2).

4.3 DATA

In our analysis, we combine pre-pandemic information on gender role attitudes with data collected during the pandemic in early 2021. For information prior to the pandemic, we use data from the German General Population Survey of the Social Sciences, ALLBUS (GESIS - Leibniz Institute for the Social Sciences, 2018). ALLBUS is a biennial cross-sectional survey conducted by GESIS – Leibniz Institute for the Social Sciences, and started in 1980. Originally, the sample was limited to eligible voters in West Germany. In 1991, following the German reunification, the sample was expanded to include the entire German resident population, with the Eastern part overrepresented with 1,100 of the 3,500 net interviews. Since 2000, the survey has taken the form of computer-assisted face-to-face interviews using laptop computers. While demographic information is collected in each wave, certain topics, such as attitudes toward marriage and family, rotate every four to six years.

ALLBUS captures gender role attitudes toward working mothers based on whether respondents "disagree completely", "disagree somewhat", "somewhat agree", or "agree completely" to the following statements: *(1) A working mother can have just as loving and trusting a relationship to her children as a mother who does not do paid work*; *(2) It is good for a child if its mother does paid work and does not only concentrate on the household*; and *(3) A toddler will definitely suffer if its mother is doing paid working*. These questions on gender role attitudes are included every four years. In our analysis, we focus on data from three pre-pandemic years: 2008, 2012, and 2016. In 2020, the ALLBUS survey would have included the gender role attitudes question, but the survey was not conducted due to the pandemic. To account for the oversampling of individuals from East Germany, we use the provided weights.

Information on gender role attitudes during the pandemic is based on data from the COMPASS survey conducted by infratest dimap, a major German polling institute.[5] The survey is designed to document the impact of the pandemic on the German population over time, starting in March 2020.

[5] For details, see https://www.infratest-dimap.de/umfragen- analysen/bundesweit/coronacompass/coronacompass/.

Every day, 250 to 350 people eligible to vote in Germany have been surveyed on the basis of a random sample of the so-called "Payback panel". The survey is based on members of Payback, the largest bonus program for consumers in Germany with around 25 million consumers. Participants were recruited offline, minimizing selection effects of the sample compared to other online access panels. The survey data is weighted to resemble the representative data of the 2018 German Micro Census of the Federal Statistical Office in terms of gender, age, education, and region (East/West). The weighted results of the COMPASS survey are representative of eligible voters in Germany with online access.[6] The data was used in previous analyses on the wellbeing of parents during the pandemic (Huebener *et al.*, 2021). It includes basic demographic information like age, gender, the number and the age of children, as well as questions on attitudes toward the governmental response to the pandemic, the intention to get vaccinated, and general wellbeing, which are included on a rotating basis. Questions on gender role attitudes, identical to the questions in the ALLBUS survey, were included between January 7 and February 14, 2021, thereby providing information on these attitudes almost one year after the start of the pandemic. Though the dataset has a panel dimension, the information on gender role attitudes was surveyed once. The COMPASS data also includes information on parents' affectedness by the daycare and school closures, which applies to 70% of all parents.

For our analysis, we combine the data from the two surveys containing identical questions on gender attitudes. Thereby, we cover the 2008 to 2021 period. To harmonize the two data sources, we exclude individuals without German nationality from the ALLBUS data and restrict the sample to individuals aged 18-65. The dataset includes a total of 4,791 observations from the ALLBUS data and 7,795 observations from the COMPASS data. On average, individuals in the ALLBUS data are comparable to those in the COMPASS data in terms of sociodemographic characteristics such as age, region, and gender (Appendix Table 4.A.1).[7]

Individuals are on average 43 years old and half of our sample are females. Across both datasets, about 20% of individuals live in Eastern Germany and 80% are employed, with three-quarters of these working full-time. The household net income (deflated to a common base year 2015) is slightly lower in the COMPASS dataset, though the difference is not statistically significant.

Our outcome of key interest are very egalitarian gender role attitudes. We classify answers as very egalitarian views if respondents "agree completely" with statements 1 or 2 and "disagree completely" with statement 3. We count the number of very egalitarian statements per individual and divide it by three, such that we obtain an index representing the share of very egalitarian answers for each

[6] Based on statistics of the German Federal Statistical Office from 2019, 90% of the German population uses the internet daily, and another 8% at least once a week. In the 16-44 age group, which is most relevant for the analysis of parental gender role attitudes, the proportion of daily users is over 98% (Statistisches Bundesamt, 2020). The focus on individuals with online access is therefore not biasing the representativeness.

[7] For some of the characteristics, such as education, employment and partnership status, the COMPASS and ALLBUS data are not immediately comparable. The COMPASS data includes no direct information on the partnership status; instead, the number of children and individuals in the household is included. This allows for calculating the partnership status indirectly, but with measurement error. Similarly, the questions on the highest educational degree differ. This may explain why we observe some differences in these characteristics between the two datasets.

individual. Combining questions in norm indices is well-established in the literature (e.g. Barth *et al.*, 2020).

In Figure 4.1, we plot the distribution of answers to the gender role attitudes separately for 2016 and 2021 for all individuals in our analysis sample. Generally, women more often fully agree to the statements favouring maternal employment. They are more likely than men to fully disagree with the statement that children suffer from having working mothers. In 2021, about 66% of women and 53% of men fully agree that a working mother can have a warm and trusting relationship with her children. About 25% of women and 16% of men fully agree that children benefit from working mothers. At the other end of the spectrum, 33% of women and 43% of men tend to agree that a young child suffers from maternal employment.

4.4 EMPIRICAL STRATEGY

Our empirical strategy proceeds in two steps. First, we aim at characterizing the Covid-19 related overall change in gender role attitudes for men and women with dependent children younger than 12. We start with a before-and-after comparison, in which gender role attitudes in 2016 are compared to those in 2021 with the following empirical model:

$$y_{it} = \alpha_0 + \alpha_1 Covid_t + \gamma' X_{it} + \varepsilon_{it} \tag{4.1}$$

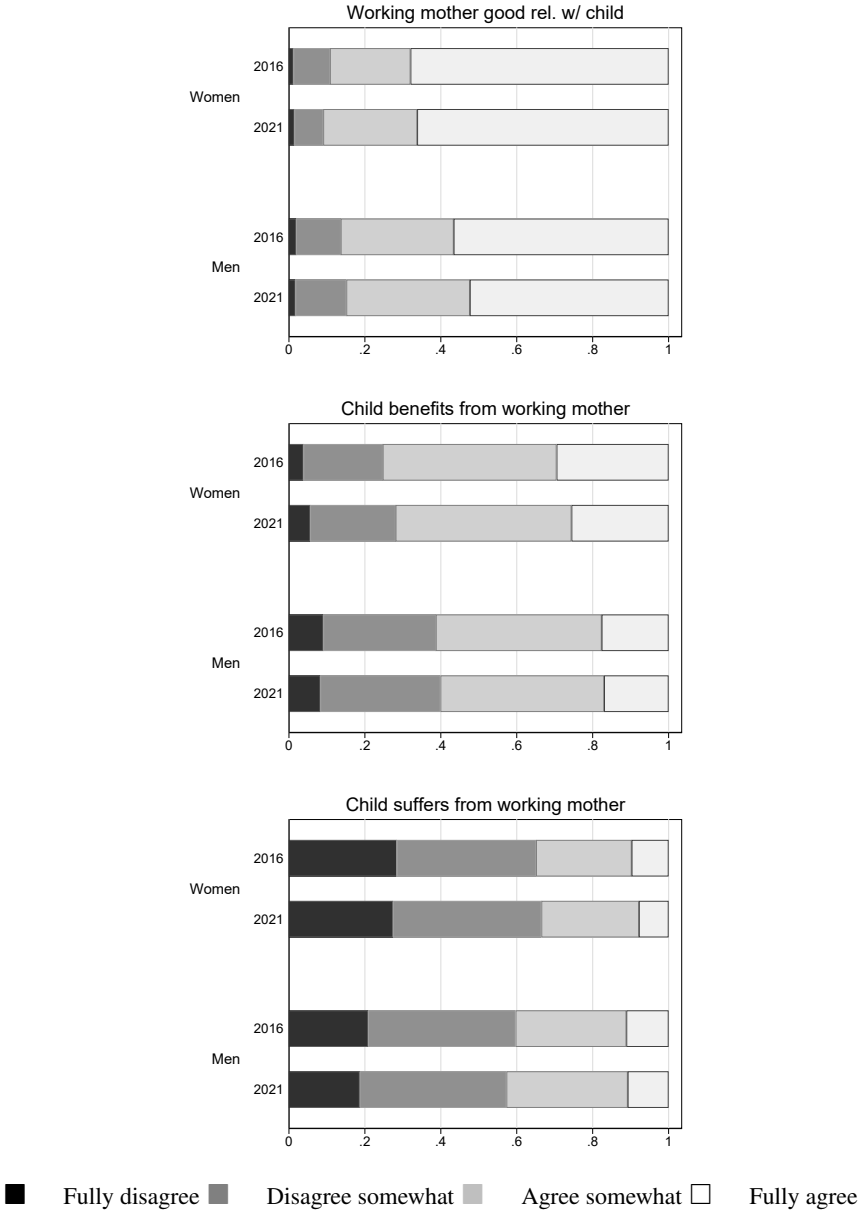
where y_{it} denotes the gender role attitudes of individual i at time t. $Covid_t$ is equal to one if the observation stems from the period after the onset of the pandemic and zero otherwise. The vector X_{it} includes fixed effects for individual's age and federal state of residence. We conduct this comparison for mothers and fathers of dependent children separately.

A causal interpretation of α_1 as a Covid-19 effect would rely on several strong assumptions. First, we would have to assume that gender role attitudes would have been constant without Covid-19. To relax this assumption, we also use information from 2008 through 2016 to extrapolate the counterfactual development of gender role attitudes in the absence of the pandemic with a linear trend. Given the previous advances in gender role attitudes, the no-change-in-attitudes assumption is probably too restrictive. On the other hand, a linear trend continuation might exaggerate the counterfactual attitudes, such that we expect this exercise to bound the true causal impact of the Covid-19 pandemic with these two approaches.

Yet, a causal interpretation would still have to assume that the two datasets were fully comparable. One threat to this assumption is that the interview mode varied between both surveys. While ALLBUS data were collected in person, the COMPASS data were collected online. If the interview mode affects the reported gender role attitudes, the resulting estimates would be biased.

Therefore, we proceed with a second step in our analysis: We additionally account for survey mode effects and other differences that vary over time but are shared by all respondents by using an additional control group. For this purpose, we extend our analysis of parents with dependent chil-

Figure 4.1: Gender role attitudes by gender in 2016 and 2021



Notes: This figure plots the responses to the questions on gender role attitudes by gender in 2016 and 2021 for all individuals age 18 to 65.
Source: Own calculations based on ALLBUS (2016) and COMPASS (2021), weighted.

dren and compare them to parents of older children and individuals without children. We employ a difference-in-differences (DiD) framework similar to Huebener *et al.* (2021) that is suited to identify causal effects of the pandemic (Goodman-Bacon and Marcus, 2020). It exploits the fact that families with dependent children were more exposed to the daycare and school closures, i.e., those counter-

measures that we expect to be a significant mechanism underlying the Covid-19 effects on gender role attitudes. We estimate the following model:

$$\begin{aligned} y_{it} = \beta_0 + \beta_1(Covid_t \times ChildB12_i) + \beta_2 ChildB12_i + \beta_3 Covid_t \\ + \beta_4 Trend + \beta_5(Trend \times ChildB12_i) + \theta' X_{it} + \varepsilon_{it} \end{aligned} \tag{4.2}$$

where y_{it} denotes the gender role attitudes of individual i at time t. $Covid_t$ is equal to one if the observation stems from the period after the onset of the pandemic and zero otherwise. $ChildB12_i$ indicates whether there is a child below age 12 in the household. The coefficient of main interest is β_1, as it identifies the treatment effect of daycare and school closures. The vector X_{it} includes fixed effects for age and the federal state. To account for potentially differential trends prior to the pandemic, we include a group-specific linear trend and year fixed effects. We estimate eq. (4.2) as a linear probability model with Ordinary Least Squares. Throughout our analyses, we estimate robust standard errors, denoted by ε_{it}.

For our DiD to be valid, we must assume parallel trends, i.e., that gender role attitudes for individuals with dependent children and other individuals would follow the same path in the absence of Covid-19. One condition for this assumption to hold is that changes in pre-determined characteristics are not related to the treatment status. To check the covariate balancing, we use pre-determined characteristics as outcome variables in our DiD framework in eq. (4.2) (Appendix Table 4.A.2). Most characteristics are balanced, but we still observe some imbalances for women on variables that are not immediately comparable between our two data sources (see Section 4.3).[8] A joint F-test supports the notion that pre-determined characteristics are balanced (Oberfichtner and Tauchmann, 2021). Our findings are not sensitive to including these covariates in our main analysis (see Section 4.5.3). We further discuss the plausibility of the common trend assumption with several robustness checks in Section 4.5.3, including a placebo test which assumes that the pandemic occurred in 2016 already. For our parallel trends assumption to hold we also require that any survey or context effects are constant across the treatment and control groups. Although we are unable to test this assumption explicitly, we cannot see reasons why there would be noticeable differences in these effects for parents of dependent children.

Note that the DiD model nets out the overall change in gender role attitudes resulting from the pandemic. If the pandemic led to a re-traditionalization of gender role attitudes in the entire population (e.g. because of a backlash of norms under economic uncertainty, i.e., when jobs are scarce, jobs should go to men), the DiD estimate would be a lower bound estimate of the true Covid-19 effect on parents of dependent children. We expect daycare and school closures and its consequences to be a significant mechanism for the overall Covid-19 effects. Yet, our DiD estimates may not to be directly

[8] For example, the full-time employment variable is highly significant. In COMPASS, this characteristic is based on pre-pandemic panel core data and it is self-reported without specified hours. In ALLBUS, individuals are classified as working full-time if they work more than 30 hours. In particular, between 30 and 40 hours, this can result in measurement error, which is exactly the employment margin at which we observe imbalances for women.

interpreted as an effect of these closures if other aspects of the pandemic could also affect parents differently. For example, with the risk of infections of children, parents might develop a preference for more traditional homecare that is independent of actual closures. In this case, the main mechanism would not be daycare and school closures, but our estimates can still be interpreted as the effects of the Covid-19 pandemic.

4.5 RESULTS

4.5.1 Graphical results

We begin by investigating the evolution of gender role attitudes graphically over time. Figure 4.2 plots the share of women and men with very egalitarian gender role attitudes by region between 2008 and 2021.[9] We differentiate parents of dependent children from parents of older children and individuals without children. In 2008, women were more egalitarian than men. Between 2008 and 2016, we observe trends toward more egalitarian attitudes for almost all groups. There is nearly no difference based on whether a woman has dependent children or not. For men, we observe that the trend toward more egalitarian gender role attitudes is more pronounced for fathers of dependent children.

In 2021, one year after the onset of the pandemic, we see that men with dependent children in West Germany experience the largest drop. A similar picture arises if we just look at egalitarian (and not very egalitarian) attitudes over time. The visual evidence suggests that fathers of dependent children show the most pronounced drop in their gender role attitudes.

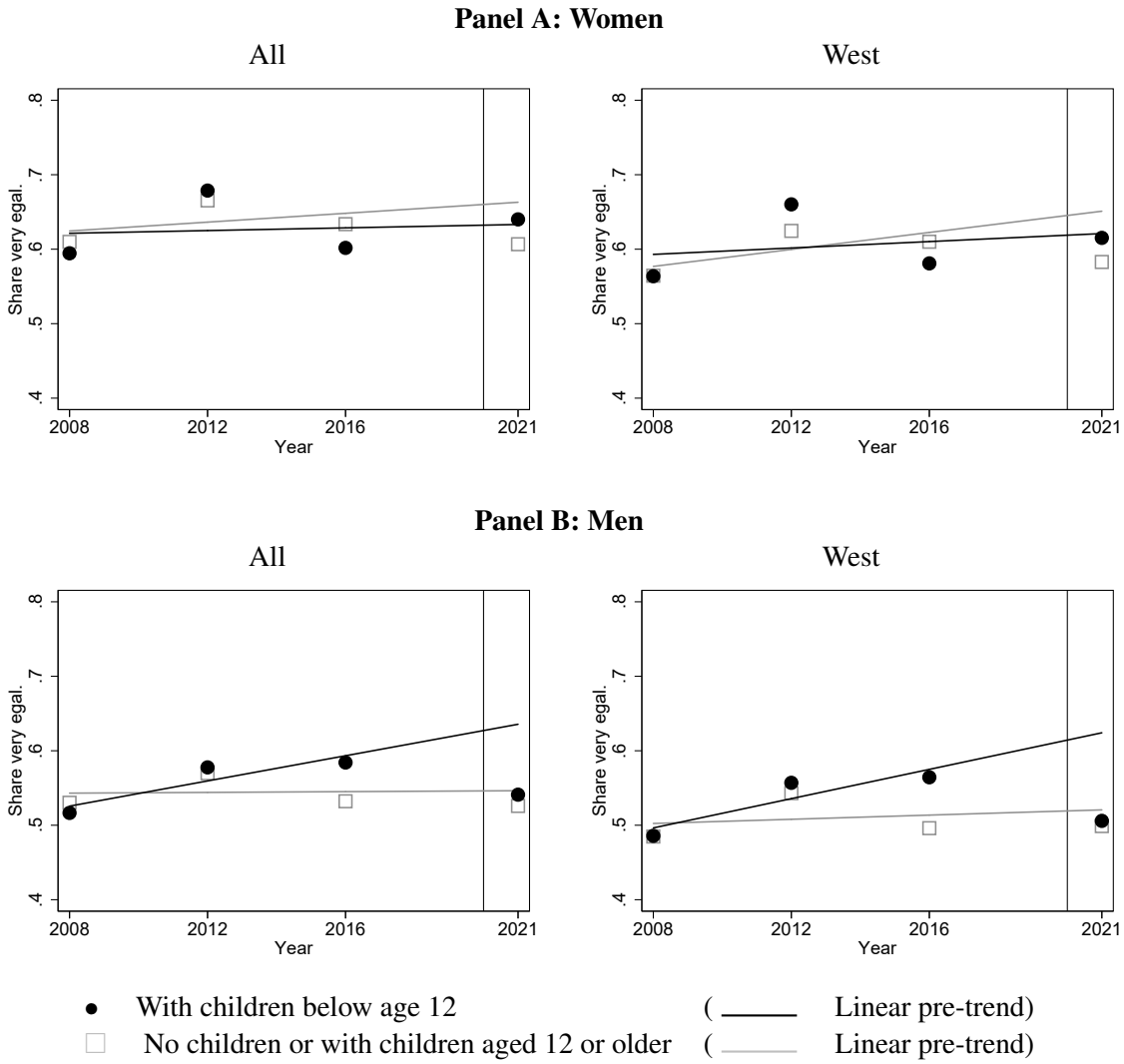
4.5.2 Estimation results

We investigate the change in gender role attitudes toward maternal employment using different specifications outlined in eq. (4.1) and (4.2). In Table 4.1, we report results for very egalitarian gender role attitudes separately by gender and region. We begin by estimating the change in attitudes of parents of dependent children between 2016 and 2021 (Panel A). While the change shows small and positive estimates for women, the change is negative for men; the latter being statistically significant at the 5-percent level for men in West Germany. For them, the average share of very egalitarian gender role attitudes falls by 7 percentage points. Unbiased estimates of the Covid-19 effect would assume, *inter alia*, that gender role attitudes were constant in the absence of the pandemic. This assumption is probably too conservative given the pronounced trend toward more egalitarian attitudes between 2008 and 2016.

Thus, we use observations from 2008 through 2016 and account for the upward pre-pandemic trend visible in Figure 4.2. We now estimate the deviation from this linear trend, finding a small and insignificant change for women, but a statistically significant negative effect for men that is expectedly larger (Panel B). The share of men with very egalitarian attitudes declines by 8 percentage points if we do not differentiate by region; when doing so, the attitudes of West German men decline by 12

[9] We do not report separate results for East Germany due to the small sample size.

Figure 4.2: Very egalitarian gender role attitudes toward maternal employment



Notes: The figure plots the share of very egalitarian gender role attitudes over time for individuals with and without children below age 12 in the household, separately by gender and region. The linear trend is based on pre-pandemic years. The vertical line indicates the start of the Covid-19 pandemic.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

percentage points. These changes are statistically highly significant. While a continuation of a linear trend is probably overestimating the real change, we expect the models in Panels A and B to bound the real Covid-19 effect between 7 and 12 percentage points.

Yet, a causal interpretation would still have to assume that the two datasets were fully comparable. One threat to this assumption is that the interview mode varied between the two surveys. While ALLBUS data was collected in person, the COMPASS data were collected online. If the interview mode affects the reported gender role attitudes, the resulting estimates would be biased.

Table 4.1: Main effects on very egalitarian gender role attitudes

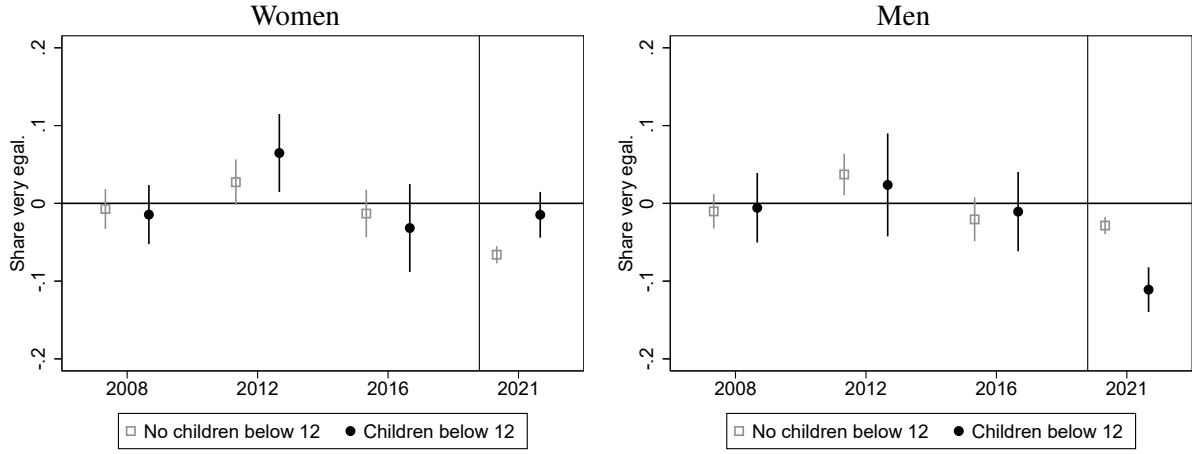
	Women		Men	
	All	West	All	West
Panel A				
First difference	0.02	0.02	-0.05	-0.07**
	(0.03)	(0.04)	(0.03)	(0.03)
N	752	577	693	528
Panel B				
Linear trend	-0.01	-0.02	-0.08**	-0.12***
	(0.04)	(0.05)	(0.04)	(0.04)
N	1,219	910	1,031	771
Panel C				
Difference-in-differences	0.05	0.05	-0.04	-0.07**
(2021 vs. 2016)	(0.03)	(0.04)	(0.03)	(0.03)
N	4,492	3,510	4,516	3,477
Panel D				
Difference-in-differences	0.05	0.05	-0.07*	-0.10**
(2008–2021)	(0.04)	(0.05)	(0.04)	(0.05)
N	6,286	4,708	6,300	4,643

Notes: Estimates in Panel A and B are based on eq. (4.1). The first difference is calculated as the change between 2016 and 2021 within the treatment group (parents with children below age 12 in the household). The linear-trend specification adds the years 2008 and 2012 and a linear time trend. The difference-in-differences specification reports the coefficient estimates from the interaction of Covid-19 and children below age 12 in the household based on eq. (4.2). All regressions include age and state fixed effects. All coefficients are estimated in separate regressions. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

In the next step, we extend our analysis of parents with dependent children, comparing their changes to those of parents with older children and individuals without children. This difference-in-differences framework additionally accounts for any changes that vary over time but are shared by all respondents, such as survey mode effects. In Panel C, we employ the DiD model to the years 2016 and 2021. The results are very similar to the before-and-after comparison reported in Panel A, suggesting that general changes in gender role attitudes for parents of older children or individuals without children are small (because of the pandemic or survey mode effects). We then extend the DiD framework and also include pre-pandemic information up to 2008 (Panel D). The model outlined in eq. (4.2) then also accounts for time trends that can differ between parents of dependent children and the individuals in the control group. The results suggest positive, albeit insignificant, effects for mothers of dependent children, while the estimates for fathers of dependent children are negative and

significant. Accordingly, the share of fathers with very egalitarian attitudes declines by 7 percentage points, driven by men in West Germany where the share declines by 10 percentage points, which is significant at the 5 percent level.

Figure 4.3: Deviation from pre-trends in West Germany: very egalitarian



Notes: The figure plots the deviation from the group-specific linear pre-pandemic trend by gender and child age. The vertical line indicates the start of the pandemic.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

The full DiD model (Panel D) effectively estimates deviations from the linear time trend for the treatment group that are corrected by deviations from the time trend in the control group. In Figure 4.3, we illustrate this variation around their time trend for the different groups. We observe reductions in very egalitarian attitudes in almost all groups, which are most pronounced for men with children younger than 12 in the household.

4.5.3 Robustness checks

To support the robustness of our results, we run several robustness checks for the before-and-after and difference-in-differences specifications reported in Table 4.2.

First, we check the sensitivity of our findings with respect to the consideration of covariates in the before-and-after comparison (Panel A). When we remove age and federal state fixed effects from our model, results are very similar to our main specification, and we draw the same conclusion. We also check the robustness of our findings to considering more covariates. To do so, we use entropy balancing methods as suggested by (Hainmueller, 2012). This multivariate reweighting method reweights the control group data to match specified covariate moment conditions in the treatment group. The considered covariates are individuals' age, education, whether they live in an urban area, household size, whether there is a partner in the household, and the monthly net income. Reassuringly, the before-and-after comparisons after entropy balancing are almost identical to our main first-differences results.

We next turn our attention to the DiD model (Panel B). First, we show that our results are neither sensitive to including fewer covariates (removing age and federal state fixed effects), nor to applying

Table 4.2: Robustness checks

	Women		Men	
	All	West	All	West
Panel A: Linear Trend				
Baseline	-0.01	-0.02	-0.08**	-0.12***
	(0.04)	(0.05)	(0.04)	(0.04)
N	1,219	910	1,031	771
No control variables	-0.00	-0.01	-0.09**	-0.11***
	(0.04)	(0.04)	(0.04)	(0.04)
N	1,219	910	1,031	771
Entropy balancing	0.01	-0.00	-0.05	-0.06*
	(0.03)	(0.04)	(0.03)	(0.03)
N	752	577	691	526
Panel B: Difference-in-differences				
Baseline	0.05	0.05	-0.07*	-0.10**
	(0.04)	(0.05)	(0.04)	(0.05)
N	6,286	4,708	6,300	4,643
No control variables	0.06	0.05	-0.06	-0.09*
	(0.04)	(0.05)	(0.04)	(0.05)
N	6,286	4,708	6,300	4,643
Entropy balancing	0.05	-0.00	-0.06	-0.13**
	(0.05)	(0.06)	(0.05)	(0.06)
N	6,264	4,689	6,277	4,624
Placebo DiD	-0.06	-0.07	0.06	0.08
	(0.05)	(0.05)	(0.05)	(0.06)
N	3,464	2,306	3,440	2,224
Childless as control group	0.06	0.06	-0.08*	-0.11**
	(0.04)	(0.05)	(0.04)	(0.05)
N	5,631	4,209	5,734	4,216

*Notes: Panel A reports the effect of the pandemic within the treatment group for the years 2008 to 2021 including a linear trend. Panel B reports the coefficient from the interaction of Covid-19 and children below age 12 in the household based on eq. (4.2). All regressions include age and state fixed effects if not indicated otherwise. All coefficients are estimated in separate regressions. Entropy balancing based on age, education, urban, household size and partner in household using the Stata command ebalance. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on ALLBUS and COMPASS, weighted.

entropy balancing weights based on the above-mentioned covariates to the difference-in-differences approach.

A causal interpretation of the DiD estimates requires the common trend assumption to hold. As the unconditional time trends appear different for the treatment and control group (see Figure 4.2), we

already included group-specific time trends in our main model. To test the plausibility of the common trend assumption conditional on time trends, we conduct a placebo check in which we use ALLBUS information from 2004 through 2016 and assume that the pandemic occurred in 2016. The placebo estimates are insignificant and reverse their sign, providing first support for a causal interpretation of our main estimates. Next, we alter our control group and remove parents with older children from the control group, as they might also be affected by school closures and could bias the estimates downward. Indeed, we find slightly larger point estimates when we remove those parents from the control group.

4.5.4 Further results and effect heterogeneity

We base our analysis on an index of gender role attitudes summarizing the share of very progressive answers to three different questions. Yet, the connotation of the different questions varies and understanding which questions are driving the results may help better understand what experiences during the pandemic drive the results. Hence, we report the DiD estimates of eq. (4.2) for each of the three questions separately (Table 4.3). In particular, fathers agree less with the statement that working mothers *"can have just as loving and trusting relation-ship to her children as a mother who does not do paid work"*. The score (scale 1 to 4, 1 - fully disagree to 4 - fully agree) decreases by 0.28 points for fathers in West Germany. Further, the point estimate for the *"child benefits from a working mother"* statement is comparably large, albeit insignificant. In contrast, mothers increase their agreement to this question. This could be driven by the unwillingness of women to be forced into a role in which they have to take the main care responsibility. It aligns with individual perceptions of difficult economic situations varying by men and women (see above and Forret *et al.*, 2010).

We also examine whether the pandemic affected not only *very egalitarian* attitudes, but also *egalitarian* and *very traditional* gender role attitudes. We classify attitudes as egalitarian if respondents *"agree completely"* or *"agree somewhat"* with statements 1 or 2 and *"disagree completely"* or *"disagree somewhat"* with statement 3. To cover attitudes at the other end of the spectrum, we define an index of *"very traditional"* gender role attitudes if respondents *"disagree completely"* with the statements 1 or 2 and *"agree completely"* with statement 3. We combine answers in indexes analogously to our main outcome. While the pandemic reduced agreements to *egalitarian* attitudes, we cannot find robust evidence for an increase in *very traditional* gender role attitudes (Appendix Table 4.A.3).

We now turn to the question whether effects on gender role attitudes differ across different groups of parents. If daycare and school closures were a major reason behind the Covid-19 effects on children, we would expect the effects to be stronger for parents of younger children. First, we compare answers in 2016 and 2021 by the age of the youngest child in the household (Figure 4.4). West German fathers of children below the age of six show the largest differences. Intuitively, this seems plausible. Not only do younger children before school starting age require more care, but also for these fathers, gender role attitudes may be more fragile and more prone to changes in circumstances and institutional environments, as they are "younger" fathers on average. When we investigate heterogeneities by child age in our difference-in-differences framework in Table 4.4, this pattern is confirmed. While

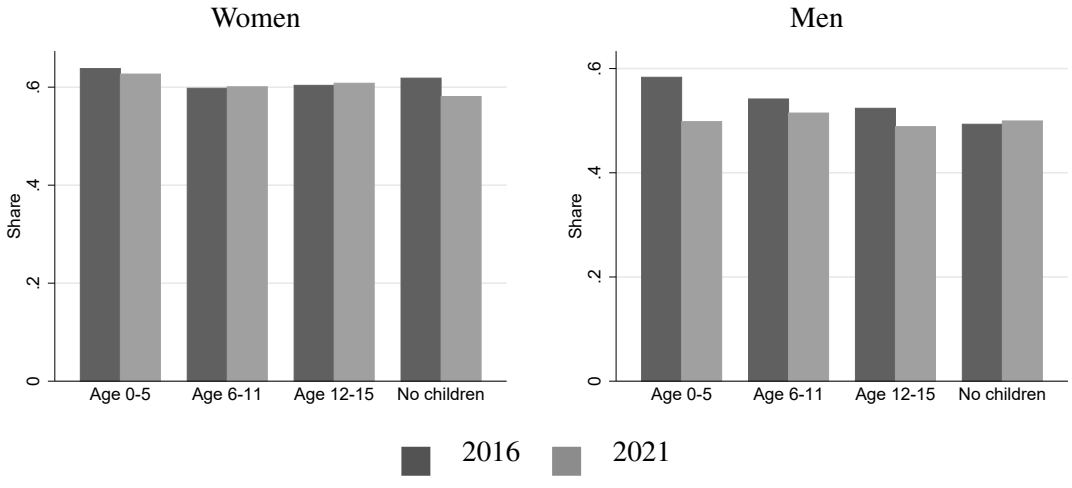
Table 4.3: Effects on the separate index items

	Women		Men	
	All	West	All	West
Working mother good rel. w/ child	0.21*	0.26**	-0.18	-0.28*
	(0.12)	(0.13)	(0.12)	(0.14)
Pre-treatment mean	3.63	3.54	3.51	3.41
N	6,286	4,708	6,300	4,643
Child benefits from working mother	0.06	0.08	-0.14	-0.20
	(0.13)	(0.15)	(0.13)	(0.16)
Pre-treatment mean	3.04	2.88	2.71	2.52
N	6,286	4,708	6,300	4,643
Child suffers from working mother	0.06	0.10	0.06	0.09
	(0.15)	(0.17)	(0.14)	(0.17)
Pre-treatment mean	2.14	2.32	2.36	2.54
N	6,286	4,708	6,300	4,643

*Notes: Difference-in-differences estimation results based on eq. (4.2). All regressions include age and state fixed effects. All coefficients are from separate regressions. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on ALLBUS and COMPASS, weighted.

we find similar point estimates when we interact the treatment indicator in eq. (4.2) with child age indicators for parents with younger children, the estimate is smaller and insignificant for parents of older children.

Figure 4.4: Gender role attitudes by child age in West Germany: very egalitarian



Notes: The figure plots the share of individuals with very egalitarian gender role attitudes by child age in the years 2016 and 2021.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

Table 4.4: Heterogeneity analysis

	Very egalitarian			
	Women		Men	
	All	West	All	West
Youngest child age 0-5	0.04	0.04	-0.05	-0.11*
	(0.06)	(0.07)	(0.06)	(0.06)
Youngest child age 6-11	0.06	0.07	-0.09*	-0.10
	(0.06)	(0.07)	(0.06)	(0.07)
Youngest child age 12-15	0.09	0.10	-0.07	-0.07
	(0.08)	(0.09)	(0.07)	(0.08)
N	6,286	4,708	6,300	4,643
High educated	0.10	0.09	-0.08	-0.11*
	(0.06)	(0.07)	(0.05)	(0.06)
Low educated	0.02	0.03	-0.07	-0.11
	(0.06)	(0.06)	(0.06)	(0.07)
N	6,286	4,708	6,300	4,643
No emergency care	0.04	0.06	-0.15**	-0.20**
	(0.07)	(0.09)	(0.07)	(0.08)
Emergency care	0.03	0.03	-0.07	-0.10*
	(0.05)	(0.05)	(0.04)	(0.05)
N	6,259	4,690	6,277	4,628
Home office not possible	0.01	0.02	-0.07	-0.12**
	(0.05)	(0.05)	(0.05)	(0.06)
Home office possible	-0.01	-0.03	-0.15*	-0.18*
	(0.09)	(0.11)	(0.09)	(0.10)
N	3,693	2,678	3,393	2,331
Up to median hh net income	0.06	0.07	-0.03	-0.05
	(0.05)	(0.06)	(0.05)	(0.06)
Above median hh net income	0.06	0.06	-0.06	-0.10*
	(0.05)	(0.05)	(0.04)	(0.05)
N	6,286	4,708	6,300	4,643

Notes: This table reports the interaction effects of the group indicators with the treatment indicator based on the model outlined in eq. (4.2). All regressions include age and state fixed effects, and group-specific pre-pandemic trends. All coefficients are from separate regressions. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

Within the DiD framework, we find that fathers in households with a higher income show a larger reduction in their very egalitarian attitudes and that this change is only significant for higher educated fathers (though the point estimate for fathers with less education are similar). It is this group of higher educated, higher income men that exhibited more egalitarian gender role attitudes in the past twenty years (Appendix Figure 4.A.3).

The COMPASS data also includes information on individual experiences during the pandemic. First, the data includes information on access to emergency daycare at the beginning of the crisis, which is also highly predictive of access to care for subsequent daycare and school closures. Second, the data includes information on whether individuals could work from home. As this pandemic-specific information is only available for the year 2021, we only interact our treatment dummy based on these characteristics.[10] The effect estimates on gender role attitudes are substantially larger for men without access to emergency daycare and for men who worked from home. We cannot rule out that individuals affected by daycare and school closures, and who worked from home, varied in their gender attitudes even before the pandemic. As we do not know to which group those individuals are best comparable to prior to the pandemic, this evidence is suggestive only.

Yet, this evidence aligns with the observation that better-educated and higher-income individuals are more affected, because this group is also more likely to be able to work from home. We assess the degree to which individuals were differentially affected by daycare and school closures, home office, and short-term work (as potential explanations for effect differences). We estimate multivariate regression models for each of the three outcomes in Table 4.5. In these models, we are mainly interested in the statistical association between the gender and region dummy, and the outcomes of interest. These help assess whether important potential channels differ significantly between men and women and regions. Men report being more frequently affected by daycare and school closures, which could relate to the fact that women are more likely to work in system relevant occupations with priority access to emergency care. Men also report about more possibilities to work from home and are marginally less affected by short-term work (both outcomes conditional on employment prior to the pandemic). Further, a higher net household income and more education are related to more home office opportunities and shield from short-term work.

We cannot find significant differences in these outcomes between East and West Germany. This suggests that the persistence of gender role attitudes prior to the pandemic could be an important determinant of its vulnerability in times of the crisis.

4.6 DISCUSSION AND CONCLUSION

This paper studies how Covid-19 and related measures to contain the spread of the virus affected gender role attitudes in Germany, with a special focus on parents. One year after the outbreak of the pandemic, we find that fathers show less egalitarian attitudes toward maternal employment. This drop is observed for fathers in West Germany, who showed a steady progression toward more egalitarian attitudes in the pre-pandemic period. Our results show that effects may be particularly present among previously very egalitarian men, who now become less egalitarian. Gender role attitudes of mothers are, on average, not affected. Challenges of the Covid-19 pandemic for families and the temporary loss of daycare infrastructure, led to changes in both the division of domestic and market work, as well as in attitudes. The identified changes in attitudes are important, as the pandemic's impact on gender

[10] As the variable is non-existent prior to the pandemic, the interaction term could also capture group-specific fixed effects.

Table 4.5: Exposure to loss of care, home office and short-term work

	Outcome		
	Affected by daycare closures	Home office possible	Short-term work
Age 0-2	0.40***	0.08	-0.03***
	(0.05)	(0.09)	(0.01)
Age 3-5	0.10***	0.01	0.01
	(0.04)	(0.05)	(0.02)
Age 6-11	0.04	-0.09*	-0.02**
	(0.03)	(0.05)	(0.01)
Age 12-16	—	-0.09	-0.02*
		(0.06)	(0.01)
Male	0.06**	0.06**	-0.01**
	(0.03)	(0.03)	(0.01)
West	-0.07	0.02	-0.01
	(0.07)	(0.07)	(0.02)
Household net income in €1,000	-0.03**	0.07***	-0.00*
	(0.01)	(0.01)	(0.00)
Medium schooling	0.03	0.11***	-0.03*
	(0.04)	(0.03)	(0.01)
Higher schooling	0.06	0.35***	-0.04***
	(0.05)	(0.04)	(0.01)
N	1,278	1,194	3,073

Notes: This table reports the relationship of different outcome variables with covariates. Loss of care is conditional on having children under age 16. Home office and short-term work are conditional on pre-pandemic employment and only available for a subset of the sample. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

equality could reach beyond short-run responses in time investments and working hours. Thus, it is the task of future research to determine the stability of these attitude changes.

From a broader perspective, our results show that shocks like the pandemic can reverse trends in gender role attitudes in the short run. If societal attitudes are more stable and established, as in East Germany, they appear to be more resistant to shocks. As many countries have seen a substantial increase in egalitarian gender role attitudes before the pandemic, we believe that our results are likely observable in other countries that adopted strict lockdown measures. First evidence from France confirms our expectation: During the first lockdown, Boring and Moroni (2021) also find that fathers of young children exhibited more traditional gender norms.

Why are the attitudes of fathers, but not mothers, affected? Arguments from the psychological literature may justify this pattern. Fathers perceive labor market uncertainty as a threat to their careers, while mothers are more likely to perceive labor market shocks as an opportunity and, in case of Covid-19, probably more as a transitional state. Fathers may adjust their attitudes more quickly to experienced circumstances. This would be in line with attitudes that are more "elastic" prior to the

pandemic in which the increase in egalitarian gender role attitudes of men came along with increased *maternal* employment and daycare care.

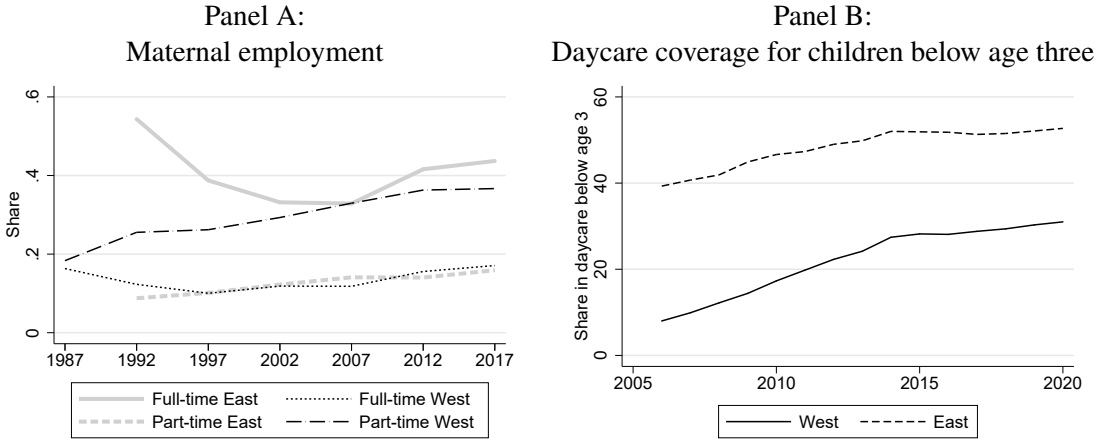
Whether the changes that we document will persist likely depends on the length of the pandemic, further daycare and school closures, as well as the economic consequences. However, effects on men's attitudes are observed both during the first lockdown (Boring and Moroni, 2021) and one year after the onset of the crisis, as shown in our analysis. Moreover, access to emergency care was much more common during the time of our survey if compared to the beginning of the crisis. Yet, we cannot completely rule out that the effects we estimate may be transitional: Fathers may return to more equal gender norms once Covid-19 related restrictions are removed and when labor markets recover. In this sense, our results are also important for future analyses to help better understand the stability, elasticity, and vulnerability of gender role attitudes to short-term fluctuations in external circumstances. In the medium- and long-run, such pronounced drops in men's egalitarian gender role attitudes could have lasting impacts on couples bargaining processes, parental employment decisions, important economic outcomes, and gender equality in general. These might impose substantial macroeconomic costs as a side-effect to other consequences of the pandemic.

Behind the average effects on gender role attitudes presented in our analysis, a more differentiated picture could emerge, in which the effects depend not only on the region and the gender of the individuals, but also on family and employment constellations of household members. For example, in families in which the mother was employed and the father took on the additional care work due to short-time work, both the experienced division of care work and the gender role attitudes might even have become more egalitarian. Using up-to-date data, our study presents first estimates for aggregate, societal changes, which are of high policy relevance and provide a launchpad for more differentiated analyses in the future. As our data lacks a panel dimension reaching to the period before the pandemic, we cannot analyze individual changes in time use, household production, and labor market effects as potential drivers of the observed effects in more depth, thus leaving this research avenue for future studies.

However, in the short run, our findings have implications for optimal lockdown policies during the ongoing or possible future pandemics. We document side-effects of containment measures (such as daycare and school closures) that run counter to the goal of increasing the labor force participation of mothers and increasing the participation of fathers in care work. Policymakers should bear such side-effects in mind and should consider prioritising access to schools and daycare over other public places like bars and restaurants when vaccines are not yet available.

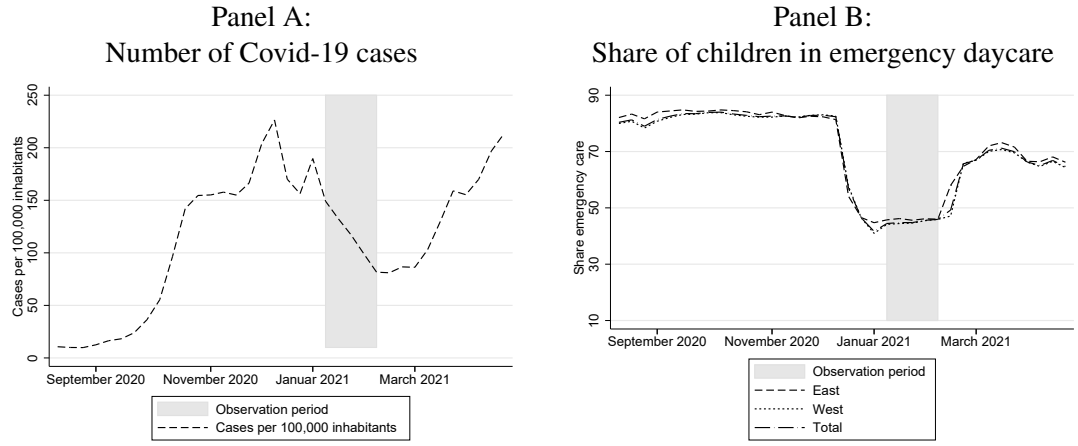
4.A APPENDIX

Figure 4.A.1: Maternal employment and daycare coverage in East and West Germany



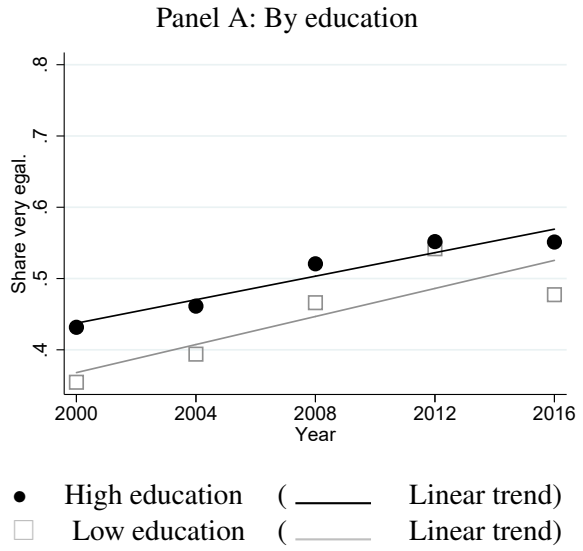
Notes: The figure plots the average daycare coverage rates for children below age three and the employment share of parents with children up to age 12.
Source: Own calculations based on Statistisches Bundesamt (2021) and German Socio-Economic Panel (SOEP, 2019).

Figure 4.A.2: Timing of COMPASS-survey: Covid-19 cases and daycare closures in Germany



Notes: The figure plots the number of Covid-19 cases per 100,000 inhabitants (Panel A) and the share of children in emergency daycare (Panel B, relative to number of children in daycare prior to the pandemic) from August 2020 until April 2021 in Germany. The grey-shaded area shows the period for which this study analyzes data on gender role attitudes.
Sources: WHO and John Hopkins University (2021) and Autorengruppe Corona-KiTa-Studie (2021).

Figure 4.A.3: Pre-pandemic gender role attitudes toward maternal employment for West German men



Notes: The figure plots the share of very egalitarian gender role attitudes for men in West Germany over time, in Panel A by education - (Fach-)Abitur vs. no (Fach-)Abitur - and in Panel B by income - up to median household net income vs. above median household net income.
Source: Own calculations based on ALLBUS, weighted.

Table 4.A.1: Descriptive statistics

	ALLBUS		***COMPASS***	
	Mean	(SD)	Mean	(SD)
Age in years	43.65	(13.30)	43.67	(13.09)
Female	0.51	(0.50)	0.50	(0.50)
No or basic schooling[a]	0.28	(0.45)	0.13	(0.34)
Medium schooling[a]	0.36	(0.48)	0.48	(0.50)
Higher schooling[a]	0.36	(0.48)	0.39	(0.49)
Household size	2.74	(1.32)	2.46	(1.22)
Partner in household	0.55	(0.50)	0.74	(0.44)
Single parent	0.09	(0.28)	0.03	(0.16)
Two parent household	0.22	(0.41)	0.21	(0.41)
No children	0.70	(0.46)	0.76	(0.43)
Youngest child age 0-2	0.07	(0.26)	0.04	(0.20)
Youngest child age 3-5	0.05	(0.22)	0.06	(0.24)
Youngest child age 6-11	0.11	(0.31)	0.08	(0.28)
Youngest child age 12-16	0.07	(0.25)	0.05	(0.22)
Household net income in euro	2916.55	(1395.19)	2782.52	(1219.78)
Employed	0.75	(0.43)	0.76	(0.42)
Full time	0.55	(0.50)	0.56	(0.50)
Part time	0.20	(0.40)	0.17	(0.38)
Not working	0.25	(0.43)	0.25	(0.43)
East Germany	0.20	(0.40)	0.20	(0.40)
Observations	4791		7795	

Notes: The table shows descriptive statistics of the ALLBUS 2008, 2012 and 2016 and the COMPASS survey from January and February 2021. [a] Differences in survey questions between ALLBUS and COMPASS: Schooling (ALLBUS: 7 categories with open answer, COMPASS: 5 categories, no open answer), full-time (ALLBUS: 30 hours and more, COMPASS: self-reported without hours specification). In prices of 2015.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

Table 4.A.2: Covariate balancing checks

	Difference-in-differences			
	2021 vs. 2016		2008–2021	
	Women	Men	Women	Men
Covariate				
Age	-1.38	-0.22	-2.14	-0.67
	(1.01)	(1.21)	(1.40)	(1.67)
Medium schooling[a]	-0.13**	-0.04	-0.17**	-0.06
	(0.05)	(0.05)	(0.07)	(0.07)
Higher schooling[a]	0.00	0.05	0.01	0.09
	(0.05)	(0.06)	(0.07)	(0.08)
Household size	0.14	-0.12	0.32**	-0.17
	(0.10)	(0.11)	(0.15)	(0.16)
Partner in household	-0.09*	0.01	-0.12*	0.05
	(0.05)	(0.05)	(0.07)	(0.07)
Household net income	-61.10	97.70	-150.91	165.42
	(150.53)	(147.66)	(208.22)	(208.76)
Working	-0.07	-0.02	-0.10	0.00
	(0.05)	(0.04)	(0.07)	(0.05)
Full time[a]	-0.11**	-0.03	-0.16**	-0.02
	(0.05)	(0.04)	(0.07)	(0.06)
Part time[a]	0.04	0.03	0.06	0.04
	(0.05)	(0.03)	(0.07)	(0.04)
Not working[a]	0.07	0.00	0.10	-0.01
	(0.05)	(0.04)	(0.07)	(0.05)
N	4,492	4,516	6,286	6,300
Joint balancing test				
F-test p-value	0.2902	0.4487	0.1231	0.2577

Notes: The table reports covariate balancing checks using the covariates as the dependent variable in the difference-in-differences model outlined in eq. (4.2) (without individual controls). [a] *Differences in survey questions between ALLBUS and COMPASS: Schooling (ALLBUS: 7 categories with open answer, COMPASS: 5 categories, no open answer), full-time (ALLBUS: 30 hours and more, COMPASS: self-reported without hours specification). The joint balancing test is based on the command stackreg.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on ALLBUS and COMPASS, weighted.

Table 4.A.3: Effects on egalitarian and very traditional gender role attitudes

	Women		Men	
	All	West	All	West
Panel A: Egalitarian gender role attitudes				
First difference	-0.01	-0.03	-0.05	-0.08**
	(0.03)	(0.04)	(0.03)	(0.04)
N	752	577	693	528
Linear trend	-0.03	-0.05	-0.11**	-0.16***
	(0.04)	(0.05)	(0.05)	(0.05)
N	1,219	910	1,031	771
Difference-in-differences (2021 vs. 2016)	0.00	0.01	-0.04	-0.06
	(0.03)	(0.04)	(0.04)	(0.04)
N	4,492	3,510	4,516	3,477
Difference-in-differences (2008–2021)	0.01	0.02	-0.07	-0.09
	(0.05)	(0.05)	(0.05)	(0.06)
N	6,286	4,708	6,300	4,643
Panel B: Very traditional gender role attitudes				
First difference	0.00	0.01	-0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
N	752	577	693	528
Linear trend	0.01	0.03	0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.03)
N	1,219	910	1,031	771
Difference-in-differences (2021 vs. 2016)	-0.01	-0.01	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)
N	4,492	3,510	4,516	3,477
Difference-in-differences (2008–2021)	-0.01	-0.01	-0.01	-0.00
	(0.03)	(0.03)	(0.03)	(0.03)
N	6,286	4,708	6,300	4,643

*Notes: The first difference is calculated as the change between 2016 and 2021 within the treatment group (parents with children up to age 12 in the household). The linear-trend specification adds the years 2008 and 2012 and a linear time trend. The difference-in-difference specification reports the coefficient from interaction of Covid-19 and children under age 12 in the household based on eq. (4.2). All regressions include age and state fixed effects. All coefficients are from separate regressions. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on ALLBUS and COMPASS, weighted.

CHAPTER 5

Parental Leave, Mothers' Careers and Divorce

This chapter (pp. 119–150) is single authored.

5.1 INTRODUCTION

Perhaps the most pronounced change over the past decades was the increase in female labor force participation. This change was primarily enabled by family policies designed to reconcile work and family life (Blau *et al.*, 2004; Goldin, 2014; Olivetti and Petrongolo, 2017; Rossin-Slater, 2018). Among these policies, parental leave schemes (along with public child care) are most common: Today, all OECD countries except the US provide parental leave in some form on the federal level, with the intention to improve maternal and child health and to enable mothers to remain close to the labor market. At the same time, parental leave policies have profound effects on families in general, for example through changes in the allocation of market work or financial resources. Consequently, they also change the way families work and the dependencies arising between two parents.

This paper investigates whether parental leave reforms also unintentionally impact the stability of families. From a welfare perspective, marital instability matters, particularly because of its negative side effects on children. Substantial research has shown that divorce is negatively correlated with both child investments and child outcomes (McLanahan, 2004; Lundberg *et al.*, 2016; Amato and Keith, 1991; Goisis *et al.*, 2019), and a number of studies have shown similar results in causal frameworks (González and Viitanen, 2018; Reinhold *et al.*, 2013; Gruber, 2004). Furthermore, in the context of household specialization, divorce also becomes a gender inequality issue. Divorces tend to harm women financially, and in particular more than men (Radenacker, 2020; Bonnet *et al.*, 2021; Leopold, 2018). Reductions in the female household income range from 19 to 44%, while men either experience small losses or even gain.[1]

I provide novel evidence on how parental leave policies affect the stability of families. I analyze two parental leave reforms which shifted maternal employment outcomes in opposite directions to study the change in the divorce risk in Germany. The first reform in 1992 increased the unpaid job protection period and delayed the return of mothers to employment (Schönberg and Ludsteck, 2014). The second reform in 2007 paid higher benefits over a shorter period of time, which resulted in an earlier return to employment and in persistently higher earnings (Kluve and Schmitz, 2018). I rely on administrative data from the German Pension Insurance containing complete employment biographies of women born between 1948 and 1985 and monthly data on child birth and divorce. I employ a combination of a regression-discontinuity design and a difference-in-difference approach. I find that both reforms did not change divorce rates on average.

Going beyond the existing literature, I investigate whether mothers who respond more strongly in terms of employment may also experience changes in the divorce rate. Mothers with low pre-birth earnings may respond less to changes in work incentives, given that they are not strongly attached to the labor marked in any case. On the other end of the distribution, career-oriented mothers with

[1] These differences can be explained by a number of factors, including restricted earnings capabilities due to care responsibilities, too low child and spousal maintenance payments, which do not fully compensate the loss of income, and in general human capital deficits resulting from household specialization (Bröckel and Andreß, 2015). The evidence on wellbeing and health is more mixed. While Leopold (2018) finds negative effects for Germany, Gardner and Oswald (2006) show with data from the UK that a divorce may actually improve the wellbeing of former couples.

high pre-birth earnings may also be unresponsive regarding parental leave policies, as they will always return to the labor market quickly. Mothers between these two extremes, however, may be most responsive in terms of employment. Consistent with this argument, I find that mothers with medium pre-birth earnings exhibit the strongest negative employment response to the expansion of the job protection period. For them, the divorce rate falls by three to five percentage points five years after the first birth. This is large given that, on average, 10% of mothers were divorced five years after their first child. Furthermore, they reduce the spacing between the first and the second birth by eight months (17% relative to baseline). However, while these mechanisms seem to be present in the 1990s, they do not seem to have symmetric effects in the 2000s. Results pass a number of robustness checks, including changes in the window around the reform, the inclusion of covariates, alternative standard error calculations, and placebo regressions.

I primarily add to the literature on how parental leave policies impact marital stability, which is so far inconclusive. I summarize the relevant studies in Table 5.A.1 in the Appendix. The studies use regression-discontinuity designs, difference-in-difference approaches or a combination of the two and exploit either expansions of maternity leave coverage, be it paid or unpaid leave, or expansions of earmarked leave for fathers. Most studies looking at maternity leave expansions find zero average effects (Danzer *et al.*, 2020; Carneiro *et al.*, 2015; Dahl *et al.*, 2016). The exception are Cygan-Rehm *et al.* (2018) who find that paying higher benefits over a shorter period of time in Germany has positive effects on cohabitation, and Canaan (2022) who studies an increase in paid leave by three years and shows it decreased marital stability. Cools *et al.* (2015), Avdic and Karimi (2018), and Olafsson and Steingrimsdottir (2020) study paternity leave expansions in Norway, Sweden and Iceland, respectively, with contradicting results.

I also contribute to the literature studying the link between female employment, children and the divorce decision. Whether children are stabilizing or destabilizing relationships is not completely resolved in the literature. Svarer and Verner (2008) show that couples who are less likely to split up select into having kids, and when selection is accounted for, children have a negative effect on relationship stability. A more crucial role may fall on female earnings. When female earnings rise or even exceed the earnings of the male partner, marital stability falls (Bertrand *et al.*, 2015; Schwartz and Gonalons-Pons, 2016; Shenhav, 2021; Folke and Rickne, 2020). Economic setbacks on the other hand, for example in the form of a job loss, increase the divorce risk (Doiron and Mendolia, 2012; Eliason, 2012). My results are consistent with this evidence as I find that a reduction in female employment after child birth has stabilizing effects, at least for the most responsive mothers.

I expand the literature in at least three ways. First, I provide novel evidence from Germany on how parental leave policies impact the risk of divorce over the past 30 years. I focus on two reforms with differential effects on maternal employment and find that average effects are close to zero, which is in line with the existing literature. Secondly, I investigate the mechanisms behind changes in the risk of divorce. I argue that effects differ substantially by the employment response, particularly since only a subset of mothers actually responds by changing their employment trajectory. I show that effects differ

by the labor market attachment prior to giving birth, and that effects are smaller for women who are either distant from the labor market or career oriented prior to becoming mothers. Mothers who reduce their employment after giving birth also have their second child earlier and have a lower divorce risk. Third, I show that these mechanisms change over time, that effects depend on the surrounding norms, and that they are not necessarily symmetric. While the 1992 reform changed the divorce risk at least for subgroups, the 2007 reform had no effects on the divorce risk. This is particularly relevant, given that policies encouraging maternal employment are on the rise.

The rest of the paper is structured as follows. Section 5.2 describes the institutional background and the two reforms, Section 5.3 derives theoretical predictions of the reform effects, Section 5.4 introduces the dataset and the identification strategy, Section 5.5 presents the results, and Section 5.6 concludes.

5.2 INSTITUTIONAL BACKGROUND

5.2.1 Marriage, divorce and maternal employment

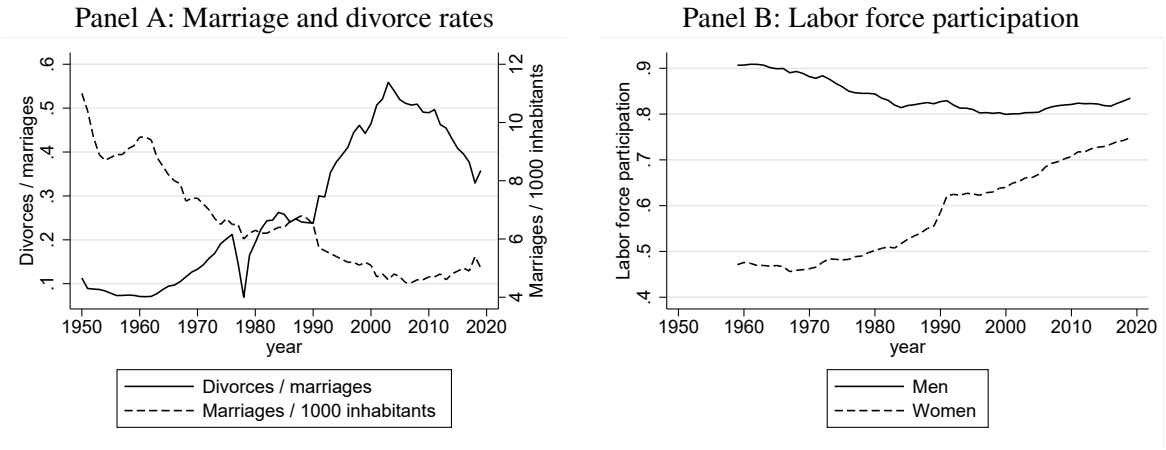
Similar to most industrialized countries and in detail discussed by Goldin (2014), the change in marriage, child birth and employment went hand in hand in Germany. The marriage rate – defined as new marriages per 1,000 inhabitants p.a. – has been falling since the 1960s while the divorce rate – divorces in relation to new marriages – has risen. Both trends are summarized in Panel A of Figure 5.1. Interestingly, and similar to the US, the trend in divorce rate has reversed since the early 2000s in Germany. This reflects a stabilization of the marriage rate and an increase in the share of older couples among all marriages (Stevenson and Wolfers, 2007). In parallel, female employment patterns shifted substantially. The German family policy and institutions long promoted a traditional family model with the man as the breadwinner (Lewis, 1992; Lewis and Ostner, 1994).[2] Panel B of Figure 5.1 visualizes the still ongoing change: Today, the difference in labor force participation between men and women amounts to less than 10 percentage points. Still, maternal labor force participation is substantially lower, particularly on the intensive margin. In 2015 only 30% of all mothers whose youngest child was aged three to five worked full-time (OECD, 2019). Sociologists framed this type of family arrangement the modern male breadwinner model in which the wife acts as the secondary earner, mostly working part-time (Trappe *et al.*, 2015).

This overall pattern hides differences between East and West Germany driven by the separation until 1990.[3] Not only are female and maternal labor force participation and full-time employment substantially higher in the East then in the West, but also family formation patterns differ between the two regions (Klüsener and Goldstein, 2016). Figure 5.2 visualizes the share of children born out of the wedlock. While in the East this share is today at roughly 60%, it stands only at 30% in the

[2] I focus here on the institutional framework in West Germany and all of Germany since unification. For a summary on family policy in the German Democratic Republic see, e.g. Cooke (2007).

[3] Becker *et al.* (2020) show that differences between the Eastern and Western part are not only driven by institutions but also predate the separation after WWII.

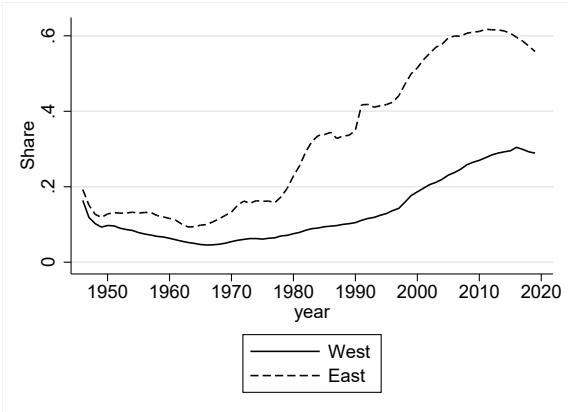
Figure 5.1: Marriage, divorce and labor force participation in Germany



Notes: Up to 1990, only West Germany is included.
Source: Federal Statistical Office (2020), own calculations.

West, and this is despite the now common institutional framework. This is also related to differences in religion summarized in Table 5.A.4. In 2011, the vast majority of the population in the Eastern part of Germany did not identify as Catholic or Protestant, which also reduces the stigma of child birth out of the wedlock but also divorce itself.

Figure 5.2: Children born outside the wedlock



Source: Federal Statistical Office (2020), own calculations.

Since reunification, family policy in Germany has been effectively transformed to allow mothers to combine work and family life. The availability of child care slots is almost universal for children above age three and the expansion continues for younger children (Bauernschuster and Schlotter, 2015; Müller and Wrohlich, 2020). Reductions in child care costs further increased maternal employment on the intensive margin (Huebener *et al.*, 2020). Still, joint taxation of married couples generates adverse

labor supply effects for the secondary earner, contributing to the high share of mothers working part-time (Steiner and Wrohlich, 2004).

5.2.2 Divorce regulations

The change in family policy went hand in hand with changes in individual responsibilities in case of a divorce. In 1977, the fault principle was abolished in (West) German alimony law. The next crucial shift was enacted in 2008, when the maintenance law was changed. Prior to the reform, a divorced mother received substantial payments, depending on the child's age. Up to age eight, she was not required to work; after that she was required to work at least part-time, but would receive support until the child turns 15. As this discriminated against children from unmarried mothers, the German constitutional court demanded change.[4] Since 2008, divorced mothers receive the same payments as separated mothers, hence payments until the youngest child turns three. The reform did not affect child alimony payments.[5]

5.2.3 Parental leave reforms

The (West) German parental leave legislation was substantially reformed since the 1970s. The details are summarized in Table 5.1. Prior to 1979, mothers were entitled to paid leave six weeks before and eight weeks after child birth. Payment was equal to previous earnings, and during this period, mothers were not allowed to be dismissed and had the right to a job comparable to her previous one. In May 1979, the job protection period was raised to six months, and payment for the additional four months was set at 750 DM. This corresponded to one third of average earnings, and only mothers who were employed pre-birth were eligible. Later expansions extended the job protection period successively to 36 months, while pay during the paid leave periods was lowered to 600 DM. The expansion of protected leave were grounded on the belief that the first months and years after birth are crucial for child development and were designed to encourage mother-child interaction.

The latest reform occurred in January 2007 (Huebener *et al.*, 2016). Since then, parents are entitled to parents money (*Elterngeld*). This benefit amounts to two thirds of the average individual net earnings, capped at 1,800 Euros, and is paid over a shorter period of time. Parents who were not employed prior to child birth receive 300 Euros, which equals the maximum amount that could be received prior to the reform. Hence, the reform generated both winners and losers. While low-income mothers only receive the previous amount over a shorter period of time, high-income parents receive up to 21,600 Euros in transfers (Cygan-Rehm *et al.*, 2018). One parent can receive the benefit for up to 12 months. Two additional months are earmarked for the other parent, usually the father, meaning

[4] BVerfG, Beschluss des Ersten Senats vom 28. Februar 2007, 1 BvL 9/04, Rn. (1-78).

[5] Bredtmann and Vonnahme (2019) show that the reform increased separations among married couples. This is not a threat to identification in the 2007 reform, since both treatment and control group are affected.

that the total of 14 months may be distributed among the partners as long as each parent takes at least two months.[6]

Table 5.1: Parental leave reforms

Reform	Job protection	Paid leave	Amount	Paternal leave	Announced
Up to May 1979	2	2	Full salary (2)	No	–
May 1979	6	6	Full salary (2) 750 DM (4)	No	No
Jan. 1986	10	10	Full salary (2) 600 DM (4 + 4 m.t.)	Yes	No
Jan. 1988	12	12	Full salary (2) 600 DM (4 + 6 m.t.)	Yes	Yes
July 1989	15	15	Full salary (2) 600 DM (4 + 9 m.t.)	Yes	Yes
July 1990	18	18	Full salary (2) 600 DM (4 + 12 m.t.)	Yes	No
Jan. 1992	**36**	**18**	**Full salary (2) 600 DM (4 + 12 m.t.)**	**Yes**	**No**
Jan. 1993	36	24	Full salary (2) 600 DM (4 + 18 m.t.)	Yes	Yes
Jan. 2007	**36**	**12**	**65% of former salary min. 300 Euro max. 1,800 Euro**	**Yes (2 earmarked)**	**No**

Notes: This table summarizes parental leave reforms in Germany. Reforms included in the analysis in bold. Abbreviations: means tested (m.t.).
Source: Schönberg and Ludsteck (2014), Dustmann and Schönberg (2012), and own research.

I choose two of the eight reforms for my analysis, namely the 1992 reform and the 2007 reform. The first increased the job protection period substantially from 18 to 36 months, leaving the paid leave unchanged. Schönberg and Ludsteck (2014) show that this reform encouraged a delay in the return to work. The second worked in the opposite direction and encouraged an earlier return to work (Kluve and Tamm, 2013; Bergemann and Riphahn, 2015; Kluve and Schmitz, 2018). These two reforms allow to identify opposite maternal employment effects. I focus on these two in particular, because the others are not suitable for different reasons. The 1988, 1989, and 1993 reforms were announced in advance, which potentially allowed mothers to plan conception accordingly (Dustmann and Schönberg, 2012). The 1986 reform is not suitable either, since Baden-Württemberg expanded the period of paid leave from six to 22 months without extending the job protection period (Schönberg and Ludsteck, 2014). As the data from the German Pension Insurance only contains one regional identifier for the year

[6] The reform increased paternity leave take-up from 2.5 to 15% in 2007 (Cygan-Rehm *et al.*, 2018). Tamm (2019) shows that these daddy months did not persistently shift paternal employment patterns, though they increased fathers' involvement in child care.

2015, it is not fully possible to remove Baden-Württemberg due to internal mobility. The 1979 and 1990 reforms are suitable, but constitute smaller shifts with smaller employment effects.

5.3 THEORETICAL CONSIDERATIONS

Following Becker *et al.* (1977) and Becker (1981), marriage is a voluntary partnership which lasts as long as both partners benefit in terms of utility. The two reforms outlined above have profound effects on families in multiple dimensions, such as the financial situation or the gains from household specialization. I outline the effects of the two reforms in Table 5.2, depending on whether mothers actually change their employment status, in other words are responsive or non-responsive to the reform.

Labor supply responses may differ, particularly due to the labor market attachment prior to giving birth. Women with a low labor market attachment or with a low earnings potential may not be responsive to changes in the job protection period. They would probably not return to their old job in any case. On the other end of the distribution, mothers with high career aspirations may not be that responsive either. For them, a fast return to employment may take place irrespective of a longer job protection period. Mothers between these two extremes, however, may be substantially more responsive. The same goes for shorter benefit payments. Hence, it is crucial to consider how effects differ by the employment situation before giving birth.

Table 5.2: Theoretical predictions for changes in parental leave legislation

	1992 reform: Increased job protection period		2007 reform: Higher benefits paid over shorter period	
	Responsive	*Non-responsive*	*Responsive*	*Non-responsive*
Financial stress	↑	–	↓	↑↓
Time constraints	↓	–	↑	–
Gains from household specialization	↑	–	↓	–
Female bargaining power	↓	–	↑	–
Household insurance	↓	–	↑	–
Compliance with gender norms	↑	–	↓	–

Notes: This table summarizes the impact of two parental leave reforms on multiple dimensions of family life.

First, both reforms impact the *financial stress* of families, as they impact employment choices and the amount of transfers. The literature has shown that shocks on the earnings capacity matter for marital stability.[7] In the 1992 setting, an increase in the job protection period does not change the level of benefits. Instead, if a mother reduces her employment after giving birth, the loss of earnings reduces the net household income. The opposite is true for the 2007 reform. Depending on the labor

[7] For husbands, negative earnings shocks increase the risk of divorce (Charles and Stephens, 2004; Doiron and Mendolia, 2012; Eliason, 2012) while positive earnings shocks decrease it (Weiss and Willis, 1997).

market attachment prior to giving birth, mothers now receive higher benefits in the first 12 months after child birth, which increases the net household income. This increase even generates an income effect for mothers with high potential earnings who would otherwise return to the labor market within 12 months after giving birth. After 12 months, however, benefits are actually lower than before the reform. Only if mothers return to the labor market, the net household income increases, otherwise it decreases.

Secondly, the reforms change the *time constraints* of families and the allocation of market and home production, which may matter for the quality of the marriage. Weagley *et al.* (2007), for example, show empirically that increases in the wife's household work hours reduce the risk of divorce. Mothers who stay home longer given the now longer job protection period have more time for child care and home production in general, which may reduce stress on the household level and hence stabilize marriages. Again, inelastic mothers are not impacted. Mothers who return to employment earlier have less time for child care. In case external care is not readily available or costly, the stress level may additionally increase.

Third, both reforms change the *gains from household specialization* (Becker, 1981). If mothers stay home longer, the benefit from having a working partner increases, hence increasing the incentive to stay married. The opposite holds if mothers return to employment earlier. These channels may be particularly strong if the length of the absence from the labor market has long-run effects on human capital and the subsequent career, changing the comparative advantage in market and home production. Again, this channel is only present in case women actually respond to the policy changes.

Relatedly, a change in the earnings potential of mothers may impact their *bargaining power* within couples (Lundberg and Pollak, 1996, 2007), particularly because it changes the economic options of women outside the partnership (Cancian and Meyer, 2014). The 1992 reform may reduce the bargaining power for women who stay home longer. The 2007 reform, on the other hand, may increase the female share in the household income and hence increase the female bargaining power. The increased labor market attachment may also shield women from the financial setback generated by a divorce and increase their economic independence, which can have both stabilizing or destabilizing effects.

Furthermore, the reforms change the ability of families to provide *insurance* in case of an economic setback. The flexibility model predicts that maternal employment can improve the risk sharing between partners and hence have stabilizing effects (Oppenheimer, 1997). While the 1992 reform lowers the ability of women to offset potential earnings reductions of the partner, the 2007 reform has the potential to do the opposite, which raises the marital surplus and increases marital stability.

Lastly, the reforms impact the *compliance with gender norms*, such as the male bread winner norm. Bertrand *et al.* (2015) have shown that the relative income within couples matters for both marriage formation and the likelihood of divorce, in particular if the woman outearns the husband. Folke and Rickne (2020) provide additional evidence, showing that promotions to top jobs (mayor and parliamentarian) increase the divorce probability, with post-promotion divorces being concentrated

among more traditional couples. While the 1992 reform may hence make it easier to comply with traditional gender norms, the 2007 reform may do the opposite.

5.4 DATA AND IDENTIFICATION STRATEGY

5.4.1 Data

I use administrative data containing full monthly employment biographies and earnings from the German Pension Insurance of 267,812 individuals aged 30 to 67 in 2015 and with German nationality.[8] For women, the dates of child birth are known on a monthly level as this is relevant for the calculation of pension entitlements. For men, children are mostly not relevant for pensions and hence rarely included in the data. Crucially, the dataset contains monthly information on the legal start and end of marriages for marriages ending in divorce and on the transferred amount of pension points between the former married couple. The overall sample records more than 34,000 divorces.

The dataset has several advantages. First, the administrative nature of the dataset minimizes measurement error. Secondly, the large sample size allows for a precise estimation of treatment effects, unlike other potential (survey) data sources like the German Socio-Economic Panel (SOEP). Third, the entire employment biography is available, which allows to track long-run effects on the individual level.

Still, the dataset has several drawbacks as well. The German Pension Insurance only includes employment information which is covered by social security. Self-employed, civil servants, and individuals who have withdrawn from the labor market completely are not part of the sample. Still, roughly 90% of all German residents are covered, though it may not be fully representative of the overall population. Further, due to to the design of the German social security system, contributions are only paid up to the social security ceiling, and earnings exceeding this threshold are top-coded.[9]. This is only relevant for less than 5% of all women in the sample.[10] Further, not all divorces occurring

[8] *Scientific Use File Statutory Pension Insurance Accounts and Divorce* (Versicherungsbiografie und Eheentscheidung, VSKT-VA, compare Keck *et al.* (2019) for details). The dataset combines the Sample of Insurance Accounts (Versicherungskontenstichprobe, VSKT) – a 1% random sample of all public pension accounts covering 90% of German residents – with the Statistics for the Equalization of Pension Entitlements after Divorce (Versorgungsausgleichsstatistik, VA). On July 1, 1977, the equalization of pension entitlements between ex-spouses, the so-called *Versorgungsausgleich*, was introduced to the German family and marriage law (1. EheRG, §§1587ff./BGB. See Keck *et al.*, 2019, for details). The idea was that retirement claims generated during marriage should be distributed equally among both partners. The dataset has so far been used to study how divorce impacts employment outcomes and earnings (Brüggmann, 2020; Radenacker, 2020) and to analyze how divorce impacts the gender pension gap (Kreyenfeld *et al.*, 2018). The restriction on German nationality was made as individuals with foreign nationalities often conduct divorces outside of Germany, especially if the marriage was initiated abroad.

[9] Compare Table 5.A.2 for the parameters of the German social security system.

[10] Since 1984 one-time payments such as holiday and Christmas payments are subject to social security contributions and hence included in the earnings measure (Bönke *et al.*, 2015). As I focus on mothers having their first birth in 1991, this is not problematic for my analysis.

in Germany are covered by the Equalization of Pension Entitlements. Keck *et al.* (2019) show that the full data covers 64% of all recorded marriages in Germany.[11]

I restrict the sample to affected cohorts containing women giving birth to their first child in the years 1991 and 1992 and 2006 and 2007, and control cohorts containing first-time mothers who give birth in the years 1990 and 2005. Further, I exclude East Germany from the analysis of the 1992 reform, as divorces are only recorded there since 1992. Following Keck *et al.* (2019), I account for divorce recording problems in individuals with earnings points from both East and West Germany by using the date the divorce petition was filed instead of the actual divorce finalization. These restrictions result in a sample of 12,658 mothers. Table 5.3 provides summary statistics separately by reform.

Mothers between the two reforms differ substantially. Even though the educational information is missing for more than 40% of all mothers in both samples, mothers who are part of the second reform sample are better educated and have higher pre-birth earnings. They give birth to their first child later, and have, on average, fewer children. For those mothers who do get divorced, the dataset contains exact information on the legal start and end date of the marriage. In order to make divorce outcomes comparable, I consider divorce outcomes up to five years after giving birth.[12] While 9% of all mothers are divorced in the 1992 sample, this share is only 7% in the 2007 sample. This is also driven by the fact that people marry less and later over time. 76% of the 2007 sample consists of mothers who worked their whole lives in West Germany, 6% lived in East Germany only, while 18% received points in both East and West Germany.

5.4.2 Identification strategy

I study two reforms in parental leave legislation to estimate the causal effect of parental leave entitlements on divorce. I combine a regression-discontinuity (RD) approach and a difference-in-difference (DD) design (Dustmann and Schönberg, 2012; Schönberg and Ludsteck, 2014; Cygan-Rehm *et al.*, 2018). Intuitively, I compare mothers of children born shortly before and shortly after each reform, hence exploiting a sharp cutoff of January 1 (*RD*) with the months of birth as the running variable. In the baseline specification, the window around the cutoff January 1 is equal to six months.[13] Additionally, I add a control group of mothers giving birth one year earlier (*DD*). I analyze first births only and estimate the following equation by Ordinary Least Squares:

[11] The date of data collection is December 31. Individuals may not be included in the statistic either because they are not covered by social security, have passed away prior to January 1 of the reporting year, or in case claims were compensated after the retirement alimony. Multiple data points may occur in case individuals are divorced more than once and hence are subject to the Versorgungsausgleich multiple times, or in case a change in the alimony is necessary. Short marriages, marriages with wealthy spouses, spouses with comparable earnings, and older cohorts may be less well covered, more so since 2009. Since 1977, the law was changed several times. The most structural change occurred in 2009. Priorly, statutory, occupational, and private pensions were also part of the pension entitlement split, resulting in a bureaucratically complicated procedure. The so-called *Strukturreform des Versorgungsausgleichs* (structural reform of the equalization of pension entitlements) removed this task from the Public Pension Insurance implies that the transferred amount before and after the reform is not comparable. Additionally, the number of recorded divorces is lower, since spouses who do not have claims to the Public Pension Insurance are no longer included. Further, short marriages of less than three years and equalizations of small magnitude are no longer subject to the equalization procedure.

[12] I can only observe mothers exposed to the 2007 reform up to 2015, hence eight years after giving birth.

[13] Results are insensitive to using a three months window.

Table 5.3: Descriptive statistics

	Reform 1992		Reform 2007	
	Sample mean	(SD)	Sample mean	(SD)
Socio-economic characteristics				
Tertiary information missing (D)	0.45	(0.50)	0.42	(0.49)
No degree (D)	0.07	(0.25)	0.04	(0.19)
Vocational degree (D)	0.44	(0.50)	0.45	(0.50)
Academic degree (D)	0.04	(0.20)	0.10	(0.30)
Pre-birth earnings in Euro	1503.20	(963.47)	1666.90	(1288.34)
Fertility				
Total number of children	2.04	(1.00)	1.80	(0.76)
Age at first birth	26.57	(4.43)	29.35	(5.03)
Divorce (five years after child birth)				
Divorced (D)	0.09	(0.28)	0.07	(0.25)
Age at first divorce	28.86	(4.64)	31.27	(5.26)
Regional				
East (D)	0.00	(0.00)	0.06	(0.23)
West (D)	1.00	(0.00)	0.76	(0.43)
East / West (D)	0.00	(0.00)	0.18	(0.38)
Observations	5,252		7,406	

Notes: The table gives descriptive statistics on the individual level for all mothers giving birth in the years 1990-1992 and 2005-2007. Dummy variables are indicated with a D. Earnings in Euros in prices from 2005.
Source: VSKT-VA 2015, own calculations, weighted.

$$Y_{it} = \alpha_{0t} + \alpha_{1t} Cohort_i + \alpha_{2t} Treat_i + \alpha_{3t}(Cohort_i \cdot Treat_i) + X_{it} + \sum_m \theta_m D_i + u_{it} \tag{5.1}$$

The outcome Y_{it} of individual i in period t after child birth is regressed on $Cohort_i$ which is equal to one if the mother is part of the reform cohorts by giving birth six months pre- and post-reform (July 1991 to June 1992 or July 2006 to June 2007) and zero otherwise, and $Treat_i$ which is equal to one if the mother gives birth between January and June. The coefficient of interest is α_{3t}, resulting from the interaction of $Cohort_i$ and $Treat_i$, capturing the treatment effect of each reform. To control for seasonality, I use mothers giving birth exactly one year earlier as the control group, i.e., mothers having their first child in 1990 and 2005. I additionally include month of birth fixed effects and a vector of covariates X_{it}, including the maternal age, maternal age squared, and dummy variables for the educational categories (including a category for missing information).[14] Eq. (5.1) is estimated separately for both reforms and 12, 18, 24, 30, 36, 48 and 60 months (t) after child birth. I compute Eicker-Huber-White heteroskedasticity- robust standard errors.[15]

[14] Results are not sensitive to removing covariates in Tables 5.A.5 and 5.A.6.
[15] Clustering at the month of birth level leaves results unchanged. Results are reported in Table 5.A.5 and 5.A.6.

Identification rests on two main assumptions. The first is that the date of birth of the child is not affected by the reform. In other words, women should not be able to sort around the cutoff. As argued above, the two reforms considered here have not been announced in advance (Schönberg and Ludsteck, 2014; Kluve and Schmitz, 2018). Further, though Raute (2019) shows that the 2007 reform increased incentives to give birth for mothers with a high earnings potential, this effect sets in with a delay, as even fertile couples require, on average, three to six months to become pregnant (Farré and González, 2019). The six-months time frame should hence exclude effects from changes in the composition of mothers. Still, I show in Tables 5.A.5 and 5.A.6 that results are not sensitive to using a smaller window of three months. To support the assumption of no selection around the cutoff further, I plot the number of births around January 1 – the start of both reforms – in Panel A of Figure 5.A.1. While there is a certain variance between different months, there does not seem to be any systematic impact of either reform. As there may be some potential to change the date of birth around the cutoff, I drop the months December and January from the analysis in one robustness check in Tables 5.A.5 and 5.A.6. Results are unchanged.

The second crucial assumption is the common trend assumption, in other words that mothers in the treatment and control group would have had a similar divorce behavior in the absence of treatment. To show that mothers do not systematically differ between treatment and control group, I plot the share of mothers with a vocational degree and the age at first birth around the cutoff for both reforms in Panel B and C of Figure 5.A.1, respectively. There do not seem to be substantial differences in education, though the age at first birth exhibits an upward trend over both reform periods. I test for differences in observables in a more systematic manner by using the socio-economic characteristics available in the data as outcome variables and estimate eq. (5.1) following Pei *et al.* (2019) in Table 5.A.3. The results support the graphical evidence of a significantly higher age at first birth after the reform. This pattern is roughly continuous across all years and supportive of flexible age controls in the main specification. Additionally, I investigate pre-trends graphically in Figure 5.3 and test for pre-trends in Table 5.A.7. Both are reassuring of the common trend assumption. Furthermore and by construction, seasonality effects may matter for identification, as treated mothers give birth in the first half of the year, while untreated mothers give birth in the second half. Hence, I further control for months of birth fixed effects to account for any additional seasonality.

5.5 RESULTS

5.5.1 Main results

I start by providing graphical evidence on how the 1992 and the 2007 parental leave reform impact employment, earnings, and the divorce risk. I compare mothers giving birth in the pre-reform years (1991 and 2006) with mothers having children in the reform years (1992 and 2007) and plot the monthly averages 30 months before giving birth up to 60 months after birth in Figure 5.3. All results refer to first births only. Employment is defined as employment subject to social security contributions

and excludes marginal employment like mini jobs. I do so to make reform effects comparable, because marginal employment is only covered in the data since 1999.[16]

I replicate the results by Schönberg and Ludsteck (2014) and Kluve and Schmitz (2018) in Panel A (employment) and Panel B (earnings) of Figure 5.3. Both reform effects materialize right at the reform change. The 1992 reform reduces employment rates 18 to 36 months after child birth. After three years, employment rates catch up. This is also reflected in a small reduction in earnings. The 2007 reform, in contrast, increases employment and earnings 12 months after birth, and effects appear persistent. The earnings effects in Panel B are in general smaller than the employment effects.

Given the effects both reforms had on maternal employment, I now turn to the outcome of interest - divorce - in Panel C. For both reforms, the confidence intervals overlap, however, there seems to be some suggestive evidence that the 1992 reform reduced the divorce rate in the long run. For the 2007 reform, there seems to be a non-persistent increase in the divorce rate.

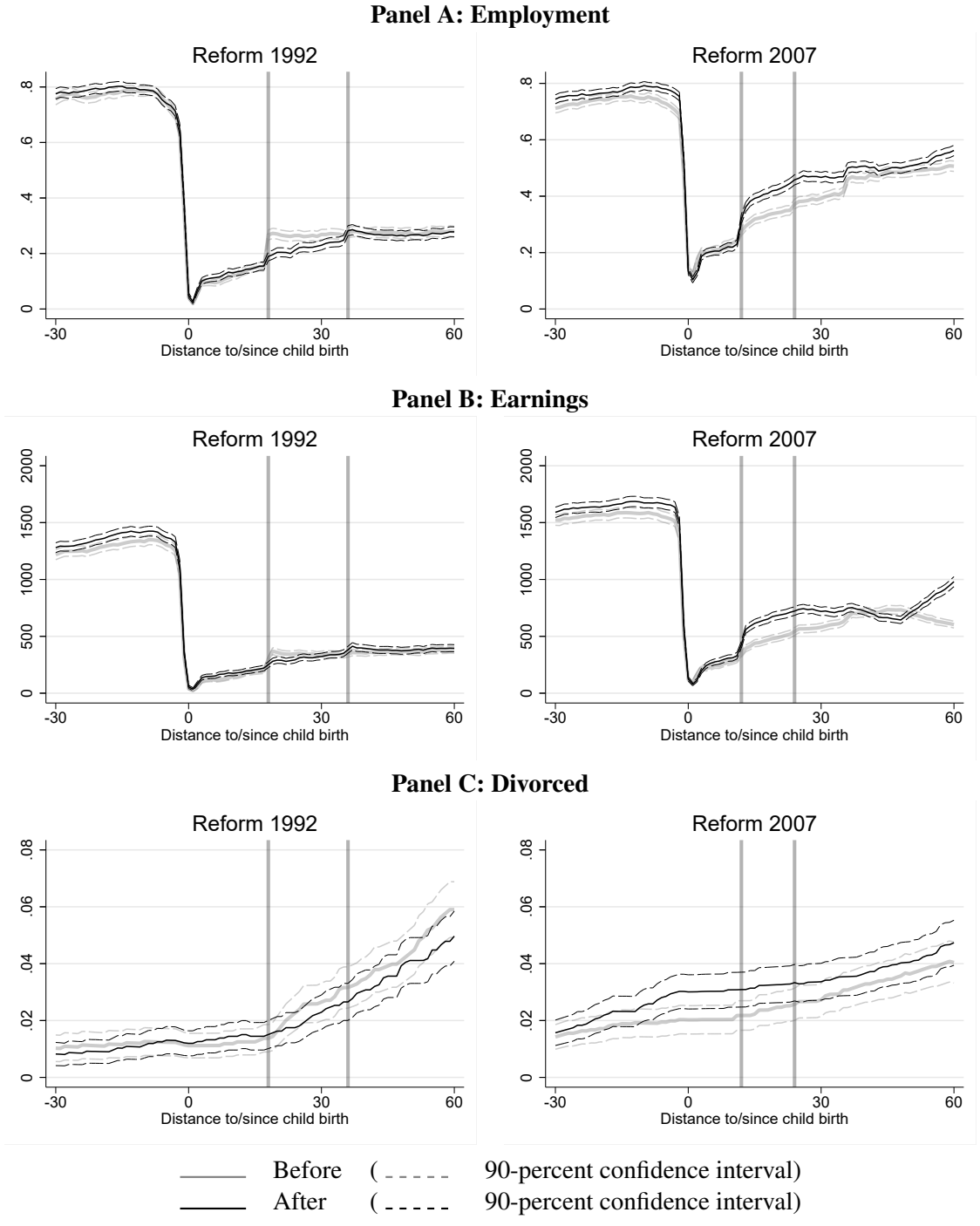
The comparison of means is supportive evidence, however, it does not provide standard errors nor accounts for month of birth effects or other covariates. Next, I estimate eq. (5.1) for both reforms and all three outcomes from 12 months up to 60 months after giving birth and report results in Table 5.4. The 1992 expansion of the job protection period from 18 to 36 months reduced employment 18 months after birth by 6 percentage points (pp) and also reduced maternal earnings on average. The effect fades out already after 24 months. In contrast, the 2007 reform significantly sped up the return to employment. 12 months after child birth, the employment rate is roughly 7 pp higher, and the point estimate stays positive five years after giving birth. This increase in employment is also reflected in substantially higher earnings. In line with the graphical evidence, I find that neither the 1992 reform nor the 2007 reform shifted divorce patterns on average. This matches the related literature that parental leave entitlements do not change marital stability on average (Cools *et al.*, 2015; Carneiro *et al.*, 2015; Danzer *et al.*, 2020; Dahl *et al.*, 2016).

5.5.2 The role of maternal employment

As outlined in Section 5.3, zero average effects are not that surprising given that only a subset of mothers responds to the changed employment incentives. Effects may differ substantially, particularly depending on the employment situation prior to giving birth. Women who were not working prior to giving birth are unlikely to react to changes in parental leave schemes. The same goes for more career-focused women: Irrespective of the generosity of parental leave entitlements, they may return to employment soon after giving birth. As a result, only a subset of women is actually responsive to the reform. This argumentation is consistent with the theoretical model outlined in González and Zoabi (2021) in which they argue that couples react differently depending on the pre-birth gender gap. Though I do not observe paternal earnings, maternal pre-birth earnings act as proxy given the high rate of full-time employed fathers in Germany (Huebener *et al.*, 2020).

[16] Before birth, around 20% of future mothers are not employment subject to social security contributions; these are either marginally employed or not employed.

Figure 5.3: Descriptive reform effects: employment, earnings and divorce



Notes: All figures plot the average outcome separately for treatment and control group 30 months pre-child birth up to 60 months post-child birth. Earnings in prices from 2005.
Source: Own calculations based on VSKT-VA, weighted.

Table 5.4: Reform effects on employment and divorce

	Months since child birth						
	12	18	24	30	36	48	60
Reform 1992							
Employed	0.001	-0.063**	-0.025	-0.015	0.020	0.000	0.039
	(0.025)	(0.031)	(0.031)	(0.032)	(0.032)	(0.032)	(0.032)
Divorced	0.001	0.000	0.001	0.002	-0.000	-0.002	-0.018
	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.014)	(0.016)
Obs.	3,095	3,088	3,083	3,076	3,073	3,068	3,052
Reform 2007							
Employed	0.071**	0.103***	0.090***	0.074**	0.039	0.020	0.020
	(0.027)	(0.029)	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)
Divorced	0.005	0.001	-0.000	-0.002	-0.009	-0.013	-0.008
	(0.009)	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.013)
Obs.	4,300	4,277	4,253	4,227	4,192	4,111	4,018

Notes: The table reports the reform treatment effect based on eq. (5.1). All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Source: Own calculations based on VSKT-VA.*

To investigate this question, I split mothers into three groups based on their position in the earnings distribution relative to the median 1.5 years prior to giving birth. I assign mothers into one of three groups, below median (*below p50*), median up to the 75th percentile (*p50 to p75*), and above the 75th percentile (*above p75*). I expand eq. (5.1) and interact the treatment indicator with the group indicator, include group fixed effects, and estimate separate effects for each group up to five years after birth. This information is not available for the entire sample - mothers may for example be self-employed prior to giving birth - and hence the number of observations is reduced for both reforms. I first report the effects of employment in Table 5.5.

I find that mothers with a low labor market attachment prior to giving birth do not react to the extension of the job protection period in 1992. Instead, most of the observed average effect is driven by mothers with medium pre-birth earnings. 18 months after giving birth, the employment rate of these mothers is 15 pp lower in case they were eligible for a longer job protection period. After 24 months, their employment rate is still 9 pp lower. Mothers with high pre-birth earnings are somewhere between the two groups.

The reform in 2007, on the other hand, impacted mothers across the entire earnings distribution, though effects seem to be a little larger for high-earning women. For women with low pre-birth earnings who also lost in terms of benefits, the positive employment effect already sets in 12 months after giving birth.

Next, I investigate whether these differential employment responses also translate into changes in the divorce risk. I use the same group definition as before (below median, median up to the 75th percentile, and above the 75th percentile) and report results in Table 5.6.

Table 5.5: Heterogeneity by pre-birth earnings: employment

	Reform effect on employment: months since child birth						
	12	18	24	30	36	48	60
Reform 1992							
Below p50	0.010	-0.007	0.003	-0.007	-0.012	-0.019	0.009
	(0.033)	(0.040)	(0.039)	(0.039)	(0.040)	(0.040)	(0.041)
p50 to p75	-0.030	-0.152***	-0.087*	-0.044	-0.011	-0.039	0.006
	(0.035)	(0.045)	(0.047)	(0.048)	(0.049)	(0.049)	(0.049)
Above p75	-0.001	-0.107**	-0.046	-0.031	0.047	-0.013	0.038
	(0.041)	(0.049)	(0.049)	(0.049)	(0.050)	(0.050)	(0.050)
Obs.	2,643	2,637	2,632	2,625	2,622	2,617	2,602
Reform 2007							
Below p50	0.092***	0.105***	0.076**	0.057*	0.004	-0.003	-0.010
	(0.031)	(0.033)	(0.034)	(0.034)	(0.034)	(0.035)	(0.036)
p50 to p75	0.061	0.066	0.110**	0.086**	0.063	0.030	0.032
	(0.042)	(0.043)	(0.044)	(0.044)	(0.044)	(0.044)	(0.045)
Above p75	0.031	0.120***	0.089**	0.105**	0.084**	0.057	0.046
	(0.042)	(0.042)	(0.042)	(0.043)	(0.042)	(0.043)	(0.041)
Obs.	4,149	4,127	4,107	4,083	4,050	3,974	3,890

Notes: The table reports the reform treatment effect based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

For the 1992 reform, I observe a decrease in the divorce rate for mothers who were between the 50th and the 75th percentile in the earnings distribution 18 months before giving birth. Three years after giving birth they are 3.1 pp less likely to be divorced. This effect is still significant after 60 months. For mothers with low or high pre-birth earnings, I estimate precise zero effects.

In contrast, the 2007 had limited differential effects by pre-birth earnings. Effects are insignificant for all subgroups and point estimates are small. Still, the effects may show up on different margins, for example through changes in living arrangements. Cygan-Rehm *et al.* (2018) show that the reform reduced the occurrence of single motherhood, an outcome which is not contained in this dataset.

For the 1992 reform it is possible to look even further ahead than five years. In Table 5.7, I report both the divorce risk and the accumulated earnings ten and 15 years after the first birth. In Panel A I find that ten years later, the divorce risk is still 6 pp lower for mothers with medium pre-birth earnings. After 15 years the effect is no longer significant, though the point estimate remains negative. In Panel B I report the effects on the sum of all earnings accumulated since giving birth. I do not report lifetime earnings to account for differences in the age at first birth. Given the large variation in earnings, the effects are not significant, however the point estimate is large and negative for medium earning mothers which is in line with the short-run employment effects reported in Table 5.5.

Table 5.6: Heterogeneity by pre-birth earnings: divorce

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Reform 1992							
Below p50	0.006	0.005	-0.002	-0.001	-0.002	0.003	-0.011
	(0.013)	(0.013)	(0.014)	(0.015)	(0.016)	(0.019)	(0.022)
p50 to p75	-0.014	-0.015	-0.017	-0.027	-0.031*	-0.041**	-0.051**
	(0.014)	(0.015)	(0.016)	(0.017)	(0.018)	(0.019)	(0.024)
Above p75	0.003	0.001	0.001	0.001	0.009	0.006	-0.019
	(0.014)	(0.015)	(0.015)	(0.017)	(0.018)	(0.019)	(0.021)
Obs.	2,643	2,637	2,632	2,625	2,622	2,617	2,602
Reform 2007							
Below p50	0.008	0.005	0.004	-0.001	-0.008	-0.014	-0.006
	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.016)
p50 to p75	0.001	-0.003	-0.004	-0.003	-0.008	-0.015	-0.012
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.016)	(0.017)
Above p75	0.003	0.001	0.002	0.003	-0.003	-0.007	-0.002
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)
Obs.	4,149	4,127	4,107	4,083	4,050	3,974	3,890

*Notes: The table reports the reform treatment effect based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on VSKT-VA.

5.5.3 The role of norms

Effects may not only differ by the pre-birth labor market attachment, but also by surrounding norms and the stigma related to getting divorced. In today's Germany, gender norms differ between East and West Germany, also owed to institutional differences during separation, with the East being substantially more progressive (Lippmann *et al.*, 2020; Bauernschuster and Rainer, 2012; Danzer *et al.*, 2021). While it is possible to assess this heterogeneity for the 2007 reform, the 1992 analysis is based on West Germany only, so I focus on another cultural divide in divorce behavior: religion. The southern part of Germany is predominantly Catholic, while the north is more Protestant. For Catholics, the negative consequences of divorce are higher.[17] I report differential effects by religion and East-West in Table 5.8.

I find the negative effects of the 1992 reform seem to be driven mainly by the protestant part of Germany. Under the assumption that norms are more progressive among Protestants, more mothers return to employment earlier in the absence of the reform.

For the 2007, reform I do not find any differences by region; effects are insignificant in both groups. This suggests that even in the more traditional West Germany, there are no adverse effects of an earlier return to employment on marital stability.

[17] I report the religious composition in Table 5.A.4 in the Appendix. I remove Baden-Württemberg from this heterogeneity because the shares of Catholics and Protestants are relatively similar.

Table 5.7: Long-term effects on divorce and cumulative earnings

	Reform effect on:			
	Panel A: Divorce		Panel B: Cumulative earnings	
	10 years	15 years	10 years	15 years
Reform 1992				
Below p50	0.001	-0.023	6577.395	4237.646
	(0.031)	(0.038)	(5967.398)	(10236.866)
p50 to p75	-0.069**	-0.051	-1913.271	-8600.311
	(0.034)	(0.043)	(7298.159)	(12235.968)
Above p75	0.002	-0.006	16933.637	26020.904
	(0.032)	(0.040)	(10439.532)	(17469.280)
Obs.	2,534	2,316	2,534	2,316

*Notes: The table reports the reform treatment effect based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Earnings in prices from 2005. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on VSKT-VA.

Table 5.8: Heterogeneity by religion

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Reform 1992							
Protestant	-0.005	-0.004	-0.007	-0.007	-0.018	-0.020	-0.038*
	(0.013)	(0.014)	(0.014)	(0.015)	(0.017)	(0.019)	(0.022)
Catholic	0.007	0.006	0.004	0.003	0.003	0.004	-0.016
	(0.011)	(0.011)	(0.013)	(0.014)	(0.015)	(0.017)	(0.019)
Obs.	2,555	2,548	2,546	2,540	2,538	2,533	2,519
Reform 2007							
West	0.006	0.003	0.002	-0.002	-0.009	-0.015	-0.008
	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.013)	(0.014)
East	-0.001	-0.004	-0.005	-0.003	-0.010	-0.009	-0.006
	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.015)	(0.015)
Obs.	4,300	4,277	4,253	4,227	4,192	4,111	4,018

*Notes: The table reports the reform treatment effect based on eq. (5.1) interacted with group indicators for the respective region. All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Earnings in prices from 2005. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on VSKT-VA.

5.5.4 Fertility

Another explanation for the observed reduction in divorce rates may be changes in subsequent fertility. There is some evidence that parental leave reforms can impact fertility decisions. Lalive and Zweimüller (2009) show for Austria that expanding the parental leave duration from one to two years increased the probability of having a second child. Farré and González (2019) study the fertility effects of earmarked paternity leave in Spain, and find that this delayed subsequent fertility. They argue that this increased maternal labor market attachment and hence raised the opportunity costs of having an additional child. It may have also increased paternal awareness of the costs of child care. For Germany, Raute (2019) analyzes the fertility effects of the 2007 parent leave reform in Germany and finds that fertility increased in particular among highly educated women and women with higher earnings.

I investigate subsequent fertility responses in Table 5.9, again differentially by the position in the earnings distribution prior to giving birth and for both reforms. I report the probability of having a second child five and eight years after the first birth, the spacing between the first and the second child (conditional on having a second child), and the total number of children eight years after the first birth.

Table 5.9: Heterogeneity by pre-birth earnings: fertility

	Reform effect on fertility outcomes			
	2nd child after 5 years	2nd child after 8 years	Spacing btw. 1st & 2nd child after 8 years	Total number of children after 8 years
Reform 1992				
Below p50	0.006	-0.038	-2.965	0.014
	(0.045)	(0.044)	(4.124)	(0.092)
p50 to p75	0.047	0.008	-8.024**	-0.002
	(0.053)	(0.051)	(3.729)	(0.094)
Above p75	-0.006	-0.056	-5.339	0.055
	(0.051)	(0.049)	(3.607)	(0.100)
Obs.	2,602	2,567	1,784	2,567
Reform 2007				
Below p50	-0.026	-0.042	-2.643	-0.168***
	(0.037)	(0.042)	(2.746)	(0.062)
p50 to p75	0.083*	0.072	0.129	0.026
	(0.045)	(0.050)	(2.773)	(0.071)
Above p75	-0.037	-0.079	3.358	-0.151**
	(0.044)	(0.048)	(2.707)	(0.066)
Obs.	3,890	3,196	1,883	3,196

Notes: The table reports the reform treatment effect based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. Spacing is reported in months. All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

For the 1992 reform I find that mothers who earned between the median and the 75th percentile react by reducing the spacing between their first and second child by roughly eight months or 17% relative to the control cohort baseline of 48 months. The reform hence brings the second birth closer to the end of the job protection period, which is only rational since having an additional child before the end of the job protection period prolongs the right to return to the previous employer. The total number of children, however, remains unaffected.

For the 2007 reform I find some evidence for reduced total fertility in mothers with low and high pre-birth earnings with mothers closer to the median are less affected. This is in line with evidence from Cygan-Rehm *et al.* (2018). While mothers with low pre-birth earnings are loosing out from the reform (benefits are now paid over a shorter period of time), the level of benefits may not be sufficiently high for mothers with a high earnings potential to have more children.

5.5.5 Robustness

In order to support the validity of the results, I apply several changes to the identification strategy outlined in Section 5.4.2 and report results for the heterogeneous effects by pre-birth earnings for the 1992 reform in Table 5.A.5 in the Appendix.[18] First, I drop all control variables from the analysis. Results are unchanged. Secondly, I reduce the window around the reform from six to three months to focus on mothers very close to the cutoff. While a smaller window around the cutoff is preferable, it also reduces power. The point estimates become a little smaller, but stay significant four years after the first birth. Next, I account for potential manipulation of the timing of births around the cutoff. This is relevant as Tamm (2013) and Neugart and Ohlsson (2013) show that for the 2007 reform, parents pushed the delivery date from December 2006 to January 2007. Hence, a similar shift may have occurred at other reforms as well. To avoid this potential bias, I remove births from December and January. The effects stay the same. Fourth, I only include mothers in the sample who I observe over the entire period of analysis and exclude mothers who leave the pension system, for example to become self-employed or civil servants. Again, results are unchanged. Fifth, I cluster standard errors on the running variable, i.e., the month of birth level. Standard errors become even smaller, which points toward the specification error pointed out by Kolesár and Rothe (2018). Hence, I stick to using Eicker-Huber-White standard errors throughout the analysis. Next, I drop the control cohort from the analysis and estimate a simple difference effect between the pre- and post-reform group, which corresponds more to a regression discontinuity design. I find that the results are not sensitive to this changes. I repeat the same analysis within the control cohort, which corresponds to a placebo regression. Reassuringly, effects are insignificant in this specification.

Finally, I investigate pre-trends in the employment, earnings, and divorce in Table 5.A.7 30, 24, 18, and 12 months before giving birth. Reassuringly, I find that pre-trends are overall stable for all outcomes and for both reforms.

[18] I report the robustness checks for the 2007 reform in Table 5.A.6. Effects are insignificant in all specifications.

5.6 DISCUSSION AND CONCLUSION

Did family policy contribute to the change in family structure that occurred over the past decades? This paper provides novel evidence on how parental leave policies are related to marital stability. I analyze two subsequent reforms in a combined regression-discontinuity difference-in-difference framework using administrative data from Germany. The first reform in 1992 doubled the (unpaid) job protection period from 18 to 36 months; the second reform in 2007 paid higher benefits (for mothers who were employed pre-birth) over a shorter period of time. The reforms hence have distinctly different effects on maternal employment.

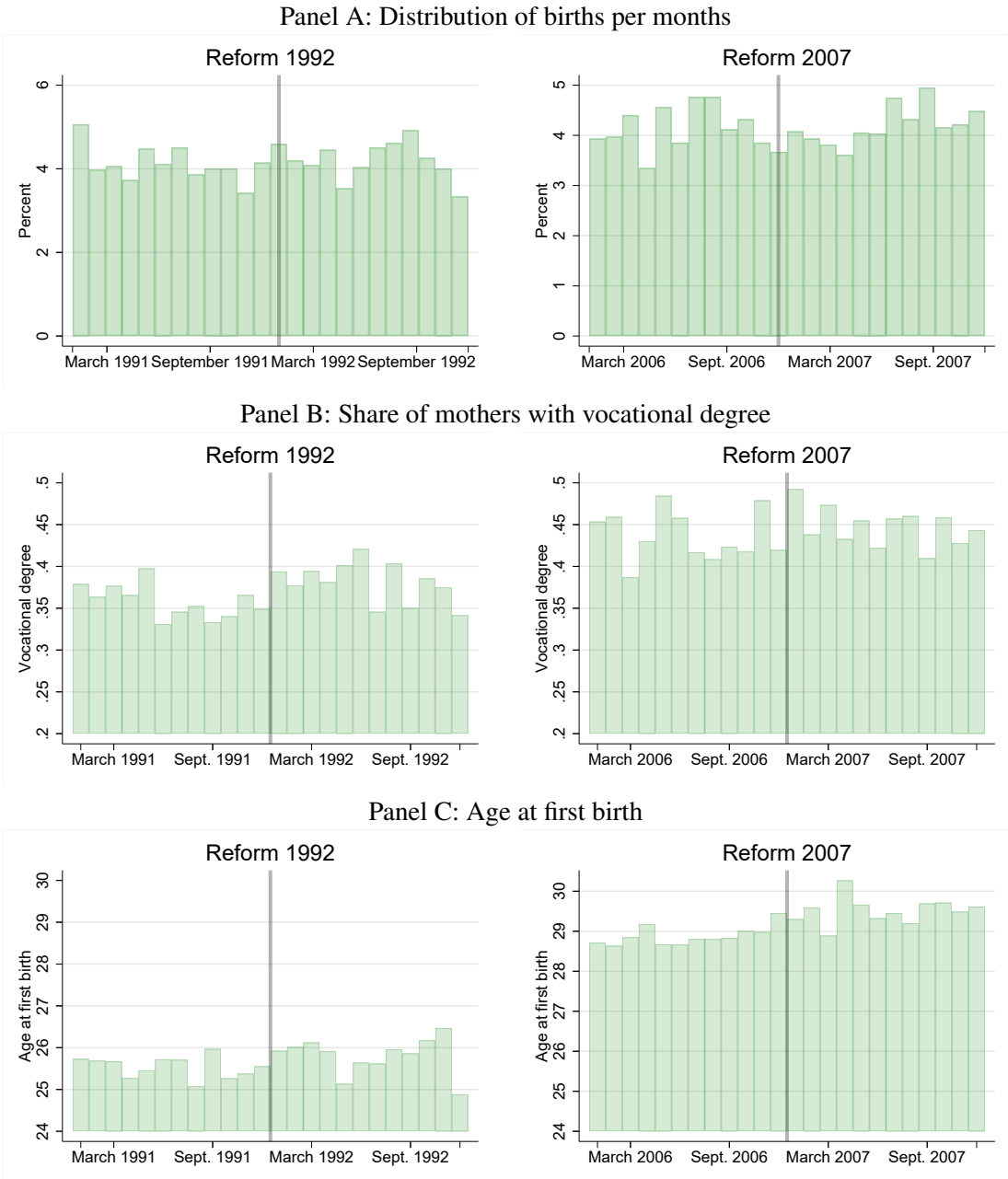
In line with the existing literature, I find that both changes in parental leave entitlements did not change the divorce risk on average. However, these average effects hide differential responses. I show that mothers who were most responsive to an extension of the (unpaid) job protection period in terms of employment also have a lower divorce risk. In these families, the reduction in maternal employment increases the gains from household specialization and may make it easier to comply with traditional gender role attitudes. The reduction in time constraints may also make it easier to have the second child earlier, which is also what I find in the data. The increase in financial stress and the improvements in intra-household insurance, which predict an increase in divorce rates, seem to be less relevant. Using the same methodological framework 20 years later, I do not find any effects of higher maternal employment on the risk of divorce.

What conclusions can we draw from these results? First, family policy like parental leave regulation can impact marital stability. However, the effects identified here are local in nature and depend not only on the design of the policy itself but also on the institutional and norm context. The 1992 reform was set in an environment with comparably low female employment rates and limited child care coverage, though both were already on the rise. In this context, some women respond strongly in terms of employment, which may reinforce traditional household specialization patterns. The second considered reform, however, was set in a different institutional environment. Child care coverage and maternal labor force participation were higher, and norms toward maternal employment were increasingly more progressive. In this environment, an increase in maternal employment does not seem to affect marital stability, which is encouraging given the recent development with respect to parental leave. It is unclear, how the reform would have faired in the 1990s.

From a welfare perspective, it is reassuring that parental leave reforms which incentivize maternal employment need not have negative effects on marital stability. Still, due to data restrictions, effects on other margins like cohabitation are possible. Given the recent increase in cohabitation, future research should not only look at marriage outcomes. Overall, future research is needed to understand the link between policy, maternal employment and the situation of families.

5.A APPENDIX

Figure 5.A.1: Sorting around the cutoff



Notes: Panel A plots the distribution of birth over the two reform time frames 1991-1992 and 2006-2007. Panel B and C plot the share of mothers with a vocational degree and the age at birth for the first time mothers in each month.

Source: Own calculations based on VSKT-VA, weighted.

Table 5.A.1: Literature review parental leave and marital stability

Study	Country	Methodology	Treatment	Effect
Maternity leave				
Danzer *et al.* (2020)	Austria	RD-DD & IV	Paid leave extension by 12 months	No effect
Cygan-Rehm *et al.* (2018)	Germany	RD-DD	Shorter payments linked to pre-birth earnings	Increase in cohabitation
Carneiro *et al.* (2015)	Norway	RD	Increase in paid leave from 0 to 4 months & in unpaid leave from 12 weeks 12 months	No effect
Dahl *et al.* (2016)	Norway	RD	Increase in paid leave from 18 to 35 weeks	No effect
Canaan (2022)	France	RD	Increase in paid leave by 3 years	Decrease in marital stability
Paternity leave				
Cools *et al.* (2015)	Norway	DD	One month earmarked paternity leave	No effect
Avdic and Karimi (2018)	Sweden	RD-DD	Two months earmarked paternity leave	Increase in couple dissolution by 1 pp
Olafsson and Steingrimsdottir (2020)	Iceland	RD	One month earmarked paternity leave	Decrease in couple dissolution
González and Zoabi (2021)	Spain	RD	Two weeks earmarked paternity leave	Increase in divorce

Notes: RD: regression-discontinuity, DD: difference-in-difference, IV: instrumental variable.
Source: Own illustration.

Table 5.A.2: Key parameters of German social security

Year	Average earnings	Pension insurance ceiling	Pension insurance rate	Health insurance ceiling	Health insurance rate	Unempl. insurance ceiling	Unempl. insurance rate	Long-term care insurance rate
1970	13,343	21,600	8.50	14,400	4.10	21,600	0.65	.
1971	14,931	22,800	8.50	17,100	4.10	22,800	0.65	.
1972	16,335	25,200	8.50	18,900	4.20	25,200	0.85	.
1973	18,295	27,600	9.00	20,700	4.60	27,600	0.85	.
1974	20,381	30,000	9.00	22,500	4.70	30,000	0.85	.
1975	21,808	33,600	9.00	25,200	5.20	33,600	1.00	.
1976	23,335	37,200	9.00	27,900	5.60	37,200	1.50	.
1977	24,945	40,800	9.00	30,600	5.70	40,800	1.50	.
1978	26,242	44,400	9.00	33,300	5.70	44,400	1.50	.
1979	27,685	48,000	9.00	36,000	5.60	48,000	1.50	.
1980	29,485	50,400	9.00	37,800	5.70	50,400	1.50	.
1981	30,900	52,800	9.25	39,600	5.90	52,800	1.50	.
1982	32,198	56,400	9.00	42,300	6.00	56,400	2.00	.
1983	33,792.5	61,200	9.04	45,900	5.80	61,200	2.30	.
1985	35,286	64,800	9.25	48,600	5.90	64,800	2.15	.
1986	36,627	67,200	9.60	50,400	6.10	67,200	2.00	.
1987	37,726	68,400	9.35	51,300	6.30	68,400	2.15	.
1988	38,896	72,000	9.35	54,000	6.50	72,000	2.15	.
1989	40,063	73,200	9.35	54,900	6.50	73,200	2.15	.
1990	41,946	75,600	9.35	56,700	6.30	75,600	2.15	.
1991	44,421	78,000	8.98	58,500	6.10	78,000	3.09	.
1992	46,820	81,600	8.85	61,200	6.40	81,600	3.15	.
1993	48,178	86,400	8.75	64,800	6.70	86,400	3.25	.
1994	49,142	91,200	9.60	68,400	6.60	91,200	3.25	.
1995	50,665	93,600	9.30	70,200	6.60	93,600	3.25	0.50
1996	51,678	96,000	9.60	72,000	6.70	96,000	3.25	0.85
1997	52,143	98,400	10.15	73,800	6.80	98,400	3.25	0.85
1998	52,925	100,800	10.15	75,600	6.80	100,800	3.25	0.85
1999	53,507	102,000	9.85	76,500	6.80	102,000	3.25	0.85
2000	54,256	103,200	9.65	77,400	6.80	103,200	3.25	0.85
2001	55,216	104,400	9.55	78,300	6.80	104,400	3.25	0.85
2002	28,626	54,000	9.55	40,500	7.00	54,000	3.25	0.85
2003	28,938	61,200	9.75	41,400	7.20	61,200	3.25	0.85
2004	29,060	61,800	9.75	41,856	7.20	61,800	3.25	0.85
2005	29,202	62,400	9.75	42,300	7.10	62,400	3.25	0.85
2006	29,494	63,000	9.75	42,756	6.50	63,000	3.25	0.85
2007	29,951	63,000	9.95	42,756	6.80	63,000	2.10	0.85
2008	30,625	63,600	9.95	43,200	6.90	63,600	1.65	0.85
2009	30,506	64,800	9.95	44,100	7.00	64,800	1.40	0.97
2010	31,144	66,000	9.95	45,000	7.00	66,000	1.40	0.97
2011	21,100	66,000	9.95	44,550	7.30	66,000	1.50	0.97
2012	33,002	67,200	9.85	45,900	7.30	67,200	1.50	0.97
2013	33,659	69,600	9.45	47,250	7.30	69,600	1.50	1.02
2014	34,514	71,400	9.45	48,600	7.30	71,400	1.50	1.02
2015	35,363	72,600	9.35	49,500	7.30	72,600	1.50	1.18

Source: Bönke et al. (2015) and own research.

Table 5.A.3: Joint balancing test

	Outcome			
	Age at first birth	No degree	Academic degree	Vocational degree
Reform 1992	0.701**	-0.011	0.056	0.005
	(0.330)	(0.021)	(0.035)	(0.013)
Obs.	3,031	3,031	3,031	3,031
Reform 2007	0.934***	0.005	0.018	0.034*
	(0.283)	(0.012)	(0.031)	(0.018)
Obs.	4,234	4,234	4,234	4,234

Notes: The table reports the reform effect based on eq. (5.1) at the time of child birth on maternal characteristics. All regressions include fixed effects for the month of child birth excluding maternal covariates. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

Table 5.A.4: Religion by state

	1987			2011		
State	Catholic	Protestant	No religion / other	Catholic	Protestant	No religion / other
West						
Baden-Württemberg	45.3	40.7	14	37.6	34.1	28.3
Bavaria	67.2	23.9	8.9	55.7	21.1	23.3
Bremen	10	61	29	11.8	43.2	45
Hamburg	8.6	50.2	41.2	10.9	33.9	55.2
Hesse	30.4	51.7	17.9	25.6	40.8	33.6
Lower Saxony	19.6	65.2	15.2	18.3	51.5	30.2
North-Rhine Westfalia	49.4	35.2	15.4	42.5	28.5	28.9
Rhineland-Palatinate	54.5	37.2	8.3	45.7	31.8	22.6
Saarland	72.7	21.7	5.6	63.3	20.1	16.7
Schleswig-Holstein	6.2	73.3	20.5	6.4	55.7	37.8
East						
Berlin	—	—	—	9.6	21.6	68.7
Brandenburg	—	—	—	3.6	18.4	78
Mecklenburg-Vorpommern	—	—	—	3.4	17.7	78.9
Saxony	—	—	—	3.8	21.4	74.8
Saxony-Anhalt	—	—	—	3.6	15.2	81.2
Thuringia	—	—	—	8	24.3	67.6

Notes: The table reports the religious composition in German states in 1987 and 2011. No data for East Germany before 2011.
Source: GESIS Religionszugehörigkeit in Deutschland 1871 – 2012.

Table 5.A.5: Robustness checks 1992

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Baseline							
Below p50	0.006	0.005	-0.002	-0.001	-0.002	0.003	-0.011
	(0.013)	(0.013)	(0.014)	(0.015)	(0.016)	(0.019)	(0.022)
p50 to p75	-0.014	-0.015	-0.017	-0.027	-0.031*	-0.041**	-0.051**
	(0.014)	(0.015)	(0.016)	(0.017)	(0.018)	(0.019)	(0.024)
Above p75	0.003	0.001	0.001	0.001	0.009	0.006	-0.019
	(0.014)	(0.015)	(0.015)	(0.017)	(0.018)	(0.019)	(0.021)
Obs.	2,643	2,637	2,632	2,625	2,622	2,617	2,602
No control variables							
Below p50	0.006	0.005	-0.002	-0.001	-0.002	0.003	-0.011
	(0.013)	(0.013)	(0.014)	(0.015)	(0.016)	(0.019)	(0.022)
p50 to p75	-0.014	-0.015	-0.017	-0.027	-0.031*	-0.041**	-0.051**
	(0.014)	(0.015)	(0.016)	(0.017)	(0.018)	(0.019)	(0.024)
Above p75	0.003	0.001	0.001	0.001	0.009	0.006	-0.019
	(0.014)	(0.015)	(0.015)	(0.017)	(0.018)	(0.019)	(0.021)
Obs.	2,643	2,637	2,632	2,625	2,622	2,617	2,602
Three months window							
Below p50	0.019	0.019	0.018	0.019	0.016	0.024	0.021
	(0.021)	(0.021)	(0.022)	(0.023)	(0.024)	(0.027)	(0.031)
p50 to p75	-0.021	-0.021	-0.025	-0.038*	-0.041*	-0.041*	-0.046
	(0.016)	(0.017)	(0.019)	(0.021)	(0.022)	(0.024)	(0.031)
Above p75	0.010	0.009	0.012	0.009	0.013	0.018	0.002
	(0.022)	(0.023)	(0.024)	(0.024)	(0.025)	(0.026)	(0.029)
Obs.	1,973	1,968	1,965	1,960	1,958	1,953	1,940
Excl. January and December							
Below p50	0.008	0.005	-0.003	0.001	-0.002	0.000	-0.014
	(0.015)	(0.015)	(0.016)	(0.018)	(0.019)	(0.022)	(0.024)
p50 to p75	-0.015	-0.020	-0.023	-0.026	-0.034*	-0.048**	-0.060**
	(0.016)	(0.016)	(0.019)	(0.019)	(0.020)	(0.021)	(0.026)
Above p75	0.010	0.005	0.005	0.009	0.015	0.008	-0.017
	(0.017)	(0.017)	(0.018)	(0.020)	(0.021)	(0.022)	(0.025)
Obs.	2,178	2,172	2,167	2,161	2,159	2,155	2,143
Balanced panel							
Below p50	0.010	0.007	0.001	0.005	0.006	0.017	-0.001
	(0.014)	(0.015)	(0.015)	(0.016)	(0.017)	(0.020)	(0.023)
p50 to p75	-0.016	-0.019	-0.019	-0.029	-0.031	-0.040*	-0.047*
	(0.015)	(0.016)	(0.018)	(0.019)	(0.020)	(0.021)	(0.026)
Above p75	0.006	0.003	0.004	0.006	0.014	0.013	-0.015
	(0.015)	(0.016)	(0.016)	(0.018)	(0.019)	(0.020)	(0.022)
Obs.	2,421	2,421	2,421	2,421	2,421	2,421	2,421

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*Notes: The table reports the reform treatment effect from alternative specifications based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. Robust standard errors in parentheses unless indicated otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*
Source: Own calculations based on VSKT-VA.

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Continuation of previous page.							
Standard clustered on the month of birth level							
Below p50	0.006	0.005	-0.002	-0.001	-0.002	0.003	-0.011
	(0.015)	(0.015)	(0.017)	(0.018)	(0.017)	(0.018)	(0.022)
p50 to p75	-0.014	-0.015	-0.017	-0.027	-0.031	-0.041**	-0.051**
	(0.010)	(0.011)	(0.018)	(0.019)	(0.019)	(0.018)	(0.016)
Above p75	0.003	0.001	0.001	0.001	0.009	0.006	-0.019
	(0.016)	(0.017)	(0.017)	(0.019)	(0.020)	(0.020)	(0.022)
Obs.	2,643	2,637	2,632	2,625	2,622	2,617	2,602
Simple difference							
Below p50	0.001	0.002	-0.002	-0.006	-0.010	-0.001	-0.017
	(0.007)	(0.007)	(0.008)	(0.011)	(0.011)	(0.018)	(0.027)
p50 to p75	-0.012	-0.017	-0.013	-0.030	-0.029	-0.043*	-0.042
	(0.012)	(0.013)	(0.015)	(0.021)	(0.021)	(0.025)	(0.035)
Above p75	0.001	0.002	0.009	0.001	0.007	0.005	-0.030
	(0.013)	(0.013)	(0.014)	(0.017)	(0.018)	(0.020)	(0.030)
Obs.	1,362	1,360	1,358	1,354	1,352	1,352	1,346
Simple placebo difference							
Below p50	0.017	0.005	0.004	0.015	0.002	-0.009	-0.017
	(0.024)	(0.027)	(0.027)	(0.028)	(0.030)	(0.034)	(0.038)
p50 to p75	0.018	0.006	0.009	0.019	0.020	-0.006	-0.018
	(0.027)	(0.028)	(0.029)	(0.033)	(0.035)	(0.037)	(0.043)
Above p75	-0.028	-0.032	-0.028	-0.019	-0.026	-0.052	-0.052
	(0.031)	(0.032)	(0.032)	(0.033)	(0.034)	(0.038)	(0.041)
Obs.	1,281	1,277	1,274	1,271	1,270	1,265	1,256

Notes: The table reports the reform treatment effect from alternative specifications based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. Robust standard errors in parentheses unless indicated otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

Table 5.A.6: Robustness checks 2007

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Baseline							
Below p50	0.008	0.005	0.004	-0.001	-0.008	-0.014	-0.006
	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.016)
p50 to p75	0.001	-0.003	-0.004	-0.003	-0.008	-0.015	-0.012
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.016)	(0.017)
Above p75	0.003	0.001	0.002	0.003	-0.003	-0.007	-0.002
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)
Obs.	4,149	4,127	4,107	4,083	4,050	3,974	3,890
No control variables							
Below p50	0.008	0.005	0.004	-0.001	-0.008	-0.014	-0.006
	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.016)
p50 to p75	0.001	-0.003	-0.004	-0.003	-0.008	-0.015	-0.012
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.016)	(0.017)
Above p75	0.003	0.001	0.002	0.003	-0.003	-0.007	-0.002
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)
Obs.	4,149	4,127	4,107	4,083	4,050	3,974	3,890
Three months window							
Below p50	0.019	0.012	0.014	0.012	0.006	-0.003	0.004
	(0.014)	(0.014)	(0.014)	(0.015)	(0.017)	(0.018)	(0.020)
p50 to p75	0.008	0.002	0.005	0.006	0.000	-0.008	-0.001
	(0.017)	(0.017)	(0.018)	(0.018)	(0.019)	(0.020)	(0.021)
Above p75	0.027	0.023	0.026	0.028	0.021	0.017	0.022
	(0.022)	(0.022)	(0.022)	(0.022)	(0.024)	(0.024)	(0.025)
Obs.	3,088	3,073	3,058	3,045	3,025	2,973	2,915
Excl. January and December							
Below p50	0.005	0.002	0.000	-0.006	-0.009	-0.015	-0.010
	(0.012)	(0.013)	(0.013)	(0.013)	(0.014)	(0.016)	(0.018)
p50 to p75	-0.003	-0.008	-0.009	-0.008	-0.008	-0.015	-0.008
	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)	(0.019)
Above p75	0.008	0.005	0.006	0.008	0.004	-0.000	0.004
	(0.016)	(0.016)	(0.017)	(0.017)	(0.018)	(0.019)	(0.020)
Obs.	3,452	3,434	3,416	3,396	3,367	3,306	3,235
Balanced panel							
Below p50	0.008	0.004	0.001	-0.001	-0.008	-0.015	-0.011
	(0.012)	(0.012)	(0.012)	(0.013)	(0.014)	(0.015)	(0.016)
p50 to p75	-0.006	-0.011	-0.012	-0.012	-0.017	-0.023	-0.016
	(0.013)	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.017)
Above p75	0.005	0.003	0.003	0.004	-0.003	-0.006	-0.005
	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)	(0.018)
Obs.	3,783	3,783	3,783	3,783	3,783	3,783	3,783

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Notes: The table reports the reform treatment effect from alternative specifications based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. Robust standard errors in parentheses unless indicated otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

	Reform effect on divorce: months since child birth						
	12	18	24	30	36	48	60
Continuation of previous page.							
Standard clustered on the year of birth level							
Below p50	0.008	0.005	0.004	-0.001	-0.008	-0.014	-0.006
	(0.011)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.016)
p50 to p75	0.001	-0.003	-0.004	-0.003	-0.008	-0.015	-0.012
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.016)	(0.017)
Above p75	0.003	0.001	0.002	0.003	-0.003	-0.007	-0.002
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)
Obs.	4,149	4,127	4,107	4,083	4,050	3,974	3,890
Simple difference							
Below p50	0.020	0.020	0.019	0.019	0.019	0.027	0.031
	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)	(0.019)	(0.020)
p50 to p75	0.005	0.003	0.002	0.005	0.007	0.013	0.004
	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)	(0.023)	(0.022)
Above p75	0.020	0.021	0.025	0.024	0.021	0.026	0.030
	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.022)	(0.023)
Obs.	2,064	2,054	2,040	2,023	2,000	1,953	1,905
Simple placebo difference							
Below p50	0.001	0.003	0.001	-0.002	0.015	0.030	0.020
	(0.017)	(0.017)	(0.018)	(0.018)	(0.022)	(0.024)	(0.026)
p50 to p75	0.002	-0.001	0.001	0.005	0.035	0.039	0.037
	(0.019)	(0.019)	(0.020)	(0.020)	(0.024)	(0.027)	(0.027)
Above p75	0.012	0.009	0.011	0.012	0.039	0.041	0.039
	(0.023)	(0.023)	(0.023)	(0.023)	(0.026)	(0.027)	(0.028)
Obs.	2,085	2,073	2,067	2,060	2,050	2,021	1,985

Notes: The table reports the reform treatment effect from alternative specifications based on eq. (5.1) interacted with group indicators for the pre-birth position in the earnings distribution. Robust standard errors in parentheses unless indicated otherwise. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

Table 5.A.7: Pre-trends in outcome variables

	Reform effect on different outcomes: months before child birth			
	30	24	18	12
Reform 1992				
Employed	-0.016	0.044	0.000	0.018
	(0.032)	(0.031)	(0.030)	(0.029)
Earnings	-55.647	35.378	-13.172	13.118
	(67.176)	(66.126)	(65.916)	(66.018)
Divorced	-0.003	-0.008	-0.009	-0.010
	(0.009)	(0.009)	(0.009)	(0.009)
Obs.	2,469	2,562	2,655	2,730
Reform 2007				
Employed	-0.006	-0.016	-0.010	-0.002
	(0.025)	(0.024)	(0.024)	(0.024)
Earnings	-0.419	-28.317	-43.331	-38.584
	(67.503)	(66.853)	(67.624)	(67.296)
Divorced	0.007	0.005	0.008	0.002
	(0.007)	(0.008)	(0.008)	(0.008)
Obs.	4,066	4,131	4,186	4,236

Notes: The table reports the reform effect based on eq. (5.1). All regressions include fixed effects for the month of child birth, and controls for maternal characteristics. Earnings in prices from 2005. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Own calculations based on VSKT-VA.

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English Summary (Abstracts)

Chapter 2: The Gender Pay Gap and Employment Choices within Couples

This paper studies whether a rising relative female-to-male wage affects partnership formation, female employment, and the gaps in working hours within couples. We specifically investigate the responses depending on the degree of gender equality in the labor market. We exploit that female labor supply patterns are historically different in East and West Germany, but are otherwise located in a common institutional framework. Isolating task-based demand shifts within industries and using German administrative data, we find that a higher relative female wage increases female labor supply on the extensive and the intensive margin and reduces employment gaps within couples in West Germany. Effects are much smaller in East Germany, where the level of gender equality in the labor market is already high.

JEL: D13, E32, J12, J16, J22

Keywords: Gender pay gap, female employment, household specialisation, structural change

Chapter 3: Suddenly a Stay-at-home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household

Commonly described as "gender care gap", there is a persistent gender difference in the division of unpaid domestic responsibilities in developed countries. We use German survey data to provide novel evidence on short- and long-run effects of an exogenous shock on paternal availability, through a job loss, on the intra-household allocation of domestic work. We find that paternal child care and housework significantly increase in the short run on weekdays, while we do not see any similar shifts on weekends. Effects are positive and persistent for fathers who remain unemployed or have a working partner, but reverse after re-employment. We also find significant changes for female partners as well as in cumulative household time investments and outsourcing of tasks. Our results are in line with theoretical predictions regarding time availability and financial constraints, while we find no strong evidence for changes in bargaining powers, gender role attitudes or emotional bonding.

JEL: J13, J22, J63

Keywords: Job loss, paternal child care, fatherhood, domestic labor, intra-household allocation

Chapter 4: Cracking under Pressure? Gender Role Attitudes toward Maternal Employment in Times of Covid-19 in Germany

This paper studies the effects of Covid-19 and related daycare and school closures during lockdowns on gender role attitudes toward maternal employment in Germany. Using data from 2008 through 2021, we study gender role attitudes of women and men with dependent children. First-difference and difference-in-differences estimates show that fathers' egalitarian attitudes toward maternal employment dropped substantially one year after the outbreak of the pandemic. This drop is observed for men in West Germany, who showed a steady progression toward more egalitarian attitudes in the pre-pandemic period. Attitudes by women are not affected. The drop in men's attitudes is most pronounced for fathers of young children. These findings suggest that the pandemic not only affected the short-term allocation of housework and childcare, but also reverses previous changes in more egalitarian attitudes toward maternal employment in the short run.

JEL: J13, J16, J18, J2

Keywords: Covid-19, gender role attitudes, maternal employment, daycare and school closures, childcare, difference-in-differences

Chapter 5: Parental Leave, Mothers' Careers and Divorce

Family polices have profound effects on the choices families make everyday. This paper provides novel evidence on how parental leave reforms interact with the risk of divorce in Germany. I analyze two parental leave reforms which shift maternal employment in opposite directions. I use administrative data and a combination of a regression-discontinuity and difference-in-difference approach. I find that both reforms did not change divorce rates on average, but hide differential responses. Heterogeneity analyses reveal that doubling the (unpaid) job protection period from 18 to 36 months reduces the divorce risk by 3 percentage points for mothers with medium pre-birth earnings. Looking into the mechanisms, I find that these mothers reduced their employment after giving birth and the spacing between the first and second child more strongly than mothers with lower and higher pre-birth earnings. A second reform paying higher benefits over a shorter time period set in a more progressive norm environment had no effects on marital stability.

JEL: J12, J13, J16

Keywords: Parental leave, maternal employment, divorce

Deutsche Kurzzusammenfassung

Der Vergleich der deutschen Durchschnittsfamilie im Jahr 2020 mit der fünfzig Jahre früher lässt die Unterschiede deutlich zu Tage treten. Modernen Familien sind diverser und weniger stabil, Fertilitäts- und Heiratsraten sind gesunken, die meisten Mütter arbeiten zumindest in Teilzeit und Ansichten über Geschlechterrollen sind zunehmend egalitärer. In Deutschland stieg das Alter der Frauen bei der ersten Heirat (beim ersten Kind) von 23 (24) im Jahr 1971 auf 32 (30) im Jahr 2020 (Statistisches Bundesamt, 2021a). Der Anteil der außerehelich geborenen Kinder erhöhte sich im gleichen Zeitraum von 8 auf 33% (Statistisches Bundesamt, 2021b). Während 1971 nur 45% aller Frauen im Alter von 20 bis 64 Jahren zur Erwerbsbevölkerung gehörten, stieg dieser Anteil auf 78% im Jahr 2019 (OECD, 2021). Im Jahr 1991 waren noch 28% der deutschen Bevölkerung der Meinung, dass es die Aufgabe des Mannes sei, Geld zu verdienen, während sich die Frau um den Haushalt kümmern sollte (Diabaté, 2021). Im Jahr 2018 ist dieser Anteil auf 11% gesunken.

Diese Dissertation leistet einen Beitrag zum Verständnis der Entwicklung der modernen Familie in Deutschland, geleitet von folgenden Fragen: Wie wirkt sich der Strukturwandel auf dem Arbeitsmarkt auf die Partnerschafts- und Erwerbsentscheidungen aus? Warum sind bestimmte Aspekte der Familie - wie die Aufteilung der unbezahlten Arbeit - immer noch vergleichsweise traditionell? Wie tragen die Institutionen zum Wandel der Familienstruktur und den Geschlechterrollen bei? Die Beantwortung dieser Fragen ist relevant, denn Familien sind maßgeblich für die Entwicklung der Gesellschaft, das Wirtschaftswachstum, die kindliche Entwicklung und die Einkommensungleichheit. Diese Dissertation besteht aus vier in sich abgeschlossene, aber zusammenhängende Artikel, die empirisch und auf Deutschland angewendet einen Beitrag zur Beantwortung dieser Fragen leisten.

Im zweiten Kapitel *The Gender Pay Gap and Employment Choices within Couples* wird untersucht, ob ein Anstieg der Löhne von Frauen im Vergleich zu Männern die Bildung von Partnerschaften, die Erwerbstätigkeit von Frauen und die Arbeitszeitunterschiede innerhalb von Paaren beeinflusst. Wir untersuchen insbesondere die Reaktionen in Abhängigkeit vom Grad der Gleichstellung der Geschlechter auf dem Arbeitsmarkt. Wir machen uns zunutze, dass die Muster des weiblichen Arbeitsangebots in Ost- und Westdeutschland historisch unterschiedlich sind, sich aber ansonsten in einem gemeinsamen institutionellen Rahmen befinden. Wir konstruieren einen potentiellen relativen Lohn zwischen Frauen und Männern unter Verwendung eines Shift-Share Ansatzes. Wir nutzen, dass sich die Lohnentwicklung zwischen Industrien und innerhalb von Industrien nach Tätigkeiten

unterscheidet und dass Regionen und Geschlechter unterschiedlich von diesen Lohnveränderungen betroffen sind. Unter Verwendung deutscher administrativer Daten stellen wir fest, dass ein höherer relativer Lohn das weibliche Arbeitsangebot am extensiven und intensiven Rand erhöht und die Erwerbsunterschiede zwischen Paaren in Westdeutschland verringert. In Ostdeutschland, wo das Niveau der Gleichstellung der Geschlechter auf dem Arbeitsmarkt bereits hoch ist, sind die Auswirkungen wesentlich geringer.

Das dritte Kapitel *Suddenly a Stay-at-home Dad? Short- and Long-term Consequences of Fathers' Job Loss on Time Investment in the Household* beschäftigt sich mit dem "Gender Care Gap", sprich der Diskrepanz zwischen den Geschlechtern bei der Aufteilung unbezahlter (Haus-)Arbeit. Wir verwenden deutsche Umfragedaten des Sozio-ökonomischen Panels und nutzen den unfreiwilligen Arbeitsplatzverlust von Vätern als Shock auf die zeitliche Verfügbarkeit. Damit können wir die kurz- und langfristigen Auswirkungen auf die Verteilung der Haus- und Sorgearbeit innerhalb des Haushalts analysieren. Wir stellen fest, dass die väterliche Kinderbetreuung und Hausarbeit an Wochentagen kurzfristig signifikant zunimmt, während wir an Wochenenden keine ähnlichen Verschiebungen feststellen können. Die Auswirkungen sind positiv und anhaltend für Väter, die arbeitslos bleiben oder einen erwerbstätigen Partner haben, kehren sich aber nach einer Beschäftigung wieder um. Wir finden auch signifikante Veränderungen bei weiblichen Partnern sowie auf die kumulativen Zeitinvestitionen im Haushalt und die Auslagerung von Dienstleistungen. Unsere Ergebnisse stimmen mit den theoretischen Vorhersagen in Bezug auf Zeitverfügbarkeit und finanzielle Zwänge überein. Wir können keine eindeutigen Belege für Veränderungen bei der Verhandlungsmacht, den Einstellungen zu Geschlechterrollen oder der emotionalen Bindung finden.

Im vierten Kapitel *Cracking under Pressure? Gender Role Attitudes toward Maternal Employment in Times of Covid-19 in Germany* werden die Auswirkungen von Covid-19 und den damit verbundenen Schließung von Kindertagesstätten und Schulen auf die Einstellung zur Erwerbstätigkeit von Müttern in Deutschland untersucht. Anhand von Daten aus den Jahren 2008 bis 2021 untersuchen wir die Geschlechterrolleneinstellungen von Frauen und Männern mit kleinen Kindern. Veränderungen in der Gruppe der Eltern und Differenzen-in-Differenzen-Schätzungen zeigen, dass die egalitären Einstellungen von Vätern gegenüber der Erwerbstätigkeit von Müttern ein Jahr nach Ausbruch der Pandemie deutlich abgenommen haben. In dieser Gruppe hatte es in der Zeit vor der Pandemie eine stetige Entwicklung hin zu egalitäreren Einstellungen gegeben. Die Einstellungen von Frauen sind davon nicht betroffen. Der Rückgang der egalitären Einstellungen von Männern ist bei Vätern von Kleinkindern am stärksten ausgeprägt. Die Ergebnisse deuten darauf hin, dass die Pandemie nicht nur die kurzfristige Aufteilung von Hausarbeit und Kinderbetreuung beeinflusst hat, sondern auch frühere Veränderungen in Bezug auf egalitärere Einstellungen gegenüber der Erwerbstätigkeit von Müttern kurzfristig rückgängig gemacht hat.

Im fünften Kapitel *Parental Leave, Mothers' Careers and Divorce* wird der Fokus auf die Auswirkungen familienpolitischer Maßnahmen auf die Stabilität von Familien gelegt. Es wird analysiert, wie Reformen in der Elternzeitregelung mit dem Scheidungsrisiko in Deutschland interagieren. Ich analysiere

zwei Reformen mit entgegengesetzten Effekten auf die Beschäftigung von Müttern. Ich verwende administrative Daten und eine Kombination aus einem Regressions-Diskontinuitäts- und einem Differenz-in-Differenz-Ansatz. Ich stelle fest, dass beide Reformen die Scheidungsraten im Durchschnitt nicht verändert haben. Heterogenitätsanalysen zeigen jedoch, dass die Verdoppelung des (unbezahlten) Arbeitsplatzschutzes von 18 auf 36 Monate nach der Geburt das Scheidungsrisiko für Mütter mit mittlerem Einkommen vor der Geburt signifikant verringert. Bei der Untersuchung der Mechanismen zeigt sich, dass diese Mütter ihre Erwerbstätigkeit nach der Geburt und den Abstand zwischen dem ersten und dem zweiten Kind stärker reduzieren als Mütter mit niedrigerem und höherem Einkommen vor der Geburt. Eine zweite Reform, durch die höhere Leistungen über einen kürzeren Zeitraum gezahlt wurden und welche in einem progressiveren Normumfeld stattfand, hatte keine Auswirkungen auf die Familienstabilität.