

Boll, Christina; Lagemann, Andreas

Working Paper

Public childcare and maternal labour supply: New evidence for Germany

HWWI Research Paper, No. 180

Provided in Cooperation with:

Hamburg Institute of International Economics (HWWI)

Suggested Citation: Boll, Christina; Lagemann, Andreas (2017) : Public childcare and maternal labour supply: New evidence for Germany, HWWI Research Paper, No. 180, Hamburgisches WeltWirtschaftsinstitut (HWWI), Hamburg

This Version is available at:

<https://hdl.handle.net/10419/171274>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Hamburg Institute
of International
Economics

Public childcare and maternal labour supply – new evidence for Germany

Christina Boll, Andreas Lagemann

HWWI Research

Paper 180

Corresponding author:

Dr. Christina Boll

Hamburgisches WeltWirtschaftsinstitut (HWWI)

Baumwall 7 | 20459 Hamburg, Germany

Tel +49 (0)40 34 05 76 - 668 | Fax +49 (0)40 34 05 76 - 776

boll@hwwi.org

HWWI Research Paper

Hamburg Institute of International Economics (HWWI)

Baumwall 7 | 20459 Hamburg, Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

info@hwwi.org | www.hwwi.org

ISSN 1861-504X

Editorial Board:

Prof. Dr. Henning Vöpel

Dr. Christina Boll

© Hamburg Institute of International Economics (HWWI) | November 2017

All rights reserved. No part of this publication may be reproduced, stored in a re-trieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of the publisher.

HWWI Research Paper 180

Public childcare and maternal labour supply – new evidence for Germany

Christina Boll, Andreas Lagemann

This study is a result of a research project funded by the Free and Hanseatic City of Hamburg - Ministry of Labour, Social, Family Affairs and Integration and the Hamburg Chamber of Commerce. The full content of the study, any omissions and views expressed therein are in the sole responsibility of the authors.

Content

1.	Introduction	4
2.	Empirical literature	5
3.	Methodology	7
4.	Data	10
a.	Data sources	10
b.	Variables	11
c.	Samples	12
d.	Descriptive statistics on policy indicators	13
5.	Main results	14
a.	<i>Policy indicators</i>	14
b.	<i>Micro-level factors</i>	16
c.	<i>Macro-level factors</i>	17
6.	Sensitivity Analyses	17
a.	Differentiating by mothers' educational level	17
b.	Differentiating by mothers' family type	18
7.	Conclusion	19
	Literature	21
	Appendix	25

Abstract

This study explores the linkage between nine policy indicators of public childcare provision and maternal employment in terms of employment propensity and (conditional) working hours. We apply different identification strategies with a two-way fixed effects specification with individual and macro-level confounders as well as year and state fixed effects as our most ambitious specification. Based on German microcensus data for waves 2006-2014, our findings show that identification, particularly in terms of state fixed effects, is crucial for the estimated effects. For three indicators however, we are left with significant associations even in the most complex model: For 1-2 year old children cared for by a childminder (3-5 year old children in daycare centres), an increase in the share of children taken care for less than 25 weekly hours on all same-age children attending public care by 10 percentage points is associated with a decrease of maternal employment propensity by 2 (4) percentage points. Thirdly, the existence of a legal claim on childcare from the age of one is associated with an increase in weekly working hours by 4.3 %, compared to a situation without such an entitlement. Compared to medium-level educated mothers, associations with respect to employment propensity are stronger (weaker) for mothers with a high (low) educational level whereas hours associations are weaker for highly skilled mothers. Compared to mothers in couples, single mothers respond less sensitively concerning both the extensive and the intensive margin of employment.

1. Introduction

Germans benefit from rather sound economic conditions these days. In 2016, employment reached its highest level since reunification 25 years ago (Federal Statistical Office 2017) and unemployment fell to a new low of 2.449.000 in September 2017 (Federal Employment Agency 2017: 12). Recruiting qualified labour becomes increasingly demanding for firms, and the level of challenge is further increased by overall trends such as demographic change and enhanced skill requirements in the course of digitalization. Thus, more focus has recently been placed on Germany's untapped workforce potential which amounted to 2.476 persons of working age (15-74) in 2016 of whom 1.560 were women. In this context, the question arises whether (and to what extent) public investments in childcare facilities might stimulate mothers' employment. The question is highly relevant not only from the macro- but also from the microeconomic perspective since a high labour market attachment is key for individuals' (and their families') prosperity.

In recent years, the German state has made great efforts to increase parental and particularly maternal labour supply by investing in public childcare infrastructure. Whereas municipal governments and/or youth welfare offices (*Jugendämter*) manage the operational planning and provision of childcare, strategy development and funding are determined at the federal and the state level. Recent reforms addressed the quantitative and qualitative expansion and the establishment of legal entitlements. For example, with the day expansion act (*Tagesbetreuungs-ausbaugesetz*, TAG) which went into effect in 2005, 230.000 additional childcare slots have been established in kindergartens, creches and day-care. As called for by the Childcare Funding Act (*Kinderförderungsgesetz*) which became effective in 2008, states had to provide daycare spots for 35 percent of all children under age three by 2013. This reform induced states to intensify their infrastructure expansion in subsequent years. By 2013, federal funding had been further increased to create additional 30.000 slots (BMFSFJ 2017b). As a result, childcare coverage for children below the age of three markedly increased from 13.6 % in 2006 to 32.3 % in 2014, ranging below OECD31-average though (34.4%; OECD 2017: 209). Starting from a far higher level, coverage rates for 3 to 5 year old children simultaneously increased from 87.6 % to 94.0 % (BMFSFJ 2017a: 4, 15).

Notwithstanding the considerable effort that has been undertaken to increase childcare provision in recent years, the German childcare market is still characterized by excess demand. This applies to children under three years of age as well as to the 3-5 year olds, although the gap decreases with age and is mostly higher in the Western than in the Eastern part of Germany. In 2016, the difference between supply and demand for the below threes amounted to 14.8 percentage points in West and to 7.3 percentage points in East Germany (BMFSFJ 2017a: 9), whereas for 3-5 year old children, the respective figures were 3.8 pp and 1.0 pp (BMFSFJ 2017a: 19). Demand exceeded supply also on the state level (the only exception is marked by Rhineland-Palatinate for 3-5 year olds). Thus, a full take-up of newly established childcare slots can be assumed. Furthermore, coverage rates differ tremendously between German states, both with respect to the achieved level and the dynamics over time. Due to severe frictions in processing legal requirements, the observed variation across time

and states is considered (at least partly) exogenous. Due to the lack of standards, the process of estimating and forecasting local demand and its outcomes varies between states. Moreover, local actors sometime struggle to meet local demand or even legal obligations: In 2013/14, 13.5 % of youth welfare offices were not able to fully satisfy parents' claims for slots for their under-threes (BMFSFJ 2015: 3).

Coming back to the question of this article, did the German childcare expansion bring about the desired effects on maternal employment? Theoretically, an increased provision of subsidized public childcare alters the relative price of childcare and can principally stimulate mothers' labour supply (Becker 1981); whether and to what extent this is the case depends on additional factors, e.g. on mothers' preferences as well as cost and availability of private substitutes (Blau 2003). The empirical literature mostly points to a positive correlation between an increased provision (e.g. Steiber and Haas 2009; Havnes and Mogstad 2011, Del Boca and Vuri 2009) or decreased costs (Blau and Currie 2006, Fitzpatrick 2012, Lundin et al. 2008) of public childcare and mothers' employment.¹ But, related to theory, the empirical evidence points to different response in different population subgroups (Cascio 2009) which hints at the importance of adequate identification strategies. This turned out to play a decisive role for the robustness and correct interpretation of results. In particular, controlling for region-fixed effects often changes the picture dramatically (Blau and Currie 2006).

In light of this discussion, we ask whether the named linkage between childcare policy and mothers' employment behavior remains valid in a methodological setting that takes account of time-variant and time-constant effects at different levels. We contribute to the literature by using a rich set of policy indicators for different subsamples of mothers and a comprehensive identification strategy. Our multivariate analyses rely on German microcensus data for the years 2006-2014 matched with policy information from different external sources. Our findings support the notion that region-fixed effects are crucial for the robustness of results. However, some associations between increased childcare provision and maternal employment in terms of employment propensity and (conditional) working hours remain significant – although with moderate effect size –, even when individual-level and macro-level confounders as well as period and state fixed effects are controlled for.

The outline of the paper is as follows. Section 2 provides a brief literature review that motivates our analysis. Section 3 describes the methodology used and Section 4 presents the data. Section 5 reports the main results, followed by Section 6 which provides sensitivity analyses with respect to mothers' educational level and family type. Section 7 concludes.

2. Empirical literature

The rich body of empirical literature on the role of public childcare in maternal employment differs in various aspects, e.g. methodology, data, variable of interest, operationaliza-

¹ Fathers' employment decisions hardly respond to altered childcare facilities, this is why most studies focus on maternal employment.

tion of policy variables and childrens' age group.² As mentioned earlier, results mostly point to a positive association of increased quantity and/or reduced price of public childcare service. However, effect sizes are rather small and findings largely hinge on the used methodology and the focused population subgroup.

For example, analyses investigating the introduction of a free pre-school year based on US data yield significant effects for single mothers only (Cascio 2009) or for mothers in rural areas (Fitzpatrick 2012). Whereas the successive expansion of low-cost childcare in Canada proved to positively impact mothers employment in the late 1990-ies (Lefebvre and Merrigan 2008, Baker et al. 2008), no comparable effects were be found for Norway in the 1970-ies (Havnes and Mogstad 2011). The authors suggest that mothers of 3-6 year olds which were addressed by their study simply substituted (so far used) private care by public care. Moreover, the starting level matters for the strength of further stimuli. In a study for Sweden, Lundin et al. (2008) fail to find significant effects of a childcare cost reduction on maternal employment for mothers with children aged 1 to 9 and conclude that Swedish mothers' employment is already on a high level and public childcare is widely used. By contrast, the introduction of free public day-care for three years-old children in Spain yielded the expected positive associations, though not for mothers with graduate education (Nollenberger und Rodriguez-Planas 2011). Furthermore, after-school care for children aged 4 to 12 proved a valid stimuli for Swiss mothers' employment (Felfe et al. 2013).

For Germany an early study of Kreyenfeld and Hank (2000) points to a substantial amount of weekly hours covered by public care as a precondition for employment consequences to emerge. The importance of prevalent employment and care cultures is highlighted by Büchel and Spieß (2002). Based on German Socio-Economic Panel data (*Sozio-oekonomisches Panel, SOEP*) they show that whereas creche facilities are of minor importance, a rationing of slots for three to five year old children notably decreases maternal employment. Furthermore, a positive association between full-day care and mothers's full-time work of mothers with pre-school aged children can be ascertained. Also Haan and Wrohlich (2011) find a positive linkage between childcare expansion and mothers' labour market participation. As Schober and Spieß (2015) show with SOEP and FID (*Familien in Deutschland*) data, the qualitative dimension of childcare also affects mothers' work propensity and hours. However, significant associations are found for mothers of under-threes only and furthermore vary between East and West Germany. The authors conclude that social norms and prevalent care arrangements shape mothers' perceptions and behavior. Bauernschuster and Schlotter (2015) find evidence for a positive stimulus of a parental entitlement to a kindergarten place for mothers' labour market participation. Extensive after-school care results in a participation increase of 4 percentage points for West German and of 1 percentage point for East German mothers as a simulation study shows (Beblo et al. 2005). Assessments of Tobsch (2013) support the notion that, due to a higher starting point in the East with respect to full-day care, effects are bigger for the Western part. The stimulus is not necessarily restricted to mothers of primary school aged children, as Boll and Hoffmann (2017) show. A provision of full-day schools at the mu-

² For an overview, cf. Rainer et al. (2013).

nicipal level for children aged 15 is associated with an increase of their mothers' weekly working time by 2.8 hours, compared to a situation without full-day school provision.

Methodological approaches include reduced form regressions (e.g. Schober and Spieß 2015, Kreyenfeld and Hank 2000), structural models (e.g. Müller and Wrohlich 2014) and quasi-experimental settings (e.g. Havnes and Mogstad 2011, Lundin et al. 2008, Fitzpatrick 2012, Bauernschuster and Schlotter 2015). Whereas IV approaches use exogenous regional variation in childcare as an instrument for mothers' (observable) decisions on child care use to identify local average treatment effects (LATE), difference-in differences (DiD) approaches exploit exogenous variation in childcare supply (with unobserved individual choice) to identify intention-to-treat (ITT) effects; see Müller et al. (2016) for a more detailed discussion. By circumventing some of the identification issues, the robustness of results delivered from quasi-experimental designs strongly hinge on a valid exogenous variation, that is, on a variation of childcare supply which is credibly independent from demand. However, the true exogeneity of cross-regional variation is questionable in many empirical analyses (Müller et al. 2016). For example, parents might move to regions where provision meets individual demand, likewise childcare providers might self-select into municipalities with adequate parental preferences. Therefore, it does not come as a surprise that many studies which incorporate region-fixed effects fail to identify statistically significant associations between policies and maternal employment. In this case, variation is limited to within-region cross-time variation that is often the smaller portion of overall variation available in the used data set.

The paper of Müller et al. (2016) makes the same point. In their study, the authors aim to identify effects of increased overall- and full-time childcare coverage rates on West German mothers' employment and hours for years 2007-2011. Their analyses focus on children aged one to three. According to their findings and in line with previous studies, significant correlations are lost in a setting with controlled county-fixed effects. Based on microcensus data, the authors are left with a significant association on the 10%-level between full-day care and mothers' working hours. Correlations with the extensive margin of maternal employment are significant as far as county-fixed effects are excluded from the model.

The study at hand directly connects with the state of the literature and makes a fourfold contribution. Based on a complex identification strategy which incorporates micro-and macro level controls as well as year and region fixed effects, we (1) use a greater sample both in the cross-time and the cross-sectional dimension; (2) we distinguish between the below threes and the 3-5 year old children; (3), we use a more elaborated set of policy indicators; and (4), we test policy associations for possible interactions with mothers' education and family type.

3. Methodology

As the microcensus does not provide information on individual childcare choice, we are not able to explore the linkage between employment and childcare provision conditional on

childcare use (LATE). Instead, we exploit quasi-experimental cross-state and within-state variation over time in the provision of (subsidized) childcare to identify an intention-to-treat effect (ITT) on maternal employment. As argued earlier, the excess demand in the childcare market in German states and the observed frictions in the implementation of childcare expansion reflect exogenous cross-time variation. This also applies to indicators like coverage rates and average contractually agreed childcare hours which involve information on parental choice since this information is retrieved from aggregate data on the regional level.

Our most complex model is a two-way fixed effects estimation with time- and state-specific policy indicators, controls on the micro- and macro level as well as year- and state-fixed effects („generalized DiD model”).³ This approach is more efficient than the standard DiD model since it exploits variation between 16 states across 4 (5) points in time (microcensus waves (2006), 2008, 2010, 2012, and 2014⁴). However, conclusions on causal relationships cannot be drawn from our analyses.⁵

We measure maternal employment behavior (y_{ijt}) both at the extensive margin (in terms of employment propensity) and the intensive margin (in terms of working hours conditional on employment, thereby referring to usually worked hours). We estimate the employment equation as a Probit model. In the results section, we report marginal effects as average marginal effects (AMEs), that is, we first compute the marginal effect for each individual and then compute the average in a second step. Marginal effects depict the percentage change in employment propensity if the independent variable increases by one unit, referring to the unit of measurement for metric variables and to a change from reference category “0” to the alternative category “1” for dummy variables.

Conditional working hours are estimated as a Heckit model to capture potential selection into the group of working mothers. In a two-step framework pioneered by Heckman (1979), we first estimate an employment equation⁶ and impute the retrieved selection term as an additional regressor into the hours equation which is formulated as an OLS model and estimated with Maximum Likelihood. Selection correction is necessary if an individual’s employment propensity and weekly hours are interrelated, or, technically speaking, the error terms of the employment and the hours equation are correlated. Since we use logarithmic hours as the dependent variable, the coefficient of an independent variable denotes the percentage change in hours worked that is associated with a one-unit increase of the independent variable. The interpretation of „units“ reads the same as in the employment equation.

³ The difference-in-difference approach (DiD) is not applicable with microcensus data. Since a pre-reform unique trend of the target variable in the treatment and control group is essential for the validity of identified policy associations, control group members have to match characteristics of treatment group members as far as possible, except for the treatment (Wooldridge 2013)). This requires at least two instances of observation of individuals in both groups – one time before, one time after the reform –, a precondition that is not satisfied with microcensus sampling that relies on buildings (households) instead of individuals.

⁴ For our reasoning on why we exploit wave 2006 only for some policy indicators, see details in Section 4.b.

⁵ This is why we refer to observed linkages as “associations” and “correlations” which are also related to cases in which, for the sake of formulation variety, we talk about “effects”.

⁶ As identifiers in the employment equation, we use the highest educational level of the respondent’s partner (which equals 0 in case of single mothers) and non-wage household net income.

Standard errors of the Heckit model are calculated as robust standard errors (White-Huber standard errors).⁷

As independent variables potentially explaining maternal employment behavior we use characteristics from three categories, first factors that characterize the individual or its related household, in what follows referred to as *micro-level factors*, X'_{ijt} ; second, factors featuring the public childcare system on the level of German states which we name *policy indicators*, POL_{jt} ; third, structural factors on the county- and state level, respectively, in what follows denoted as *macro-level factors*, X'_{jt} . Since we pool observations across states and waves, we use year-dummies for 2006, 2008, 2010, 2012 and 2014 to control for calendar effects, in what follows named *year-fixed effects*, γ_t . Additionally, we employ *state-fixed effects*, μ_j , to capture time-invariant state-specific influences on employment decisions. As policy indicators lie in the center of our analyses, micro- and macro-level factors as well as year- and state-fixed effects operate as control variables.

For our main analyses, the following equations (1) and (4) denote the Probit model and the Heckit model, respectively. Additionally, we conduct sensitivity analyses to explore potential interactions between policies and mothers' educational level (equation (2) for the Probit and (5) for the Heckit model) as well as between policies and mothers' family type (equation (3) for the Probit and (6) for the Heckit model). In sum, we are left with six models:

Probit

$$\Pr(y_i = 1) = \Phi(\alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + \gamma_t + \mu_j + \varepsilon_{ijt}) \quad (1)$$

$$\Pr(y_i = 1) = \Phi(\alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + (POL * BILDUNG)\beta_3 + \gamma_t + \mu_j + \varepsilon_{ijt}) \quad (2)$$

$$\Pr(y_i = 1) = \Phi(\alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + (POL * ALLEINERZ)\beta_3 + \gamma_t + \mu_j + \varepsilon_{ijt}) \quad (3)$$

Heckit

$$y_{ijt} = \alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + \gamma_t + \mu_j + \varepsilon_{ijt} \quad (4)$$

$$y_{ijt} = \alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + (POL * BILDUNG)\beta_3 + \gamma_t + \mu_j + \varepsilon_{ijt} \quad (5)$$

$$y_{ijt} = \alpha + POL_{jt}\beta_0 + X'_{ijt}\beta_1 + X'_{jt}\beta_2 + (POL * ALLEINERZ)\beta_3 + \gamma_t + \mu_j + \varepsilon_{ijt} \quad (6)$$

To trace each single category's impact on the target variable, we employ a multi-stage design with four main models and six interaction models as sensitivity analyses (**Table 1**).

Starting with the simplest specification that solely comprises of the policy indicator as explaining variable (model 1), we successively add further covariates. Model 2 differs from model 1 in that it additionally comprises micro-level and macro-level factors. In Model 3, year-fixed effects are added, and Model 4 additionally accounts for state-fixed effects. Thus, Model 4 is the most complex model in terms of identification and our preferred specification.

⁷ However, separate analyses with conventional standard errors yield only slightly different results.

Models 5-7 (8-10) correspond to main models 2-4, supplementing each of them with a policy#education (policy#family type) interaction term.

Table 1:

Model overview

Model	Main analyses				Sensitivity analyses 1 (education)			Sensitivity analyses 2 (single parent)		
	1	2	3	4	5	6	7	8	9	10
Policy indicator	x	x	x	x	x	x	x	x	x	x
Individual control variables		x	x	x	x	x	x	x	x	x
Regional control variables		x	x	x	x	x	x	x	x	x
year fixed effects			x	x		x	x		x	x
state fixed effects				x			x			x
Interaction policy#education					x	x	x			
Interaction policy#single parent								x	x	x

x=included in the model. Own illustration.

4. Data

a. Data sources

Our analyses rely on different data sources. For micro-level information, we use waves 2006, 2008, 2010, 2012 and 2014 of the German microcensus. Microcensus data are further used for a minor part of the macro-level variables, the majority of them are taken from the INKAR database "*Indikatoren und Karten zur Raumentwicklung*" of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (*Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR)*). Some of the policy indicators stem from the INKAR database, the remaining ones have been drawn from the Ländermonitoring of the Early Childhood Education and Care system, ECEC (*FBBE-Indikatoren des Ländermonitors Frühkindliche Bildungssysteme der Bertelsmann-Stiftung*). This dataset is updated and released on a yearly basis by the Bertelsmann Foundation in cooperation with the Center for Statistics on Child and Youth Welfare in Dortmund. The monitor compiles current data on educational participation, investments and educational quality for all 16 German states.⁸

The longitudinal design of our study is a precondition to study within-state variation over time which is intended with our most complex model specifications 4, 7 and 10 (see Section 3).

⁸ For more information, see the project description on the foundation's website: <https://www.bertelsmann-stiftung.de/en/our-projects/state-by-state-monitoring/project-description/>

b. Variables

The selection of micro-and macro-level variables follows the relevant literature (cf. for micro-level factors e.g. Schober and Spieß 2015; Cascio 2009, Fitzpatrick 2012; Rainer et al. 2013, for macro-level factors Müller et al. 2016). We use age and age squared, highest education attained (low, medium and high, with medium education as a reference), nationality (EU-vs. Non-EU nationality, with German as a reference) and a range of factors associated with the family context, i.e. number of children, age of youngest child, type of living arrangement (single parent or parents in couple households) and marital status (married vs. not married).⁹ Highest educational level of the partner and non-wage net household income are used as identification variables in the employment equation only. On the macro level, we use agglomeration type (4 categories, with urban areas as a reference) which captures heterogeneity of respondents' residences with respect to population density and, thus, labour market options. Furthermore, we control for birth rate of women aged 45 or younger, gross national product per capita, participation- and unemployment rates by sex, women's part-time quota and the population share of graduates. Except for agglomeration degree which is coded on the county level, macro-level factors are computed on the state level. **Chapter A1** in the Appendix provides a detailed variable description. **Table A2** in the electronic appendix reports descriptive statistics on micro- and macro-level factors for all samples.

Policy Indicators

Policy indicators lie at the centre of our study. We use overall coverage rates as well as full-time coverage rates. Full-time coverage refers to the share of children who are in public childcare at least seven hours per day on all same-age children. In general, state-and year-specific childcare coverage rates are drawn from the INKAR data.¹⁰ Unlike Müller et al. (2016), we use coverage rates both for the below threes and the 4 to 5 year old children and for each age group, we further differentiate between children in kindergartens (day-care centres, *Kindergarten*) and those which are taken care of by (publicly subsidized) childminders (daycare, *Kindertagespflege*).

Coverage rates bear information on parental childcare choice, as only those children whose parents decided to use public childcare are accounted for. We therefore supplement our policy indicator set by policies which are purely supply-driven. They stem from the Ländermonitoring of the Early Childhood Education and Care system, ECEC (see Section 4.a). These are, first, the "right to a place in a day care centre from the age of one" and second, "contractually agreed childcare time per week", for both age groups of children and for each group, differentiating between kindergartens and daycare. Thus, we are left with four varia-

⁹ We thereby refer to the 'living arrangements concept' as the new standard for family-related analyses in the microcensus since 2005.

¹⁰ The sole exception refers to Hamburg with respect to overall coverage rates for the below three and the 3-5 aged children as well as full-time coverage rates for children aged 3-5 which are provided by Ministry of Labour, Social, Family Affairs and Integration (*Behörde für Arbeit, Soziales, Familie und Integration (BASFI) der Freien und Hansestadt Hamburg*). Robustness analyses with the INKAR-based values showed only minor deviations. However, information from this source is restricted to the year 2008 onwards (2008, 2010, 2012, 2014). This is why analyses for the named three policy indicators cover these four waves only.

bles for the latter named policy indicator which indicates the share of same-age children that is covered by an arrangement of 25 weekly hours maximum. Hence, a higher value signals a lower full-time coverage.

All state- and year-specific policy indicators are matched with our microcensus data at the state level. State-specific policies affect the respective state's citizens only, therefore policy indicators are linked to individuals according to their place of residence. ECEC indicators are available on the state level only. Furthermore, regional variation (standard deviation) in (full-time) coverage rates is higher between states than between counties within states. This applies to all coverage rates except the overall coverage rate for 3 to 5 year old children.

c. Samples

We restrict our sample to mothers aged 25 to 49 as mothers are most likely to be affected by public care policies in the stage of family foundation and family extension. Mothers from all 16 German states are included. As we analyze different childcare policies which affect different age groups of children, each policy indicator is analyzed with a subsample of mothers with a youngest child in the respective age group. Focusing on the youngest child follows the literature that states that younger siblings in the family arguably decrease maternal employment effects of public childcare expansion (Bauernschuster und Schlotter 2015). The restriction of subsamples to potentially affected mothers is key for the validity of our results, but this comes at the cost of a severe decrease in observation numbers.¹¹ Therefore, further sample stratifications, e.g. between one-child families and families with two or more children, or by maternal employment history, were not feasible (for both differentiations, cf. Rainer et al. 2013). Moreover, due to a lack of continuous information on individuals' moves into a dwelling, we were not able to address the issue of (potentially) endogenous childcare supply by restricting the sample to mothers who had been living in the respective state for a couple of years.¹²

Table 2 provides an overview of policy indicators, data source and samples used in our study.

Table 2

	Policy indicator	Data source	Sample: Mothers with the youngest child aged...
1	childcare coverage age under 3 in %	INKAR bzw. BASFI	0-2
2	childcare coverage age 3-5 in %	INKAR bzw. BASFI	3-5
3	full-time childcare coverage age under 3 in %	INKAR	0-2
4	full-time childcare coverage age 3-5 in %	INKAR bzw. BASFI	3-5
5	childcare entitlement from age 1: yes/no	ECEC	1-6

¹¹ Separate regressions show that parents with a youngest child below 3 (aged 3 to 5) make up for only 13% (10%) of the full sample (figures based on microcensus waves 2006-2012).

¹² To be more concrete, the question as to when the household moved into the dwelling (EF 493) is posed in years 2006, 2010 and 2014 only (ad-hoc questionnaire). As individuals cannot be observed throughout waves, corresponding information is missing for individuals surveyed 2008 and 2012.

6	Childcare time less than 25 hours per week, daycare centres, age under 3 in %	ECEC	0-2
7	Childcare time less than 25 hours per week, childminders, age under 3 in %	ECEC	0-2
8	Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	ECEC	3-5
9	Childcare time less than 25 hours per week, childminders, age 3-5 in %	ECEC	3-5

INKAR= Indikatoren und Karten zur Raum- und Stadtentwicklung, INKAR, provided by Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR); BASFI=Behörde für Arbeit, Soziales, Familie und Integration der Freien und Hansestadt Hamburg; ECEC= Ländermonitoring of the Early Childhood Education and Care system, provided by Bertelsmann Foundation; illustration: HWWI.

Sample sizes vary by children's age group and observation period. The sample based on waves 2006-2014 for mothers with a youngest child below three (3 to 5) consists of 64,027 (71,507) mothers. The sample based on waves 2008-2014 for mothers with a youngest child below three (3 to 5) comprises 51,305 (56,678) mothers. The sample based on waves 2006-2014 for mothers with a youngest child aged 1-6 contains 95,929 mothers.

d. Descriptive statistics on policy indicators

Table A1 in the appendix reports the state and year-specific values for childcare policy indicators as they enter our multivariate analyses. The figures show both a high regional and a high cross-time variation in the dynamics of childcare expansion.

For 2014 for example, childcare coverage rates for the below threes range between 23.8% (North Rhine-Westphalia) and 58.3 % (Saxony-Anhalt). From 2008 to 2014, the expansion of slots for children of this age group has been particularly high in Hamburg (+20.3%) and Lower-Saxony (+18.8%). By contrast, starting from an already high level, coverage rates exhibited only a moderate further increase in East German states. Even more diverse are full-time coverage rates. For children aged 3 to 5, they differ by 71 percentage points between 91.1% (Thuringia) and 19.8% (Baden-Wuerttemberg). For the below threes, full-time coverage rates range between 9.6% (Bavaria) and 47.3% (Thuringia). Whereas in the elementary sector (age group 3-5) dynamics have lost some momentum in states which start from a high level, the opposite is true for the nursery section (age group 0-2). Here, states like Saxony, Saxony-Anhalt or Thuringia which already provide extensive full-time care continue to expand. Variation with respect to childcare entitlements from the age of one is mostly seen in the longitudinal section. Most states established this legal claim in recent years only (2012-2014). The sole exceptions are Saxony-Anhalt and Thuringia which introduced this measure in 2008 and 2012, respectively.

Further, states perform differently with respect to the contractually agreed childcare hours per week. Among children aged 3 to 5 in 2014, the share of those attending kindergartens for a maximum of 25 hours a week ('part-time care') amounted to 1.6% in Saarland and to 46.3% in Lower Saxony. The differences between states are smaller for the below threes. Moreover, the respective share of children decreased in most states over time for both age groups. In Saxony-Anhalt and Schleswig-Holstein, the decrease in part-time care was particularly pronounced with 30 percentage points from 2006 to 2014 whereas Bavaria displayed a rather

moderate decrease of 3.9 pp at the same time. In East Germany, the decreasing importance of part-time care is not limited to kindergartens but also applies to children in day care. For most West German states however, contractually agreed part-time daycare became more important over time, although even here, the indicator differs markedly across state and time.

5. Main results

We find that error terms of the employment and hours equation are negatively correlated throughout models¹³, that is, a higher employment propensity is associated with fewer hours, confirming that without a selection bias correction, the hours equation would have been misspecified. Obviously, part-time work serves as a ‘door-opener’ in the labour market.

In what follows, we discuss the results of our main analyses (models 1-4) for policy associations as our core variables (**Table 3**) and subsequently, we summarize the results for micro- and macro-level confounders. Detailed results for all estimated models can be found in **Tables A3 to A20** of the supplementary electronic appendix.

a. Policy indicators

Table 3:

	1	2	3	4	N (Model 2-4)
Weekly working hours conditional on employment					
<i>Policy indicators</i>					
childcare coverage age under 3 in %	0,004***	0,003***	0.001	0.004	51305
full-time childcare coverage age under 3 in %	0,005***	0,003***	0	0	51305
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0,004***	-0,001**	0	-0.001	64027
Childcare time less than 25 hours per week, childminders, age under 3 in %	-0,002***	0,001**	-0.001	0	64027
childcare coverage age 3-5 in %	0,016***	0	-0,004**	-0.001	56678
full-time childcare coverage age 3-5 in %	0,006***	0,002***	0,002***	-0.002	56678
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	-0,002***	0,001***	0,001***	0.002	71507
Childcare time less than 25 hours per week, childminders, age 3-5 in %	-0,006***	-0,001***	-0,002***	0.001	71507
childcare entitlement from age 1: yes/no	0,044***	0,065***	0,024*	0,043**	95929

¹³ Athrho is significantly negative on the 1%-level across all models and policy indicators.

Employment propensity					
<i>Policy indicators</i>					
childcare coverage age under 3 in %	0,013***	0,015***	0,014***	-0.002	51305
full-time childcare coverage age under 3 in %	0,013***	0,017***	0,011***	-0.007	51305
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0,005***	-0,003***	-0,002***	-0.002	64027
Childcare time less than 25 hours per week, childminders, age under 3 in %	-0,001***	0.001	-0,002***	-0,002***	64027
childcare coverage age 3-5 in %	0,035***	0,018***	0,012***	0.005	56678
full-time childcare coverage age 3-5 in %	0,005***	0,003***	0.001	0.001	56678
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	-0,003***	-0,002***	-0,001***	-0,004*	71507
Childcare time less than 25 hours per week, childminders, age 3-5 in %	-0,002***	0,001**	-0.001	0.001	71507
childcare entitlement from age 1: yes/no	0,159***	0,125***	0.036	-0.031	95929
<i>Control variables</i>					
Micro- and macro-level factors		x	x	x	
year fixed effects			x	x	
state fixed effects				x	

***significant on 1%-level; **=significant on 5%-level; *=significant on 10%-level. Sources: *RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus, survey years 2006-2014, own calculations*; Indikatoren und Karten zur Raum- und Stadtentwicklung. INKAR. Ausgabe 2016. Hrsg.: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) – Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Ministry of Labour, Social, Family Affairs and Integration (childcare coverage age under 3, childcare coverage age 3-5 and full-time coverage age 3-5 for Hamburg); HWWI.

Starting with model 1, we find the expected positive associations of policy indicators both with a mother's employment propensity and with conditional working hours. Coverage rates for both age groups and the childcare entitlement from age 1 are positively related to both maternal employment variables, whereas a contractually agreed childcare time less than 25 weekly hours is negatively correlated. However, significance is partially lost when micro- and macro-level confounders are included (model 2), even though the working direction stays mostly the same. Some models referring to childcare time <25 h/week yield deviating results. Incorporating year-fixed effects (model 3) results in even fewer significant associations, particularly in the hours estimation for the below threes. Furthermore, the parameter sign for the coverage rate referring to 3-5 year old children turns negative here.

Adding state-fixed effects (model 4), leads to further significance losses. In our most preferred specification, the only indicator that remains significant in the hours-estimation is the legal childcare claim from the age of one. Maternal weekly working hours increase by 4.3 % when such a claim exists, compared to a situation without a respective claim. This points to a significant within-state across-time variation in this indicator. In the Probit estimations, two indicators, both referring to contractually agreed weekly childcare time less than 25 hours, remain significant whereas all other indicators turn insignificant. First, a 1%-(10%) increase in the share of children below three cared for by a childminder for less than 25 hours a week is associated with a 0.2%-(2%) decrease in maternal employment propensity. By contrast, the

same indicator lacks significance in the hours estimation, suggesting that within-state variation over time with respect to childminders' weekly care time for the below threes matters more for mothers' employment propensity than for their working hours.¹⁴ Second, a 1% (10) increase in the share of children aged 3-5 attending a kindergarten is associated with a 0.4% (4%) decrease in maternal employment propensity. However, the association is significant only at the 10%-level. As descriptive statistics (**Table A 1** in the appendix) show, the share of children taken care of for less than 25 weekly hours in kindergartens has been notably decreasing from 2006 to 2014 throughout states. However, starting levels varied markedly between states, which might explain the somewhat decreased significance of this indicator in model 4. In the hours-estimation, the indicator lacks significance. Unlike for the below-threes where, with respect to maternal hours, the indicator already lost significance in model 3, the significance is lost in model 4 only for mothers of children aged 3-5. Although the relation of full-time care to working hours of mothers with children 3-5 is more robust against period-fixed effects than for those of mothers with a youngest child below three, here too an important part of the variation is between-state variation. Hence, for both age groups of children, the models fail to identify a significant association between full-day care and maternal working hours in our preferred model 4. Note that the same holds true for the alternative specification of full-time care, the full-time coverage rate, which sets an even higher requirement for 'full-time' (care covers at least 7 hours a day). With respect to full-time coverage rates, significant associations are completely lost both in the hours- and the participation-estimations when state-fixed effects are added to the model (partially even earlier when year-fixed effects are controlled for).

b. Micro-level factors

Micro-level factors turn out to be of high significance, mostly in the expected work directions, even in model 4. Generally, associations concerning maternal employment propensity differ from those with respect to hours. A higher age of both the mother and the youngest child in the household¹⁵ increases the employment likelihood. The sample applies to maternal education and partner education, as well as for a German nationality, living together with a partner, being married, living out of central cities. A higher non-wage net household income and a higher number of children in the household are associated with a lower conditional employment propensity. Concerning working hours, a young maternal age, being a single mother, not being married, a foreign nationality (particularly a non-EU nationality), a low educational level (compared to a medium education), a young age of the youngest child

¹⁴ Note that the time trend in this indicator differs between the Eastern and the Western German states. Whereas the share of children cared for by a childminder for less than 25 weekly hours has been declining in most Eastern states between 2006 and 2014, the opposite holds true for most West German states. Considering the positive employment trend of mothers with children below three in both German regions in the period of observation, it becomes clear that the single aspect of a childminder's care volume that lies within the focus of this model was not relevant for the overall results.

¹⁵ The terms „household“ and „family“ are used synonymously in this study. Both refer to the family type concept as the standard in family-related statistics based on the German microcensus since 2005 (Nöthen 2005).

in the household and living in a central city show positive associations. This holds true for mothers with children in both age groups. For mothers with a youngest child aged 3-5, a high educational level (compared to medium education) increases working hours, which furthermore steadily increase with increased population density. A less clear-cut pattern with respect to agglomeration type emerges for mothers with a youngest child below the age of three.

c. Macro-level factors

A high fertility rate, a high per-capita income and a high female participation rate mostly increase mothers' employment propensity whereas a high female unemployment rate reduces it. No clear patterns appear with respect to the share of graduates and the share of part-time workers among the employed. With respect to maternal working hours, associations are somewhat different. Whereas a high female participation rate and a high fertility rate prove to be stimulating even with respect to the intensive margin of employment, a high per capita-income and high part-time quotas mostly exhibit negative relations. Positive associations with maternal weekly working hours can also be ascertained for a high female unemployment rate and a high share of graduates on the employed. However, associations lose significance as soon as period- and state-fixed effects are controlled for. This is to be expected, since all macro-level factors except agglomeration type are linked to the state level and the cross-time (within-state) variation strongly correlates with period.

6. Sensitivity Analyses

In this section, we want to explore to what extent policy associations are dependent on the level of maternal education and maternal family type, respectively.

a. Differentiating by mothers' educational level

To test the existence of educational gradients, we add interaction terms with maternal education to main models 5-7 (cf. Table 1), yielding models 5-7, with mothers with medium education as a reference. As associations are very similar, we restrict the following results discussion to model 7, which is the most complex model including state- and period-fixed effects **Table 4** reports the resulting policy-specific interaction parameters and the basic parameters. For most policy indicators, a similar picture emerges. A low educational level weakens and a graduate education strengthens the policy relations to mothers' employment propensity. This is in accordance with findings from the study of Schober & Stahl (2017) showing that in recent years, day-care use in East and West Germany increased more strongly among families with medium and highly educated mothers compared to those with low

education. The creation of legal claims creates an exception in this regard, as both a low and a high educational level attenuate the policy association with maternal employment propensity. Concerning (conditional) working hours and again compared to mothers' medium education, a low educational level does not significantly alter the derived policy associations, whereas a graduate education regularly attenuates them. This seems plausible, considering the relatively lower importance of part-time work for graduate mothers' employment. However, one exception arises: Concerning the introduction of a legal childcare entitlement from the age of one, graduate mothers' working hours respond more sensitively than those of their less highly qualified counterparts. Still, the interaction is significant on the 10%-level only.

Table 4:

	Model No. 7		
	Basic parameter	Interaction policy##low education	Interaction policy##high education
Weekly working hours (conditional on employment)			
<i>Policy indicators</i>			
childcare coverage age under 3 in %	0.005	0.001	-0,001*
full-time childcare coverage age under 3 in %	0.001	0.001	-0,002***
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0.001	-0.002	0.001
Childcare time less than 25 hours per week, childminders, age under 3 in %	0	-0.001	0,002***
childcare coverage age 3-5 in %	-0.001	0	-0.002
full-time childcare coverage age 3-5 in %	-0.002	0	-0,002***
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	0.002	0.001	0
Childcare time less than 25 hours per week, childminders, age 3-5 in %	0	-0.001	0,002***
childcare entitlement from age 1: yes/no	0,036*	0.004	0,020*
Employment propensity			
<i>Policy indicators</i>			
childcare coverage age under 3 in %	-0.001	-0,010***	0.001
full-time childcare coverage age under 3 in %	-0.006	-0,013***	0,002*
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0.003	0,009***	-0,002**
Childcare time less than 25 hours per week, childminders, age under 3 in %	-0,002**	0,002**	-0,002***
childcare coverage age 3-5 in %	0.007	-0,027***	0,013**
full-time childcare coverage age 3-5 in %	0.001	-0,007***	0,006***
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	-0,004*	0,002***	0
Childcare time less than 25 hours per week, childminders, age 3-5 in %	0.002	0,002***	-0,005***
childcare entitlement from age 1: yes/no	0.005	-0,173***	-0,066***
<i>Control variables</i>			
Micro- and macro-level factors	x	x	x
year fixed effects	x	x	x
state fixed effects	x	x	x

***significant on 1%-level; **=significant on 5%-level; *=significant on 10%-level. Sources: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus, survey years 2006-2014, own calculations; Indikatoren und Karten zur Raum- und Stadtentwicklung. INKAR. Ausgabe 2016. Hrsg.: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) – Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Ministry of Labour, Social, Family Affairs and Integration (childcare coverage age under 3, childcare coverage age 3-5 and full-time coverage age 3-5 for Hamburg); HWWI.

b. Differentiating by mothers' family type

To test if a single mother-status significantly impacts policy associations with maternal employment, we add corresponding interaction terms to main models 2-4, yielding models 8-10. As the derived interaction effects hardly differ between models, we refer to model 10 in what follows. Mothers in couple households serve as a reference. Table 5 depicts the policy-specific interaction parameters and the basic parameters.

As can be seen in **Table 5**, few policies prove to be significant. Where this is the case, associations are weaker for single mothers than for mothers living in couple households, not the other way round. This finding is in line with the literature. In their analysis of full-day childcare, Müller et al. (2016) support the notion of less policy-sensitive lone mothers (compared to married mothers) for mothers of toddlers. According to Rainer et al. (2013: 219), lone mothers who use public childcare facilities show a higher labour market integration compared to lone mothers who do not use them, but the difference is more pronounced for mothers in coupled households, particularly for mothers with toddlers.

Table 5:

	Basic parameter	Model No. 10 Interaction policy##dummy single parent
Weekly working hours (conditional on employment)		
<i>Policy indicators</i>		
childcare coverage age under 3 in %	0.004	-0.001
full-time childcare coverage age under 3 in %	0.001	-0.001
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0.001	0
Childcare time less than 25 hours per week, childminders, age under 3 in %	0	0
childcare coverage age 3-5 in %	0	-0.006
full-time childcare coverage age 3-5 in %	-0.002	-0,002***
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	0.002	0,001*
Childcare time less than 25 hours per week, childminders, age 3-5 in %	0	0,002***
childcare entitlement from age 1: yes/no	0,042**	0.005
Employment propensity		
<i>Policy indicators</i>		
childcare coverage age under 3 in %	-0.001	-0.001

full-time childcare coverage age under 3 in %	-0.007	0
Childcare time less than 25 hours per week, daycare centres, age under 3 in %	-0.003	0.002
Childcare time less than 25 hours per week, childminders, age under 3 in %	-0,002***	0.001
childcare coverage age 3-5 in %	0.008	-0,015**
full-time childcare coverage age 3-5 in %	0.002	-0.001
Childcare time less than 25 hours per week, daycare centres, age 3-5 in %	-0,004*	0
Childcare time less than 25 hours per week, childminders, age 3-5 in %	0.001	0
childcare entitlement from age 1: yes/no	-0.016	-0,093***

Control variables

Micro- and macro-level factors	x	x
year fixed effects	x	x
state fixed effects	x	x

***significant on 1%-level; **=significant on 5%-level; *=significant on 10%-level. Sources: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus, survey years 2006-2014, own calculations; Indikatoren und Karten zur Raum- und Stadtentwicklung, INKAR, Ausgabe 2016. Hrsg.: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) – Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Ministry of Labour, Social, Family Affairs and Integration (childcare coverage age under 3, childcare coverage age 3-5 and full-time coverage age 3-5 for Hamburg) ; HWWI.

7. Conclusion

The study explores the linkage between selected policy indicators of public childcare provision and maternal employment in terms of employment propensity and (conditional) working hours. We apply a generalized difference-in-differences-model with time and state specific policy indicators, state and year fixed effects as well as control variables on the individual and the regional level. Our multivariate analyses for the years 2006-2014 are based on a cross-country sample with pooled information from all 16 states and 16 state-specific subsamples. The information stems from various data sources. We use the German microcensus data drawn from the Research Data Centre of the Federal Statistical Office (*Statistischen Ämter des Bundes und der Länder*), information from the INKAR database "*Indikatoren und Karten zur Raumentwicklung*" provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (*Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR)*) and indicators on early childhood education and care (ECEC), provided by the Bertelsmann Foundation. To this end, we utilize the in part substantial variation in the data with regard to childcare, policy measures and maternal employment both in the longitudinal section over time and the state cross-section.

Our results show that individual characteristics strongly determine parental employment behavior. Several contextual factors at the regional level are similarly influential, although their significance declines, as expected, as soon as state fixed effects are controlled for. Most interesting, some indicators of childcare expansion which lie at the center of our study retain their significance throughout models, even when state-fixed effects are controlled for. The significant indicators cover different age groups of children, different forms of care and both

the extensive and intensive margin of maternal employment. Our findings accord with previous findings for full-day care (Büchel/Spieß 2002) and of legal claims (Bauernschuster/Schlotter 2015). Extending the study of Müller et al. /2016), we find evidence for indicators addressing 3-5 year old children and for maternal employment propensity. We further show that the associations vary with mothers' education and family type.

However, several limitations of our study suggest a cautious interpretation of results. In our analysis of single indicators, we refrained from taking interrelations between indicators into account, which tends to lead to upward biased results. This is particularly the case for childcare coverage rates if different forms of care are (at least partially) perceived as substitutes. Further, any behavioral response on childcare expansion has to be interpreted in the broader institutional, legal and normative framework of the society. As these confounders hardly ever change in the short-term, their influence will be underestimated in the time frame of our study. Finally, our methodological setting does not allow us to draw any conclusions on causal relationships.

Concerning avenues for future research into the relationship between childcare and maternal employment, we suggest that a stronger focus can be put on childcare quality. As evidence for Germany shows, the individual perception of childcare quality and its evaluation for maternal employment decisions differs by region, children's age group and further socio-economic characteristics of mothers (Schober & Spieß 2015). Furthermore, high quality pays off not only for mothers: Returns to early childcare and education in terms of child outcomes in later years (Bourchinal et al. 2009; 2010) and even in subsequent pre-school years (Li et al. 2013) notably hinge on high quality care. Having made considerable progress in terms of quantitative expansion in recent years, it comes as no surprise that quality aspects currently gain importance in the political, societal and scientific debate in Germany. Thus, it seems promising to explore future trends in childcare quality and the perceptions and linkages to maternal employment.

Literature

Afentakis, A.; Bihler, W. (2010): Das Hochrechnungsverfahren beim unterjährigen Mikrozensus ab 2005. In: *Wirtschaft und Statistik* (10), S. 1039–1048.

Baker, Michael; Gruber, Jonathan; Miligan, Kevin (2008): Universal Childcare, Maternal Labor Supply, and Family Well-Being. In: *Journal of Political Economy* 116 (4), S. 709–745.

Bauernschuster, S.; Schlotter, M. (2015): Public childcare and mothers' labor supply—Evidence from two quasi-experiments. In: *Journal of Public Economics* (123), S. 1–16.

Beblo, M.; Lauer, C.; Wrohlich, K. (2005): Ganztagschulen und Erwerbsbeteiligung von Müttern: Eine Mikrosimulationsstudie für Deutschland. In: *J Labour Market Res* 38 (2), S. 357–372.

Becker, Gary S. (1981): *A Treatise on the Family*, Harvard University Press, Cambridge, MA.

Bertelsmann-Stiftung/ Our Projects/State by State Monitoring/Project Description (Online-Resource), <https://www.bertelsmann-stiftung.de/en/our-projects/state-by-state-monitoring/project-description/>

Blau, D. M. (2003): Child Care Subsidy Programs," in Moffitt, R. A. (ed.): "Means-Tested Transfer Programs in the United States" National Bureau of Economic Research Conference Report, pp. 443-516.

Blau, D. M.; Currie, J. (2006): Pre-school, day care, and after-school care: Who's minding the kids? In: E. A. Hanushek und F. Welch (Hg.): *Handbook of the economics of education*. New York: Elsevier, S. 1163–1278.

Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) (Hrsg.) (2015): Fünfter Bericht zur Evaluation des Kinderförderungsgesetzes, Kurzfassung, März 2015, Berlin.

Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) (2017a): Kindertagesbetreuung Kompakt: Ausbaustand und Bedarf 2016. Ausgabe 02, Berlin, Januar 2017.

Federal Ministry for Family Affairs, Senior Citizens, Women and Youth (BMFSFJ) (2017b): Gesetzliche Grundlagen für den Ausbau der Kinderbetreuung. Bundesministerium für Familie, Senioren, Frauen und Jugend (BMFSFJ). Online verfügbar unter <https://www.bmfsfj.de/bmfsfj/themen/familie/kinderbetreuung/ausbau-kinderbetreuung>, accessed on 4 October, 25.08.2017.

Boll, C. (2017): Die Arbeitsteilung im Paar – Theorien, Wirkungszusammenhänge, Einflussfaktoren und exemplarische empirische Evidenz. Hamburg (Expertise im Rahmen des Zweiten Gleichstellungsberichts der Bundesregierung).

Boll, C.; Hoffmann, M. (2017): Elterliches Erwerbsverhalten und kindlicher Schulerfolg. Hamburg (HWWI Policy Paper, 100).

Büchel, F.; Spieß, C. K. (2002): Kindertageseinrichtungen und Müttererwerbstätigkeit – Neue Ergebnisse zu einem bekannten Zusammenhang. In: *DIW-Vierteljahreshefte zur Wirtschaftsforschung* 71 (1), S. 95–113.

Burchinal, P.; Kainz, K.; Cai, K.; Tout, K.; Zaslow, M.; Martinez-Beck, I.; Rathgeb, C. (2009): Early Care and Education Quality and Child Outcomes, OPRE Research- to-Policy, Research-to-Practice Brief 15/2009, March, Office of Planning, Research and Evaluation, Washington/DC.

- Burchinal, M.; Vandergrift, N.; Pianta, R.; Mashburn, A. (2010): Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs, *Early Childhood Research Quarterly* 25: 166-176.
- Cascio, E. U. (2009): Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools. In: *The Journal of Human Resources* 44 (1), S. 140–170.
- Del Boca, D.; Vuri, D. (2009): The mismatch between employment and child care in Italy: The impact of rationing. In: *Journal of Population Economics* 20, S. 805–832.
- Federal Employment Agency (Bundesagentur für Arbeit)(2017): Statistik/ Arbeitsmarktberichterstattung: Der Arbeits- und Ausbildungsmarkt in Deutschland – Monatsbericht, September 2017, Nürnberg 2017.
- Federal Statistical Office (Statistisches Bundesamt): Startseite/Zahlen & Fakten/ Gesellschaft & Staat/ Bevölkerung/Der Mikrozensus stellt sich vor. Online verfügbar unter <https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/Mikrozensus2.html>, zuletzt geprüft am 01.04.2017.
- Federal Statistical Office (Statistisches Bundesamt) (2017): Zahl der Erwerbstätigen im Jahr 2016 um 1 Prozent gestiegen, Pressemitteilung Nr. 001 vom 02.01.2017, Wiesbaden.
- Felfe, C.; Lechner, M.; Thiemann, P. (2013): After-School Care and Parents' Labor Supply. In: *IZA Discussion Paper* (7768).
- Fitzpatrick, M. D. (2012): Revising our thinking about the relationship between maternal labor supply and preschool. In: *Journal of Human Resources* 47, S. 583–612.
- Geis, Wido (2017): Bund muss Kita-Lücken schließen. IW Köln. Online verfügbar unter <https://www.iwd.de/artikel/bund-muss-kita-luecken-schliessen-319262/>, zuletzt geprüft am 25.08.2017.
- Haan, P.; Wrohlich, K. (2011): Can child care policy encourage employment and fertility? Evidence from a structural model. In: *Labour Economics* (18), S. 498–512.
- Havnes, T.; Mogstad, M. (2011): Money for nothing? Universal child care and maternal employment. In: *Journal of Public Economics* 95, S. 1455–1465.
- Heckman, J. (1979): Sample selection bias as a specification error. In: *Econometrica* 47, S. 153–161.
- Kreyenfeld, M.; Hank, K. (2000): Does the availability of child care influence the employment of mothers? Findings from western Germany. In: *Population Research and Policy Review* 19 (4), S. 317–337.
- Lefebvre, Pierre; Merrigan, Philip (2008): Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada. In: *Journal of Labor Economics* 26 (3), S. 519–548. DOI: 10.1086/587760.
- Li, W.; Farkas, G.; Duncan, G. J.; Burchinal, M. R.; Vandell, D. L. (2013): Timing of high-quality child care and cognitive, language, and preacademic development., *Developmental Psychology* 49(8): 1440-1451.

- Lundin, D.; Mörk, E.; Öckert, B. (2008): How far can reduced childcare prices push female labour supply? In: *Labour Economics* 15 (4): 647–659.
- Müller, K.-U.; Wrohlich, K. (2014): Two Steps Forward – One Step Back? Evaluating Contradicting Child Care Policies in Germany. Technical Report. Deutsches Institut für Wirtschaftsforschung, DIW (German Institute for Economic Research). Berlin (SOEPpapers on Multidisciplinary Panel Data Research, 684).
- Müller, Kai-Uwe; Sengül, Denise; Wrohlich, Katharina (2016): Does subsidized care for toddlers increase maternal labor supply? Evidence from a large-scale expansion of early childcare. In: *Beiträge zur Jahrestagung des Vereins für Socialpolitik 2016: Demographischer Wandel - Session: Evaluation of Labor Market Policies*, No. A20-V1.
- Nollenberger, N.; Rodriguez-Planas, N. (2011): Child Care, Maternal Employment and Persistence: A Natural Experiment from Spain. Technical Report. In: *IZA Discussion Paper* (5888).
- Nöthen, M. (2005): Von der „traditionellen Familie“ zu „neuen Lebensformen“. Neuerungen in der Familienberichterstattung des Mikrozensus. In: *Wirtschaft und Statistik* (1), S. 25–40.
- OECD (2017): *The Pursuit of Gender Equality: An Uphill Battle*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264281318-en>
- Rainer, Helmut; Bauernschuster, Stefan; Auer, Wolfgang; Danzer, Natalia; Hancioglu, Mine; Hartmann, Bastian et al. (2013): *Kinderbetreuung*. Hg. v. ifo Institut. München (ifo Forschungsberichte 59).
- Schober, P. S.; Stahl, J. F. (2017): Convergence or divergence? Educational discrepancies in work-care arrangements of mothers with young children in Germany, *Work, Employment and Society*, April 2017.
- Schober, P. S.; Spieß, C. K. (2015): Local Day Care Quality and Maternal Employment: Evidence from East and West Germany. In: *Journal of Marriage and Family* 77 (3), S. 712–729.
- Steiber, N.; Haas, B. (2009): Ideals or compromises? The attitude–behaviour relationship in mothers' employment. In: *Socio-Economic Review* 7, S. 639–668.
- Tobsch, V. (2013): Betreuung von Schulkindern – ein weiterer Schlüssel zur Aktivierung ungenutzter Arbeitskräftepotenziale? In: *SOEPpapers on Multidisciplinary Panel Data Research* (573).
- van Ham, M.; Büchel, F. (2006): Unwilling or Unable? Spatial and Socioeconomic Restrictions on Females' Labour Market Access. In: *Regional Studies* 40 (3), S. 345–357.
- Wooldridge, J. M. (2013): *Introductory econometrics: A modern approach*, 5th ed., int. ed., Mason, Ohio u.a.: South-Western Cengage Learning.

Appendix

A1 Description of explanatory variables

Micro-level variables

The list of covariates at the individual and household level follows the relevant literature (e.g. Schober und Spieß 2015, Cascio 2009, Fitzpatrick 2012, Rainer et al. 2013). We control for age (in years) and age squared, capturing a potential non-linear relationship between age and both participation and hours.¹⁶ Concerning education, we differentiate three categories, oriented on the International Standard Classification of Educational Degrees (ISCED 2011), these are first no completed vocational training (ISCED 0-2)¹⁷, second, completed vocational training (ISCED 3-4)¹⁸ as a reference and third tertiary education (ISCED 5a, b; 6)¹⁹. Further, we incorporate nationality (EU-foreign nationality and non-EU foreign nationality, with German nationality as a reference). Finally, we control for a set of household-related variables. We thereby refer to the family type concept as the standard in family-related statistics based on the German microcensus since 2005 (Nöthen 2005). The terms 'household' and 'family' are used synonymously in this study. Household-related variables are the number of children in the household, the age of the youngest child in the household, the family time (living as a single mother vs. living in a coupled household²⁰) and marital status (married vs. not married).

Macro-level variables

The major portion of the macro-level variables stems from the INKAR database "*Indikatoren und Karten zur Raumentwicklung*" of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (*Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR)*). The BBSR has been regularly offering current information on the situation and the development of the regional living conditions in Germany for many years. The developed INKAR indicators are published in the INKAR online atlas.²¹ We use the following five indicators.

First (1), we account for agglomeration areas. We differentiate between four categories, according to the respective classification of the 'Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR)'. These are first central cities (>100,000 inhabitants), second highly agglomerated counties (population

¹⁶ We refrain from controlling for tenure, due to a poor performance in our models. Presumably, tenure is multicollinear with age.

¹⁷ (keine abgeschlossene Berufsausbildung: Elementarbereich, Primarbereich, Sekundarbereich I)

¹⁸ (abgeschlossene Berufsausbildung: (Abend-) Gymnasium, Fachoberschule, Berufsschule, Berufsfachschule, Berufs-/ Technische Oberschule)

¹⁹ (Hochschulausbildung: Universität, Fachhochschule, Fachschule, Berufsakademie, Promotion)

²⁰ Coupled households include married couples, cohabiting unions, same-sex non-marital relationships

²¹ For more information (available in German only), see: http://www.bbsr.bund.de/BBSR/DE/Raumebeobachtung/InteraktiveAnwendungen/INKAR/inkar_online_node.html

density > 300 inhabitants/km²) as a reference, thirdly agglomerated counties (population density > 150 inhabitants/km²) and fourthly rural counties (population density < 150 inhabitants/km²). We thereby account for the population density of the respondent as it correlates with many employment-relevant characteristics, e.g. number of job options and commuting distance. Measured on the level of German counties, this variable controls for agglomeration type heterogeneity within territorial states.

As further macro-level factors (on the state level), we use (2) the total fertility rate of cohorts up to age 45, (3) per capita-income (measured as the gross national product per inhabitant), (4) the unemployment rate (as the percentage share of unemployed persons in the civilian labour force), and finally (5), the participation rate (as the percentage share of the civilian labour force in the population aged 15-64). Concerning unemployment and participation rate, we employ gender-specific quotas (Schober & Spieß 2015, van Ham & Büchel 2006).

From the microcensus two additional macro-level factors are derived, first the part-time quota (measured as the percentage share of part-time workers on the employed) and second, the graduates quota (as the percentage population share of persons with tertiary education). These two indicators are measured as state-specific averages and refer to persons aged 25-49, corresponding to the age group in our mother sample.

Policy indicators

With respect to our core variables – childcare expansion policies – we differentiate between nine indicators. As previously mentioned, each of them is estimated on a specific subsample, composed of mothers with a youngest child that is, by its age, potentially affected by the respective measure (see **Table 2**). Coverage rates and full-time coverage rates have been taken from the INKAR database, indicators referring to legal claims and contractually agreed childcare time per week have been drawn from the Ländermonitoring of the Early Childhood Education and Care system, ECEC (*FBBE-Indikatoren des Ländermonitors Frühkindliche Bildungssysteme der Bertelsmann-Stiftung*). This dataset is updated and released on a yearly basis by the Bertelsmann Foundation in cooperation with the Center for Statistics on Child and Youth Welfare in Dortmund. The monitor compiles current data on educational participation, investments and educational quality for all 16 German states.²²

Coverage rates refer to state- and year-specific percentage shares of children attending publicly subsidized childcare (supplied by childminders or in day-care centres²³) on the same-age population. We use overall coverage rates and full-time coverage rates, both differentiating between children below the age of three and children aged 3 to 5. That is, we are left with four coverage rates. Full-time coverage rates refer to children who are cared for at least 7 hours a day. Coverage rates are conditional on childcare usage since they cover only those children whose mothers' childcare demand matches the respective supply. In this respect, they differ from pure supply oriented indicators such as legal childcare claims. However, as discussed earlier, coverage rates are measured at the state level. Although they may capture

²² For more information, see the project description on the foundation's website: <https://www.bertelsmann-stiftung.de/en/our-projects/state-by-state-monitoring/project-description/>

²³ The terms 'day-care centres' and 'kindergartens' are synonymously used in this study.

a region-specific aggregate demand, they would not be expected to cause potential endogeneity with respect to individual employment behavior (cf. Müller et al. 2016).

Childcare time less than 25 hours per week: Similar considerations apply to indicators comprising the share of children who are taken care of for a maximum of 25 weekly hours (corresponding to a maximum of 5 hours per day) on all same-age children attending public care. Childcare time refers to contractually agreed hours. Note that an increasing indicator value corresponds to a decreasing importance of full-day care. Similar to coverage rates, we differentiate between children below the age of 3 and those aged 3 to 5. Unlike coverage rates, we further differentiate between children taken care of by childminders and those who attend a kindergarten. This leaves us with four indicators which are measured as state- and year-specific averages and are therefore considered exogenous with respect to individual employment decisions.

Childcare entitlement from age 1: The existence of a legal claim from the age of one is a purely supply-driven indicator which is measured as a binary variable, taking on value “1” if such a claim exists in the respective state and year, and “0” otherwise. The information is linked to mothers with a (youngest) child aged 1 or older in our sample.²⁴

²⁴ The FBBE dataset comprises of further indicators which are principally reasonable but which did not perform well in separated analyses and have therefore been discarded. First, this applies to a legal childcare claim from age 2. Unlike for the legal claim from age 1, information is available in a two-year-interval only and assignment is partially ambiguous. Second, lunch provision did not converge in test estimations and thus had to be skipped. Thirdly, fee exemption in the last pre-school year and the last two pre-school years have also been analyzed in separate regressions. We refrain from using these indicators for several reasons. On the one hand, an employment effect can hardly be theorized, as most children’s enrolment in public childcare starts at an earlier age, thus a cost reduction in the last (one or two) year(s) should not incentivize a first enrolment decision. Moreover, as the hourly volume of free care differs between states, cross-state comparisons are not feasible. Finally, even analyses within-state (cross-time) are challenging as existing fee exemptions have been reversed later on in some states (i.e. Saxony).

Table A1:

Descriptive Statistics– Policy Indicators

	childcare coverage age 3-5				childcare coverage age under 3				full-time childcare coverage age 3-5				full-time childcare coverage age under 3			
	2008	2010	2012	2014	2008	2010	2012	2014	2008	2010	2012	2014	2008	2010	2012	2014
Baden-Württemberg	94.0	94.8	95.2	94.8	13.6	18.3	23.1	27.8	9.3	13.1	16.1	19.8	3.2	5.1	7.4	9.8
Bavaria	88.9	90.0	91.0	91.4	13.2	18.5	23.0	27.1	20.1	22.9	27.0	31.6	3.3	4.9	7.7	9.6
Berlin	93.4	93.7	93.9	94.2	40.4	42.1	42.6	46.0	53.7	55.1	58.7	61.0	22.6	26.0	28.7	30.8
Brandenburg	94.8	95.4	96.3	95.8	44.8	51.0	53.4	57.8	49.9	54.8	59.1	61.4	27.6	34.4	37.7	38.2
Bremen	86.2	88.1	89.1	90.2	12.7	16.1	21.2	26.9	20.0	22.3	26.6	32.7	5.3	7.2	11.3	15.4
Hamburg	86.3	88.1	92.3	97.3	22.9	28.5	35.8	43.2	34.9	39.6	44.8	49.7	11.7	16.0	21.0	21.8
Hesse	91.6	92.6	93.4	93.4	14.2	19.3	23.7	28.8	29.3	36.4	41.4	46.8	6.0	9.8	13.5	16.9
Mecklenburg-Vorpommern	94.1	95.2	95.9	95.1	44.9	50.7	53.6	56.1	52.9	56.9	62.6	65.9	27.7	33.1	37.5	40.6
Lower Saxony	86.0	89.5	92.6	93.5	9.1	15.8	22.1	27.9	10.9	14.5	19.0	24.3	2.5	4.7	7.2	10.4
North Rhine-Westphalia	90.2	91.8	92.9	92.4	9.3	14.0	18.1	23.8	26.8	33.4	37.9	41.6	4.3	6.8	8.9	11.7
Rhineland-Palatinate	95.4	96.6	97.4	97.4	15.0	20.1	27.0	30.6	23.4	33.6	44.7	48.0	4.4	7.5	12.4	15.0
Saarland	92.7	93.9	94.6	96.1	14.1	17.7	22.1	27.0	19.0	25.8	34.8	42.6	6.0	9.9	14.1	19.4
Saxony	94.6	95.2	96.0	95.7	36.5	42.8	46.4	49.9	66.0	75.0	76.5	79.3	25.4	33.5	36.9	41.0
Saxony-Anhalt	93.7	94.4	95.6	95.0	52.7	55.9	57.5	58.3	54.5	58.1	63.5	80.4	28.8	34.2	37.6	47.0
Schleswig-Holstein	84.0	86.8	90.7	90.9	11.6	18.1	24.2	30.3	12.8	16.3	21.6	26.1	3.2	5.9	8.9	12.4
Thuringia	95.9	95.9	96.9	96.8	38.9	45.1	49.8	52.4	84.9	87.1	87.4	91.1	32.2	39.7	42.9	47.3

Sources: Indikatoren und Karten zur Raum- und Stadtentwicklung. INKAR. Ausgabe 2016. Hrsg.: Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) - Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Behörde für Arbeit, Soziales, Familie und Integration der Freien und Hansestadt Hamburg (childcare coverage U3, childcare coverage 3-5 sowie Ganztagschildcare coverage 3-5 für Hamburg); illustration: HWWI.

Tabel A1 (ctd.):

Descriptive Statistics– Policy Indicators

	childcare entitlement from age 1: (1=yes; 0=no)				Childcare time less than 25 hours per week, day- care centres, age 3-5 in %				Childcare time less than 25 hours per week, day- care centres, age under 3 in %					
	2008	2010	2012	2014	2006	2008	2010	2012	2014	2006	2008	2010	2012	2014
Baden-Württemberg	0	0	0	1	12.4	11.4	4.9	2.3	1.7	30.8	31.5	23.2	22.3	17.3
Bavaria	0	0	0	1	34.9	33.3	32.0	29.1	25.1	38.1	44.1	42.3	38.3	34.2
Berlin	0	0	0	1	8.9	9.7	8.4	5.3	2.7	14.2	14.9	12.2	8.5	10.8
Brandenburg	0	0	0	1	7.5	5.6	3.7	2.1	2.0	6.6	5.8	3.5	2.3	2.4
Bremen	0	0	0	1	38.0	36.0	31.7	27.1	17.7	36.4	30.8	25.1	20.4	14.8
Hamburg	0	0	0	1	50.7	46.5	39.2	36.5	33.8	12.5	9.8	7.6	7.4	27.6
Hesse	0	0	0	1	41.8	34.4	27.0	19.0	16.2	31.5	23.2	15.7	15.3	12.2
Mecklenburg- Vorpommern	0	0	0	1	10.6	7.2	4.9	2.8	1.8	12.0	9.8	7.6	3.1	1.4
Lower Saxony	0	0	0	1	76.7	70.2	63.3	53.7	46.3	48.9	49.5	41.6	35.5	29.2
North Rhine-Westphalia	0	0	0	1	19.2	12.9	9.3	7.3	6.2	26.0	25.2	16.6	13.4	11.0
Rhineland-Palatinate	0	0	0	1	20.6	21.3	18.0	2.5	3.8	27.4	29.1	23.9	5.1	6.6
Saarland	0	0	0	1	25.9	25.4	20.7	3.4	1.6	20.7	17.6	10.6	4.0	2.1
Saxony	0	0	0	1	12.0	8.5	4.8	4.3	3.2	13.2	10.3	6.4	5.5	4.5
Saxony-Anhalt	1	1	1	1	40.5	38.0	34.8	31.4	10.1	43.3	41.1	35.5	32.5	12.9
Schleswig-Holstein	0	0	0	1	66.4	60.0	51.3	42.4	36.5	52.3	42.2	35.6	27.3	23.2
Thuringia	0	0	1	1	7.7	5.7	4.4	3.3	2.3	12.2	9.1	5.7	5.7	4.7

Sources: Indikatoren und Karten zur Raum- und Stadtentwicklung. INKAR. Ausgabe 2016. Hrsg.: Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) - Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Behörde für Arbeit, Soziales, Familie und Integration der Freien und Hansestadt Hamburg (Betreuungsquote U3, Betreuungsquote 3-5 sowie Ganztagsbetreuungsquote 3-5 für Hamburg); illustration: HWWI.

Table A1 (ctd.):

Descriptive Statistics– Policy Indicators

	Childcare time less than 25 hours per week, childminders, age 3-5 in %					Childcare time less than 25 hours per week, childminders, age under 3 in %				
	2006	2008	2010	2012	2014	2006	2008	2010	2012	2014
Baden-Württemberg	70.6	68.0	68.7	88.9	89.0	39.0	51.6	46.8	70.7	65.5
Bavaria	56.1	63.8	64.4	76.9	74.1	4.8	45.1	41.4	61.7	55.1
Berlin	18.3	21.7	22.8	19.9	13.8	35.7	18.7	11.7	7.9	11.6
Brandenburg	8.5	9.0	11.3	8.1	9.9	31.6	8.7	3.8	2.4	3.9
Bremen	46.6	54.5	49.2	61.4	51.3	17.5	30.4	25.2	38.3	39.8
Hamburg	48.9	35.4	39.9	65.0	65.3	53.7	37.5	34.3	45.3	52.3
Hesse	64.0	55.4	48.8	76.3	68.4	26.2	29.2	26.2	43.6	41.3
Mecklenburg- Vorpommern	5.6	10.0	6.7	2.8	1.1	28.0	9.1	8.6	1.4	0.8
Lower Saxony	61.4	58.8	65.7	76.3	77.7	40.8	45.7	46.9	60.8	58.6
North Rhine-Westphalia	55.9	60.3	63.8	75.0	70.1	7.0	32.0	30.0	52.3	46.2
Rhineland-Palatinate	63.1	69.2	67.0	86.0	87.5	39.1	40.3	36.9	59.0	56.2
Saarland	51.1	51.9	66.7	75.9	73.4	43.8	35.3	40.6	47.4	47.8
Saxony	30.9	27.5	28.4	13.3	7.9	8.6	6.0	3.1	1.8	2.3
Saxony-Anhalt	35.3	15.2	30.7	32.3	18.9	19.8	23.5	16.3	21.7	6.4
Schleswig-Holstein	57.3	54.0	58.8	73.9	65.1	46.7	47.9	42.0	59.3	55.3
Thuringia	71.4	48.0	66.7	84.4	67.6	16.8	21.2	9.9	10.0	8.7

Sources: Indikatoren und Karten zur Raum- und Stadtentwicklung. INKAR. Ausgabe 2016. Hrsg.: Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung (BBR) - Bonn 2016. © 2016 Bundesamt für Bauwesen und Raumordnung, Bonn; Behörde für Arbeit, Soziales, Familie und Integration der Freien und Hansestadt Hamburg (Betreuungsquote U3, Betreuungsquote 3-5 sowie Ganztagsbetreuungsquote 3-5 für Hamburg); illustration: HWWI.

Tables A2-A20: see electronic appendix:

http://www.hwwi.org/fileadmin/hwwi/Publikationen/Publikationen_PDFS_2017/HWWI_ResearchPaper_180-appendix.pdf

The **Hamburg Institute of International Economics (HWWI)** is an independent economic research institute that carries out basic and applied research and provides impulses for business, politics and society. The Hamburg Chamber of Commerce is shareholder in the Institute whereas the Helmut Schmidt University / University of the Federal Armed Forces Hamburg is its scientific partner. The Institute also cooperates closely with the HSBA Hamburg School of Business Administration.

The HWWI's main goals are to:

- Promote economic sciences in research and teaching;
- Conduct high-quality economic research;
- Transfer and disseminate economic knowledge to policy makers, stakeholders and the general public.

The HWWI carries out interdisciplinary research activities in the context of the following research areas:

- Digital Economics
- Labour, Education & Demography
- International Economics and Trade
- Energy & Environmental Economics
- Urban and Regional Economics

Hamburg Institute of International Economics (HWWI)

Baumwall 7 | 20459 Hamburg | Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

info@hwwi.org | www.hwwi.org