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Encouraging Mothers

The effect of German regional childcare policies on maternal employment between 2006 and 2018

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Abstract

Childbearing is often associated with employment interruptions in women's careers. Since 2005, the German federal government has implemented childcare reforms aiming at expanding the suitable infrastructure for children under the age of three, which should facilitate and accelerate the return to employment. The reforms have been a paradigm shift, because they show a shift from a traditional breadwinner family model to a dual earner-carer model. Despite federal leadership in childcare reforms, the characteristics of the care infrastructure in Germany vary by state and over time, which may contribute to different employment-interruption lengths. The study at hand evaluates Germany's recent childcare reforms regarding the impact on maternal employment by examining relationships between childcare-characteristics -namely quality and availability- and mothers' employment interruptions. A piecewise-constant exponential model is used to capture the cross-state and over time differences in childcare and their impact on the timing of women's return to employment within the first three years after birth of their first child. The study uses individual data from the Pairfam 10.0 study and childcare indicators, which are collected by the federal and state's statistical bureaus. The risk population includes 927 first-time mothers who gave birth between March 2006 and March 2018. Within this period, 525 first-time mothers return to employment within the first three years after childbirth. A significant positive effect of the childcare reform on maternal employment is revealed. Both the availability expansion and the quality improvements are associated with earlier returns to employment, establishing both institutional and cultural effects of childcare policies. An educational gradient of the effect of childcare quality on maternal employment was tested, but the results were not significant.

Keywords: family policies, maternal employment, German childcare reform, piecewise-constant exponential model, life-course studies

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Introduction

This study investigates the notable changes in women's employment patterns in Germany at the beginning of the 21st century and offers an attempt to capture the contribution of childcare policies. Historically, the western world has experienced increasing female employment rates since the 1970s and somewhat earlier in the Nordics. Women entered universities and jobs, so that the socioeconomic gap between the sexes narrowed. However, labor market participation of women drops after childbirth and the employment gap to their male counterparts arises again (Mcbridge Murry, Satterwhite Mayberry, & Berkel, 2013). Hence, childbirth has been labeled as 'new social risk' (Taylor-Gooby, 2004). To limit the duration of the employment interruption following childbirth is important for the sustainability of welfare states as the pension system and fiscal budgets are reliant on a large workforce. The individual economic situation is affected as well, because the interruption length is associated with a motherhood wage penalty and reduced chance to continue a career (Aisenbrey, Evertsson, & Grunow, 2009). Hence, the work interruption is a key issue for the individual well-being of mothers as much as for gender equality in a society.

Countries across Europe have implemented policies to shorten mothers' employment interruption. The German government has reformed the family policies since 2005. The new regulations strive to bring mothers back to work and increase maternal employment levels. Parental leave periods were cut, investments into childcare were increased and since 2013 every child is legally entitled to childcare. The increased national spending on public childcare raised coverage, educated new personal and exempted certain groups from parental fees. The reforms indicate a paradigm shift from the traditional male breadwinner to a dual earner-carer model which has the potential to transform German society.

Germany presents an interesting case for investigations of the effect of childcare infrastructure on mothers' return to employment because the subnational level is responsible for the implementation. As state governments differ in political alignment and agenda, they have different styles of spending and regulation. This leads to variation in childcare characteristics among German states. Furthermore, the recent reforms in family policies gave impetus and money from the national level top-down, which enhanced sub-national spending in public childcare. Increasing budgets have caused a dynamic development of childcare characteristics in the states. Hereby, the spending effectively increased availability of public childcare and improved the quality of the daycare centers as can be seen in the notable growth of the educated staff. The spatial and time variation enables a thorough empirical investigation of the impact of

public childcare on maternal employment. The study examines the impact of childcare availability and quality, measured in staff-to-child ratio, on maternal labor supply. The question posed within this study is: Which childcare characteristics influence the time out of work of first-time mothers?

Recent studies have observed that the maternal employment levels of educational groups are diverging (Stahl & Schober, 2017; Drasch, 2013; Pettit & Hook, 2009). Especially highly educated mothers show increasing participation rates. The study aims to shed light on the contribution of the family-policy reform period to the growing educational divide in maternal employment. The second and related question is: Are mothers with different levels of education affected differently by the childcare reforms?

The recent family-policy reforms in Germany are analyzed when operating a piecewise-constant exponential model that regresses the time out of work on childcare characteristics. This study uses data from ten annual waves of the Pairfam-study (2008-2018), which were combined with official data on childcare launched by the statistical bureaus in Germany. The contribution of the study is threefold. First, it improves the understanding of mothers' return to work in Germany. Second, the study monitors the recent childcare reforms in Germany and provides guidance for policy makers as to whether investments in expanding availability or improving quality are rewarded in employment levels. Finally, it contributes to the theoretical discourse on the institutional and cultural impacts of family policies.

The paper is organized as follows. The first part provides a theoretical framework and three working hypotheses. Then, I summarize previous studies on the relationships between childcare provisions and mothers' return to employment. In the third section, I outline the German context of the family, economics, and the labor market. I then introduce my empirical analysis, describe my data and method; and present results. I end the text with a discussion of the results.

Theories

The study relies on institutional and cultural explanations for maternal employment. Hereby, the role of family policies is of interest for the return to work following childbirth.

The institutional approach states that social policies have the potential to reduce the constraints to maternal employment and thereby enable mothers to return to work (Pettit & Hook, 2005; Braun, 2001). The institutional framework relies on assumptions that the majority of mothers generally want to work, and their employment demand is fixed. However, the institutional

context, which causes work-family conflicts, prevents the realization of employment. Therefore, the maternal workforce is usually underutilized. Public policies alter the institutional setting and might eradicate the constraints to maternal employment. One of the measures to do so is publicly subsidized childcare, which seeks to provide a direct substitute for maternal care. Public childcare relieves part of a mother's care burden, so that the transition to employment is facilitated. Therefore, state-provided childcare is an effective instrument to reconcile the family and employment roles (Olivetti & Petrongolo, 2017; van der Lippe & van Dijk, 2002). The institutional approach suggests that in countries where childcare effectively addresses employment constraints, demand for employment equals realized employment. Cross-country comparative studies support institutional approaches. In these studies, publicly provided childcare is associated with higher maternal employment levels and earlier returns to employment (Aisenbrey, Evertsson, & Grunow, 2009; Ferrarini, 2006). However, the institutional approach has a shortfall when analyzing the effect of childcare policies. From an institutional point of view, childcare policies affect just the constraint structure. Nevertheless, it was seen in Denmark, a county with highly subsidized childcare, that the realized employment hours and levels surpass the preferred employment levels (Kremer, 2007). In contradiction with the institutional approach, when employment constraints are absent, demand for and realized employment do not necessarily form an equilibrium. Instead, mothers' labor supply can exceed the demand for employment. I assume that family policies can push the labor supply beyond the level of preferred employment. Hence, social policies seem not to be restricted in their effect on the constraint structure. Apart from the institutional effect of social policies, they may encourage labor supply in a different way, which cannot be accounted for by the institutional approach.

Cultural approaches suggest that social policies exert influence via the creation of social norms (Kremer, 2007; Duncan, 2005; Bergqvist & Saxonberg, 2016). Maternal employment is surrounded with morality issues. Questions related to mothering pop up: What is the appropriate care for my child? Does maternal employment harm my child's emotional development? The state suggests answers and influences the discourse on the morality of care, because family policies underly a narrative of appropriate care and employment (Kremer, 2007). People are influenced by the normative messages that are incorporated in the social policies. Various studies verify the norm-creating potential of social policies (Bergqvist & Saxonberg, 2016; Gangl & Ziefle, 2015). For example, increased subsidies for public childcare contest the traditional gender notion of care and thus put a new care attitude in place. As a consequence,

mothers think that public childcare and maternal employment are appropriate and socially expected. The newly established ideal of care affects employment and care practices. Thus, demand for employment is not assumed to be fixed; instead, the demand is dependent on the policy context. Family policies may increase maternal employment, because the normative message encourages the use of public childcare and the transition to employment. The cultural approach closes the theoretical gap and provides explanation for the shortfall of the institutional approach. The labor supply of mothers may exceed the preferred employment levels, because childcare policies additionally exert normative impact on mothers and stimulate maternal employment.

My study contributes a theoretical framework, which offers explanations for employment effects of both childcare availability and quality. By integrating cultural and institutional pathways of social policies, the effect of public childcare is assumed to be twofold. First, childcare policies alter the constraint structure. Second, childcare policies may encourage demand for labor through establishing norms. The synthesized framework attempt to explain the effect of childcare characteristics beyond the economic approach (Blau, Ferber, & Winkler, 2006; Becker, 1993).[1]

Theoretical Framework: Childcare Characteristics and Mother's Return to Employment

The study tests hypotheses derived from a synthesized framework, which combines institutional and cultural arguments. The combined framework offers an explanation for relationships between specific childcare characteristics and maternal labor supply.

High availability of childcare is expected to stimulate maternal labor supply, because mother's use of childcare is facilitated. Low childcare availability hampers the transition to employment, as the childcare provision cannot satisfy the demand. The lack of availability stimulates the competition for childcare slots, which decreases the chance to obtain public childcare immediately and in proximity to home. Instead, mothers subscribe to waiting lists and broaden

[1] *My study does not consider economic explanations for two reasons. First, in her theoretical contribution, Hakim (Work-Lifestyle Choices in the 21st Century: Preference Theory, 2000) questions that the economic framework is fruitful for the explanation of employment pattern at the beginning of the 21st century. She argues, that maternal employment behavior is increasingly decoupled from economic necessity as consequence of labor market restructuration and gender revolutions (Hakim, 2000). Second, the economic framework does not provide a coherent explanation of the relationship between childcare availability and maternal employment. The economic models assume either sufficient childcare provision or an equilibrium on the childcare market, which results from flexible costs (Kreyenfeld & Hank, 2000). In Germany, where private day-care centres do not exist, childcare supply is exogenous and childcare costs are low, the childcare choices are unlikely to ground on economic reasoning (Schmitz, Spieß, & Stahl, 2017).*

the search, so that the search for adequate public childcare becomes costly and time-consuming. As a consequence, mothers may not be able to use childcare facilities immediately and may thus be constrained with regard to employment (Pettit & Hook, 2005). Availability expansions relax the competition for public childcare slots. Because demand and availability are more balanced, the waiting time for public childcare is diminished, and the chance to find a place in proximity to home is elevated. Therefore, availability expansions make the use of public childcare more suitable for a fast transition to employment. In high-availability regions the transition to employment is expected to be faster.

Furthermore, increasing childcare availability may set normative incentives to return soon after childbirth to employment. Kremer (2007) suggests that social policies shape the ideals and preferences of care in a society. The state acts as moral agent and childcare subsidies signal official support for non-maternal care. When family-policy reforms aim at expanding public childcare, the use of public childcare is defined as ideal of care. As care and employment are related, mothers regard a fast transition to employment as appropriate. Widely available childcare promotes the norm of maternal employment. The norm influences mothers' decisions regarding employment and contributes to increasing labor supply.

> ***First Hypothesis:*** *Increasing availability accelerates the transition to employment after the first childbirth.*

Beyond availability, the quality of facilities is also relevant as parents care about the development of their children. As stated by Schober and Spieß, "one may expect that mothers will aim to maximize the quality of care received by children in terms of emotional security as well as cognitive and social stimulation" (Schober & Spieß, 2015, p. 715). Therefore, low quality public childcare can be viewed as constraint to employment, because child's well-being is not guaranteed, so that mothers are reluctant to use public childcare. Childcare reforms, which direct money to the improvement of childcare quality, stimulate the use of public childcare. High childcare quality increases the chance that the mother's care standards are met, thus making mothers more willing to enroll their children in facilities. Therefore, in a context of high-quality childcare, mothers are less constrained to return to employment.

Childcare quality might also affect public opinion towards state-provided childcare. When childcare standards are low, public childcare does not enjoy a good reputation. Mothers might hesitate to use institutional care because they might be stigmatized as "bad mothers". Quality improvements potentially establish acceptance of public care and maternal employment (Pettit

& Hook, 2009). Consequently, public care is more often regarded as substitute for care at home, and the stigma of public childcare fades. Mothers become more willing to use public childcare and to return to work.

> ***Second Hypothesis:*** *The quality of childcare accelerates the return to employment after the first childbirth.*

While childcare improvements to quality and accessibility may be conducive to mothers' employment given that such improvements provide opportunities to reconcile work and family, mothers are a heterogenous population. Constraints and opportunities for mothers' employment may also be dependent on their social characteristics and attitudes. Based on the assumption that childcare policies have heterogenous effects, I investigate an educational gradient of childcare quality on maternal employment.

Mothering behavior is related to education, because highly educated women place more emphasizes on the child's cognitive development than women who are less well-educated (Johanssen, Leibowitz, & Waite, 1996; Kulic, Skopek, Triventi, & Blossfeld, 2019). Highly educated mothers tend to use day care regularly, because high-quality public childcare provides a safe environment for the children and enhances children's cognitive development (Blossfeld, Kulic, Skopek, & Triventi, 2017). By contrast, low educated mothers use public childcare generally less often, prefer home care and have longer working interruptions (Johanssen, Leibowitz, & Waite, 1996; Debacker, 2008; Schober & Spieß, 2015). In consequence, mothers with different levels of education appear to make other choices regarding work and care.

The employment behavior of different educational groups was diverging between 1974 and 2004 in Germany (Konietzka & Kreyenfeld, 2010). The childcare infrastructure may have contributed to growing polarization of maternal employment between well-educated and less well-educated mothers, because the effect of childcare provision on maternal employment may be mediated by educational level of the mother. As educational groups value care quality differently, I assume, the quality improvements mainly influence the work and care behavior of highly educated women. I expect well educated mothers to know what constitutes high-quality childcare and to value such care. Their employment behavior depends largely on childcare quality in the region, while the labor supply of low educated mothers is less affected by childcare quality. Therefore, I expect differential effects of childcare quality between low and highly educated mothers. In a low-quality childcare context, well-educated mothers are reluctant to use public childcare and care for children at home instead. Therefore, the

educational polarization of employment pattern is less pronounced in regions, where the childcare quality is low. The employment constraints for highly qualified mothers disappear when family-policy reforms improve childcare quality. Highly educated "mothers are likely to consider higher quality ECEC a more suitable substitute for their own care time" (Schober & Spieß, 2015, p. 715). In contexts of high public childcare quality, the chance is elevated that public childcare meets their expectations. Therefore, the educational polarization of employment pattern is more emphasized in a high-quality childcare context.

> ***Third Hypothesis:*** *Highly educated mothers are more responsive to improvements to childcare quality, returning to employment faster than mothers with less education.*

Previous Studies

A large body of studies has investigated relationships between childcare and maternal employment, and most studies point at positive effects of childcare policies. In cross-country comparisons, a strong correlation was found between national childcare spending and levels of maternal employment (Mills, et al., 2014; OECD, 2017; Profeta, 2020). High national childcare expenditures are associated with high maternal employment rates. Regardless, the macro-level relationships are vulnerable to critiques as the association can be suspected to be partially spurious because the expenditure on childcare is collinear with gender attitudes, economic performance and general welfare state generosity. Furthermore, problematic is the endogeneity of the association since countries might get more active when maternal employment is high. This means that the relation is potentially reversed.

Therefore, research has focused on national childcare reforms in order to detect causality. These studies apply a difference in difference approach (DiD), which exploits reform-induced variation of childcare between and within regions. The idea is that the magnitude of the change differs between regions because some regions react more progressively, while others are reluctant. The difference in change is related to the change in employment levels, so that the effect of childcare on employment is identified. The study design relies on the assumption that if the reform had not occurred, the employment levels would have developed similarly in all regions. The results of DiD studies are mixed. In the US, a program of universal available childcare implemented in Oklahoma and Georgia did not show significant effects on maternal labor supply, albeit more children were enrolled (Fitzpatrick, 2010). Fitzpatrick argues that the population composition as well as previous subsidies in childcare mitigate the employment effect of the program. Therefore, childcare effects seem to be context dependent. First, family

policies might be mitigated by a saturation effect; so that employment levels do not increase further during a reform period when large-scale subsidies have been in place before. Second, the effect is dependent on the population composition. In contrast, other studies could find positive effects of reforms in countries with a suitable context. The availability expansions in Norway, Switzerland and in Italy have had positive effects on maternal employment (Brilli, Del Boca, & Pronzanto, 2016; Havnes & Mogstad, 2011; Ravazzini, 2018). Similar relationships were found in the Netherlands during an episode of increasing childcare subsidies (Bettendorf, Muller, & Jongen, 2013). These mixed results indicate a context dependency in the effect of childcare policy reforms.

For Germany, positive employment effects are found for the recent availability expansion of childcare. Studies that exploit the cross-state variation in the dynamic of childcare availability find substantial employment effects (Zoch & Hondralis, 2017; Drasch, 2013). Zoch and Hondralis (2017) applied an event-history model to measure the effect of childcare availability on the probability and the timing of the return to employment. Increasing availability of publicly subsidized childcare is found to be positively related with an early return to employment.

Moreover, the impact of the German childcare expansion on employment propensity was modelled in structural econometric models (Haan & Wrohlich, 2011; Deutsches Insitut für Wirtschaftsforschung, 2013; Schmitz, Spieß, & Stahl, 2017; Müller & Wrohlich, 2020). Hereby, the statistical propensity to work is calculated by parameterizing economic costs and benefits. Studies point to a strong employment stimulation resulting from the childcare expansion in Germany as childcare subsidies have had significant positive effects on mothers' employment propensity.

Research on the relationship between childcare quality and maternal employment in Germany is limited. To the best of my knowledge, just one study has been executed in Germany, which revealed a significant positive effect of childcare quality on the probability to be employed (Schober & Spieß, 2015). A logistic regression was applied to test whether the regional averages of child-to-staff ratio, number of children in a group and percentage staff without vocational degree affect the probability of being employed. The child-to-staff ratio is found to increase the probability of being employed when the child is younger than three years old. However, the study is limited, as it uses cross-sectional data and does not test the relationship over time. Hence, unobservable characteristics at the regional level may produce biased results.

Research on the educational gradient of the effect of childcare quality on maternal employment has not been conducted yet. However, studies found that the divergence in educational groups in terms of maternal employment was increasing in Germany (Konietzka & Kreyenfeld, 2010; Stahl & Schober, 2017). An increasing number of highly educated mothers are working, while the employment rates of low-educated mothers are not affected and are stagnating. Konietzka and Kreyenfeld suspect that the trend might be a consequence of the childcare reform, as the childcare and employment trends appeared simultaneously. They argue, highly educated mothers benefit particularly from childcare reforms. An educational gradient of childcare use is supported by research, which relates childcare quality to take-up rates of groups with different educational level (Jessen, Schmitz, & Waights, 2019; Stahl, Schober, & Spiess, 2018). In Germany, low-educated groups experience lower quality and lower take-up of childcare than high-educated mothers. The results point at knowledge, preferences or networks that are decisive, so that high-educated mothers benefit particularly from high-quality public care. Regardless, the clarification has not been empirically verified yet.

A research gap exists in the combined analysis of childcare quality and availability effects on maternal employment over time. This study contributes to the existing literature by analyzing the relationship between reform-induced changes of childcare quantity and quality on maternal employment in a longitudinal setting.

The German Context

The historical division into Federal Republic of Germany (BRD), now West Germany, and the German Democratic Republic (DDR), now East Germany, continuous to be relevant today. The BRD had established a strong male breadwinner/female-homemaker model in the post-war period, characterized by policies like joint taxation and long maternal leave, family laws which encouraged women to stay at home. Generous wages contributed to the male breadwinner model, because a single provider earned sufficiently for the entire household (Trappe, Pollmann-Schult, & Schmitt, 2015). In contrast the DDR was guided by a socialistic ideology that was centered around employment. The government encouraged women to work and endeavored to eradicate gender inequality. Therefore, the family-work model in the DDR was completely different to the male-breadwinner model in the BRD. The DDR government subsidized public childcare and encouraged women's work participation, so that the reconciliation of work and family have already been promoted in the 1970s (Nickel, 1998). As a consequence, the DDR established a dual-worker model that favored short employment interruptions and high participation levels. This is reflected in the high female participation rate

of 91% in 1989, compared to 51% in West Germany. Current research revealed that the historical division is perpetuated in family norms, careers and the labor market structure (Mätzke, 2019; Trappe, Pollmann-Schult, & Schmitt, 2015).

After reunification in 1990, East and West Germany were converging in respect to policies and behavior toward the "male-breadwinner/female part-time carer" arrangement (Rosenfeld, Trappe, & Gornick, 2004). The East German part was transformed into a market economy and the welfare state legislation was fully adopted from the former West. The transformation has had immense implications for society and was labeled as "colonialization" (Dümcke & Vilmar, 1996). First, the economy experienced a recession and unemployment spread. Particularly women lost their jobs, so that the dual earner-carer model eroded gradually (Flockton, 1998; Trappe & Sørensen, 2006). The economic situation and the adaption of the West German legislation had direct implications for the childcare infrastructure in East Germany. The provision of childcare was cut-back, because the demand had decreased and West German legislation favored the male breadwinner model. As a result, childcare availability fell in East Germany, but remained higher than in the Western part. The transformation had also severe demographic implications. Many people, the majority of whom were women, have migrated from East to West Germany and fertility levels dropped to lowest-low fertility (Bangel, et al., 2018).

At the beginning of the 21st century, economic and legislative disruptions affected the prevalent traditional male breadwinner model in West Germany. First, the unified economy experienced a structural crisis. The gross national income stagnated between 1992 and 1996 and fell in 1993 by 1% compared to the previous year (Statistisches Bundesamt; Destatis, 2020). The male breadwinner model became less popular in West Germany, because job security weakened and a single provider became a risk for financial sustainability in families (Trappe & Sørensen, 2006). Second, the employment legislation was reformed in 2003; job-protection laws have been relaxed and the welfare state gradually liberalized. Consequently, the number of jobs has increased and contributed to growing female employment in West Germany. Yet, the growing participation rates, especially of mothers, are solely due to part-time work, so that a modified breadwinner model became more popular. In their study 'The Rise and Decline of the male breadwinner model' Trappe and Sørensen summarize: "in West Germany, the traditional male breadwinner model was gradually replaced by the modified male breadwinner, whereas in East Germany in recent years, the dual-earner model declined in favor of the modified male breadwinner model." (2015, pp. 283-39).

Since 2004, Germany is experiencing economic recovery, and the economy continues to improve. The gross domestic product (GDP) has increased from 2,513 billion € in 2007 to 3,386 billion € in 2018. The growth in GDP was accompanied with a consistent increase in the female employment rate in West and East Germany (Statistisches Bundesamt, 2020).

Family legislation: Childcare and Parental-Leave

In Germany, childcare is governed in a complex federal system in which municipalities control the operational planning and provision of childcare, while strategy and funding are controlled by the federal and the state governments. At the beginning of the 21st century, the economic developments, including dualization of the labor market and a severe economic recession, prompted federal actions to stimulate maternal employment. Additional pressure came top-down from the supranational level. Both, the European Union and the United Nations put female employment and early childhood education on the agenda (The United Nations; EU Council, 2002). Furthermore, bottom-up claims for early childhood education became louder because individualization and gender norms progressed. The male-breadwinner model eroded as it could not provide economic security and no longer matched prevailing values (Leitner, Ostner, & Schmitt, 2008; Trappe, Pollmann-Schult, & Schmitt, 2015).

In 2005, the federal government reacted and confronted "the persistent cultural tradition of subsidiarity in which parenthood and care work are viewed in highly privatized terms" (Rosenfeld, Trappe, & Gornick, 2004, p. 121). The federal level got more involved, arguing that family issues are intertwined with social inequality and labor market outcomes. The dominant motivation of the federal administration was to enable both parents to work (BMFSFJ, 2005). The Federal Minister for Family Affairs, Senior Citizens, Women and Youth, Ursula von der Leyen, formulated the agenda in an interview to a regional newspaper: "We want to give new impulses through subsidizing, so that new, legal job opportunities in childcare and for households are created. That is the goal." [Author's translation] (BMFSFJ, 2006) Thus, the dual earner-carer model was promoted to reconcile family and work responsibilities (Leitner, Ostner, & Schmitt, 2008; Trappe, Pollmann-Schult, & Schmitt, 2015). The Federal Daycare Expansion Act ('Tagesbetreuungsausbaugesetz') in 2005 was the first step and directed large subsidies to the states for early education and care. The money was mainly targeted at expanding the availability of public childcare for children under three years old. Additionally, in 2005, income tax legislation was adjusted as well to prevent systematic economic disadvantages for parents compared to childless couples (Bundesverfassungsgericht, 2005). The new tax law aimed at reducing the financial burden of working parents due to the possibility to get tax relief for the

childcare expenses, in case at least one parent is working. Hereby, parental employment and the use of childcare centers were financially incentivized because the childcare costs could be partially refunded when paying taxes.

In 2007, parental leave and benefits were adapted to the dual earner-carer model. The length of the period was shortened to 12 months shared parental leave with a bonus of two months of parental leave if the father uses two of the 12 months (Gangl & Ziefle, 2015).

In 2008, the subsequent federal Childcare Funding Act *("Kinderförderungsgesetz-KiföG"*) implemented investments to expand availability and reduce costs of high-quality childcare. Linked to the subsidies was the legal entitlement to a public childcare place from the age of one, which is binding from 2013. Together, these laws aimed at bringing mothers back into employment before the youngest child turns three years old (Gesetz zur Förderung von Kindern unter drei Jahren in Tageseinrichtungen und in Kindertagespflege, 2008, p. 2404; Leitner, Ostner, & Schmitt, 2008).

The most recent step was taken in 2018, when a law on development of quality and availability of childcare was passed *('Gesetz zur Weiterentwicklung der Qualität und zur Teilhabe in der Kindertagesbetreuung'*). It aimed at improving the quality of public childcare through large subsidies for education of staff.

These federal initiatives were implemented in collaboration between the federal and sub-national level. This is manifested in the different contracts between single states and the federal government, which declare the goals and defines the subsidies. Among the specified targets were extensions of availability and opening hours, cost reductions, staff education and extensive staff recruitment (Die Bundesregierung, 2019). The recent federal actions added up to notable budget increases at the state level. The subsidies contributed to expansions and improvements of public childcare. The reform-induced dynamic provides a natural experiment, which is going to be exploited in order to assess its impact on maternal employment behavior.

The childcare infrastructure in the states

Since 2005, the budget for early childhood education increased to improve the childcare infrastructure in the states. The federal arrangement contributes to different actions by sub-national governments: The money is provided by the national level, but the states have the responsibility to distribute the fund according to the collaboratively specified goals. The subsequent part presents sub-national variation in childcare for children under the age of three (U3) in 2018.

The difference between West and East Germany is prevalent in childcare availability, as most variance corresponds to the former division. In every East German state, the coverage rates for under threes surpass the 50% threshold while there is not a single West German state with coverage of 50% or more. However, the West is slowly catching up in terms of availability, as consequence of the federal investments. Notwithstanding the great progress that has been made in childcare provision, the demand still exceeds the availability. This prevalent excess in demand is diminishing as a consequence of the childcare reforms, but it is still significant with an average difference of 21 percentage points between availability and demand (Hubert, Lippert, & Alt, 2019). The misfit has direct consequences for parents, who experience long waiting times to find a slot and sometimes bear long commuting times to the facilities, because no place is available in the direct neighbourhood.

The quality of childcare has not been the major concern of politics in Germany, which is reflected in the absence of federal, legally binding quality criteria for childcare. However, some states have introduced quality targets and used childcare subsidies to educate staff (Bund-Länder-Konferenz, 15. November 2016). The regulations at the state level lead to a great diversity in terms of education of the personnel and staff-to-child ratio. East Germany has lower quality in terms of staff size, but the staff is generally better educated. The unsatisfactory quality prompted certain states to act. Hereby, the additional spending contributed to convergence between East and West Germany, because eastern Germany quickly improved the quality, as the infrastructure and the educated staff had remained in place from the DDR (Mätzke, 2019).

The childcare costs are low in Germany. In accordance with the national imperative to make childcare available and affordable to everyone, childcare fees are relative to parents' income and disadvantaged groups - including working lone parents, poor families- are exempted from parental fees (Schmitz, Spieß, & Stahl, 2017). Therefore, the costs have not been an obstacle to enroll the child for anyone. Regardless, the financial burden is proportionally higher for families below the poverty line than for families not experiencing relative poverty (Bertelsmann Stiftung, 2018, p. 8). The states authorize additional rules and cost schemes, so that the financial burden varies between the states. Three states made childcare accessible free of charge for everyone from the age of one (Berlin, Hamburg, Rheinland-Pfalz). According to a study by the Bertelsmann Stiftung, the relative burden varies between the average of 2% of the net household income in Berlin and 8.9% in Schleswig-Holstein (Bertelsmann Stiftung, 2018, p. 8). Since the

costs are still at a low level and disadvantaged groups are exempted, the economic dimension has weak to no implications on mothers' transition to employment.[2]

Maternal Employment

The following section analyses developments of maternal employment during the reform period. The maternal employment rate[3] has been increasing since the first childcare act was implemented, indicating that maternal employment has become facilitated and accepted in Germany. In 2006, 60.6 % of mothers with a child were employed. The number grew by 10.4 percentage points to 71 % in 2018 (Statistisches Bundesamt, 2019). The maternal participation rate correlates strongly with the age of the child, highlighting the time-component of maternal employment. The following maternal working rates from the '*Mikrozensus 2019*' are broken down by the age of the youngest child (Statistisches Bundesamt, 2019). Just 9.9% of mothers with an under one-year old are working, indicating the relevance of parental leave. The number increases to 42% for mothers with a one-year old child (2008: 36%). In the group of mothers, who have a child between the ages two and three, 61% are employed (2008: 46%). This indicates that the return to employment rarely occurs in the first year, but maternal employment increases strongly after the first 12 months following childbirth (Statistisches Bundesamt, 2019, p. 28).

The historical differences between East and West Germany persist, as 30 years after the unification, the maternal employment behavior is generically different between mothers in East Germany and West Germany. Nevertheless, the two regions are converging and mothers in whole Germany are more often and earlier employed after childbirth. In West Germany just 40% of the mothers of a one-year old child work, while in East Germany the number exceeds 53%. The pattern persists for the age group 2-3, though 58% in West Germany are employed and 71% in East Germany (Statistisches Bundesamt, 2019, p. 28).

A trend in the recent years has emerged. Research has found a growing educational divergence of maternal employment in Germany (Stahl & Schober, 2017; Drasch, 2013; Konietzka &

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[2] *The cost component will not be examined further, because economic reasoning is not as relevant in Germany as in other countries. In Germany, the relative economic burden of public childcare is low. Fees are scaled according to household income and certain groups are exempted from paying them (Schmitz, Spieß, & Stahl, 2017). Secondly, the research on cost effects is extensive; for a detailed review please consult (Akgunduz & Plantenga, 2018). Finally, the causal direction is uncertain, because the costs are related to the income, therefore maternal employment leads to higher costs.*

[3] *The denominator refers to mothers living together in a household with at least one child younger than 18 years. The numerator includes just actively working population, so that mothers on parental leave or maternal leave are not included.*

Kreyenfeld, 2010). The difference in the employment probability between low educated mothers and mothers with high education increased significantly from 13 to 25 percentage points. This difference is mirrored in the childcare use, which is diverging simultaneously. Stahl and Schober suspect that family policies contributed to the educational gradient in maternal employment. They argue, "families with medium and highly educated mothers took greater advantage of the new policies than low educated mothers" (Stahl & Schober, 2017, p. 646).

Data and Method

The study assesses the effects of childcare availability and quality on the transition to employment following the first childbirth, controlling for other factors. The analysis relies on a compilation of different data sources. For individual-level data, my study uses the German 'Panel Analysis of Intimate Relationships and Family Dynamics' (Pairfam) and the integrated demodiff-subsample (Huinink, et al., 2011). The demodiff-subsample is an additional dataset of East German respondents, which is complementary to the Pairfam data, but enables also a separate and representative investigation of East Germany. The data is added in order to increase the number of East German respondents in the analysis, hereby enabling significant conclusions on East-West differences. The most recent version of the two samples is used, which was launched in 2019 and consists of data from annual polls, conducted between 2008 and 2018 (Alt, et al., 2019). While respondents' partners and children were also interviewed from the second wave onwards to provide a multi-actor design, these additional datasets are not used in the analysis. The surveys were conducted via a Computer Assisted Self-Administered Interview (CASI).

In the first wave, 12,000 people participated in the study, and the response rate was close to the common rate of 40% in Germany. The number of respondents diminished to 4,200 in the most recent wave. The respondents belong to three cohorts: 1971-83, 1981-83 and 1991-93. The design consists an unproportionate sampling of cohorts and East German respondents, which allows the investigation of these subgroups (Huinink, et al., 2011). A design weight was applied in the regression models to estimate representative results. It ensures, that the contribution of East German respondents and of the cohorts is proportional to the population share, so that the results are not sample biased.

From the two datasets the following variables are included in the analysis: maximal educational level, place of residence, cohort, household income, settlement structure and the event-history calendar of the birth and employment biographies. Crucial for my study is the retrospective

event-history calendar of employment and family events, which enables the analysis of the time-dependency between birth and employment.

Macro-level data is collected from the federal statistical bureau in Germany (Destatis; Statistisches Bundesamt , 2019). For years 2006 and 2007, the data is supplemented by information from the databases of the states' statistical agencies (Arbeitsstelle Kinder- und Jugendhilfestatistik, 2008). The sources contribute yearly information on childcare characteristics in the states: the average child-to-staff ratio and the average coverage rate in the states between 2006 and 2018. An advantage of this data source is that it provides comprehensive and accurate official data. Finally, yearly information on the state's unemployment rate is gathered from the federal employment agency and is included in the dataset as well (Bundesagentur für Arbeit, Juli 2019).

The dataset was constructed as follows. First, the 10 waves of the Pairfam-study and the demodiff-sample were merged to one dataset including respondents' life-courses. Second, the resulting dataset was reduced to first-time mothers giving birth in the period between March 2006 and March 2018. Therefore, the sample size diminished to 927 individuals, as first-time mothers are a subpopulation.

I then calculated the duration of mothers' employment interruption following childbirth measured in months by constructing a spell for the transition to employment following first childbirth. I right censor observation after 36 months or at the last interview. When a first-time mother has not left economic inactivity within 36 months during the observation period, the person is right-censored. My reasoning to cut after three years is that the childcare infrastructure is structurally different for three to six years old children, and the reforms under investigation are aimed mainly at improving childcare for under threes. Hereafter, the data contains a total analysis time at risk and under observation of 18,983 months.

Furthermore, episodes were created when time-varying variables change value, and the observations were split into sub-episodes after 12 and 24 months following the first childbirth, which are the time-intervals representing the shape of the process. Therefore, each respondent has multiple sub-episodes resulting from the intervals, the waves and when time-varying variables change their values. Every sub-episode is either right censored or marked by an end due to return to employment.

In the last step, I linked the individual data to the macro level data on childcare and unemployment in the specific state. Identification of the respondent's place of residence in the

supplemental data set makes the concatenation of additional state indicators possible. Therefore, I matched the datasets via the person's residence in a state in a specific year to the information at the macro-level in the same state this particular year. The final data set is hierarchically structured, where each individual in the data consists of multiple sub-episodes giving information on the individual and the state. The data set sums up to 927 individuals and 3,281 episodes.

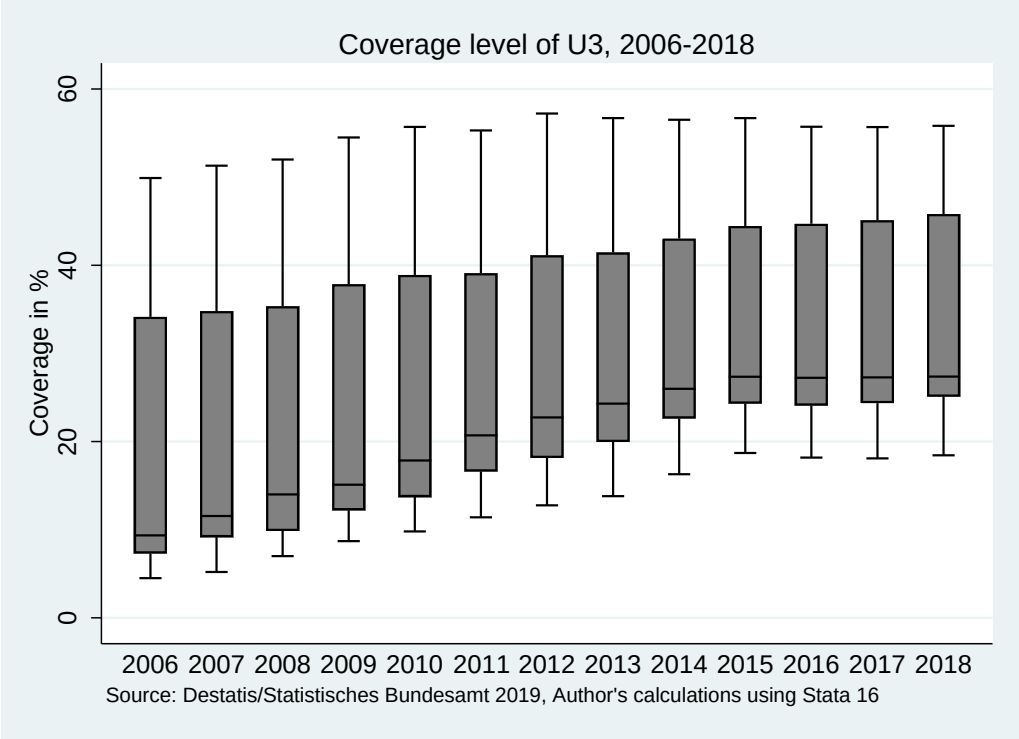
Variables

The dependent variable is the timing of mothers' return to work after childbirth, which is stored in person-months and ranges from zero to 36. The risk population amounts to 927 first-time mothers; of them 525 mothers return to work within 36 months after first birth.

Availability

Childcare availability is included as macro-level indicator, which gives the average coverage rate of under-threes in a specific state. The indicator is operationalized as the state- and year-specific average share of children under three enrolled in publicly subsidized childcare on the population under three. The subnational variation in childcare availability is presented in Figure 1. The overall mean of the states has increased from 18% in 2006 to 34% in 2018, as a direct consequence of increased childcare subsidies from the national government that aimed at availability expansion. The reforms effectively enhanced childcare availability, as the coverage rates almost doubled within 12 years. The overall expansion was paralleled with a convergence between the different states. The range decreased from 45 to 37 percentage points. The standard deviation of the mean fell from 15 percent to 12 percent. This can be explained by large investments targeted at the states with low availability.

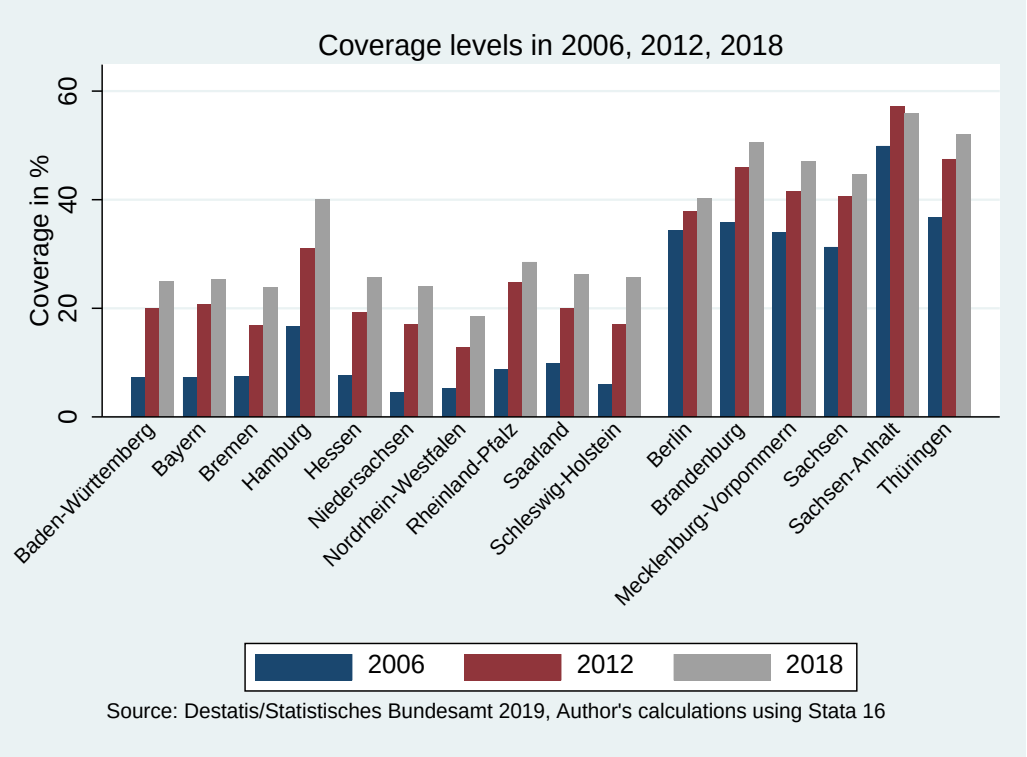
Figure 1: The Dynamic of Childcare Availability for under threes in the German States between 2006 and 2018



Note: The graph summarizes the coverage levels of childcare for under threes in the 16 states between 2006 and 2018 in form of a box-whisker plot. The whiskers are highlighting the lowest and highest coverage level among the states. The grey box is displaying the two central quartiles around the mean, while the line inside the box is indicating the mean of the states.

Although the West German states have the steepest increase in childcare availability, the geographic pattern in 2018 still resembles the historical division between East and West Germany (Appendix A, map 1). The East German states show higher coverage rates than any West German State. Hamburg is the only West German state, which almost caught up with the East German states and show coverage levels of 40% in 2018.

Figure 2: Average Childcare Availability for under threes in the German States in 2006, 2012 and 2018



Note: The graph is displaying the average coverage levels in the states in 2006, 2012 and 2018. The West German states are bundled on the left-hand side, while the East German states are concentrated at the right end.

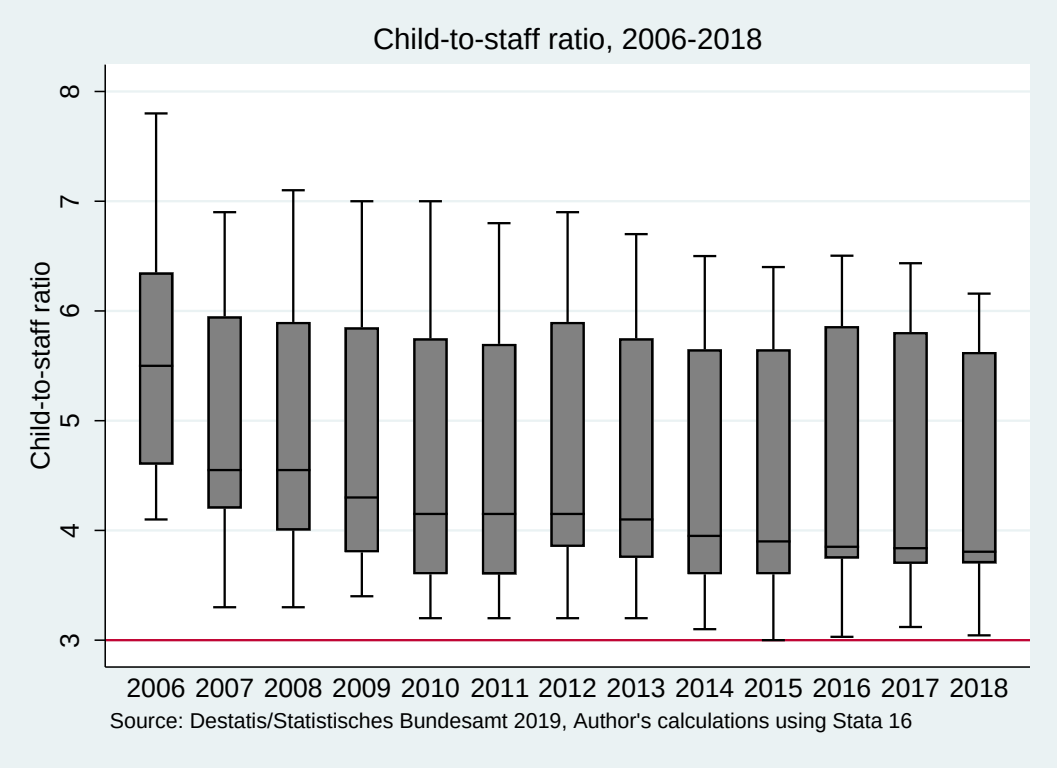
Low-Quality

In this study, I include child-to-staff ratios as a measure of low childcare quality, which is commonly used in research on early education services. The measure is a macro-indicator at the state level and is operationalized as the year- and state-specific ratio number of children that are cared for by one member of staff in publicly subsidized childcare. A higher value indicates lower childcare quality in the state, because each child is expected to receive less attention and supervision by the educator. Hence, the measure gives "at least some quantitative indication of the frequency of contact between staff and children" (OECD, 2018). Another advantage is that the indicator resembles a visible component of childcare, which may influence parents' decisions about using childcare service.

An alternative indicator of childcare quality is staff qualifications. However, parents tend to overestimate the quality of the staff in Germany (Schober & Spieß, 2015; Mocan, 2007). The reason might be that qualifications are potentially less visible, so that parents may get distorted impressions of the quality. It would be difficult to assess how qualification determines the employment decisions. Therefore, my research is based on the child-to-staff ratio.

In educational literature, the recommended value is dependent on the age of the children; hereby younger children need more supervision and therefore a lower ratio. For the care of under three years old children, a ratio of three is widely recommended, meaning that on average one pedagogue takes care of three children (Blossfeld, Kulic, Skopek, & Triventi, 2017; Esping-Andersen, 2016). Figure 3 illustrates the development of the indicator throughout the observation period and shows the recommended value (3.0) with the red line. Over the period, the median has decreased from 5.7 to 4.5, which is a direct consequence of increased spending on childcare. However, the pace slowed down after 2014. The development in the child to adult ratio across states do not present any clear pattern. The measures of variation like the standard deviation have increased from 1.05 to 1.07 as the variance did from 1.11 to 1.14, implying that the values for the states have scattered. But the range was decreasing simultaneously, which suggests that the extreme states have become more alike the others, indicating a convergence.

Figure 3: The Dynamic of the Low-Quality Childcare for under threes in the States between 2006 and 2018



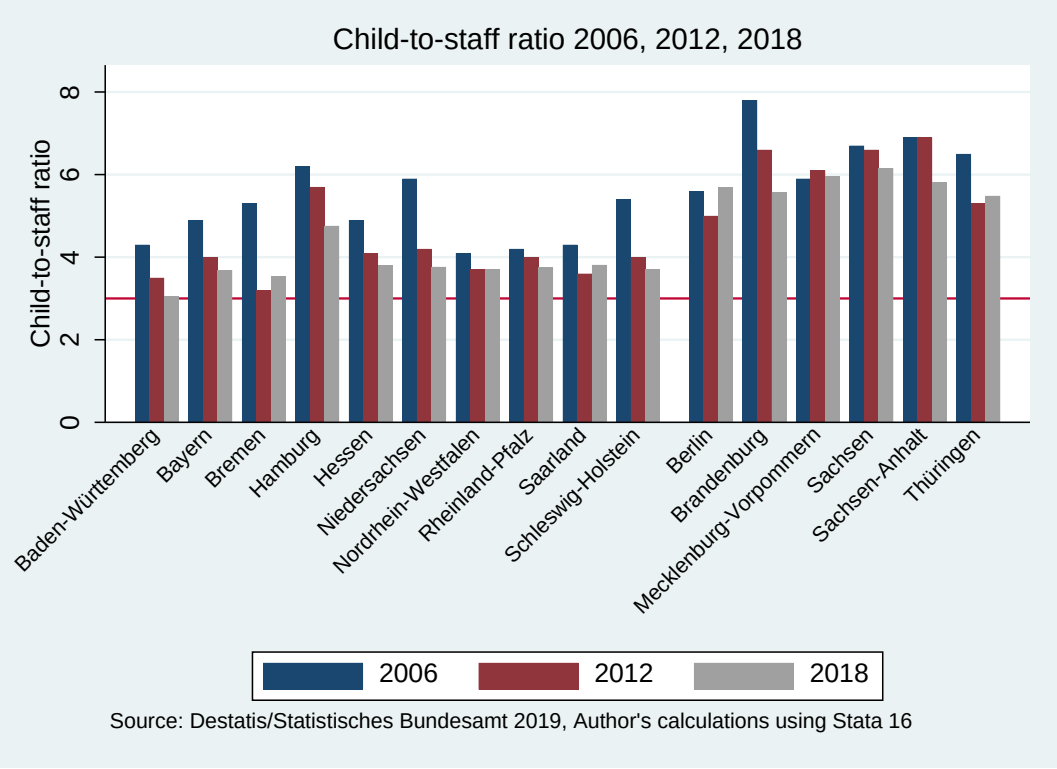
Note: The graph summarizes the child-to-staff ratio for under threes in the 16 states between 2006 and 2018 in form of a box-whisker plot. The whiskers are marking the lowest and highest quality among the states. The grey box is displaying the two central quartiles of the child-to-staff ratio distribution at the state level, while the line inside the box is indicating the mean of the states. The red line is indicating the recommended value of 3.0.

Again, the East-West divide arises, but somehow reversed to the coverage levels. In 2018, the indicator for quality is higher in East German states than in West German states (Appendix A,

map 2). This indicates lower quality, but higher availability in East Germany compared to West Germany. Coverage and quality have trade-offs. In Germany, high quality goes hand in hand with low coverage and *vice versa*. This might be the result from the historical division of East and West Germany in combination with budget constraints, which force states to prioritize either quality or availability.

Figure 4 presents the dynamic of childcare quality in the states. In the first half of the observation window, most West German states could reduce the child-to-staff ratio, while in three East German states, Mecklenburg-Vorpommern, Sachsen and Sachsen-Anhalt, the ratio indicates quality reductions. In the second half of the observation period, the changes were minor. The majority of the states show further improvements, but Thüringen, Bremen and Berlin present decreasing quality. The overall reduction in the child-to-adult ratio shows that within the observation period the overall quality has improved. In a few states temporary quality drops occurred. It can be assumed that the quality was secondary for some state governments.

Figure 4: Low-Quality Childcare in the German States indicated by the child-to-staff ratio of U3 childcare in 2006, 2012 and 2018



Note: The graph is displaying the average child-to-staff levels in the states in 2006, 2012 and 2018. The West German states are bundled on the left-hand side, while the East German states are concentrated at the right end. The red line is indicating the recommended value of 3.0.

Control variables

In Table 1, the unweighted distribution of controls in the sample is summarized (the weighted proportions are included in Appendix A, Table 5). The first and second column present the attributes for mothers when giving birth and relates to the risk population. The third column summarizes the distribution over the episodes, which is a better format for comparing time-varying variables, which are place of residence, settlement structure and repeated childbirth. The time-constant variables are birth cohort, maximal educational level and social stratum.

Table 1: Descriptive Statistics

	Proportion in the mother sample in % (at birth)	***Number of Mothers at birth***	***Proportion of person-episodes in %***
Residence			
East	29.8	275	26.8
West	70.2	652	73.2
Birth cohorts			
1971-1973	11.2	104	11.7
1981-1983	66.5	617	64.3
1991-1993	22.2	206	24.0
Education			
low	10.0	93	11.7
intermediate	41.1	381	43.4
high	48.9	453	44.9
Settlement structure			
Rural (< 20 000 inhabitants)	62.1	576	64.0
Urban (> 20 000 inhabitants)	37.9	351	36.0
Social stratum			
Lower class (< 1406 €)	17.4	162	56.0
Middle class	72.0	668	74.5
Upper class (> 6152€)	10.5	97	8.30
Repeated Childbearing			
No	73,2	679	61.2
Yes	26,8	248	38.7
N	**100**	**927**	**3,281**

Source: Pairfam 10.0, Author's calculation using Stata 16

Education is an indicator assessing various dimensions in relation to employment propensity. It is a proxy for the human capital and is associated with attitudes and values which are relevant regarding employment (Cunningham, 2008; Gangl & Ziefle, 2015; Schober & Spieß, 2015; Drasch, 2013; Blossfeld, 1997). The variable for education is operationalized as highest-achieved level of education, which is "low" ('no education/lower secondary'), intermediate ('upper secondary education') or high ('post-secondary education' and 'tertiary education'). Of

the risk population, 10 % have low education; 41% have an intermediate level of education and the remaining 49 % are highly educated.
The household income is a widely used indicator for wealth in a family. The variable refers to the value of the last wave before giving birth and is held constant throughout the observation period in order to prevent endogeneity. For the analysis, the variable was grouped into social strata according to the classification of social classes provided by the federal statistical agency (Statistisches Bundesamt, 2020). The lowest income class is characterized by a household income below 1,406€ per month (60% of the median household income), which consists 11% of the sample. The intermediate income class disposes of 1,406 € to 6,152 € a month and is represented by 76.5% of the sample. The highest income class is defined by income higher than 200% than the median income, which represent 8.3% in the sample.

Additionally, I include a control for second childbirth, because different fertility behavior may affect a mother's return to employment. In case of small birth spacing, the amount of parental leave benefits refers to the income in the period prior to the first childbirth, which may incentivize an early second childbirth. Therefore, repeated childbearing could be the result of a strategy to maximize benefits, as mothers may substitute employment by parental leave payments and thus postpone employment reentry. In both cases, the risk of endogeneity could lead to biased results. The dummy variable for second childbirth is time-varying; thus, the value changes when a second child is born.

The Pairfam data offers the opportunity to analyze the effect of contextual conditions via linking microdata from the Pairfam survey with a selection of external macro-data. In the analysis, I include variables for main place of residence in West respective East Germany and urban/rural settlement structure. The dummy for place of residence on eastern and western German soil is included and captures all cultural and unobserved impacts from the historical division. Berlin is treated as East German state together with Thüringen, Sachsen, Sachsen-Anhalt, Brandenburg and Mecklenburg-Vorpommern. The variable changes when the person moves to another state, so that the variable is time varying. The proportion of first-time mothers living in West Germany amounts to 72%, while 28% are residing in East Germany when giving childbirth.

Research indicates that the settlement structure is relevant for family attitudes, and other studies show different employment patterns between urban and rural areas (Duncan, 2005). The model consists of a control for urban and rural areas. The classification of an urban area is related to the threshold of 20,000 inhabitants, which is suggested by the German federal institute for

housing and urban development (Bundesinstitut für Bauwesen und Raumordnung, 2017). The variable is time-varying, and 64% of episodes indicate a residence in rural areas, while 36% episodes show a residence in urban areas.

The data consists of three cohorts. The Pairfam cohorts are born 1971-73, 1981-83 or 1991-93. The cohorts in the sample are not evenly distributed, due to the restriction of the observation period which leads to an overrepresentation of first-time mothers from the 1981-1983 cohort adding up to 66.8%. The cohort from 1971-72 amounts to a proportion of 22% and the youngest cohort from 1991-93 is represented with 11% of the sample.

Moreover, I include a macro-level control for the state's unemployment rate. As was discussed in the historical background, the increase in maternal employment occurred during a period of economic growth and prosperity. The economic development of a state is suspected to have direct effects on the employment propensity, because the number of available workplaces and the costs of employment seeking are associated with the state's economic situation. The model accounts for economic performance of the state by including the unemployment rate. The indicator is included in a state-year format and is obtained from the federal employment agency (Bundesagentur für Arbeit, Juli 2019). Figure 6 in Appendix A shows decreasing unemployment from a mean of 11% to 6% between 2006 and 2018. The division of Germany and the economic consequences of the unification are reflected in a great East-West difference, where West Germany has constantly lower unemployment levels over the period. However, the recent economic growth was particularly pronounced in East Germany, so that the unemployment levels were converging during the observation period.

Methodology

The process of returning to employment after first childbirth is analyzed in a stepwise-constant exponential model. The method belongs to the class of continuous event-history analysis, thus calculating time-to-event measured on a continuous time scale (Blossfeld, Golsch, & Rohwer, 2009; Allison, 2012). The method was chosen because the timing of the return is of primary interest. Life course research suggests intertwinement of family and employment biographies. The argument points at the relevance of the time dimension for maternal employment; hence, an event-history model is superior to cross-sectional data. The primary objective is to measure the effect of the child-care characteristics on the time outside employment following first childbirth. For that purpose, I opted for a piecewise-constant exponential model (PCE-model) on the basis to address the impact of changing childcare characteristics at the state level on

mothers' employment behavior while controlling for individual and macro-level factors. Hereby, the time to return to employment is regressed on the values and development of the childcare characteristics in the residence state. This approach enhances previous methods by accounting for endogeneity, because the model regresses the time-to-event to the level of the childcare characteristics before the event. Thus, the problem of reversed causation is circumvented. Secondly, the PCE-model offers the opportunity to flexibly model the pattern of duration dependence in the baseline hazard. Through the inclusion of an interaction of time and the policy indicators, the proportionality assumption can be relaxed in the model, and the duration-dependent effects can be tested.

The model

The equation below gives the hazard for individual i at time t.

$$h(t,i) = e^{\beta_{t_{interval}} + \beta X_{i,t}}$$

The model assesses the time-dependence on the risk to return to employment as well as the effect of different determinants. The equation can be decomposed into two components. First is the $\beta_{t_{interval}}$, which assesses the duration-related hazard. The risk within the intervals is assumed to be constant throughout the whole episode. The time intervals are defined *ex ante*, hereby I created interval lengths of 12 months. The independent variables, which are the determinants and covariates, are incorporated in vector X in the $\beta X_{i,t}$-term. Table 2 illustrates the measurement strategy to test the different hypotheses. The first two hypotheses are tested through forming a model that consists of the policy indicators. When the estimators are significant and tend to increase the risk of return to employment, the policy effect can be revealed. In the second part of the empirical analysis a heterogenous effect of childcare quality is investigated. I test whether highly educated mothers are more reactive to quality improvements. If the interaction term of high educational level and child to adult ratio is positive and significant, the *third hypothesis* can be verified.

Table 2: Measurement Strategy in the Different Models

	Hypothesis I	**Hypothesis II**	**Hypothesis III**
Time intervals	X	X	X
Coverage	X		
Quality		X	X
Education			X

Model fit and selection

Model fit estimations and comparisons are executed in order to obtain the best model (Hosmer, Lemeshow, & May, 2008). This procedure determines the covariate selection. In a stepwise modelling procedure, the covariates were added to the reduced model which consists of the childcare characteristics and the time-intervals. For every model, the natural logarithm of the likelihood function was maximized in a numerical iteration procedure, the Newton-Parson method:

$$logLik = -\sum_{i=1}^{n} \delta_i \beta x_i - \sum_{i=1}^{n} e^{(-\beta x_i)} \times t_i$$

The next step, the nested models are compared regarding the model fit by calculating the likelihood ratio test using the formula below. The result is on the χ^2-distribution, which enabled me to choose the best covariates for each hypothesis:

$$LRtest = 2 \times (LogLik(full\ model) - LogLik(nested\ model))$$

This procedure guaranteed the best model fit and the appropriate selection of covariates, that prevent overfitting and omitted variable bias (Hosmer, Lemeshow, & May, 2008; Blossfeld, Golsch, & Rohwer, Event-History Analysis with Stata, 2009). Based on the procedure I include controls for education, East/West and unemployment rate in the main analysis.

Additional, three sensitivity tests were executed. The first one tests the proportionality assumption of the policy effects through including an interaction term between the duration and the policy indicators (Model 3 and Appendix A; Model 4). Secondly, to determine whether repeated childbearing undermines the results, I test robustness of the effect when controlling for a second childbirth (Appendix A; Model 5). Finally, I have tested a model consisting of all covariates derived from theory, adding to the reduced model variables for repeated childbearing, social stratum, cohort, and settlement structure, no matter the fit of the model (Appendix A; Model 6).

Results

Table 3 presents the estimates for the different models and additional results from the sensitivity analysis are included in table 4 in Appendix A. The analysis was executed while applying a design weight, which ensures the representative contribution of cohorts and East German respondents.

Table 3: Childcare Characteristics and the Duration of Employment Interruption following Childbirth, Piece-Wise Constant Model

Hazard Ratios	(1)	(2)	(3)	(4)
Time Intervals	(ref.)	(ref.)	(ref.)	(ref.)
>12-24 Months	2.856***	3.082***	3.346***	3.083***
>24-36 Months	2.225***	2.552***	6.808***	2.554***
Coverage	1.019***	1.027***	1.039***	1.028***
Low-Quality	0.773***	0.846*	0.854	0.920
Education		(ref.)	(ref.)	(ref.)
Intermediate		3.739***	3.687***	5.701
High		6.311***	6.180***	9.026*
Unemployment rate		0.960*	0.958*	0.960*
East		0.773	0.724	0.768
Time × availability			(ref.)	
2. Interval × availability			1.001	
3. Interval × availability			0.955***	
Education × quality				(ref.)
Intermediate × quality				0.908
High × quality				0.922
Baseline Hazard	0.0304***	0.00550***	0.00429***	0.00377***
BIC	1853.6	1761.1	1757.5	1776.9
AIC	1823.1	1694.1	1678.3	1697.6
Observations			3380	
Subjects			929	
Failures			525	

Source: Pairfam 10.0/Demodiff, Author's calculations using Stata 16

The results are weighted for East German and cohort oversampling

** p<0.05, ** p<0.01, *** p<0.001*

As can be seen from the upper half of the panel, the propensity to return to employment is related to the duration passed since the first childbirth. In model 1, the baseline hazard in the first twelve months equals on average 0.0304 events per person-month, which are returns to employment. The hazard rate is small thus indicating a neglectable risk to return to employment when the child is younger than one year old. Thereafter the hazard increases steeply and reaches its maximum. In the second interval, the hazard rate is 2.856 times higher than in the first period. This increase is probably due to the end of the parental leave period (either 12 months, or 12+2 when the father takes two months of the leave). The last interval has a 2.225 times higher hazard than the reference category in interval one, but the risk to return to employment reduces compared to the second interval. All intervals together give a picture of a hazard rate that is somewhat bell-shaped, with a very low risk in the beginning of the transition.

The reduced model 1, which tests the main effects of the childcare policies and the time-dependency, reveals strong effects of both policy indicators. Therefore, the *first hypotheses* can

be preliminary confirmed, since the parameter is significant and in the expected direction, that availability of childcare raises the risk of return to employment in the first 36 months after childbirth. The quality estimator is in accordance with the *second hypotheses*, that better quality, or a lower child-to-staff ratio increases the hazard rate of return to employment.[4] The effect is significant at a 0.001 level. The first set of analysis confirmed institutional effects of childcare on the return to employment.

When the control variables are added in model 2, the effects of coverage levels remain significant. These tests reveal that availability is relevant for the transition to employment following childbirth also when individual and structural factors are considered. An increase by one percentage point in enrollment rates increases the hazard by 1.027 times on average. This indicates that when availability in a state increases, the average employment interruption becomes shorter and more women return to employment within 3 years, *ceteris paribus*. To get a better picture of the magnitude and thus enable proper interpretations, the percentage change in survival time for a one-unit increase was calculated in an accelerated failure time model.[5] The interruption length shortens on average by 2.66 % when the availability increases by one percentage point. The high magnitude of the effect emphasizes the relevance of the coverage levels in a state. The results can confirm the *first hypotheses*, that increasing availability accelerates the transition to employment after childbirth. Interestingly, I found in the sensitivity analyses that the effect of childcare availability is duration dependent. In model 3, the proportionality-assumption is relaxed, which improves the model fit indicated by AIC. The result suggests that the effect of availability varies over the different intervals. The interaction-term in the third interval, which is 0.955, is significant at a 0.001 level. The interpretation of the interaction term is multiplicative, since the model is non-linear. This indicates that the effect of childcare availability is weaker for mothers with a two to three years old child. Figure 5 illustrates the duration dependent effect of childcare availability on the risk to return to employment. It reveals that availability have pronounced effects on the employment propensity

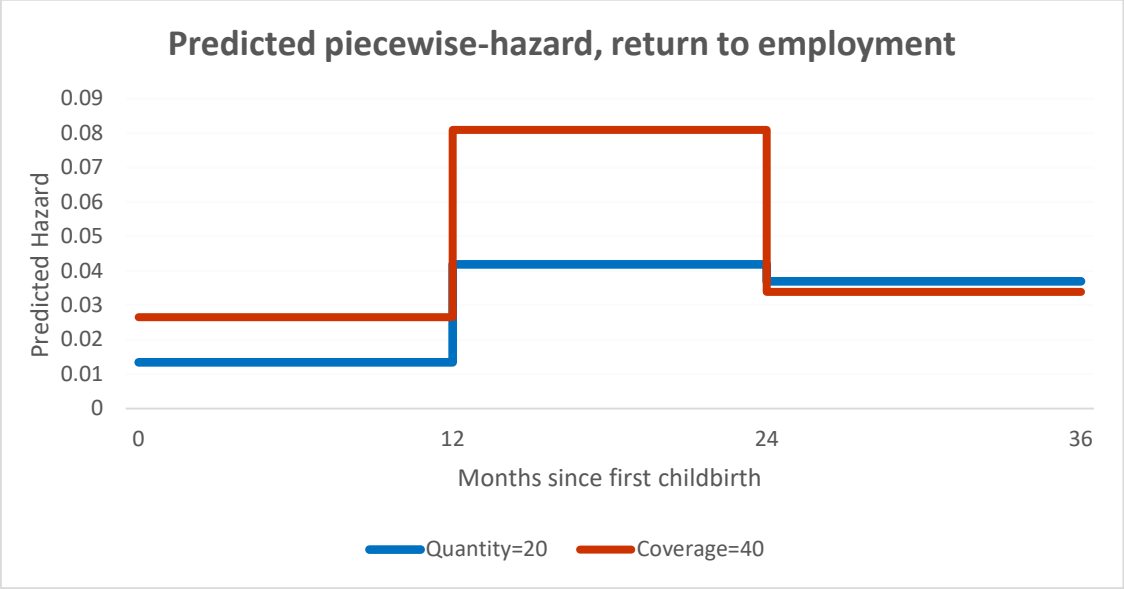
[4] A negative effect of child-to-adult ratio was expected, because the included indicator is the staff-to-child ratio, which indicates better quality the lower the value is.

[5] The percentage change in survival time for a one-unit increase in x is derived from the formula underneath, which can be applied whenever the dependent variable is logged (Allison, 2012):

$$\Delta S(x) = \frac{S(x+1)}{S(x)} = 100 \times \left(e^{\beta} - 1\right)$$

of mothers when the child is younger than 24 months old, while the effect is almost non-existent in the last interval.

Figure 5: Duration-dependent Effect of Childcare Availability Derived from Model 3



Note: Model includes controls for child-to-adult ratio, unemployment rate, East/West, and education level. The results are weighted for cohort and East oversampling

Source: Pairfam 10.0/Statistisches Bundesamt (2006-2018).

When looking at quality characteristics, further analysis could reinforce the finding that the child-to-staff ratio is negatively associated with the interruption length. In model 2, the hazard is 15.4 % smaller when the child-to-staff ratio increases by one percentage point. As the child-to-adult ratio indicates a better quality the lower the value is, the propensity to return to employment is positively associated with childcare quality. The finding is significant exclusively at a 0.05 level and the magnitude is somehow smaller compared to the reduced model, which highlights that the quality-effect is partially spurious. However, the positive effect of better childcare quality on maternal employment is replicated and verifies the *second hypothesis*. In an accelerated-failure time model the effect of quality equals to an average increase in employment interruption by 18.17%, when the child-to-staff ratio increases by one. In contrast to availability, the childcare quality does not show duration-dependent effects, which is tested through including an interaction of child-to-staff ratio and the time intervals (Appendix A, model 5). Neither the estimates are significant, nor the BIC, AIC or log-likelihood ratio test indicate an improvement of model fit. I conclude the effect of childcare quality is certainly time proportional.

Further evidence of the relevance of childcare infrastructure on maternal employment results from the coefficient of East and West Germany, which is surprisingly not significant in model 2. However, the stepwise modelling allows to draw conclusion on suppression effects. In a model without State's childcare characteristics the residence in East Germany is a significant predictor for early return to employment. This effect becomes spurious when quality and availability of childcare infrastructure are added to the model. Therefore, the effect of East and West German residence is to a large part due to the differences in childcare characteristics resulting from the historical division, but not geographic or cultural heritages.

In model 4, the interaction effect of child-to-staff ratio and education was tested. No statistically significant difference was identified in the effect of quality between different educational groups. Furthermore, the model fit reduces compared to model 2. Contrary to expectations, I did not find an educational gradient of childcare quality. The quality variable was rescaled on an ordinal scale in order to test non-linearity of the effect. The results remained insignificant. The data cannot reveal an educational gradient of the childcare quality on maternal employment.

Sensitivity analyses showed that the childcare effects are robust to additional controls. When including repeated childbearing as control variable, the hazard ratio of quality and availability do not change considerably (Appendix A, model 5). Therefore, I can exclude the risk that the effects are driven by short birth spacing. The same is valid for the inclusion of settlement structure, social stratum and cohort, which do not mitigate the significance or the magnitude of the childcare effect (Appendix A, model 6).

Discussion

The results suggest that the childcare reforms indeed played a major role in the revolution in maternal employment participation in Germany. Both quality and availability improvements removed employment constraints and encouraged women to return to the labor market following childbirth. Previous research applying the difference-in-difference design focused on one childcare characteristic and have not analyzed quality and availability in a combined setting. This study aimed at filling the research gap, thus contributing an explanation of the effect of quality and quantity when controlling for the other. I found tentative evidence that childcare policies and maternal employment are related.

As hypothesized, availability is associated with earlier returns to employment following childbirth. In accordance with the synthesized framework relying on institutional and cultural arguments, more women return to employment within the first 36 months. The strategy captures the response of mothers to the availability expansion as part of the childcare reform. In states with increasing availability, the average employment interruption length is decreasing. This demonstrates the contribution of the expansion of childcare on female employment rates.

An interesting result to emerge from the data is that availability has duration dependent effects on the probability to return to employment. This was revealed by forming an interaction term of time and the availability indicator, which relaxes the proportionality assumption. I found that the effect is pronounced 12 months after the first childbirth. The results point to the probability that availability does not encourage mothers who do not want to return to employment, because the risk to return to employment would be elevated over the whole interval. Rather women who planned to return anyways, do it earlier. In states with high availability, a great share of returns shifts to the second year after childbirth. The duration-dependency would appear to indicate a clear acceleration of the transition to employment.

The theoretical framework provides explanations for such an acceleration. On one side, the availability expansion has affected the structural constraints to employment as suggested by the institutional framework. Germany has had a great excess in demand for childcare. There is a good chance that part of the acceleration is due to shorter waiting times for childcare slots. Hence, during the childcare reforms converted the institutional setting, so that childcare availability is no longer a constraint to maternal employment, and the transition to employment is facilitated. Consequently, the average employment interruption was reduced during the family policy reform period. However, normative incentives could be shaping the employment decision. The state may have established a norm of a one-year employment interruption (Bergqvist & Saxonberg, 2016; Kremer, 2007). Together with the parental-leave reform in 2007 and the entitlement to a childcare spot from the age of one, the childcare expansion defines the norm of 12 respectively 14 months employment interruption. Where the policies are more progressed, the transitions to employment are concentrated at this time-point. In states with high availability levels, women are particularly encouraged to return to employment after a one-year interruption. The childcare and parental-leave policies jointly maximize the propensity to return in the second year after childbirth, which is in line with previous research (Haan & Wrohlich, 2011; Zoch & Hondralis, 2017; Saraceno & Keck, 2011). I encourage further

research, which could survey the preferred maternal interruption length in Germany and hereby verify the progress towards a norm of one-year employment interruption.

One should sound a note of caution with regard to such interpretations, because economic theory suggests an alternative account (Blau, Ferber, & Winkler, 2006; Olivetti & Petrongolo, 2017). Mothers are economically discouraged to return to employment in the first year or in the third year. In the first twelve months the leave entitlements provide an economic incentive to stay at home. In the third year after childbirth, the availability of public childcare provides a substitute for home care, so that the opportunity costs of employment are reduced. Hence, increasing availability may incentivize returns in the second year after childbirth. However, as mentioned in the theoretical discussion, several authors question economic theory's relevance for the investigation of childcare availability on maternal employment (Hakim, 2000; Kreyenfeld & Hank, 2000). Moreover, I cannot exclude that women return to employment at a lower rate in the third year after first birth, because a group of mothers may anticipate a second childbirth and therefore remain out of employment.[6]

Quality improvements are found to have proportional effects over the three years following childbirth. Thus, I see an encouragement effect, because it is not a shift of the risk, but the risk to return to employment is constantly elevated. Mothers return to employment within the three years at a higher rate in states with better quality. The findings would seem to demonstrate that quality improvements contribute to a better narrative on public childcare, hereby the usage of public childcare for children younger than the age of three becomes more accepted. This implies that the public care/ maternal employment option becomes an alternative to maternal care. Mothers, who otherwise would not have worked within three years following childbirth, return to employment, because moral scruples and doubts are calmed (Pettit & Hook, 2009; Schober & Spieß, 2015). Interestingly, the effect weakened after controlling for individual and macro-level characteristics. One possible explanation could be that the population composition partially accounts for the quality impact as suggested by previous research (Fitzpatrick, 2010). Hence, the reduced model overestimates the effect of quality, as in states with high quality, there seem to live more people that return early because of their individual characteristics.

[6] *However, the economic incentives to such a long birth spacing are weak because parental leave payments would be small; hence, I do not expect a large group of mothers, that systematically remain out of employment in the third year after first childbirth. When the interval between first and second birth is wider than 24 months, the assessment period for parental leave payments stretches only after the first birth and does not regard the income prior to the first birth. Since the group does not have an income in this period, because they have not returned to work yet, the parental leave payments would be the basic payments and therefore small.*

When accounting for relevant individual characteristics like education or place of residence, the effect of quality is reduced. Theory suspects a moderation by education.

One can see that both quality and availability improvements were effective in enabling mothers to return to employment. Both have in common to make the transition to employment feasible and faster. However, the context for the childcare reform was suitable for maternal employment growth. As was mentioned in the historical background, the laws were implemented during an economic upturn and when the demand exceeded the availability. This points at supportive circumstances for an increase in maternal employment. Therefore, a generalization of the results might be problematic. Although the model accounts for economic performance in the states, it is possible, that during times of economic downturn, when maternal employment levels are already very high or when the childcare is underutilized, that the childcare effect is mitigated. Previous studies suggested that the context might be important for childcare infrastructure effects (Lundin, Mörk, & Öckert, 2008; Lewis, Campbell, & Huerta, 2008; Fitzpatrick, 2010). Future research is encouraged to examine childcare effects over longer observation periods and in different contexts, which might reveal the context-dependency.

The study did not find a link between mother's educational level and childcare quality in the effect on the return to employment. In contradiction with my theoretical framework and suggestions from previous research (Konietzka & Kreyenfeld, 2010; Schober & Spieß, 2015), the educational gradient for quality effects was not significant. There are several possible explanations for this outcome. First, it cannot be ruled out that highly qualified mothers have been satisfied with the public care before the reform, which implicates that quality of public care has never been viewed as an obstacle to employment. This clarification finds evidence in that Germany has relatively high quality standards. In comparison with OECD countries, Germany is ranked second behind Iceland in terms of child-to-staff ratio and is way below the average value (OECD, 2018). This indicates that the overall standard is sufficiently high, so that educated mothers have not been reluctant to use public care. This is mirrored in the public opinion on public childcare. Schober and Spieß (2015) surveyed childcare recipients in Germany and found that the parents are widely satisfied with public childcare. A second possible explanation could be that childcare costs suppress the interaction effect. As fees are scheduled according to parents' income and education, fees are positively associated with earnings; thus, the quality-related incentives to return to employment for highly educated mothers are countered by higher costs. Thus, the income-related fees might partially offset the educational gradient of childcare quality. Such trade-offs between costs and quality in childcare

are suggested by Akgunduz and Plantenga (2018). Finally, it cannot be ruled out that the statistical power was limited. Given that the findings are based on a limited number of events, an interaction term including a ratio scaled variable might overwhelm the model. This could result in large standard errors and insignificant results, so that the finding should consequently be treated with the utmost caution. Further data collection is required to determine exactly how childcare quality is mediated by education in the effect on maternal behavior.

Conclusion

This study examines the relationship between childcare characteristics and maternal employment. For the first time for Germany, quality and availability of publicly subsidized childcare have been analyzed in a longitudinal setting. The federal government has directed large subsidies to the states for improving childcare infrastructure, hereby contributing to great improvements in terms of quality and availability. After investigating the reform period in Germany between 2006 and 2018, the results suggest that both quality and availability expansions have had positive effects on the propensity to work with a child younger than three. The results point to a growing concentration of returns after one year, which is the joint outcome of parental leave reforms and increasing childcare availability. Quality improvements increase the propensity to return to work proportionally over three years following childbirth. The results stress the importance of family policies for maternal employment.

From a theoretical standpoint, this research suggests that employment decisions of mothers are affected during family-policy reform periods. The findings verify institutional and cultural explanations for the effect of childcare characteristics on the propensity to return to employment following childbirth. Availability expansions remove employment constraints and establish a norm of fast transitions to employment. Quality improvements stimulate acceptance for public childcare and maternal employment. Hence, mothers return systematically earlier and more often to employment in a suitable childcare setting.

Surprisingly, I was not able to find an educational gradient in the effect of childcare quality. I suspect that income-related childcare costs and the comparatively high-quality standard mitigate the result. However, given the small sample size, caution must be exercised. I encourage further research on the educational gradient of the employment effect of childcare quality.

The methodology is confronted with two limitations. First, the data includes only the return to employment, but not the individual use of childcare. The problem is that the Pairfam-data does not include information on respondent's childcare usage before the 10th wave. Thus, the model regresses the state-specific childcare indicators on individual employment behavior and cannot estimate the direct effect of childcare take-up. The findings do not distinguish between context and direct effects. Consequently, the observed pattern may result from unobserved variables, for example different admission practices of daycare centers. Therefore, the model is not able to detect causality, but associations. Nevertheless, the complex identification strategy consisting of individual and states level measures in a longitudinal regression analysis allows decisive interpretations. Secondly, previous research indicates that the increase in maternal employment is due to growing part-time rates (Leitner, Ostner, & Schmitt, 2008; Trappe & Sørensen, 2006; Trappe, Pollmann-Schult, & Schmitt, 2015). Future research could address the contribution of childcare to the dualization of the labor market. I could think of a competing risk design, which differentiates between part-time vs. full-time work as dependent variables.

Results so far have been very promising, and additional investments in availability and quality are expected to increase maternal employment participation further. I want to emphasize that the context was suitable for childcare expansion throughout the observation period, so that the results might not be transferable to different settings. Further studies are needed to relate childcare effects to a wider range of cultural and economic contexts. Regardless, the results point at the potential of public childcare, which presents a powerful and promising tool to ensure the sustainability of welfare states and to improve gender equality. My research suggests policy makers to invest in childcare infrastructure. A widely available and high-quality infrastructure could prove the label 'new social risk' for childbirth as wrong and can prepare welfare states for future challenges as they rely on a larger, female workforce (Taylor-Gooby, 2004).

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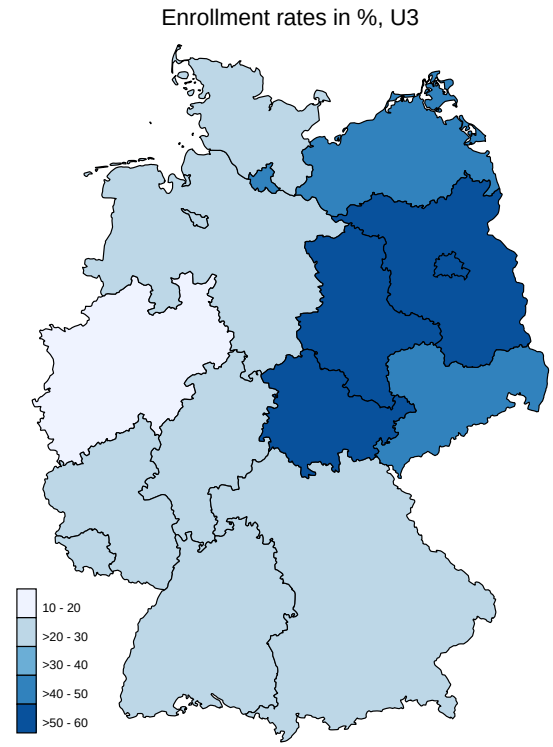
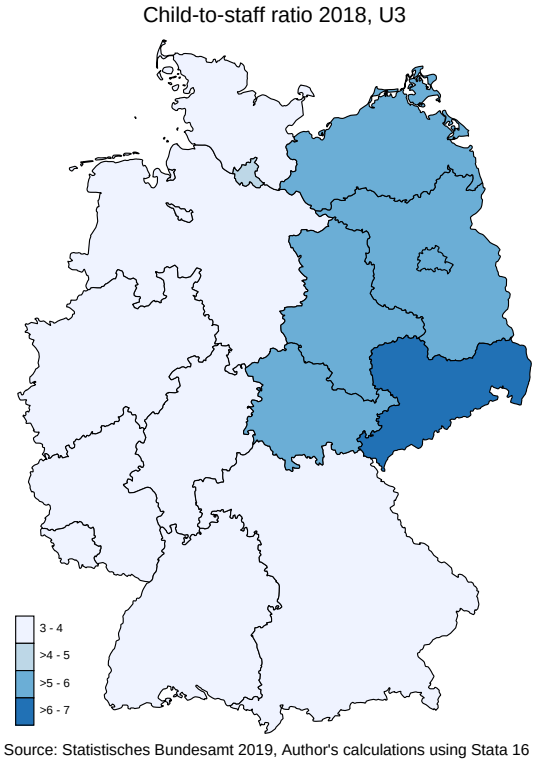
Appendix A

Map 1 -A: Availability in the States, 2018



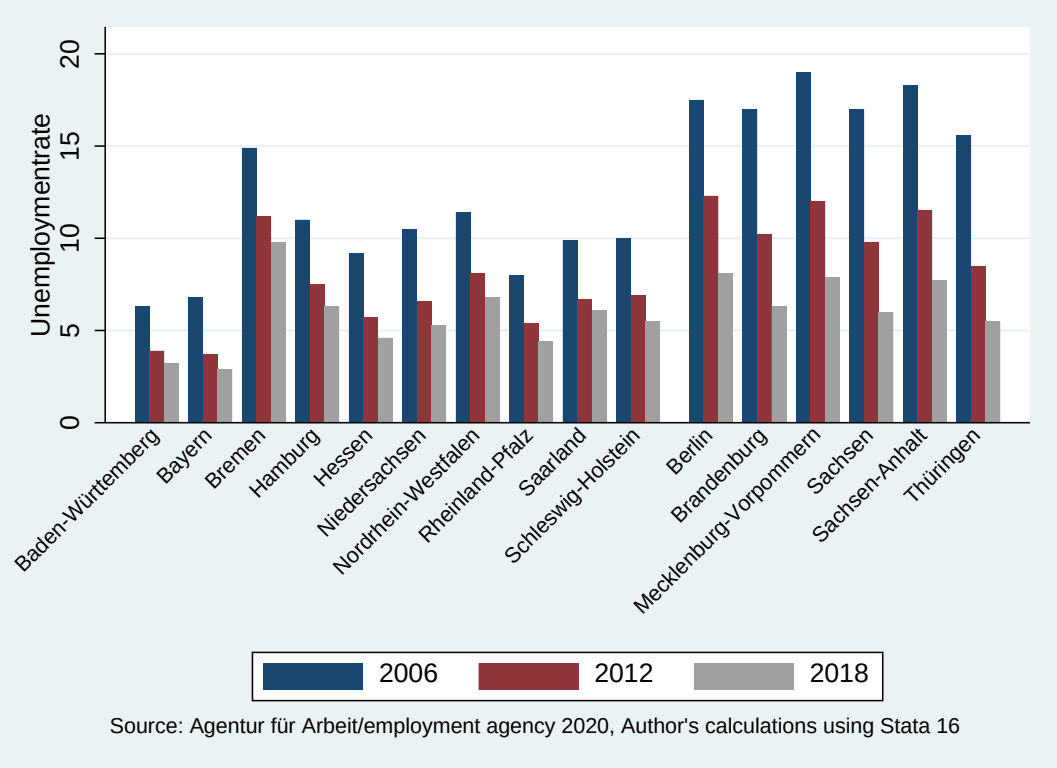
Source: Statistisches Bundesamt 2019, Author's calculations using Stata 16

Map 2 -A: Low-Quality in the States, 2018



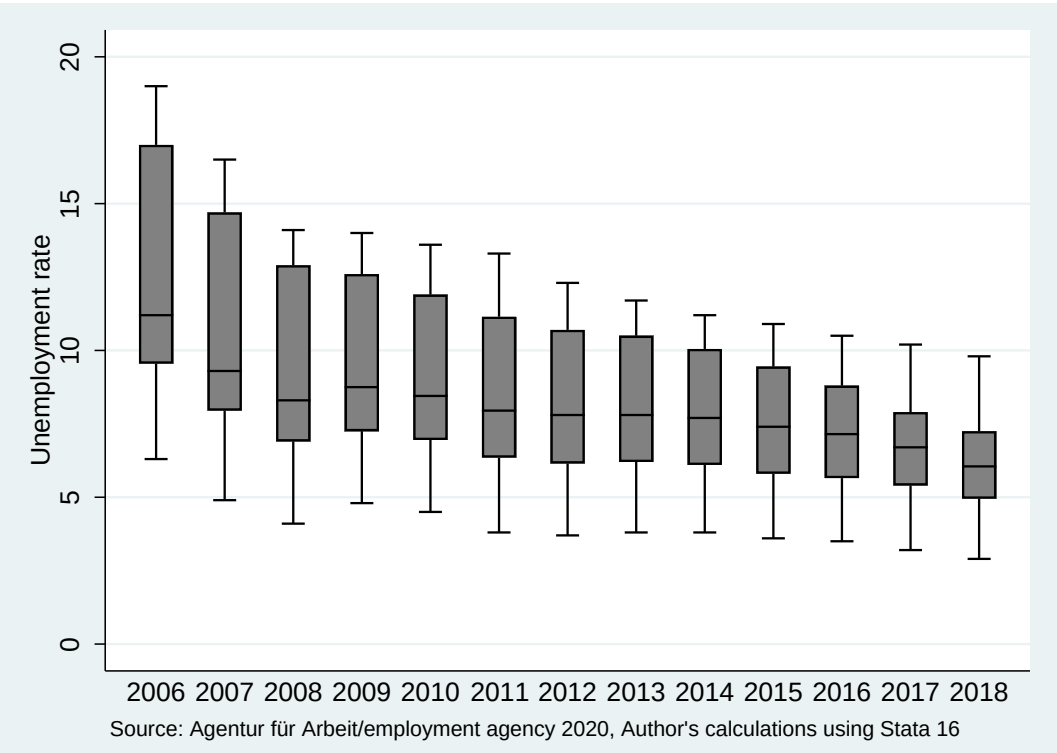
Source: Statistisches Bundesamt 2019, Author's calculations using Stata 16

Figure 6-A: Unemployment Rate in the German States in 2006, 2012, 2018



Source: Agentur für Arbeit/employment agency 2020, Author's calculations using Stata 16

Figure 7- A: Dynamic of Unemployment Level in the States in Germany between 2006 and 2018



Source: Agentur für Arbeit/employment agency 2020, Author's calculations using Stata 16

Table 4: Sensitivity Analysis of the Regression Results in the Piecewise-Constant Exponential Model

Hazard Ratios/ Standard Errors	(4)		(5)		(6)	
	hr	se	hr	se	hr	se
Child to adult ratio	0.731**	0.0789	0.851*	0.0687	0.848*	0.0711
Time Intervals in months	0.006***	0.0031	0.006***	0.0028	0.004***	0.0017
>12-24	0.015***	0.0071	0.020***	0.0086	0.013***	0.0056
>24	0.029***	0.0157	0.019***	0.0081	0.012***	0.0054
Coverage	1.027***	0.0064	1.027***	0.0063	1.026***	0.0067
Education	(ref.)		(ref.)		(ref.)	
Intermediate	3.654***	0.9643	3.722***	0.9856	2.730***	0.7592
High	6.214***	1.6306	6.358***	1.6739	4.248***	1.2096
Unemployment rate	0.947**	0.0163	0.945***	0.0162	0.940***	0.0165
East	0.827	0.2403	0.806	0.2333	0.987	0.2895
Time × quality	(ref.)					
2. Interval × quality	1.065	0.0906				
3. Intervals × quality	0.861	0.0882				
Second Childbirth			0.325***	0.0787	0.321***	0.0784
Urban					1.111	0.1077
Cohorts: 1991-1993					(ref.)	
2 1981-1983					1.291	0.2723
3 1971-1973					1.078	0.2496
Stratum					(ref.)	
Middle class					2.083***	0.3307
Upper class					2.274*	0.7430
BIC	1882		1891		1919	
AIC	1821		1836		1834	
Observation Episodes			3281			
Number of subjects			927			
Number of failures			525			

Source: Pairfam 10.0, Author's calculations using Stata 16

* p<0.05, ** p<0.01, *** p<0.001

Table 5: Weighted Descriptive Statistics of the Data

	Proportion in the mother sample in % (at first birth)	*Proportion of person-episodes in %*
Residence		
East	20.9	20.4
West	79.1	79.6
Birth cohorts		
1971-1973	16.4	17.3
1981-1983	58.5	55.6
1991-1993	25.1	27.1
Education		
low	11.6	13.8
intermediate	39.4	41.8
high	49.0	44.4
Settlement structure		
Rural (< 20 000 inhabitants)	62.9	63.8
Urban (> 20 000 inhabitants)	37.1	36.2
Social stratum		
Lower class (< 1406 €)	17.3	20.8
Middle class	79.8	77.1
Upper class (> 6152€)	2.87	2.01
Repeated Childbearing		
No	85.4	92.4
Yes	14.6	7.58
%/N	**100**	**3,281**

Source: Pairfam 10.0, Author's calculation using Stata 16

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