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## The cost of fair pay: How child care work wages affect formal child care hours, informal child care hours, and employment hours

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Verena Löffler

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# The cost of fair pay: How child care work wages affect formal child care hours, informal child care hours, and employment hours

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## **Abstract**

The debate on the effects of child care policies on household and individual behavior is substantial but lacks a discussion of the unintended consequences of rising wages in the child care work sector. To address this gap in the debate, the relation between rising pay and formal child care hours, informal child care hours, and employment hours is analyzed empirically with a case study on child care in Germany between 2012 and 2019. Among other findings, the evidence demonstrates that the consumption of formal child care hours of middle- and high-income households in eastern Germany correlates negatively with child care work wages, indicating price elasticity.

**JEL classification:** J13, J22, J38

**Keywords:** care work wage, early childhood education and care, informal child care, employment hours

# 1 Introduction

The child care sector in Germany suffers from a labor shortage, especially considering highly qualified care workers. To increase the attractiveness of care work jobs, scholars and policy-makers have been discussing wage raises (Fuest and Jäger 2023; Gambaro et al. 2021; Kroczek and Späth 2022). Possible unintended consequences of such wage increases have been overlooked thus far for the consumption of formal child care hours, the provision of informal child care, and individual employment hours. I address this gap by discussing how higher child care wages correspond to changes in these three variables. I base my argument on the theory of time allocation by Becker (1965), linking formal child care hours, informal child care hours, and employment hours via budget and time constraints. The derived hypotheses are tested empirically, using data between 2012 and 2019, showing that effects differ between a western and eastern German sample, between men and women, and between income groups, where labor income (the amount of income that one earns through employment) is distinct from household income.

The importance of care work gained public attention during the COVID-19 pandemic. In Germany, care workers and their jobs were quickly labeled as relevant for the system, and people applauding from balconies as a sign of solidarity was one of the most prominent images that arose during lockdown. However, daily applause was perceived as cynical when calls for financial remuneration of care work were voiced and answered with one-time payments. Another pandemic phenomenon affecting care work and its perception was that informal child care became more common because many early childhood education and care (ECEC) institutions closed. These aspects of child care, namely wages paid to ECEC workers, the consumption of formal child care, and the provision of informal child care, have already been extensively discussed, as separate issues and in relation to employment hours (see for example Brady 2018; Dong and An 2015; England et al. 2002; England 2005; Gambaro et al. 2021; Lightman and Kevins 2021; Lightman and Link 2021; Lim and Zabek 2023).<sup>1</sup> However, to the best of my knowledge, no studies have yet investigated a possible interdependence between ECEC wages and the other variables. Therefore, this article analyzes how an increase in care work wages af-

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<sup>1</sup>An overview of current scholarship and the development of the debate is also given by Moos (2021). Dolan and Stancanelli (2021) provide an overview focusing on gender gaps in employment.

fects formal child care hours, informal child care hours, and employment hours, shedding light on side effects of pay raises.

Formal child care work is paid less well compared to other industries (Ferragina and Parolin 2022; Lightman 2017). One reason could be that markets do not internalize the positive external effects of child care (England and Folbre 1999). Hence, an increase in ECEC wages could restore the equilibrium on the child care labor market, increasing formal child care labor supply. However, if a wage increase translates into higher cost (Moos 2021), then ECEC prices will increase, affecting the demand side of the formal child care service market. Two scenarios are plausible: Price increases could either encourage substituting formal child care hours with informal child care hours or lead to an increase in employment hours in order to cover additional expenses. Therefore, an ECEC wage increase could indirectly affect household and individual decisions on child care and employment, possibly aggravating inequality in formal and informal child care provision. From a scholarly perspective, the problem is relevant because such a link between care work wages, formal child care hours, informal child care hours, and employment hours has not been established yet. From a practical perspective, the problem is relevant because policymakers might need to consider a trade-off between increasing ECEC wages and aggravating inequality with respect to informal child care and employment hours, which makes it necessary to look at the relation in depth.

This article explores the proposed relationship empirically. Results are obtained by fixed-effects panel regressions on a combined data set using the Socio-Economic Panel (SOEP) and the Regional File of the Sample of Integrated Labour Market Biographies (SIAB-R 7519), both of which contain data collected in Germany. The SOEP data encompasses information on how households and individuals spend their time during a typical weekday (Liebig et al. 2021), providing dependent and control variables. The SIAB-R 7519 offers data on wages in the child care work sector (Berge et al. 2021), providing the main explanatory variable. The German case is interesting because ECEC is organized on the municipal and on the state level, offering variation to exploit empirically (Schober 2021, p. 485).<sup>2</sup> In particular, the German ECEC market is highly regulated, and child care prices vary on the municipal level and according to

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<sup>2</sup>Germany is a federal republic with multiple levels of organization. In this article, I differ between nation state, state (*Bundeslaender*), district (*Kreise*) and municipal level (*Kommunen*).

household income as well as number and age of the supervised children. Further, prices are affected by child care subsidies on the state level, more often in the case of western Germany. The analysis is based on four subsamples on the individual level, differing between eastern and western Germany, as well as between men and women.

The empirical exploration offers four main results. First, it shows that marginal effects of increases in ECEC wages on the consumption of formal child care hours are negative and significant for middle- and high-income households in eastern Germany, while effects are insignificant in western Germany. Second, for women across Germany, ECEC wage changes do not correspond to systematic behavioral changes in informal child care and employment. Third, for men in western Germany, higher ECEC wages correlate with higher employment hours in the middle-labor income group and with lower employment hours in the low-labor income group. Finally, men in eastern Germany belonging to the middle-labor income group or the high-household income group, supply more employment hours when ECEC wages are higher.

This article contributes to the literature in two ways. First, it establishes an empirical link between wages in the ECEC sector, household consumption of formal child care hours, and the time individuals spend on informal child care and employment. Thereby, this research informs policymakers on possible side effects of wage raises that are often demanded. This is especially relevant in the care work sector because wages tend to be low and because the analysis suggests that formal paid child care is a necessary service for price-insensitive households in western Germany. Second, the analysis gives new insights on the nature of the interdependence between ECEC wages and individual time decisions, especially considering care distribution and how the so-called care gap might be affected. Accordingly, male behavior correlates with wage differences, while female behavior does not. In particular, the evidence suggests a possible moral hazard problem of intensive formal child care subsidies in western Germany because, for low-income men, higher ECEC wages correspond to lower employment hours. This might be explained by the rationale to further reduce income by reducing employment hours to reduce prices for formal child care. Moreover, for men in eastern Germany, higher ECEC wages correspond to higher employment hours, indicating a wider employment gap within high-wage districts for child care work.

The remainder of this article is structured as follows. In the second section, the general literature on care and the particular literature on child care in Germany is discussed to contextualize the presented research question. I define the concept of care work, illustrate trends in the formal care work sector, identify the economic value of informal care work, and discuss how child care policies affect individual time allocation. Section three provides detailed information on ECEC organization in Germany. Section four explores the proposed mechanism between ECEC wages and the three dependent variables. In the fifth section, I empirically investigate the effect of ECEC wages in Germany. In the sixth section, I discuss the results considering the presented literature. Finally, I conclude and illustrate further research options.

## **2 Related literature**

In this article, child care work is defined as a range of tasks with the purpose of providing for children. In general, care work “contributes to the health, education, and well-being outcomes” (Duffy et al. 2013, p. 149) of those being cared for. Folbre and Wright (2012) specified that for a task to be considered care work, concern for the care receiver’s well-being is sufficient, regardless of the care worker’s actual contribution, thus highlighting a difference between the mere existence of care and the quality of care. Importantly then, care work does not necessarily involve prosocial behavior because prosocial behavior excludes a formal obligation to care, as for example due to wage payments (Bierhoff 2002, p. 9). While a caregiver’s skill, emotional attachment, prosocial behavior and/or empathy might be relevant for the quality of care work, they are not part of its definition. This reduces care to helping or interpersonal support (Bierhoff 2002, p. 9), and emphasizes the dependence between the care worker and the person being cared for.<sup>3</sup>

Care work is provided within one of four institutions: (1) families or households, (2) state-owned firms, (3) private non-profit firms, or (4) private for-profit firms. In this context, unpaid care work is distinguished by not being paid per unit (Folbre and Wright 2012). The following analysis concentrates on the interdependence between unpaid and paid care work. While both

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<sup>3</sup>This article refrains from expanding the definition of care to include self-care and caring for animals or the environment, facilitating the empirical analysis and focusing on the inter-human context (for more on this see Equal Care Day 2020).



unpaid and paid care work, can be provided by any institution, I suppose in the following that most care work provided informally within the family is unpaid and that most care work provided formally within another institution is paid by unit, irrespective of whether the institution is public or private.

Analyzing data from the United States and 24 European countries, Ferragina and Parolin (2022, p. 126) found that in Germany, child care work is paid particularly poorly. They identified the care penalty in Germany as being one of the largest in the world, next to those in the United States and Luxembourg.<sup>4</sup> Similarly, Jokela (2019, pp. 42-46) found that formal care workers in Germany, the United States, and Luxembourg are more likely to be precariously employed than workers in other industries, where precariously employed workers tend to be employed part-time, have had unemployment experience in the preceding year, be exposed to job tenure, and earn low wages (less than two-thirds of the OECD median wage).<sup>5</sup> Duffy (2007) pointed out that “informal unpaid activities remain largely defined in contrast to work. And when those informal unpaid activities are performed by paid workers, they seem to retain their invisibility as labor” (Duffy 2007, p. 316).

England and Folbre (1999) gave five reasons for low pay in care work: gender bias, intrinsic rewards, a public-goods problem, poor clients, and moral concerns about a commodification of care work. First, “skills culturally coded as female” (England and Folbre 1999, p. 44) might not be perceived as being important enough to be adequately paid. This cognitive error results in low pay. Second, the intrinsic rewards of caring replace the otherwise necessary extrinsic motivation of high pay to ensure the working relation. Third, society free rides on the positive externalities of care work, such as aiding in the development of human capital, which leads to low pay as well as insufficient provision (England 2005). Fourth, paying care workers to tend to mostly poor clients is believed to be unnecessary or even unfair because individuals are supposed to be able to care for themselves. This reason is given in reference to the cultural importance of individualism and resulting self-responsibility. Finally, some are apprehensive that a payment might devalue care that should be given as an act of love (England and Folbre

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<sup>4</sup>Ferragina and Parolin (2022, p. 121) differentiated between care penalties in nurturing care work and reproductive care work, with child care belonging to the latter category.

<sup>5</sup>Jokela (2019) discussed precarious conditions in the care industry in addition to and in comparison to the working conditions in domestic work and other industries.

1999). An additional reason for the low pay in care work was given by Moos (2021), who argued that profit orientation in care work necessarily leads to either low wages and/or higher prices. The argument goes back to the idea of Baumol's cost disease (Baumol 1996; Baumol 2012), stating that costs rise "as a result of increased labor costs in sectors that do not experience labor productivity gains" (Moos 2021, p. 94).

If, in fact, profit orientation and low productivity gains are another reason for low pay, an increase in wages must put pressure on the price of formal paid care work, such that it should cause people to replace formal paid care with informal unpaid care. Therefore, I hypothesize a link between care work (i.e. ECEC) wages and the provision of formal child care hours, informal child care hours, and employment hours. In the following, I explore the literature on the demand side of formal child care, informal child care, and the interdependence between child care and employment.

Studies on the demand and cost of ECEC in Germany have mostly focused on the effects of free daycare expansion. This expansion is theorized to have the opposite effect of the discussed wage increase, but working through the same channel: A change in child care costs affects family behavior. Busse and Gathmann (2020) found that between 2000 and 2015, the expansion of free daycare policies in western German states positively affected the ECEC attendance of two- to three-year-old children. In another study, Gathmann and Sass (2018) analyzed the effects of a new home-care subsidy in the eastern German state Thuringia in 2006, effectively increasing opportunity cost for formal child care. They found that after the subsidy was introduced, formal child care decreased by eight percentage points compared to the period before the policy introduction. The decline was bigger for so-called vulnerable families, including single-parent, low-skilled, low-income, and immigrant households. At the same time, informal child care increased by 18 percentage points.

The relevance of informal unpaid care work, considering its economic dimension, has been discussed for various countries (Dong and An 2015; Duffy et al. 2013; Fast et al. 2023; Moos 2021). In 2020, Oxfam estimated that the annual global value of informal care work accounted

for 10.8 trillion US dollars using the legal minimum wage for 72 countries as replacement cost<sup>6</sup> (Espinoza Revollo 2020). For German households, a study by the Federal Statistical Office analyzing data from 2012 and 2013 found that “even when based on a cautious valuation, unpaid work represents roughly one third of the gross value added as shown by the gross domestic product” (Schwarz and Schwahn 2016, p. 35). For the same time span, the initiative CloseEcon-DataGap estimated the worth of women’s unpaid work in the household setting in Germany at 825 billion euros using the specialist approach (Rudolf et al. 2015).

One of the most discussed attributes of those providing informal care work is gender. Studies agree that care work is still mostly performed by women. Lightman and Kevins (2021) analyzed data from 29 European countries based on two waves<sup>7</sup> of the European Quality of Life Survey dis-aggregating child care and housework. Their findings support a trend of so-called “intensive mothering” (Lightman and Kevins 2021, p. 780) across income groups, meaning that child care is “more gendered than classed” (Lightman and Kevins 2021, p. 780). Considering Germany, a recent study by Boll and Schüller (2023) found that gender care and income gaps aggravate when parents separate. Two further studies on Germany focused on the effects of the pandemic on gender equality within the household setting, and they gave contrasting results. Jessen et al. (2022) argued that while women did most of the additional informal child care during the first lockdown in spring 2020, the intra-family distribution of informal child care returned to its pre-pandemic status during the second lockdown in autumn. In contrast, Kohlrausch (2021) showed that the gender care gap increased between April 2020 and June 2021 because women more often reduced their employment hours to provide informal child care. However, working from home was found to have a positive effect on gender care equality.

This finding adds to the final set of literature to which this research is related, namely the mechanisms behind mothers’ employment. Various simulation models postulate that increasing availability of ECEC services in Germany will positively affect German mothers’ employment (Fehr and Ujhelyiova 2013; Geyer et al. 2015; Wrohlich 2011). Based on this theoretical work,

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<sup>6</sup>Replacement cost can be calculated by two approaches. The generalist approach multiplies time spent on care work with the average wage of an informal unpaid worker. The specialist approach differs between care work tasks and multiplies the time spent on each task with the average wage of a specialist (Moos 2021, p. 93). Using the minimum wage instead of the average wage, the estimation by Espinoza Revollo (2020) is conservative.

<sup>7</sup>2007 to 2008 and 2016 to 2017.

K.-U. Müller and Wrohlich (2020) analyzed data between 2007 and 2014 and found that labor market participation increased by 0.2 percentage points when child care slots increased by one percentage point. The effect was mainly driven by women with medium skill levels. While the literature seems to agree on the effectiveness of increasing ECEC availability to increase female labor supply, evidence on child care subsidies is mixed. The model developed by Bick (2016) supports the intuition that child care subsidies increase female employment, but the effect might not be big enough to raise female labor force participation in western Germany to the standards of other western and northern European nations. In contrast, Huebener et al. (2019) analyzed the relation between child care subsidies and female labor supply using data between 2006 and 2011. They focused on the effect of cost exemption for the last year of kindergarten, and they showed that this particular subsidy increased female labor supply on the intensive margin, but did not increase labor market participation.<sup>8</sup>

Analyses of home-care subsidy effects provide further details on mothers' choices considering child care and employment. In Germany, recalling the study on the home care subsidy that was introduced in Thuringia, women postponed their labor market re-entry in response to the subsidy, while men increased their labor supply at both the intensive and the extensive margins (Gathmann and Sass 2018). Further evidence on a possible price elasticity of family labor supply in the context of child care was explored by Gangl and Ziefle (2015). They found that more generous parental leave policies negatively affect women's return-to-labor preferences. Estevez-Abe and Hobson (2015) focused on the availability of ECEC institutions and they argued that highly educated women in Germany face a time deficit due to the lack of child care infrastructure, making it difficult to provide informal child care and to be employed formally at the same time.<sup>9</sup> In the following, I provide more details on the German ECEC system and how it is organized.

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<sup>8</sup>A more extensive overview of economic studies on ECEC in Germany is given by Spieß (2022).

<sup>9</sup>Shire (2015) showed that this development has partly been countered by affordable household support, but this has led to new inequalities between high- and low-skilled women.

### 3 The German case

The German ECEC system encompasses nurseries for infant care up to the age of three, kindergartens for children between three and six years old, and daycare centers combining the two offers (Spieß 2008, p. 3). German ECEC is organized according to its federal system, and, therefore, responsibility is shared between different institutional levels. Legal responsibility lies with the nation state. Laws passed on the national level are transformed into state laws independently (Oberhuemer et al. 2010, p. 171; Spieß 2008, p. 3). Hence, political responsibility is shared between the nation state and the states, while administrative responsibility, including the responsibility to organize ECEC funding, mainly lies with districts and municipalities (Spieß 2008, p. 5). ECEC is mostly financed on the national level and in municipalities, but on average 14 percent of the cost is still covered by parental fees (Schober 2021, p. 486-487).

In the beginning of the 21st century, Germany was in dire need of expanding child care facilities. Wrohlich (2008, p. 1218) found that in 2002, almost 59 percent of parents in eastern Germany and 24 percent in western Germany were queuing for a spot in an ECEC institution for children aged younger than three. On the national level, the expansion of ECEC services was supported with two laws: the Day Care Development Act in 2005 and the Child care Funding Act in 2008. These laws supported the expansion of daycare facilities and secured a legal right for parents of children at least one year old to make use of ECEC services starting in August 2013 (International Centre Early Childhood Education and Care 2023; Mätzke 2019, p. 50).<sup>10</sup> Consequently, the number of daycare centers increased from roughly 45,000 in 2006 to almost 53,000 in 2019 (Maaz et al. 2020, pp. 81-82).

On the state level, ECEC is organized more concretely. Specifically, states adopted policies enabling free daycare for children of certain age groups. Table 1 shows free daycare regulations in all 16 German states in 2012 and 2019, which mark the beginning and the end of the analyzed time span in this article. Despite the expansion of subsidies, 84 percent of German families paid at least some ECEC fees in 2017 (Bock-Famulla 2018, p. 14). Differences be-

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<sup>10</sup>K.-U. Müller and Wrohlich (2016) estimated that the introduction of the legal claim had a positive effect on maternal labor supply. The effect was partly offset by the introduction of a nationwide home-care subsidy, called *Elterngehd.* In 2015, the home-care subsidy was declared illegal by the German Federal Constitutional Court, which is why it is not explored in more detail at this point. For an economic discussion, see Boll and Reich (2012).

tween states ranged from 98 percent of families paying fees in Brandenburg to only 36 percent of families paying fees in Rhineland-Palatinate (Bock-Famulla 2018, p. 14). In general, child care expenditure increased between 2005 and 2015, and low-income households paid the same relative amount of their overall income for ECEC services as high-income households (Schmitz et al. 2017).

Table 1: Information on free daycare regulations in German states in 2012 and 2019

State	Free daycare in 2012	Free daycare in 2019	Last reform
Baden-Wuerttemberg	No	No	
Bavaria	No, but subsidy of 50 euros per month for the last year before school entry	No, but subsidy of 100 euros per month starting at the age of three	2019
Bremen	No	Last year before school entry	2019
Hamburg	Last year before school entry (max. 5 hours)	For all children (5 hours)	2015
Hessen	Last year before school entry (min. 5 hours)	Starting at the age of three (max. 6 hours)	2018
Lower Saxony	Last year before school entry (4 to 8 hours)	Starting at the age of three	2018
North Rhine-Westphalia	Last year before school entry	No change	
Rhineland-Palatinate	Starting at the age of two	No change	
Saarland	No, but subsidies for low-income families for the last year before school entry	No change	
Schleswig-Holstein	No	No, but refund of up to 100 euros per month for children younger than three years	2017
Berlin	Two years before school entry (max. 7 hours)	For all children	2018
Brandenburg	No	Last year before school entry	2018
Mecklenburg-Vorpommern	No, but partial subsidy for the last year before school entry	For siblings	2019
Saxony	No	No change	
Saxony-Anhalt	No	For siblings	2019
Thuringia	No	Last year before school entry	2018

Sources: Bertelsmann Foundation (2022), Bock-Famulla and Lange (2013), and Bock-Famulla et al. (2020)

Notes: Table depicts free daycare regulations for western and eastern German states in 2012 and 2019 as well as the year of the last reform.

Concrete ECEC prices are determined on the municipal level. By national law, prices for formal child care need to vary according to the age of the supervised child and according to the number of children living in the household. Moreover, most municipalities adapt child care costs according to household income (Schober 2021, p. 487). Therefore, households living on below 25,000 euros per year are usually exempt from child care costs (Busse and Gathmann 2018, p. 9), and, thus, are excluded from the sample population in the following analysis.<sup>11</sup>

Further regional differences exist considering the institutional background of ECEC providers. In 2019, 65 percent of ECEC centers were non-profit, mostly church affiliated and organized privately, another third was public and operated by municipalities, and merely two percent were profit oriented and private (Maaz et al. 2020, pp. 81-82). In large cities, for example in Hamburg, the share of private for-profit kindergartens is bigger, while in eastern Germany there are more public institutions (Mätzke 2019, p. 50; Schober 2021, p. 487).

The East-West divide is also detectable when examining coverage rate and expansion speed. Mätzke (2019, p. 56) argued that these differences persist because of institutional and cultural legacies. After World War II, Germany was divided into the German Democratic Republic (GDR) in eastern Germany and the Federal Republic of Germany (FRG) in western Germany until 1990. In eastern Germany, the GDR expanded daycare centers as well as institutions for infant care in order to enable women to participate in the labor market (Oberhuemer et al. 2010, p. 168-169). Up until today, attitudes toward formal child care for children and infants are more positive in eastern Germany than in western Germany. However, in both regions informal child care was assigned mostly to women (Mätzke 2019, p. 58). In western Germany, the FRG organized child care according to the principle of subsidiarity.<sup>12</sup> Accordingly, the family, as the smallest entity, was the first child care provider, and public daycare centers were designed as supportive structures for those who were unable to fulfill this duty until the early 1970s (Oberhuemer et al. 2010, p. 168-169). Hence, the male breadwinner model of family

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<sup>11</sup>Due to the presented regional and time differences, the empirical analysis incorporates time and state fixed effects.

<sup>12</sup>Subsidiarity is rooted in the Catholic social doctrine. The principle is based on the idea that the smallest social entity, the individual or family, possesses the duty as well as the right to help itself without interference. Support by bigger entities, like the district, state, or nation state, is only provided if the smallest entity is unable to help itself (C. Müller 2022, p. 91-92). Moreover, public institutions only interfere if private provision fails (Oberhuemer et al. 2010, p. 171).



organization “had strong normative and institutional support in the (old) Federal Republic of Germany” (Mätzke 2019, p. 58).

To sum up, eastern Germany’s greater child care infrastructure, and stronger cultural attitudes supporting female employment, in contrast to western Germany’s male-breadwinner-model, enabled a more dynamic child care expansion in eastern Germany in the 21st century (Mätzke 2019, p. 58). While western Germany has caught up in terms of coverage rate of infant care since the legal reforms in 2005 and 2008, eastern Germany provides more full-time slots and has expanded faster (Mätzke 2019, p. 53). The persistent differences in formal child care demand, lead to differences in ECEC coverage rates and hours of formal child care consumption on the state and on the district levels (Schober 2021, pp. 489–499).

Certain patterns can also be found for employees in German ECEC institutions. The labor force consists mainly of so-called *Erzieher:innen* (Oberhuemer et al. 2010, pp. 182-183). Overall, 94 percent of ECEC employees are female, and 81 percent feel strained due to their low income. In addition, a third of the ECEC labor force would like to reduce employment hours (Gambaro et al. 2021). Recruitment is seen as the main issue for formal child care workers: “Whereas in the western part of Germany in 1990 only a fifth of centre staff was over 40 years of age, this is the case for every second member of staff today (in 2009, author’s note). In the eastern *Laender* (states, author’s note) the proportion is even higher, where every third practitioner is older than 50” (Oberhuemer et al. 2010, p. 188). Oberhuemer et al. (2010, p. 189) identified two options to counter this development: recruit more men and pay higher wages. While the wage is only one and not the most important factor in attracting more people to work in the care sector (Kroczek and Späth 2022), this policy choice might have unintended side effects. In the following, I explore the theoretical relation between care work wages, formal child care hours, informal child care hours, and employment hours.

## 4 Mechanism

Care work in general, and informal unpaid care work in particular, poses a challenge to neo-classical economic theory. Accordingly, individuals decide to spend their time either on formal labor or on leisure. Hence, the model does not account for informal work despite its unques-

tionable relevance in everyday life. Becker (1965) was the first to question the traditional labor-leisure allocation of the neoclassical labor market model, putting a bigger emphasis on the allocation of non-working time. In contrast to the traditional approach, he argues that foregone earnings of non-working time are more relevant to the decision of how to allocate time than the enjoyment of leisure because the distinction between work, non-work, and leisure is difficult. Becker (1965) reasoned that producing and consuming commodities always costs time as well as goods; hence, the difference between firms and households becomes more blurry than assumed by the neoclassical approach. Like the firm, the household also “combines capital goods, raw materials and labour to clean, feed, procreate and otherwise produce useful commodities” (Becker 1965, p. 496).<sup>13</sup> Building on Becker (1965), I explore the relation between child care wages and the dependent variables, supporting the assumed correlation between child care wages and child care prices with an empirical test. I further investigate the relation among the dependent variables, namely formal child care hours, informal child care hours, and employment hours, when child care prices increase in theory. Finally, I formulate two competing hypotheses that are tested empirically in the following section.

The mechanism of the relation between wages in child care work and household and individual child care and employment decisions is illustrated by Figure 1. I assume that wages affect child care prices because increasing the cost of child care by increasing wages cannot be otherwise internalized in a care setting (Moos 2021). On the institutional level, prices are

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<sup>13</sup>Becker’s approach has been criticized by care work scholars who take the view that care workers in particular “do not conform to the traditional model of rational economic man” (England and Folbre 1999, p. 40), hence, they are not subject to the dichotomous choice between consumption and leisure that is still the basis of the theory by Becker (1965). Folbre (2004) argues that time allocation rather depends on coordination problems within the household setting than on individual utility. In general, neoclassical theory allegedly misses that decision-making is affected by origins of preferences, initial asset distribution, and institutional settings. Moreover, “individuals derive benefits from the (nonmarket) activities themselves as well as from their outputs” (Folbre 2004, p. 11). This means that time allocation can be motivated by preferences *and* value, while neoclassic theory allegedly only incorporates the former. Folbre (2004) further criticizes that considering care work, time and money cannot be substituted as easily as Becker (1965) assumes for two reasons. First, the market does not internalize positive externalities of care work. This reason is also called upon when trying to explain why care work wages are low (England and Folbre 1999). And second, emotional work is not adequately represented by the concepts of replacement or opportunity cost in the context of care work (Folbre 2004). Opportunity costs are calculated individually for each informal care worker depending on what he or she could have earned in formal employment (Moos 2021, p. 93). In general, advocates of neoclassical modeling counter at least parts of this critique by pointing out that almost everything can be considered in the utility function of a rational individual or household, including the value of an activity itself (see for example Palermo Kuss and Neumaerker 2018). Moreover, while not denying that care work creates positive externalities, it is most likely that these do not depend on its provision being paid or unpaid. Finally, Stigler and Becker (1977) explain why preferences are assumed to be exogenous in neoclassical theory.

also affected by national and state regulations. In a final step, municipalities set prices. Usually prices differ according to household characteristics, while most municipalities offer different prices depending on parental income. These systematic price differences are subsumed as subsidies in Figure 1.<sup>14</sup>

On the household level, prices affect the number of formal child care hours consumed and, with this, the expenditure on formal child care, which is the function of prices and formal child care hours. Expenditure is subtracted from income as a cost and, therefore, affects employment decisions. On the individual level, formal child care hours enable employment and reduce time for informal child care hours. The three dependent variables affect the individual time and consumption budget and are, hence, interdependent as is explained in a second step in this section.<sup>15</sup>

At first sight, child care expenditure seems to be the more intuitive explanatory variable in comparison to child care wages, since it subsumes the price variable.<sup>16</sup> However, I decided to use mean child care wages as price proxy for three reasons. First, observations on child care expenditure are only available for the years 2012, 2013, 2015, and 2019, whereas the SIAB provides wage data for the seven consecutive years between 2012 and 2019, thus enabling a more comprehensive discussion. Second, because child care expenditure is directly affected by the number of formal child care hours consumed, child care wages are better suited to detect possible price effects when consuming formal child care hours. Third, and most importantly, child care wages are the variable of interest in this case, allowing one to explore the possibly unintended side effects of wage increases in ECEC. To provide evidence for the validity of my assumption that child care wages affect prices, I estimate an ordinary least squares (OLS) regression detecting the correlation between child care wages and expenditure, which is a function of consumed formal child care hours and prices.<sup>17</sup>

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<sup>14</sup>The empirical analysis tries to account for the missing data on municipal child care prices by using wage data on the district level, incorporating state and year fixed effects, as well as interacting the wage variable with different income categories and controlling for household characteristics.

<sup>15</sup>The empirical analysis controls for these time restrictions and adds household or individual fixed effects to isolate the correlation between wages and formal child care hours, informal child care hours, or employment hours.

<sup>16</sup>For example, Herbst (2010) explained mothers' employment with differences in child care cost.

<sup>17</sup>Fixed effect regressions are less useful in this case, because the data contains on average only 1.5 observations per household due to the smaller observation period of four years.

$$\begin{aligned}
\text{Expenditure for formal child care}_{ht} &= \beta_0 + \beta_1 \text{ wage}_{kt} \\
&+ \beta_2 \text{ controls}_{ht} \\
&+ \gamma_s + \lambda_t + u_{ht}
\end{aligned}$$

Table 2 shows the average marginal effects (AMEs) of a one-euro-increase in mean daily child care wages on monthly average child care expenditure per household and year<sup>18</sup> with and without controls and with state and year fixed effects for western and eastern Germany. The sample is restricted to households with at least one child aged younger than six and with at least 25,000 euros annual gross household income as in the main analysis. As explained, average expenditure depends not only on prices but also on the number of children living in the household and household income that are added as control variables. Table 2 shows that the correlation between wages and expenditure is positive and significant in western Germany and insignificant in eastern Germany. This is plausible because the number of observations may be too small to generate significant results in eastern Germany. In western Germany, however, in districts where daily child care work wages are ten euros higher, child care expenditure is 0.57 euros<sup>19</sup> higher per month. Hence, I argue that it is reasonable to assume a relation between child care work wages and child care prices in the following analysis for western Germany.

In the following, I explore the theoretical relation between care work prices, formal child care hours, informal child care hours, and employment hours. The consumption of formal child care hours is plausibly assumed to be a household decision. However, I argue that individual decisions on informal child care and employment hours exist due to differences in foregone earnings and preferences, among other factors. Whether these hours are affected by a price increase in ECEC depends on the substitution and income effects. An overview of possible total effects depending on the interplay of substitution and income effect and on the perception of formal and informal child care as either normal or necessary services is illustrated by Table

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<sup>18</sup>The variable is generated by dividing the sum of household expenditure by the number of formal child care hours consumed per household.

<sup>19</sup>0.0571 · 10

Table 2: Marginal effect of mean daily child care wages on expenditure for formal child care hours for western and eastern Germany

	Western Germany		Eastern Germany	
	(1)	(2)	(3)	(4)
Child care wage	0.0736**	0.0571*	-0.0552	-0.0509
Year dummies	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	3544	3544	981	981
R-squared	0.0996	0.1643	0.1293	0.1661
Standard errors	Clustered (household level)			

Notes: Table shows AMEs from OLS regressions for western Germany, column (1) and (2), and eastern Germany, column (3) and (4), without controls in column (1) and (3) and with controls in column (2) and (4). Dependent variable is *expenditure for formal child care hours* which is a continuous variable, capturing the average monthly expenditure per household for formal child care. *Child care wage* is a continuous variable, capturing the mean wages for child care paid in the regional district within which the household is situated. Control variables include the number of children living in the household and net household income. Unit of observation is the household. Years covered by the dependent variable are 2012, 2013, 2015, and 2019. Standard errors are clustered on the household level.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

3.

Table 3: Effects of a price increase in ECEC on consumption expenditure for formal child care hours and informal child care hours

Formal child care hours as ...	SE	IE	TE
Normal service	–	–	–
Relatively inferior service	–	– (under-proportionate)	–
Superior service	–	– (over-proportionate)	–
Absolutely inferior service	–	+	?
Informal child care hours as ...	SE	IE	TE
Normal service	+	–	?
Relatively inferior service	+	– (under-proportionate)	?
Superior service	+	– (over-proportionate)	?
Absolutely inferior service	+	+	+

Notes: Table depicts the signs of substitution and income effects for the two substituting services, namely formal and informal child care, in the case of a price increase for formal child care.

The time constraint adds a third variable to the presented reasoning because it connects informal child care and employment hours on the individual level. Moreover, formal child care hours and employment hours act as complements. On the one hand, using formal child care frees up time to follow up on employment, but, on the other hand, labor income is necessary to pay for ECEC services. Therefore, a price increase in ECEC can affect employment hours in two ways. If formal child care is a normal service, decreasing when prices increase, informal

child care hours have to increase as a substitute. In this case, employment hours would decrease because there is less time available. However, if formal child care is perceived as a necessity, employment hours have to increase to cover additional expenditure. In this case, informal child care would decrease because there is less time available. To sum up, this reasoning implies two competing hypotheses considering the effect of a price increase in ECEC.

**Hypothesis 1** *If formal child care is perceived as a normal service, then an increase in ECEC wages corresponds to a decrease in formal child care hours, an increase in informal child care hours, and a decrease in employment hours.*

**Hypothesis 2** *If formal child care is perceived as a necessity, an increase in ECEC wages does not correspond to a change in formal child care hours, but rather to a decrease in informal child care, and an increase in employment hours.*

The strength of the effects may differ according to preferences, cultural norms, and income group. Therefore, the following analysis tests the effects of ECEC wages on formal child care hours, informal child care hours, and employment hours for subsamples that differ between western and eastern Germany, as well as between men and women. Moreover, I discuss whether the effects differ according to household and labor income groups.

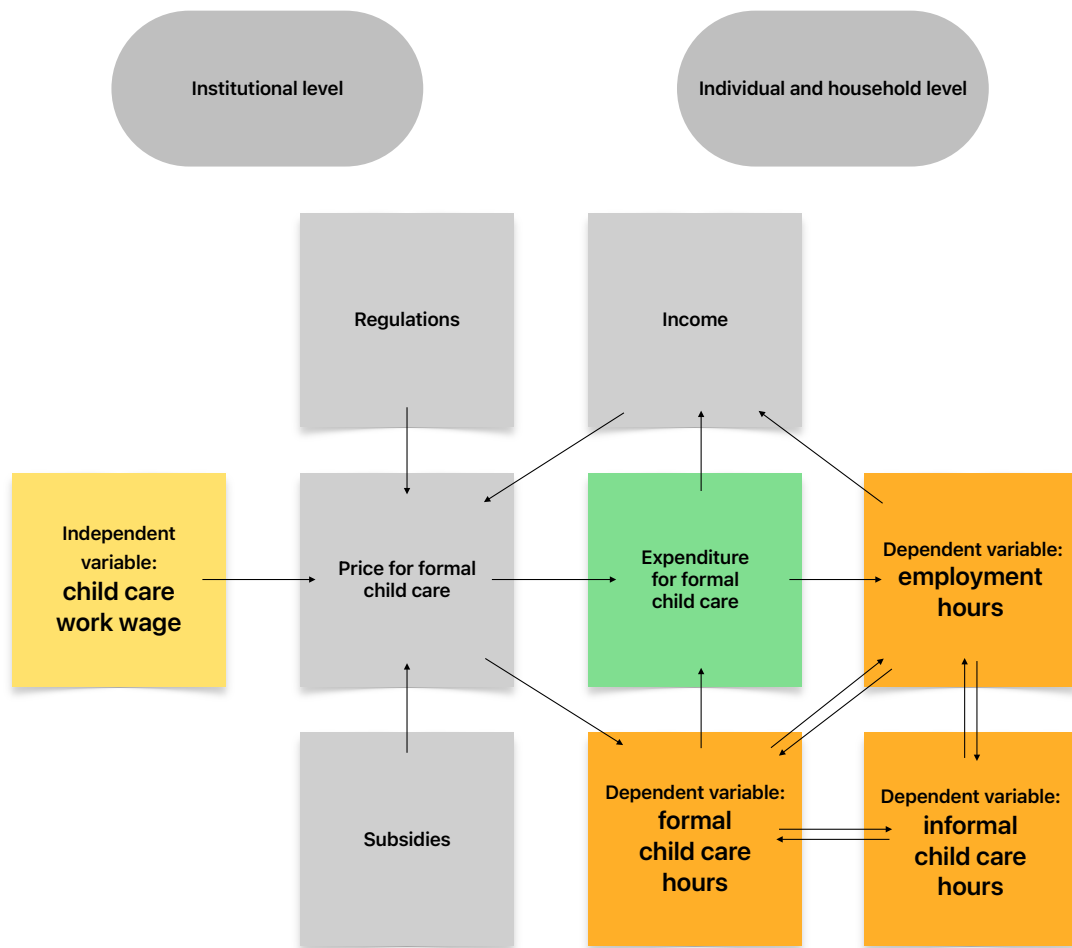


Figure 1: The mechanism behind the relation between child care workers’ wages, formal child care hours, informal child care hours, and employment hours

*Notes:* Figure depicts the relation between the independent variable, child care work wages (light yellow), and the dependent variables of the analysis, formal child care hours, informal child care hours, and employment hours (all dark yellow), tracking the hypothesized relation from the institutional to the individual and household levels and illustrating further variables affecting the relation. The presented mechanism is tested with the help of an ordinary least squares (OLS) regression tracking the relation between child care work wages and expenditure for formal child care (green).

## 5 Empirical exploration

### 5.1 Data

For the empirical analysis, I use combined data from the German Socio-Economic Panel (SOEP) and the Regional File of the Sample of Integrated Labour Market Biographies (SIAB-R 7519) (Berge et al. 2021; Liebig et al. 2021). Access to the SOEP data set is provided via SOEPremote. The SOEP is a representative data set that has collected data on the German population since 1984, covering a range of well-being topics on the individual level and on the household level.<sup>20</sup> Access to the second data set, namely the SIAB-R 7519 (in the following referred to as SIAB), is provided via a Scientific Use File supplied by the Research Data Centre (FDZ) of the German Federal Employment Agency (BA) (Frodermann et al. 2021). The SIAB is a two percent random sample from the Integrated Employment Biographies (IEB) of the Institute for Employment Research (IAB).<sup>21</sup> The SIAB data contains observations on employed individuals living in Germany between 1975 and 2019, including wages, addresses, and occupational codes (Berge et al. 2021).

The merged data is reduced to observations between 2012 and 2019.<sup>22</sup> The sample is further reduced to include only the working population, aged 16 to 65. I also drop observations of individuals living in households with a yearly gross household income below 25,000 euros because these households are often exempt from ECEC fees (Busse and Gathmann 2018). Finally, the sample is reduced to households with at least one child being younger than six years old, thus

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<sup>20</sup>The sample has been updated continuously over the years adapting to the changing structure of German society, for example, by additional samples covering the eastern German population (starting in 1990), immigrants, and high-income households. The SOEP contains regionally clustered multi-stage random samples obtained by annual face-to-face interviews with the household head and all individuals aged 16 and older living in the household. Special questionnaires, for example on the youth, complement the data. Households are selected within regional sample points by random walk. In 2019, the SOEP interviewed 32,050 adults living in 19,032 households. For the presented analysis, I use variables from various data sets in long format: pequiv, pl, ppathl, kidlong, and regionl (Goebel et al. 2019; Grabka 2020; Kantar Public 2020).

<sup>21</sup>In Germany, employers are obliged to regularly report data on their employees to social insurances and to the German Federal Employment Agency (BA) for statistical reasons. For more details, see §§ 1-13 DEUEV.

<sup>22</sup>While the dependent variables from the SOEP data are available from an earlier date, occupational coding changed in 2010, which is why a consistent analysis with the SIAB data on child care wages is only possible starting in 2012.



they are eligible for ECEC.<sup>23</sup> Moreover, households had to consume at least one hour of formal child care. The last restriction is a workaround for missing data on availability of child care data that plausibly has an effect on parents' use of ECEC (Mätzke 2019, p. 53; Schober 2021, p. 495; Wrohlich 2008). I assume that availability of formal child care is given if households consume at least one hour of formal child care. More information on data manipulation is given in the appendix.

## 5.2 Descriptive analysis

Within the SOEP survey, information on how many hours per day a child spends in formal child care institutions is available for each year starting in 2009.<sup>24</sup> This information is summed up for all children aged younger than six living in the household and merged with the main data. The analysis concentrates on effects on the intensive margin rather than the extensive margin. Hence, the first dependent variable is on the household level and captures how many hours of formal child care are consumed by households on a working day, from one to 30 hours<sup>25</sup>, excluding households who do not consume any formal child care.

Moreover, individuals are asked how many hours of informal unpaid child care work they provide during a typical weekday.<sup>26</sup> I argue that within each household, there is a definite amount of child care that needs to be either consumed or supplied to meet children's needs. While the decision to consume formal child care is located on the household level, the reaction to changes in this consumption might differ on the individual level. Therefore, the second dependent variable is on the individual level and describes how many hours an individual spends

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<sup>23</sup>In Germany, children who are six years old on a cutoff date are sent to school. The cutoff date differs according to state law but is generally between the end of June and the end of September. Hence, the sample suffers from an under-coverage problem because I drop observations on ECEC care of children who turn six in the respective year. However, if I included this data, the sample would suffer from an over-coverage problem, and yearly averages would be skewed due to school entry and the reduction of ECEC consumption to zero hours in the middle of the year.

<sup>24</sup>Between 2017 and 2019 there were considerably fewer observations than in the previous years because the question was only included in about 60 percent of the surveys (Socio-Economic Panel 2023a).

<sup>25</sup>It is plausible that the daily amount of consumed ECEC hours per household can exceed 24 hours because it encompasses ECEC hours of all children aged younger than six living in the household rather than only one child.

<sup>26</sup>The questionnaire specifically asks how many hours the individual spends on the job, errands, housework, child care, care in general, education, repairs, sports, and leisure (Kantar Public 2020, p. 4).

on informal child care work on a typical weekday from zero to 24 hours.<sup>27</sup>

Lastly, I am interested in the effect of child care wages on employment hours. The third dependent variable is on the individual level and describes how many contractual hours an individual spends on employment per week from zero to 80 hours.

In accordance with the literature, I argue that, in the specific case of Germany, socio-economic and cultural differences presumably affecting child care decisions persist between eastern and western Germany despite reunification. Moreover, child care consumption and provision systematically differ according to an individual's sex. Thus, I divide the sample by whether a household or an individual lives in eastern or western Germany and by individual sex. The descriptive analysis strengthens this decision by showing systematic differences according to two-sample t-tests on the dependent variables.<sup>28</sup> To sum up, households in western Germany consume fewer formal child care hours than households in eastern Germany. Women in western Germany spend more hours on informal child care and fewer hours on employment than women in eastern Germany. Men in western Germany spend fewer hours on informal child care and more hours on employment than men in eastern Germany. Moreover, men in western Germany spend less time on informal child care and more on employment than women in western Germany. For the population in eastern Germany, the differences between men and women follow the same pattern as in western Germany while being considerably smaller.

The theoretical reasoning behind the presented analysis is further based on the assumption that opportunity costs affect the decision on how much time an individual spends on informal child care and employment hours. Therefore, Figure 2 to Figure 4 show mean comparisons of the consumption of formal child care hours, informal child care hours, and employment hours according to sex and net household income or individual labor income groups, respectively. Income groups are defined for each year and within states across sexes and divide the samples into three income groups. This means that the number of observations belonging to each subsample

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<sup>27</sup>Note that the analysis does not provide information on the parental status of individuals but rather concentrates on the shared living arrangement than on social or biological relation between the individual and the child being cared for. I argue that in practical terms the living situation is more relevant for child care arrangements than the exact form of the relationship. That means that I not only analyze child care decisions of parents but also of siblings or grand-parents within the same household. However, this focus does not allow me to differ between home care and informal care by others than parents.

<sup>28</sup>Specific results are shown in the appendix, see Table 15 to 16 on pages 55 to 56.

might differ because more women than men belong to the low income group and vice versa for the high income group, which is plausible considering the stated differences in employment hours and gender wage gaps.

Figure 2 illustrates the mean sum of daily formal child care hours, represented on the ordinate, for each income group, represented by the grouped pillars. Mean daily formal child care hours for the western German sample population are shown on the left side of the abscissa, whereas the eastern German sample population is shown on the right side. In western Germany, formal child care hours are highest for households belonging to the high-household income group, the third pillar, and in eastern Germany, for households belonging to the middle-income group, the second pillar. Moreover, formal child care hours are higher for each income group in the eastern German sample population in comparison to the western German sample population.

Figure 3 illustrates mean informal child care hours for the four subsamples on the individual level, female and male sample in western and eastern Germany, following the same logic as Figure 2. The upper figure reports informal child care by labor income groups, the lower figure by household income groups. Considering the upper figure, the higher the labor income group, the lower the informal child care hours for both sexes, while women provide more informal child care than men across labor income groups. Moreover, differences between labor income groups as well as between sexes are bigger in western Germany than in eastern Germany. Considering the lower figure, the picture is more nuanced. Differences between men in western and eastern Germany are insignificant, while women in western Germany still supply significantly more informal child care than women in eastern Germany across household income groups. Differences between the low- and middle-household income group are also insignificant, while women and men in the high-household income group supply significantly less informal child care in both western and eastern Germany.

Finally, Figure 4 illustrates mean employment hours. The upper figure reports employment hours by labor income groups, the lower figure by household income groups. Unsurprisingly, the upper figure shows that employment hours are higher for the middle- and high-labor income groups. Moreover, for the low- and middle-labor income groups, employment hours are higher in eastern Germany than in western Germany. Finally, employment hours are higher for men

than for women across income groups for both regions, but the difference between sexes is smaller for the high-income groups and smaller for the eastern German than for the western German sample population. The same is true for the lower figure, which shows an even larger employment gap between sexes. Moreover, men in the low-household income groups supply the highest amount of employment hours in both regions, and men in western Germany supply more employment hours than in eastern Germany. For women in western Germany, the opposite is true, with women in low-income households supplying least employment hours. This indicates wider employment gaps in the low-household income groups in western Germany. For women in eastern Germany, differences in employment hours between household income groups are insignificant.

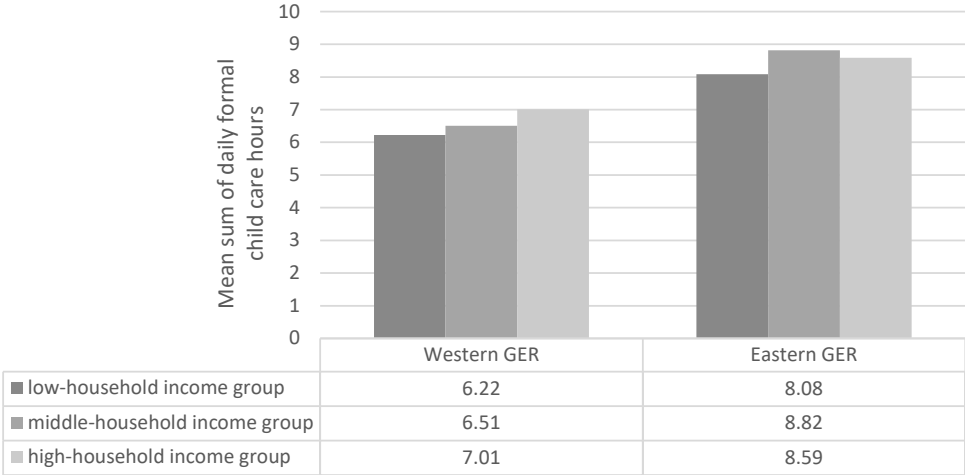
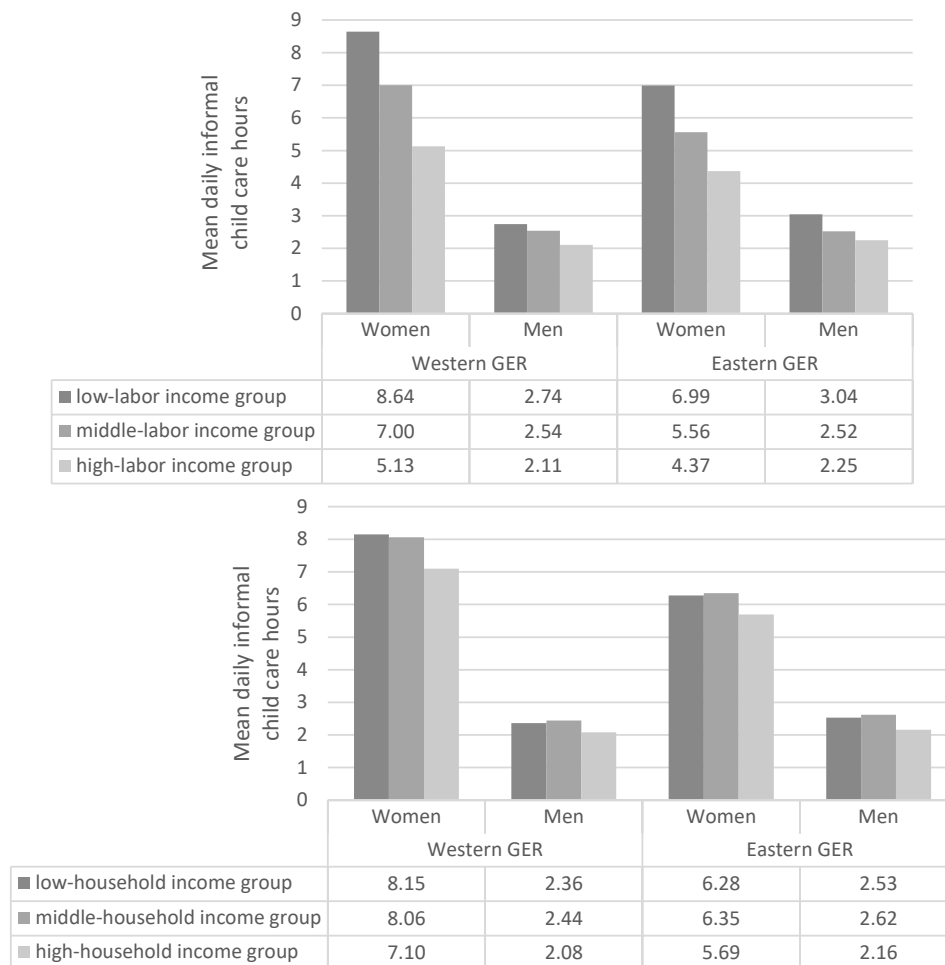


Figure 2: Mean comparison of formal child care hours for western and eastern Germany by household income group

Notes: Figure depicts mean values of *formal child care hours* for western Germany, on the right side, and eastern Germany, on the left side, by household income groups, represented by the grouped pillars. Pillars are shaded according to income group, with the darkest shade representing the low-household income group. Table below the figure depicts precise mean values for each sample subgroup. Unit of observation is the household. Years covered range from 2012 to 2019.

Overall, the results hint at the relevance of sex as well as one’s financial situation for the decision on how individuals spend their time. To the best of my knowledge, the following presents the first attempt to analyze the effect of care work wages on formal and informal child care and employment hours in this context. The analysis is based on the reasoning that wage increases in the child care sector increase child care costs, which translate into increasing prices because ECEC is not capital intensive, leaving little chance to internalize costs otherwise. Hence, wages as price proxy are assumed to have an effect on the time that household and



**Figure 3: Mean comparison of informal child care hours for western and eastern Germany by individual sex as well as labor income group and household income group**

*Notes:* Figures depict mean values of *informal child care hours* for western Germany, on the right side, and eastern Germany, on the left side, by sex, represented by the grouped pillars, and by income group. Mean values for the female sample are illustrated by the first (western Germany) and third (eastern Germany) groups. Mean values for the male sample are shown in the second (western Germany) and fourth (eastern Germany) groups. Pillars represent labor income groups for the upper figure and household income groups for the lower figure. Pillars are shaded according to income group, with the darkest shade representing the low-labor income group. Tables below the figures depict precise mean values for each sample subgroup. Unit of observation is the individual. Years covered range from 2012 to 2019.

individuals spend on child care and employment. Wages paid to those who provide formal child care work (i.e., ECEC wages), as the main explanatory variable, are looked at in more detail in the following.

On average, ECEC wages have increased steadily between 2012 and 2019, while they are persistently lower in eastern Germany than in western Germany as illustrated by Figure 5. Average yearly ECEC wages for each district between 2012 and 2019 are generated on the basis of the SIAB data set, as explained in section 5.1. The displayed mean values are generated across districts without weighting district wages according to population. Differences between western and eastern Germany are significant according to two-sample t-tests for each year.

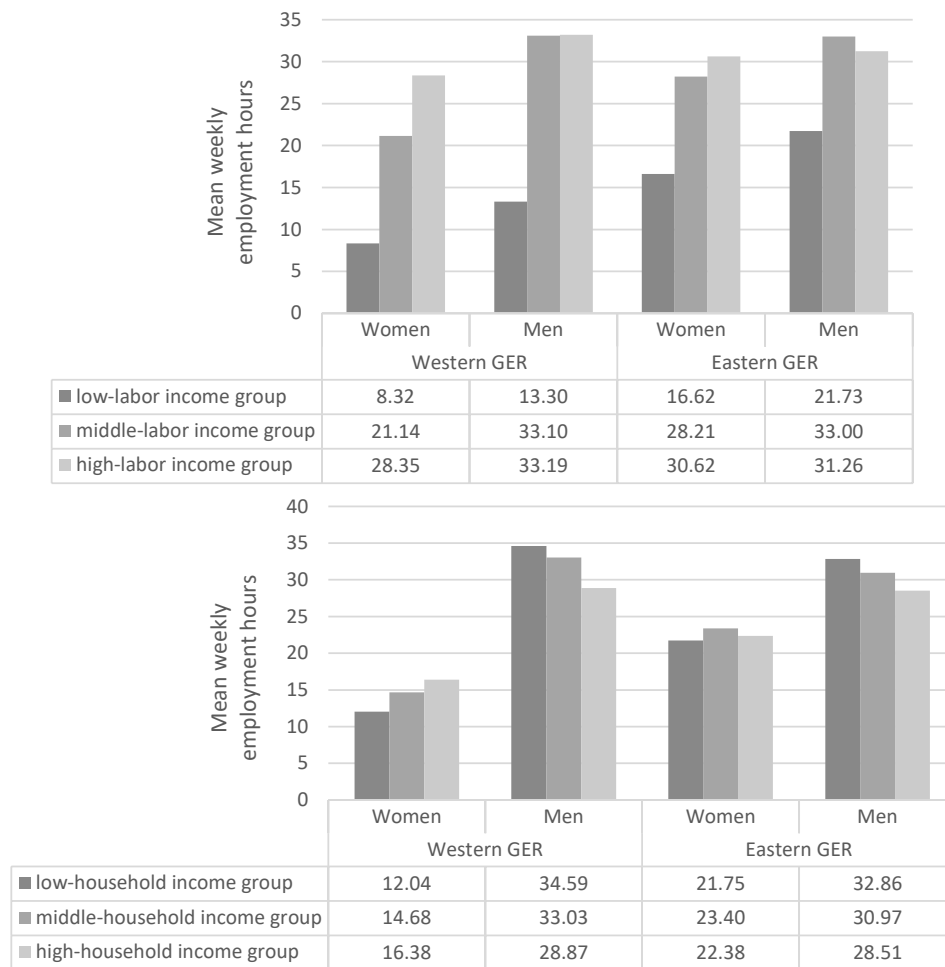


Figure 4: Mean comparison of employment hours for western and eastern Germany by individual sex as well as labor income group and household income group

Notes: Figures depict mean values of *employment hours* for western Germany, on the right side, and eastern Germany, on the left side, by sex, represented by the grouped pillars, and by income group. Mean values for the female sample are illustrated by the first (western Germany) and third (eastern Germany) groups. Mean values for the male sample by the second (western Germany) and fourth (eastern Germany) groups. Pillars represent labor income groups for the upper figure and household income groups for the lower figure. Pillars are shaded according to income group, with the darkest shade representing the low-labor income group. Tables below the figures depict precise mean values for each sample subgroup. Unit of observation is the individual. Years covered range from 2012 to 2019.

The empirical strategy aims to control for factors that might affect the dependent variables besides wages, including household or individual, time and state fixed effects. As illustrated in the descriptive analysis, region, individual sex, and income presumably play a pivotal role in the analyzed decision. Thus the sample is split between women and men living in western and eastern Germany. Moreover, the analyses control for individual labor income (log) and household net income (log). Further control variables include number of children aged younger than six, the age of the youngest child living in the household, a dummy on whether the household is a single-parent household, plus GDP and unemployment rate on the district level.

Descriptive statistics for the control variables are shown in Table 4 to Table 6. Considering

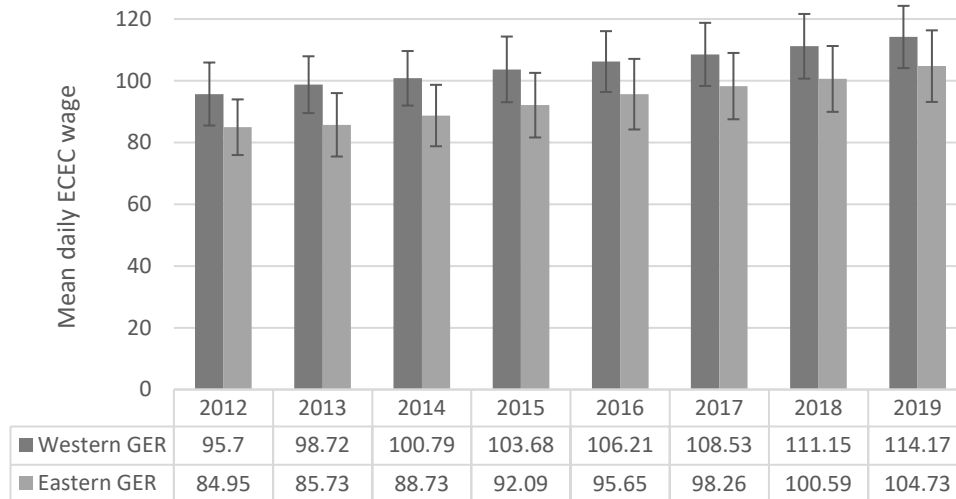


Figure 5: Mean comparison of ECEC wages for western and eastern Germany over time

Notes: Figure depicts mean values of *ECEC wages* for western and eastern Germany for each year, represented by the grouped pillars. Pillars are shaded according to region, with the darker pillars representing western Germany and the lighter pillars representing eastern Germany. Standard deviations are illustrated by bars added to each pillar. Years covered range from 2012 to 2019.

the household-level analysis, samples in western and eastern Germany are fairly similar, except GDP and unemployment rate. GDP is higher and the unemployment rate is lower in western German states than in eastern German states. Considering the individual-level analysis, women and men in western Germany only differ according to individual labor income, which is higher for men. The same is true for the eastern German samples. In contrast, net household income is similar across samples and the standard deviation is comparatively low which can be explained by the fact that households with a yearly gross income below 25,000 are exempt from the analyses. Finally, the percentage of single-parent households is low in both German regions, and especially low for the male sample population living in eastern Germany.

On a final note, institutional factors might also affect the provision of care work. For example, welfare state regimes that provide more social security might incentivize formal child care provision by providing it publicly at lower cost than private institutions. However, since I look at care provision within Germany, whereby I exploit the variance between districts considering wages, while controlling for systematic difference between states with the help of state fixed effects, institutional differences are less relevant for the following analyses.

Table 4: Descriptive statistics of control variables for the household samples in western and eastern Germany

	Western GER			Eastern GER		
	Mean	Sd	N	Mean	Sd	N
Net household income (log)	10.8	0.42	7047	10.71	0.36	1989
Number of children U6	1.31	0.51	7047	1.23	0.45	1989
Age of the youngest child	3.35	1.42	7047	3.21	1.37	1989
Living with a partner (dummy)	0.98	0.15	7047	0.97	0.18	1989
GDP (district level)	71853	14510	7047	59396	7722	1989
Unemployment rate (d.l.)	5.33	2.4	7047	8.75	2.38	1989

Notes: Table depicts mean values, standard deviations, and number of observations for control variables in western Germany, column 2 to 4, and eastern Germany, column 5 to 7. *Net household income* is a continuous variable, capturing the mean of the logarithm of net household income. *Number of children U6* is a continuous variable, capturing the mean number of children aged five and younger living in the sample households, with age being the difference between survey year and year of birth. *Age of the youngest child* is a continuous variable, capturing the mean age of the youngest child living in the sample households, with age being generated as already stated. *Living with a partner* is a binary variable, capturing the mean status of partnered living in the sample households, with *living with a partner=1* and *single household=0*. *GDP* is a continuous variable, capturing the mean gross domestic product across districts. *Unemployment rate* is a continuous variable, capturing the mean rate of unemployment across districts. Years covered range from 2012 to 2019.

Table 5: Descriptive statistics of control variables for female and male sample in western Germany

	Women			Men		
	Mean	Sd	N	Mean	Sd	N
Individual labor income (log)	5.84	6.18	7695	10.12	2.89	7510
Net household income (log)	10.79	0.41	7695	10.8	0.42	7510
Number of children U6	1.33	0.54	8300	1.33	0.54	8077
Age of the youngest child	3.3	1.45	8300	3.3	1.45	8077
Living with a partner (dummy)	0.92	0.27	8300	0.94	0.23	8077
GDP (district level)	71540	14157	8277	71530	14226	8057
Unemployment rate (d.l.)	5.38	2.45	8277	5.36	2.43	8057

Notes: Table depicts mean values, standard deviations, and number of observations for control variables for the female sample, column 2 to 4, and the male sample, column 5 to 7, living in western Germany. *Individual labor income* is a continuous variable, capturing the mean of the logarithm of individual labor income. *Net household income* is a continuous variable, capturing the mean of the logarithm of net household income. *Number of children U6* is a continuous variable, capturing the mean number of children aged five and younger living in the sample households, with age being the difference between survey year and year of birth. *Age of the youngest child* is a continuous variable, capturing the mean age of the youngest child living in the sample households, with age being generated as already stated. *Living with a partner* is a binary variable, capturing the mean status of partnered living in the sample households, with *living with a partner=1* and *single household=0*. *GDP* is a continuous variable, capturing the mean gross domestic product across districts. *Unemployment rate* is a continuous variable, capturing the mean rate of unemployment across districts. Years covered range from 2012 to 2019.



Table 6: Descriptive statistics of control variables for female and male sample in eastern Germany

	Women			Men		
	Mean	Sd	N	Mean	Sd	N
Individual labor income (log)	7.53	5.19	2087	9.92	2.75	2004
Net household income (log)	10.71	0.36	2087	10.72	0.35	2004
Number of children U6	1.25	0.48	2233	1.25	0.48	2133
Age of the youngest child	3.15	1.4	2233	3.14	1.4	2133
Living with a partner (dummy)	0.93	0.26	2233	0.95	0.21	2133
GDP (district level)	59474	7623	2223	59416	7665	2125
Unemployment rate (d.l.)	8.82	2.37	2223	8.78	2.35	2125

*Notes:* Table depicts mean values, standard deviations, and number of observations for control variables for female sample, column 2 to 4, and male sample, column 5 to 7, living in eastern Germany. *Individual labor income* is a continuous variable, capturing the mean of the logarithm of individual labor income. *Net household income* is a continuous variable, capturing the mean of the logarithm of net household income. *Number of children U6* is a continuous variable, capturing the mean number of children aged five and younger living in the sample households, with age being the difference between survey year and year of birth. *Age of the youngest child* is a continuous variable, capturing the mean age of the youngest child living in the sample households, with age being generated as already stated. Living with a partner is a binary variable, capturing the mean status of partnered living in the sample households, with *living with a partner=1* and *single household=0*. GDP is a continuous variable, capturing the mean gross domestic product across districts. Unemployment rate is a continuous variable, capturing the mean rate of unemployment across districts. Years covered range from 2012 to 2019.

### 5.3 Regression analyses

This section presents the marginal effects of child care wages on formal child care hours consumed by households, before illustrating the effects on individual informal child care and employment hours. I estimate fixed-effect panel regressions with household or individual fixed effects,  $\alpha_h$  or  $\alpha_i$ , state dummies,  $\gamma_s$ , and year dummies,  $\lambda_t$ . Complete regression equations are displayed in the following. The analysis on the household level differs between eastern and western Germany. On the individual level, I analyze four different subsamples, differing between men and women living in eastern and western Germany. While for each sample, the first regression is fairly simple, I then introduce control variables on the household or individual and on the district level. Finally, child care wages are interacted with net household income group or individual labor income group to allow for different effects of wage changes according to income group. In the following, I present the significant marginal effects of each subsample analysis. Insignificant results are presented in the appendix. First, I look at the effect of mean child care wages on the district level,  $wage_{kt}$ , on formal child care hours on the household level, *formal child care hours*<sub>ht</sub>.

$$\begin{aligned} \text{formal child care hours}_{ht} = & \beta_0 + \beta_1 \text{ wage}_{kt} \\ & + \beta_2 \text{ household income group}_{ht} \\ & + \beta_3 \text{ wage}_{kt} \times \text{ household income group}_{ht} \\ & + \beta_4 \text{ controls}_{ht} \\ & + \beta_5 \text{ controls}_{kt} \\ & + \gamma_s + \lambda_t + \alpha_h + u_{ht} \end{aligned}$$

The marginal effects of mean daily child care wages on consumed formal child care hours are negative across regression specifications for eastern Germany as can be seen in Table 7. The significance of the effect is represented by asterisks, as usual. If mean daily child care work

wages are ten euros higher<sup>29</sup>, households belonging to the middle-household income group consume 19 minutes<sup>30</sup> fewer formal child care per day, and households in the high-household income group consume 15 minutes<sup>31</sup> fewer. Other than that, the consumption of formal child care hours does not significantly correlate with child care wages. However, this does not necessarily mean that individuals do not adapt their consumption and time decision behavior along other dimensions, which is why the following section discusses the marginal effects of mean child care wages on individual time spent on informal child care hours and employment hours.

Table 7: Marginal effects of mean daily child care wages on consumed formal child care hours in eastern Germany

	Eastern Germany			
	(1)	(2)	(3)	(4)
Child care wage	-0.0119	-0.0239***	-0.0238***	
low household income				-0.0144
middle household income				-0.0319**
high household income				-0.0249**
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Interaction term	No	No	No	Yes
Observations	1989	1989	1989	1989

*Notes:* Table depicts AMEs from fixed-effects panel regressions for eastern Germany. Observations of the state Mecklenburg-West Pomerania are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on the household level, column (3) shows results for the estimation with regional control variables, and column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

<sup>29</sup>Standard deviation of mean child care wages is between eight and twelve. I choose to illustrate the marginal effects with a wage increase of ten euros for reasons of simplicity and because it is a plausible estimate of wage variation between districts according to the standard deviation.

<sup>30</sup> $0.0319 \cdot 10 \cdot 60$

<sup>31</sup> $0.0249 \cdot 10 \cdot 60$

$$\begin{aligned}
\text{informal child care hours}_{it} = & \beta_0 + \beta_1 \text{ wage}_{kt} \\
& + \beta_2 \text{ labor income group}_{it} \\
& + \beta_{3a} \text{ wage}_{kt} \times \text{ labor income group}_{it} \\
& + \beta_{3b} \text{ wage}_{kt} \times \text{ household income group}_{ht} \\
& + \beta_4 \text{ controls}_{it} \\
& + \beta_5 \text{ controls}_{kt} \\
& + \gamma_s + \lambda_t + \alpha_i + u_{it}
\end{aligned}$$

Table 8 shows the marginal effects of a one euro increase in mean daily child care wages on daily informal child care hours. If child care work wages are ten euros higher, men living in western Germany and in the high-labor income group spend six minutes<sup>32</sup> fewer on informal child care per day.

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<sup>32</sup>0.0107 · 10 · 60

Table 8: Marginal effects of mean daily child care wages on informal child care hours for men in western Germany

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0044	-0.0039	-0.0039		
low income group				0.0178	-0.0068
middle income group				0.0074	-0.0006
high income group				-0.0107**	-0.0054
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6597	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

$$\begin{aligned}
 \text{employment hours}_{it} = & \beta_0 + \beta_1 \text{ wage}_{kt} \\
 & + \beta_2 \text{ labor income group}_{it} \\
 & + \beta_{3a} \text{ wage}_{kt} \times \text{ labor income group}_{it} \\
 & + \beta_{3b} \text{ wage}_{kt} \times \text{ household income group}_{ht} \\
 & + \beta_4 \text{ controls}_{it} \\
 & + \beta_5 \text{ controls}_{kt} \\
 & + \gamma_s + \lambda_t + \alpha_i + u_{it}
 \end{aligned}$$

Tables 9 and 10 show the marginal effects of a one euro increase in mean daily child care wages on weekly contractual employment hours. For men living in western Germany, I find that the effects of child care work wages on weekly employment hours differ between income

groups. If child care work wages are ten euros higher, employment hours are two hours and nine minutes<sup>33</sup> lower per week for men belonging to the low-income group. For men belonging to the middle-labor income group, employment hours are one hour<sup>34</sup> higher per week.

Table 9: Marginal effects of mean daily child care wages on employment hours for men in western Germany

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0148	0.0195	0.0194		
low income group				-0.2151**	0.0342
middle income group				0.1008**	0.003
high income group				-0.0147	0.0299
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6437	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

In eastern Germany, the effect of child care work wages on weekly employment hours is significant for men belonging to the middle-labor income group and for men belonging to the high-household income group. If child care work wages are ten euros higher, men belonging to the middle-labor income group contract one hour and four minutes<sup>35</sup> more employment hours per week. Men belonging to the high-household income group contract one hour and 18 minutes<sup>36</sup> more employment hours per week.

<sup>33</sup> $0.2151 \cdot 10 \cdot 60$

<sup>34</sup> $0.1008 \cdot 10 \cdot 60$

<sup>35</sup> $0.1062 \cdot 10 \cdot 60$

<sup>36</sup> $0.1296 \cdot 10 \cdot 60$

Table 10: Marginal effects of mean daily child care wages on employment hours for men in eastern Germany

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.069	0.0879*	0.0895**		
low income group				0.0328	-0.0021
middle income group				0.1062*	0.1168
high income group				0.0832	0.1296*
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1735	1715	1707	1707	1707

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Results for the state Mecklenburg-West Pomerania are omitted due to collinearity, when control variables on the district level are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## 5.4 Robustness checks

This section presents three robustness checks on the results of the regression analysis. These robustness check regression analyses are conducted *ceteris paribus*. The first analysis forgoes state fixed effects, the second reduces the sample to individuals living in households with children aged four and younger, and the third changes the basis of observations for generating average care work wages. Average marginal effects are displayed in the appendix. Table 11 to Table 14 compare effects from the main analysis and the robustness checks.

First, the presented analysis uses state fixed effects to control for different policy introductions in different years in the respective states that might affect results. However, state fixed effects reduce the variance of the explanatory variable, which is why observations of some states are omitted due to collinearity when introducing regional control variables. The regression analyses *without state fixed effects*, hence, including the lost observations but being possibly subject to omitted variable bias, strengthen the validity of the presented results. All coefficients that

are significant in the analysis with state fixed effects are significant in the analysis without state fixed effects. Moreover, men belonging to the middle-household income group in eastern Germany also work significantly more when wages are higher in the analysis without state fixed effects.

Second, during the analyzed time span, most states have introduced policies that enable children to visit formal child care institutions free of charge when being one year before school entry, hence, roughly at the age of five. In the following analysis, I only include households with *children younger than five*, excluding households with the youngest child being five years old, in contrast to the main analysis. Henceforth, the results of the analysis with the smaller sample are presented *ceteris paribus*, controlling for different state policies with year and state dummies. Results strengthen the robustness of the main analysis, except for the effects on child care wages on employment hours for men in western Germany, which are insignificant when the sample is restricted as described. However, analyzing the restricted sample reveals a positive marginal effect of child care wages on informal child care hours for men in eastern Germany belonging to the middle-labor income group. While this effect is only significant for this specific sample, the result is not discussed further at this point.

Third, there are several problems with the wage data being obtained from the SIAB data set. In general, employer reports may be subject to classification mistakes in that employers might report part-time workers as full-time workers because this variable is not decisive for social security claims; therefore, obtained average wages might be smaller than in reality. Another problem is that job types may have been misclassified, because this classification has changed in 2011.<sup>37</sup> Attempting to decrease possible over-coverage in the data, I use the old and the new occupational coding to restrict the sample as described in the appendix. The SIAB data offers one more variable to restrict observations. For a robustness check, the data is therefore reduced according to “the Classification of Economic Activities, Edition 2008 [...] of the Federal Statistical Office [...](, which) is based on the Statistical Classification of Economic Activities in the European Community NACE Rev. 2” (Frodermann et al. 2021, p. 57). Accordingly, observations are only kept if employers are classified as being in the education sector or in human

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<sup>37</sup>At this point, I want to thank Phillip vom Berge of the Institute for Employment Research (IAB) for valuable support.



health services, residential care, and social work activities ( $w08\_gen\_gr== 12$  or  $13$ ). Together with the restriction on occupational coding, the analysis attempts to focus on wages paid by kindergartens (education sector) and daycare centers (human health services, residential care, and social work activities) (German Federal Statistical Office 2008, pp. 509 f., 528). This way, wages from child care workers in industrial daycare centers are not part of the child care wage. This procedure may reduce over-coverage, but it does not completely eliminate the problem. Moreover, the analysis now suffers from an under-coverage problem. However, the *alternative calculation of mean wages* strengthens the validity of the presented results. All coefficients that are significant in the main analysis are significant in the analysis with the slightly different mean wage variable.

Table 11: Robustness checks on marginal effects of mean daily child care wages on consumed formal child care hours in eastern Germany

	(4)		
	Low income group	Middle income group	High income group
Main analysis	-0.0144	-0.0319**	-0.0249**
Check 1	-0.0148	-0.0329***	-0.025**
Check 2	-0.0166	-0.0258*	-0.0237*
Check 3	-0.0148	-0.0338***	-0.0246**

*Notes:* Table depicts significant AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Lines present results of the main analysis and the different robustness checks. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 12: Robustness checks on marginal effects of mean daily child care wages on informal child care hours for men in western Germany

	(4)			(5)		
	Low income group	Middle income group	High income group	Low income group	Middle income group	High income group
Main analysis	0.0178	0.0074	-0.0107**	-0.0068	-0.0006	-0.0054
Check 1	0.017	0.0066	-0.0115**	-0.0075	-0.0016	-0.0063
Check 2	0.0253	0.0043	-0.0104*	-0.0023	0.0052	-0.0191**
Check 3	0.0177	0.0074	-0.0106**	-0.0069	-0.0006	-0.0054

Notes: Table depicts significant AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Lines present results of the main analysis and the different robustness checks. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 13: Robustness checks on marginal effects of mean daily child care wages on employment hours for men in western Germany

	(4)		
	Low income group	Middle income group	High income group
Main analysis	-0.2151**	0.1008**	-0.0147
Check 1	-0.2157**	0.1007**	-0.0128
Check 2	-0.1533	0.0757	-0.02
Check 3	-0.2153**	0.1009**	-0.0145

Notes: Table depicts significant AMEs from fixed-effects panel regressions considering western Germany for the male sample. Table shows results for the estimation with controls and interaction effect of child care wage and labor income group, columns present effects for different labor income groups. Lines present results of the main analysis and the different robustness checks. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 14: Robustness checks on marginal effects of mean daily child care wages on employment hours for men in eastern Germany

		(4)			(5)		
	Low income group	Middle income group	High income group	Low income group	Middle income group	High income group	
Main analysis	0.0328	0.1062*	0.0832	-0.0021	0.1168	0.1296**	
Check 1	0.0333	0.1055*	0.0936	0.001	0.1305*	0.1295*	
Check 2	0.0329	0.159**	0.1199	0.042	0.1385	0.1541	
Check 3	0.0328	0.1062*	0.0832	-0.0021	0.1168	0.1296**	

*Notes:* Table depicts significant AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Lines present results of the main analysis and the different robustness checks. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## 6 Discussion

Considering the child care landscape in Germany, this analysis finds that a cultural divide between eastern and western Germany persists, with lower wages and higher ECEC consumption in eastern Germany. Across Germany, individuals with lower labor income provide more informal child care hours. Moreover, gender inequality in time allocation considering informal child care and employment hours is significant, with women supplying more informal care and men providing more employment hours. These gender gaps are smaller in eastern than in western Germany. Besides these supporting findings, the regression analyses provide four main results that extend the current scholarship and that are discussed in more detail in the following.

1. Higher child care work wages correspond to lower formal child care hours for middle- and high-income households in eastern Germany, while correlations are insignificant for western Germany.

On the one hand, the regression analysis shows that higher child care work wages do not correspond to differences in formal child care hours in western Germany. One possible reason for a missing correlation could be that households in western Germany simply do not react to price changes in formal child care. However, Busse and Gathmann (2020) found that the introduction of free daycare policies corresponded with increased ECEC attendance of two- to three-year-old children in western Germany, indicating that western German households are indeed sensitive to the costs of ECEC services. Two further explanations exist for missing correlation. First, formal child care could be a necessary service for western German households (see Hypothesis 2 on page 19). Insignificant wage effects could be explained by opposing substitution and income effects. Second, ECEC prices are highly regulated in western Germany. The result could be a further indication that child care subsidies in western Germany do not allow for passing on higher costs for wages to ECEC consumers.

On the other hand, the presented analysis demonstrates that if child care work wages are ten euros higher, middle-income households in eastern Germany consume 19 minutes fewer and high-income households 15 minutes fewer formal child care hours per day.

The results support the reasoning offered by Gathmann and Sass (2018) who found that the introduction of a home-care subsidy in the eastern German state Thuringia decreased ECEC attendance, namely that households are sensitive to the costs of ECEC services in eastern Germany. Accordingly, the analysis indicates that formal child care is a normal service for middle and high-income households in eastern Germany (see Hypothesis 1 on page 19). Middle- and high-income households can afford to react to higher wages, and, hence, presumably higher prices in ECEC by reducing consumption. The fact that this relation is only found for the eastern German sample may be explained by fewer free daycare policies in eastern German states.

Overall, I conclude that if child care costs correlate with child care wages, they seem to play a significant role in the consumption of formal child care hours.<sup>38</sup> This indicates a possible trade-off between paying higher wages in child care work and the consumption of ECEC services in eastern Germany. It is plausible that individuals adapt informal child care and employment hours to compensate for higher prices for ECEC services. Considering that care and employment gaps are smaller in eastern Germany than in western Germany, a reduction in ECEC consumption could increase these gaps. Such unintended consequences need to be considered carefully when increases in pay are demanded. However, since correlations are only significant for eastern Germany, subsidies in western Germany seem to be effective tools to inhibit such a trade-off.

2. For women across Germany, informal child care and employment hours do not systematically differ when child care wages are higher.

Female time allocation does not correspond to changes in child care wages, neither in western nor eastern Germany, while the descriptive analysis suggests that care and employment gaps still exist between western and eastern Germany as well as between sexes. The data matches with the intuition provided by Bick (2016), namely that positive effects of child care subsidies are not enough to decrease care and employment inequality in western Germany. Moreover, for women, cost sensitivity seems to be one-sided. While Huebener et al. (2019) found a positive effect of free daycare subsidies on female employ-

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<sup>38</sup>In this case, the empirical result opposes the theoretical reasoning presented by Figari and Narazani (2020).

ment hours, the presented analysis finds no effect by increases in wages, and, therefore costs. The insignificant correlations between wages and female time allocation in both eastern and western Germany strengthen the reasoning that for women, cultural norms are more prevalent than the cost-benefit rationale applied to their decisions on child care and employment hours, argued by Gangl and Ziefle (2015), at least considering increases in costs.<sup>39</sup> A further explanation could be that higher child care work wages effectively increase the ECEC labor force, hence, increasing the availability of child care. Child care availability, in turn, has a positive effect on female labor force participation, according to the literature (Fehr and Ujhelyiova 2013; Geyer et al. 2015; K.-U. Müller and Wrohlich 2020; Wrohlich 2011), possibly counteracting negative effects of price increases on average employment hours.

Despite insignificant correlations for female behavior, child care prices still affect care and employment gaps. While the literature on female behavior in the context of the trade-off between informal child care and employment hours is substantial, the discussion misses the fact that male behavior also affects gender inequality. For example, men in western Germany who belong to the high-labor income group supply less informal child care when wages are higher. Even if female behavior does not correlate with wages with respect to informal child care hours, this means that care gaps in high-ECEC wage districts in western Germany are bigger than in low-ECEC wage districts. If it is a political goal to decrease inequality in informal care, results should be considered when deciding on ECEC wages and child care subsidies. The same is true for correlations between child care work wages and employment hours which are discussed in more detail in the following.

3. In western Germany, men who belong to the low-labor income group supply less employment hours when wages are higher. In contrast, men who belong to the middle-labor income group supply more employment hours.

The demonstrated differences in male employment hours in western Germany depend-

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<sup>39</sup>A similar argument was made by Magda et al. (2023) for the case of Poland. The authors suggested narrowing wage gaps to improve gender equality on the labor market and in the household setting.

ing on labor income group may be explained by differences in foregone earnings. For men belonging to the low-labor income group, foregone earnings are lower when lower income corresponds to lower wages, such that it is more intuitive to reduce employment time to enable substituting formal child care with informal child care hours. However, the decrease in employment hours does not correspond to an increase in informal child care hours. Another explanation could be an unintended incentive structure posed by child care subsidies, which are more extensive in western Germany. In most German municipalities, child care prices depend on income. For low-income men, it could, therefore, be rational to further reduce income by reducing employment hours to reduce prices for formal child care, possibly revealing a moral hazard problem. In both ways, low-income men in western Germany possibly free ride either on the provision of female informal child care or formal child care services. In contrast, for middle-income men in western Germany, the same reasoning applies as for men in eastern Germany, which is discussed in the following.

4. In eastern Germany, men who belong to the middle-labor income group or the high-household income group supply more employment hours when wages are higher.

When ECEC wages are higher, middle-income men or men in the high-household income group in eastern Germany supply more employment hours, possibly to pay for additional expenses. Considering the time constraint, spending more time on formal employment means having less time to spend either on informal child care or leisure. Because the increase in employment hours does not correspond to a decrease in informal child care, men belonging to the respective income groups possibly reduce leisure time in favor of employment hours. Another explanation for higher employment hours in high-wage districts could be that opportunity costs for informal child care and leisure are higher. However, this explanation is only plausible if higher child care work wages also indicate a higher wage level in general. Moreover, the empirical strategy attempts to control for these regional economic differences by including GDP and unemployment rate on the district level. According to the presented results, existing gender differences in time allocation on employment hours are bigger in regions where ECEC wages are higher, indicating that

there might be a trade-off between paying higher wages in ECEC and increasing gender equality.

## **7 Conclusion**

The analysis demonstrates that for eastern German middle- and high-income households, higher wages in child care work correspond to lower formal child care consumption. Moreover, in high-wage districts in eastern and western Germany, middle-labor income men supply more employment hours, suggesting larger gender employment gaps. In western Germany, where formal child care is subsidized more intensively, a moral hazard problem might explain lower employment hours considering men with low labor income. Overall, ambiguous effects on the household level hint at paid formal child care being a necessary service for western German households, which could be why men adapt employment hours.

Four implications for policymakers follow. First, increasing costs by increasing wages seem to be effectively internalized if and only if ECEC prices are regulated strongly, for example with the help of child care subsidies. This conclusion is based on differing correlations between wages and formal child care in western and eastern Germany. Evidently, child care subsidies effectively counteract wage effects on ECEC consumption in western Germany. Hence, a decrease in formal child care consumption is not per se a valid argument to counter demands for wage increases in child care work. Second, across Germany, the results suggest that child care costs do not systematically affect female time allocation for informal child care and employment hours. Therefore, cultural norms might be more relevant than cost-benefit calculations in female decision-making. Third, child care subsidies differing by income could lead to a moral hazard problem. This is indicated by the observation that increases in child care work wages correspond to lower employment hours for low-labor income men in western Germany. Finally, special emphasis should be given to middle-labor income men across Germany, who supply more employment hours when child care work wages are higher. On the one hand, the result expresses bigger gender employment gaps in ECEC-high wage districts. On the other hand, middle-labor income men might be over-proportionally burdened by higher child care costs.

Because of the limited explanatory power of the presented results considering causality, the



analysis highlights the relevance of further research. To the best of my knowledge, this article is the first to shed light on the relation between child care work wages and time allocation for child care and employment hours, which has been overlooked in a fruitful discussion on child care policies thus far. In future research, data on child care prices on the municipal level should be gathered and used as explanatory variables for household and individual time allocation focusing on child care and employment. With the help of this data, the relation between wages and costs may be explored in more detail. Moreover, it would be interesting to inspect intra-household substitution effects in time allocation when considering price elasticity of formal child care. In this context, expanding the analysis to include, for example, time spent on leisure and housework is promising. Extending the country case study on Germany to include other welfare state regimes that are less regulated, for example the United States, would also enrich the debate.

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## Descriptive analysis

Table 15 illustrates that eastern German households consume on average 1.91 hours more formal child care per day than western German households. Table 16 shows that the number of informal child care hours is higher for men and lower for women in eastern than in western Germany. Further, there is a significant difference in the provision of informal child care between the male and female sample population, with men providing on average 5.4 hours less informal child care per day than women in western Germany and 3.69 hours less than women in eastern Germany. Table 17 demonstrates that employment hours are lower for men and higher for women in eastern than in western Germany. Lastly, employment hours also significantly differ according to sex: Men work on average 17.82 hours more than women in western Germany, and 8.32 hours more than women in eastern Germany.

Table 15: Two-sample t-test of formal child care hours for western and eastern Germany

	Mean	Sd	N
Formal child care (West)	6.57	2.79	7047
Formal child care (East)	8.49	2.92	1989
Formal child care (combined)	7	2.92	9036
Difference			1.91
Ho: diff = 0			Ha: diff > 0
			Pr(T < t) = 0.00

Notes: Table shows mean values of *formal child care hours* in western and eastern Germany, as well as combined. It also illustrates the difference between mean values and its significance. Unit of observation is the household. Years covered range from 2012 to 2019.

Table 16: Two-sample t-test of informal child care hours for western and eastern Germany by sex

	Western GER			Eastern GER		
	Mean	Sd	N	Mean	Sd	N
Informal child care (men)	2.36	2.34	6627	2.5	2.27	1834
Informal child care (women)	7.76	5.39	7290	6.19	4.52	1992
Informal child care (combined)	5.19	5.01	13917	4.43	4.06	3826
Difference						-3.69
Ho: diff = 0						Ha: diff < 0
						Pr(T < t) = 0.00

Notes: Table shows mean values of *informal child care hours* in western and eastern Germany for male and female sample, as well as combined. It also illustrates the differences between mean values and their significance. Unit of observation is the individual. Years covered range from 2012 to 2019.

Table 17: Two-sample t-test of weekly employment hours for western and eastern Germany by sex

	Western GER			Eastern GER		
	Mean	Sd	N	Mean	Sd	N
Employment hours (men)	32.13	15.36	6464	30.82	16.51	1747
Employment hours (women)	14.31	13.86	7147	22.5	15.86	1929
Employment hours (combined)	22.77	17.09	13611	26.46	16.69	3676
Difference	17.82			8.32		
Ho: diff = 0	Ha: diff > 0			Ha: diff > 0		
	Pr(T < t) = 0.00			Pr(T < t) = 0.00		

*Notes:* Table shows mean values of *weekly contracted employment hours* in western and eastern Germany for male and female sample, as well as combined. It also illustrates the differences between mean values and their significance. Unit of observation is the individual. Years covered range from 2012 to 2019.

## Insignificant results

### Formal child care hours

Table 18: Marginal effects of mean daily child care wages on consumed formal child care hours in western Germany

		Western Germany		
	(1)	(2)	(3)	(4)
Child care wage	-0.0051	-0.0051	-0.0045	
low household income				-0.0032
middle household income				-0.0046
high household income				-0.0061
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Interaction term	No	No	No	Yes
Observations	7047	7047	7047	7047

*Notes:* Table depicts AMEs from fixed-effects panel regressions for western Germany. Observations of the state Bremen are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on the household level, column (3) shows results for the estimation with regional control variables, and column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## Informal child care hours

Table 19: Marginal effects of mean daily child care wages on informal child care hours for women in western Germany

	Female sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0099	-0.0099	-0.0091		
low income group				-0.0127	-0.0045
middle income group				-0.0023	-0.0168
high income group				-0.0109	-0.0033
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	7258	6869	6854	6854	6854

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the female sample. Observations of the state Bremen are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 20: Marginal effects of mean daily child care wages on informal child care hours for women in eastern Germany

	Female sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.018	-0.0012	-0.0021		
low income group				-0.0103	0.0003
middle income group				0.0078	-0.007
high income group				0.015	-0.0037
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1979	1895	1887	1887	1887

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the female sample. Observations of the state Mecklenburg-Pomerania are omitted due to collinearity when regional controls are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 21: Marginal effects of mean daily child care wages on informal child care hours for men in eastern Germany

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0032	0.0054	0.0052		
low income group				-0.0099	0.0084
middle income group				0.0096	0.0009
high income group				0.0058	0.0043
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1822	1715	1707	1707	1707

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Observations of the state Mecklenburg-Pomerania are omitted due to collinearity when regional controls are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## Employment hours

Table 22: Marginal effects of mean daily child care wages on employment hours for women in western Germany

	Female sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.003	-0.0023	-0.0035		
low income group				-0.0108	0.0147
middle income group				-0.0258	0.0312
high income group				0.0853	0.0123
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	7117	6869	6854	6854	6854

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the female sample. Observations of the state Bremen are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .



Table 23: Marginal effects of mean daily child care wages on employment hours for women in eastern Germany

	Female sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.047	0.0174	0.0174		
low income group				0.0604	0.0878
middle income group				0.0056	-0.0342
high income group				-0.0179	0.0047
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1916	1895	1887	1887	1887

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the female sample. Results for the state Mecklenburg-West Pomerania are omitted due to collinearity, when control variables on the district level are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## Data manipulation

### Manipulating the SIAB data

The SIAB data file was originally not organized by year but by spells. Some of these spells overlap, which is why the SIAB data provides two variables covering spells. The variables *begorig* and *endorig* encompass starting and ending date of the original possibly overlapping spells. The variables *begepi* and *endepe* encompass the starting date of split episodes, hence they encompass duplicates in terms of *begepi*, *endepe* and personal identification number with different information for other variables (Frodermann et al. 2021, pp. 20-21). To generate a year variable, I use the beginning of the observation period according to *begepi* and drop every observation for which spells begin earlier than in 2012. Hence, I am losing information on spells that began in 2011 and ended in 2012, posing an under-coverage problem. If I include episodes that began in 2011 and ended in 2012, however, the analysis would be exposed to an over-coverage problem.

Next, I reduce observations to the industry of interest. I only keep observations for which the variable *beruf2010\_gr* is equal to 103. Variable *beruf2010\_gr* is based on the most recent *Classification of Occupations* KldB 2010. The new categorization was implemented in November 2011, which is why this analysis encompasses only the time span between 2012 and 2019. Analyses of the period before the implementation of the current code would be insufficient because “the new occupation code is considerably more detailed than the old one” (Frodermann et al. 2021, p. 48), and recoding earlier observations “by transferring the key area [...] results in substantial inaccuracies” (Frodermann et al. 2021, p. 48). Moreover, “there is a considerable increase in the number of missing values in 2011 due to the change in the occupation code” (Frodermann et al. 2021, p. 48). The relevant classification for the industry of interest according to KldB 2010 is code 8311 *Occupations in child care and education* (German Federal Employment Agency 2011, p. 149; Paulus and Matthes 2013, p. 22). The SIAB data only differs on the three-digit level, and the code 831 (which is recoded to 103 in the Scientific Use File (Frodermann et al. 2021, p. 72)) encompasses *Occupations in education and social work, and pedagogic specialists in social care work*. Hence, we have an over-coverage problem in the data. Therefore, the old occupation coding is used to reduce observations further to employees

Table 24: Fictive example calculation for observations with the same personal identification number (*persnr*) and survey year (*syear*)

<i>endepi</i>	<i>begepi</i>	<i>tentgelt_gr</i>	<i>spelldays</i>	<i>spelldays_year</i>	<i>tentgeltweigh</i>	<i>tentgelt_year</i>
01/01/2012	01/31/2012	100	31	51	60.78	92.15
03/01/2012	03/21/2012	80	20	51	31.37	92.15
After forcing to drop duplicates in terms of <i>persnr</i> , <i>syear</i> , <i>tentgelt_year</i>						
01/01/2012	01/31/2012	100	31	51	60.78	92.15

who are identified as kindergarteners and child care workers (*beruf\_gr* == 110) (Frodermann et al. 2021, p.67).

The observations are further reduced to annual employment reports (*grund\_gr* == 6) of employees who are subject to social security (*erwstat* == 1) and work full-time (*teilzeit* == 0). Further, reports of daily wages below 25 euros are dropped due to inconsistency. Next, duplicates in terms of personal identification number, beginning and ending of spell period, and daily wage are dropped, so that yearly averages are not artificially increased.

Average daily wages per year are generated in five steps. First, the variable *spelldays*, encompassing the amount of days per spell, is generated by subtracting the beginning of the spell period from the ending of the spell period and adding one. Second, the variable *spelldays\_year* is calculated by summing up the amount of days per spell for each person and year. Third, the variable *tentgeltweigh*, a weighted daily wage for each spell period is generated, by multiplying *spelldays* and daily wage, *tentgelt\_gr*, for each observation and dividing by *spelldays\_year*. Fourth, the variable *tentgelt\_year*, the average daily wage per year, is generated by summing up *tentgeltweigh* for each person and year. Finally, duplicates in terms of personal identification number, survey year, and daily average wage per year are dropped. A fictive example calculation can be seen in Table 24. In a last step, the data set is collapsed on the district level to obtain average wages by district level (*ao\_region*) and year.

### Adding data sets via SOEPremote

The manipulated SIAB data set with three variables, *ao\_region* (renamed as *kkz\_rek* to match the SOEPremote labeling of the district variable), year, and average wage, is added to the per-

sonal SOEPremote account of the author with the help of the input command.

A second data set is added via the input command, which contains information on gross domestic product (Statistical Offices of Germany and the States 2022b) and unemployment rate (Statistical Offices of Germany and the States 2022a) per survey year for each district region. The data set is manipulated to match the SIAB coding of the districts (for more on this, see the following section on merging manipulated data sets) by weighting the variables according to the working population living in the merged districts.

To calculate the weighted mean for two combined districts A and B for the statistics unemployment rate and GDP per capita, the following formula is used:

$$\frac{\text{stat for A} \cdot \frac{\text{working population of A}}{\text{working population of B}} + \text{stat for B} \cdot \frac{\text{working population of B}}{\text{working population of A}}}{\frac{\text{working population of A}}{\text{working population of B}} + \frac{\text{working population of B}}{\text{working population of A}}}$$

To see how the weighted mean is calculated in the data at hand, the example of district 1058 and the unemployment rate can be examined. In the SIAB dataset this district is combined with district 1004. Working population in these two districts are 113,687 and 47,831 respectively. Unemployment rates are 5.5 percent and 11 percent, respectively. Therefore, the weighted mean unemployment rate is calculated as follows:

$$\frac{(5,5 \cdot \frac{113687}{47831} + 11 \cdot \frac{47831}{113687})}{\frac{47831}{113687} + \frac{113687}{47831}} = 6.327141707$$

For a district consisting of three individual statistical districts the formula extends to:

$$\frac{\text{stat A} \cdot \frac{WP A}{WP B+WP C} + \text{stat B} \cdot \frac{WP B}{WP A+WP C} + \text{stat C} \cdot \frac{WP C}{WP A+WP B}}{\frac{WP A}{WP B+WP C} + \frac{WP B}{WP A+WP C} + \frac{WP C}{WP A+WP B}}$$

### Merging manipulated data sets

Next, the relevant variables from the data sets of the SOEP and the manipulated SIAB data set are merged. First, the dependent variable *pli0044\_h* from the pl data set is used. The pl data

contains original data on the net sample of the SOEP on the individual level (Socio-Economic Panel 2023b). The variable *pli0044\_h* is a continuous variable generated from the question “What is a typical day like for you? How many hours do you spend on the following activities on a typical weekday?” considering child care (Kantar Public 2020, p. 41). Answers range from zero to 24 hours. In addition, the variable on weekly contracted employment hours (*plb0176\_h*), individual and household identifier as well as survey year are extracted. Variables are saved in a separate data set. In a second step, the variable *partner* from the *ppathl* data set is extracted and merged one to one via personal identification number and survey year to the saved data set.

Moreover, variables from the *pequiv* data set are extracted. The *pequiv* file “is based on the Cross-National Equivalent File (CNEF) with extended income information for the SOEP” (Grabka 2020, p. 2). I extract the following variables: sex of individuals (*d11102ll*), age of individuals (*d11101*), household pre-government income (*i11101*), household post-government income (*i11102*), individual labor income (*i11110*), state of residence (*l11101*), and region of residence (*l11101\_ew*) (Grabka 2020, pp. 4-8). I merge the variables one-to-one via personal identification number and survey year to the saved data set.

Next, variables from the *kidlong* data set are extracted. I extract the following variables: year of child birth (*k\_birthy\_h*) and amount of hours in formal child care (*kd\_hrs\_v1*). First, the value -2 for formal child care hours (missing value if formal child care does not apply (Socio-Economic Panel 2023a)) is replaced with zero. This way, the analysis allows for one child being supervised in formal child care and the other at home or otherwise, generating a mean value for each household. Otherwise, the sum of formal child care hours per household could only be generated for households where all children are covered by formal child care and the analysis would suffer from an under-coverage problem. Missings are tagged as such, before generating a variable encompassing the age of the child by subtracting year of birth from survey year. Three observations reporting a child age of -1 are dropped due to inconsistency. The observations are reduced to encompass only observations of children aged younger than six. A dummy variable on whether the child is aged younger than six is generated. Finally, the data set is collapsed on the household level encompassing variables on the age of the youngest child, the number of children younger than six years old living in the household, and the sum

of formal child care hours consumed by each household per year.

Further, regional districts are added to the data set. The regional district codes differ between SIAB and SOEP data set because the SIAB aggregates districts with less than 100,000 inhabitants to ensure anonymity, reducing districts from 401 to 328 district regions (Frodermann et al. 2021, p. 25). Therefore, the data set regional, specifically the variable *kkz\_rek* consisting of the regional district codes effective December 2017, from the SOEP was recoded to match the SIAB data according to the SIAB documentation (Frodermann et al. 2021, pp. 74-82). Moreover, the SOEP data differs between eastern and western Berlin, while the SIAB data does not. While I recoded this district number as well, observations belonging to the district of Berlin are still divided according to the East-West dummy provided by the SOEP and, hence, belong to different samples in the analyses. Observations with missing individual identifier were dropped at this point.

Lastly, the input data sets on mean child care wages and GDP and unemployment rate are matched on the district level. Observations with missing household identifier are dropped at this point.

A second data set on the household level is generated by collapsing. The data set encompasses mean formal child care hours, informal child care hours, and employment hours on the household level. Moreover, the data set includes the logarithm of the household net income, age of the youngest child living in the household, number of children living in the household, a single-parent dummy, a regional dummy on whether the household is situated in eastern or western Germany, average child care wage, GDP, and unemployment rates on the district level.

### **Recoding the data**

The sample is further manipulated to include only observations from 2012 to 2019, with individuals aged 16 to 65, living in households with at least one child younger than six years old, possessing an annual gross household income of at least 25,000 euros, and consuming at least one hour of formal child care. The variable on contracted working hours is recoded to zero if the variable is coded as -2 (does not apply). The variable on individual sex is recoded to be equal to one if the individual identifies as female, and equal to zero if the individual identifies as male.

The data does not allow any other specification. The variable on region is recoded to be equal to one if the individual or household is situated in western Germany, and equal to zero if the individual or household is situated in eastern Germany. The variable on partner status is recoded to be equal to one if individuals live with a partner, and equal to zero if the individual is a single parent. Moreover, the variables on individual labor and household net income are manipulated to contain logarithms of income, after first replacing an income of zero with 0.01. Finally, three income categories separating individuals into low-, middle-, and high-income groups for each state and survey year are formed.

## Robustness check: without state fixed effects

Table 25: Marginal effects of mean daily child care wages on consumed formal child care hours in eastern Germany (check 1)

	Eastern Germany			
	(1)	(2)	(3)	(4)
Child care wage	-0.0124	-0.0243***	-0.0244***	
low household income				-0.0148
middle household income				-0.0329***
high household income				-0.025**
Year dummies	Yes	Yes	Yes	Yes
State dummies	No	No	No	No
Controls	No	Yes	Yes	Yes
Interaction term	No	No	No	Yes
Observations	1989	1989	1989	1989

*Notes:* Table depicts AMEs from fixed-effects panel regressions for eastern Germany. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on the household level, column (3) shows results for the estimation with regional control variables, and column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .



Table 26: Marginal effects of mean daily child care wages on informal child care hours for men in western Germany (check 1)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0052	-0.0047	-0.0047		
low income group				0.017	-0.0075
middle income group				0.0066	-0.0016
high income group				-0.0115**	-0.0063
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	No	No	No	No	No
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6597	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 27: Marginal effects of mean daily child care wages on employment hours for men in western Germany (check 1)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0166	0.0205	0.0206		
low income group				-0.2157**	0.0347
middle income group				0.1007**	0.0041
high income group				-0.0128	0.0318
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	No	No	No	No	No
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6437	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 28: Marginal effects of mean daily child care wages on employment hours for men in eastern Germany (check 1)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0762	0.0947*	0.0951**		
low income group				0.0333	0.001
middle income group				0.1055*	0.1305*
high income group				0.0936	0.1297*
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	No	No	No	No	No
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1735	1715	1707	1707	1707

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

## Robustness check: households with children younger than five

Table 29: Marginal effects of mean daily child care wages on consumed formal child care hours in eastern Germany (check 2)

	Eastern Germany			
	(1)	(2)	(3)	(4)
Child care wage	-0.0092	-0.0226**	-0.0222**	
low household income				-0.0166
middle household income				-0.0258*
high household income				-0.0237*
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Interaction term	No	No	No	Yes
Observations	1553	1553	1553	1553

*Notes:* Table depicts AMEs from fixed-effects panel regressions for eastern Germany. Observations of the state Mecklenburg-West Pomerania are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on the household level, column (3) shows results for the estimation with regional control variables, and column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 30: Marginal effects of mean daily child care wages on informal child care hours for men in western Germany (check 2)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0049	-0.0047	-0.0046		
low income group				0.0252	-0.0023
middle income group				0.0043	-0.0052
high income group				-0.0104*	-0.0191**
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	4877	4540	4536	4536	4536

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 31: Marginal effects of mean daily child care wages on informal child care hours for men in eastern Germany (check 2)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0059	0.0088	0.009		
low income group				-0.0089	0.0054
middle income group				0.0216*	0.0039
high income group				0.0055	0.0159
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1439	1343	1337	1337	1337

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Observations for the state Mecklenburg-West Pomerania are omitted due to collinearity, when control variables on the district level are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 32: Marginal effects of mean daily child care wages on employment hours for men in western Germany (check 2)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0036	0.0077	0.0206		
low income group				-0.1534	0.0224
middle income group				0.0757	0.0469
high income group				-0.02	-0.0417
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	4731	4540	4536	4536	4536

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 33: Marginal effects of mean daily child care wages on employment hours for men in eastern Germany (check 2)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0785	0.1088*	0.1186*		
low income group				-0.0323	0.042
middle income group				0.159**	0.1385
high income group				0.1199	0.1541
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1362	1343	1337	1337	1337

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single-parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .



## Robustness check: child care wage for specific industries

Table 34: Marginal effects of mean daily child care wages on consumed formal child care hours in eastern Germany (check 3)

	Eastern Germany			
	(1)	(2)	(3)	(4)
Child care wage	-0.0118	-0.0246***	-0.0244***	
low household income				-0.0148
middle household income				-0.0338***
high household income				-0.0246**
Year dummies	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Interaction term	No	No	No	Yes
Observations	1964	1964	1964	1964

*Notes:* Table depicts AMEs from fixed-effects panel regressions for eastern Germany. Observations of the state Mecklenburg-West Pomerania are omitted due to collinearity. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on the household level, column (3) shows results for the estimation with regional control variables, and column (4) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *formal child care hours*, which is a continuous variable, capturing mean daily formal child care hours consumed by the household. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables on the household level include mean net household income, mean informal child care hours, mean employment hours provided by the household, age of the youngest child, number of children living in the household, and a dummy on whether the household is a single-parent household. Control variables on the district level include GDP and unemployment rate of the district within which the household is situated. Unit of observation is the household. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 35: Marginal effects of mean daily child care wages on informal child care hours for men in western Germany (check 3)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	-0.0044	-0.0039	-0.0039		
low income group				0.0177	-0.0069
middle income group				0.0074	-0.0006
high income group				-0.0106**	-0.0055
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6597	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *informal child care hours*, which is a continuous variable, capturing mean daily informal child care hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, employment hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 36: Marginal effects of mean daily child care wages on employment hours for men in western Germany (check 3)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.0147	0.0194	0.0192		
low income group				-0.2153**	0.0342
middle income group				0.1009**	0.0032
high income group				-0.0145	0.0292
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	6437	6196	6183	6183	6183

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering western Germany for the male sample. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, and a dummy on whether the individual is a single-parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .

Table 37: Marginal effects of mean daily child care wages on employment hours for men in eastern Germany (check 3)

	Male sample				
	(1)	(2)	(3)	(4)	(5)
Child care wage	0.069	0.0879*	0.0895*		
low income group				0.0328	-0.0021
middle income group				0.1062*	0.1168
high income group				0.0832	0.1296*
Year dummies	Yes	Yes	Yes	Yes	Yes
State dummies	Yes	Yes	Yes	Yes	
Controls	No	Yes	Yes	No	Yes
Interaction with labor income	No	No	No	Yes	No
Interaction with household income	No	No	No	No	Yes
Observations	1735	1715	1707	1707	1337

*Notes:* Table depicts AMEs from fixed-effects panel regressions considering eastern Germany for the male sample. Observations for the state Mecklenburg-West Pomerania are omitted due to collinearity, when control variables on the district level are introduced. Column (1) shows results for the baseline regression, column (2) shows results for the estimation with control variables on individual and household level, column (3) shows results for the estimation with control variables on the district level. Column (4) shows results for the estimation with controls and interaction effect of child care wage and labor income group. Column (5) shows results for the estimation with controls and interaction effect of child care wage and household income group. Dependent variable is *employment hours*, which is a continuous variable, capturing weekly contracted employment hours provided by the individual. *Child care wage* is a continuous variable, capturing mean wages for child care paid in the regional district within which the household is situated. Control variables include net household income, individual labor income, informal child care hours, formal child care hours consumed by the household, age of the youngest child, number of children living in the household, a dummy on whether the individual is a single parent. Control variables on the district level include GDP and unemployment rate in the district within which the individual is situated. Unit of observation is the individual. Years covered by the dependent variable range between 2012 and 2019. Standard errors are robust.

\* $p < 0.1$ . \*\* $p < 0.05$ . \*\*\* $p < 0.01$ .