Draft paper

Maternity leave duration and maternal health in the long run: the role of selection for first-time mothers in Germany

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ABSTRACT:

The increasing female labour force participation in Western countries leads to problems in reconciling family and working life, as women have to combine their obligations as mothers and employees. This multiple commitment could result in role conflicts of motherhood and employment and have a negative impact on maternal distress and mothers' health. Drawing attention to strategies that mitigate this effect, maternity leave is one of these reconciliation strategies. In the last three decades, research has shown positive association of maternity leave duration on mothers' health outcomes but also differences in the selection mechanisms into maternity leave spells. Little attention has been paid to the relationship between maternity leave and maternal health in the German context, which is characterised by low fertility levels, traditional role models of parenting and generous maternity leave entitlements. The present research investigates the association between the selection into different maternity leave durations and first-time mothers' health outcomes in Germany. Using very detailed German Statutory Pension Fund administrative panel data, we apply discrete-time event history analysis to estimate the relationship between the length of maternity leaves and the probability of sickness occurrence among women (N = 4,237). Results show that the likelihood of sickness occurrence increases with the duration of the maternity leave. After interacting different women's characteristics with the duration of maternity leave, both high-income and pre-conception-sickness mothers have the highest probabilities of sickness occurrence, while average mothers and mothers with reduced working hours indicate comparatively lower and more stable probabilities across the maternity leave durations. Moreover, the probability of getting sick over time remains higher for mothers with longer maternity leaves. Our analysis shows that selection into maternity leave plays a major role in explaining the relationship between maternity leave durations and women's health outcomes.

Keywords: Maternity Leave; Mothers' Health; Germany; Administrative Panel Data; Discrete-Time Event History Analysis

1. Background and theory

Due to the rising female labour force participation since the 1960s in Western countries (OECD, 2016), an increasing share of workers face challenges of reconciling family and work. This is mainly experienced by women as they have mostly compromised their professional careers (Budig & England, 2001; Correll et al., 2007) and they traditionally take over parenting after the transition into motherhood (Hein, 2005). The resulting task of balancing motherhood and employment affects *maternal distress* levels (Barnett & Baruch, 1985; Emmanuel & St John, 2010; Esping-Andersen & Billari, 2015; Morgenroth & Heilman, 2017; Tiedje et al., 1990), which can be offset by reconciliation strategies. *Maternity leave* is a legal entitlement enabling the postponement of returning to work and prolonging the period of familiarisation with the newly acquired mother-role while protecting the jobs of the women. The legislation aims both to ensure the labour market attachment of mothers and to protect maternal health (Joesch, 1997). Previous research shows mixed results on the association between *maternity leave* and mothers' health outcomes. Most studies not focusing on the leave duration find a positive influence of *maternity leave* on mothers' health (Burgess et al., 2008; Grace et al., 2006; McGovern et al., 1997). When including the length of *maternity leave*, studies show that longer leaves are positively related with post-leave maternal health outcomes in the context of West-Germany (Avendano et al., 2015) and Germany (Thyrian et al., 2010). These associations might be spurious meaning that they are driven by selection because different women's characteristics might impact the *maternity leave* duration. Other research find correlations of the health performance and other characteristics of mothers, for instance socio-economic status, which might play a role in the decision on the length of leave depending on the entitled *maternity leave* allowances that differ between contries (Bullinger, 2019; Benson et al., 2017; Guertzgen & Hank, 2018; Hewitt et al., 2017; McGovern et al., 1997).

Differences in the utilisation of *maternity leave* in terms of leave durations, the entitled benefits and mothers' selection into these can be assumed, suggesting variations in *maternal distress* and also mothers' health outcomes. Using unique data from the German Statutory Pension Fund, we investigate the role of *maternity leave* duration on first-time mothers' post-*maternity leave* health outcomes in Germany. We measure maternal health outcomes with the occurrence of serious sickness after returning from *maternity leave*. The German context is particularly interesting since fertility levels are low despite recent increases during the last decade (Destatis, 2017), the female labour force participation is only slowly increasing (Kreyenfeld & Geisler, 2006; Spiess & Wrohlich, 2008), and persistent traditional family role models putting mothers in charge of parenting (Borck, 2014; Maurer, 2006). The German *maternity leave* legislation has statutory *maternity leave* entitlements of eight weeks post-partum and offers the possibilities to extend the leave up to 36 months including full job protection, offering a high flexibility to mothers in their choice on the length of leave (BMFSFJ, 2018). On the other hand, the leave benefit entitlements have their limits and might cause a selection into different *maternity leave* durations for mothers with different characteristics. The latest policy reform in 2007 changed the type of parental benefit from a means-tested benefit to an income replacement payment based on the mother's

individual income before childbirth (BMFSFJ, 2006; BMFSFJ, 2018). The main aim of this reform was to increase the attractiveness of *maternity leave* for well-educated women with a higher income, a selective group (Guertzgen & Hank, 2018; Spiess & Wrohlich, 2008). Although *maternity leave* policies in Germany encourage mothers to return to the labour market as a response to the economic need for women to participate more in the labour market due to shortage of skilled labour, they also reinforce *intensive mothering* (Allen et al., 2013; Bernardi & Keim, 2017; Collins, 2019; Kreyenfeld & Konietzka, 2017; Schaeper et al., 2017) and traditional male-breadwinner models (Borck, 2014; Maurer, 2006) by establishing individual income-based childcare benefits. Paternity leave is equally included in the legislation (BMFSFJ, 2018), the *maternity leave* legislation provides only poor incentives for the father to engage in infant parenting; however, from an economic perspective, the parent with the lower income would have to take parental leave to achieve the lowest possible income loss at couple level, and this is usually the mother. Yet, the division of unpaid work within the households might exacerbate mothers' reconciliation issues. As recent studies show men contribute do far less domestic work than women even after childbirth. In addition to the unique setting of the German context, this study addresses a highly relevant topic given the rising female work shares in Western countries and governmental efforts of expanding *maternity leave* rights as recently seen in the European Union's directive on statutory paternity leave to stimulate work-life-balance as an act of increasing well-being (European Commission, 2017; European Commission, 2019).

Based on the theory of social roles by Ralf Dahrendorf (1965), the two predominant roles of women after the transition into motherhood are being a mother and being an employee, whose agreement cannot be easily implemented. Compromises can lead to not living up to all different role expectations can increase distress (Barnett & Baruch, 1985; Dahrendorf, 1965; Tiedje et al., 1990). Social norms of *intensive mothering* can worsen this distress by putting additional expectations on the mother (Bernardi & Keim, 2017; Collins, 2019). Within this context, *maternity leave* aims to alleviate *maternal distress* in its reconciliation function to offset the double burden of motherhood and employment. In accordance with the German *maternity leave* legislation (BMFSFJ, 2018), women an decide on the length of maternity leave themselves and choose between three and 36 months after the childbirth.

The extracted selection mechanisms refer to individual considerations of *affordability*, *amortisation*, and *motivation* for *maternity leave* durations. *Affordability* and *amortisation* both account for socio-economic selectivity: the selection into a *maternity leave* duration depends on the period of leave a mother can afford without receiving her full income and want to spend assessing her relative income loss (Spiess & Wrohlich, 2008). *Motivation* addresses the individual priority of the leave duration, which might, for instance, be shaped by the mother's general health condition and her parenting preferences (Johnston & Swanson, 2006; Spiess & Wrohlich, 2008). All those considerations account for a selection mechanism in the *maternity leave*-health association. On the other hand, *maternity leave* durations could solely result from the legislative entitlements. In a recent paper, Guertzgen and Hank (2018) explore the causal relation between a change in the legislation and the selection into different length of *maternity*

leaves in Germany. They find that the introduction of a more generous *maternity leave* allows negative health selection: less healthy women can return to work after a longer period of *maternity leave*. In other words, without the reform those women would not have returned to their jobs.

In this study, we therefore answer the following research question, *Under which conditions does the length of maternity leave affect the post-childbirth health outcomes for first-time mothers in Germany?,* by elaborating on following hypotheses:

H1a: The demographic composition of women varies across different *maternity leave* durations and by post-childbirth sickness occurrence.

H1b: The post-childbirth sickness occurrence differs between maternity leave durations.

H2: A longer *maternity leave* positively affects mothers' health outcomes.

H3: The association between mothers' health and *maternity leave* durations is driven by selection.

2. Data

The current study uses a biography panel data set by the German Statutory Pension Fund (DRV), the 'FDZ-Biografiedatensatz für die Biografiedaten der Versicherten' (VSKT) [Pension data set on biography data of insured persons] of the year 2015, providing employment biographies as a panel survey with monthly data entries (DRV, 2018a). After cleaning the data, the final sample results in working 4,237 mothers born between 1960 and 1979 and having their first child between the age of 20 and 39. We implement discrete-time logit models to estimate the probabilities of becoming. The main dependent variable is a binary outcome variable indicating sickness occurrence for every month after the return from the *maternity leave*, which is defined as any serious sickness causing long-term absence from work of at least six weeks that can be spread across multiple incidences of one condition, or as a period of rehabilitation measures (DRV, 2018b). Since this information gathered by the DRV relies on official sick leave reporting, the starting time of the observation was set on first month after the maternity leave to assure the correct measurement of the outcome variable. The main explanatory variable is the duration of the *maternity leave* in months starting with the month of the childbirth. It is coded as a categorical variable with categories of 2 (statutory leave) as reference category, 3-12, 13-24 and 25-36 months of leave. Our variable for the time between the childbirth and the sickness occurrence is the monthly women's health status, which indicates the exact timing of a sickness occurrence. Women are observed until the incidence of post-*maternity leave* sickness occurrence or censored at their 50th birthday. Furthermore, women who experienced second birth transition were dropped from the sample to avoid health interference due to the second pregnancy.

Missing data was positively tested for randomness and case-wise deleted. For missing values in the *maternity leave* variable, an imputation variable was constructed to avoid biases derived from recording errors in the underlying variable in the DRV data set. Furthermore, we control for mother's age at first childbirth categorised as 20-24, 25-29, 30-34 and 35-39, mother's birth cohort categorised as 1960-

1964, 1965-1969, 1970-1974 and 1975-1979, and mother's income-percentile prior to the childbirth. Additional controls are the pre-conception sickness occurrences (dummy) as a proxy for the mothers' general health status, two dummy variables indicating whether pre-childbirth earnings fall above or below the mean and the median of the income distribution respectively, two dummy variables to controls for the type of in-force *maternity leave* legislation from 1990-2006 (introducing a means-tested leave allowance and enabling 36 months of maternity leave including job protecting) and from 2007 until now (expanding the leave allowance to an individual income-based payment), and three dummy variables indicating the post-leave employment conditions of full-time work, transition to reduced working hours or marginal employment.

3. Method

After data cleaning and case selection, the final sample results of 4,237 mothers. Table 1 illustrates the distribution of mothers' characteristics on the different *maternity leave* lengths. The mean *maternity leave* duration is 13.5 months. The distribution across the leave categories shows that the majority of the mothers either only takes the *statutory maternity leave* of 2 months (46.66 %) or a leave of more than 25 months (28.30 %). 10.17 % prolong their leave up to 12 months and 14.87 % take a leave of 13-24 months. 27.26 % of the women in the sample experience sickness after their first-child's *maternity leaves*. The incidence of pre-conception sickness is 14.63 %. Besides the slightly smaller share in the birth cohort category of 1960-1964 (17.18 %), the women are approximately equally distributed among the birth cohort categories with shares between 25 % and 32 %. The highest share of first-time mother can be found in the age category of 25-34 with 39.79 %, the smallest share has a child with 35-39 years (8.83 %).

Table 1: Snapshot of the sample (selection)

	cases	%		cases	%
N	**4,237**	100	***Maternity leave*** (M = 13.50 months, SD = 14.85 months)		
			2 months (stat.)	**1,977**	46.66
Sickness occurrences*	**1,155**	27.26	3-12 months	**431**	10.17
(Duration until sickness: M = 2.87 years, SD = 3.94 years)			13-24 months	**630**	14.87
Previous sickness*	**620**	14.63	25-36 months	**1,199**	28.30
Birth cohort (M = 1970.37)			**Age at first childbirth** (M = 28.37 years, SD = 4.27)		
1960-64	**728**	17.18	20-24	**877**	20.70
1965-69	**1,065**	25.14	25-29	**1,686**	39.79
1970-74	**1,339**	31.60	30-34	**1,298**	30.63
1975-79	**1,105**	26.08	35-39	**374**	8.83
Income > mean*	**1,310**	30.92	**Post-*maternity leave* working conditions**		
Income < median*	**1,529**	36.09	Return to full employment*	**1,892**	44.65
Income distribution			Return with reduced working hours*	**789**	18.62
<= 25 %	**718**	16.95	Transition to marginal employment*	**547**	12.91
26-50 %	**811**	19.14	**Childcare benefit reforms (1992 & 2007)**		
51-75 %	**1,170**	27.61	1992*	**2,919**	68.89
> 75 %	**1,538**	36.30	2007*	**675**	15.93

Note: Snapshot of the sample providing a selection of the women's characteristics. Indicated are the total number of cases, the share of the entire sample (%), and partially means (M) and standard deviation (SD). If dummy variables are used (*), only their positive expressions are shown.

Source: VSKT 2015, own analysis

Logistic event history analysis is used to estimate the role of the *maternity leave* duration on the monthly probabilities of sickness occurrence. The VSKT meets all necessary requirements to conduct this analysis (DRV, 2018) and, additionally, the monthly data records enable a detailed coverage of *maternity leave* and sickness biographies of mothers. The analysis was conducted in four different hierarchically developed models, to which different covariates were added to control for the effect of independent variables and time (Table 2). Model 1 is the base model, we include the length of *maternity leave*, the time measured in months, and the time squared to predict the effect of the leave duration on sickness occurrence. The statutory maternity leave of 2 months is used as reference category. Time squared is used to account for a quadratic trend of time in the current analysis. Model 2 additionally includes the interaction between the different *maternity leave* categories, time and time squared. Model 3 further controls for the association of relevant covariates such as age at first childbirth, birth cohort, pre-conception sickness, income distribution positioning, post-leave employment arrangements and the applicability of the different childcare leave reforms of 1990 and 2007.

Table 2: Included variables in the discrete-time logit models to predict the probabilities of sickness occurrence

Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Maternity leave duration (main explanatory variable)	X	X	X	X
Time in months	X	X	X	X
Time squared in months	X	X	X	X
Maternity leave duration x time		X	X	X
Maternity leave duration x time squared		X	X	X
Age at first childbirth			X	X
Birth cohort of the mother			X	X
Pre-conception sickness			X	X
Income above mean			X	X
Income below median			X	X
Post-leave full employed			X	X
Post-leave reduced working hours			X	X
Post-leave marginal employed			X	X
Childcare leave reform of 1990			X	X
Childcare leave reform of 2007			X	X
Age at childbirth x *maternity leave* duration				X
Age at childbirth x *maternity leave* duration x time				X
Birth cohort x *maternity leave* duration				X
Birth cohort x *maternity leave* duration x time				X
Pre-conception health x *maternity leave* duration				X
Income above average x *maternity leave* duration				X
Post-leave full employed x *maternity leave* duration				X
Post-leave reduced working hours x *maternity leave* duration				X

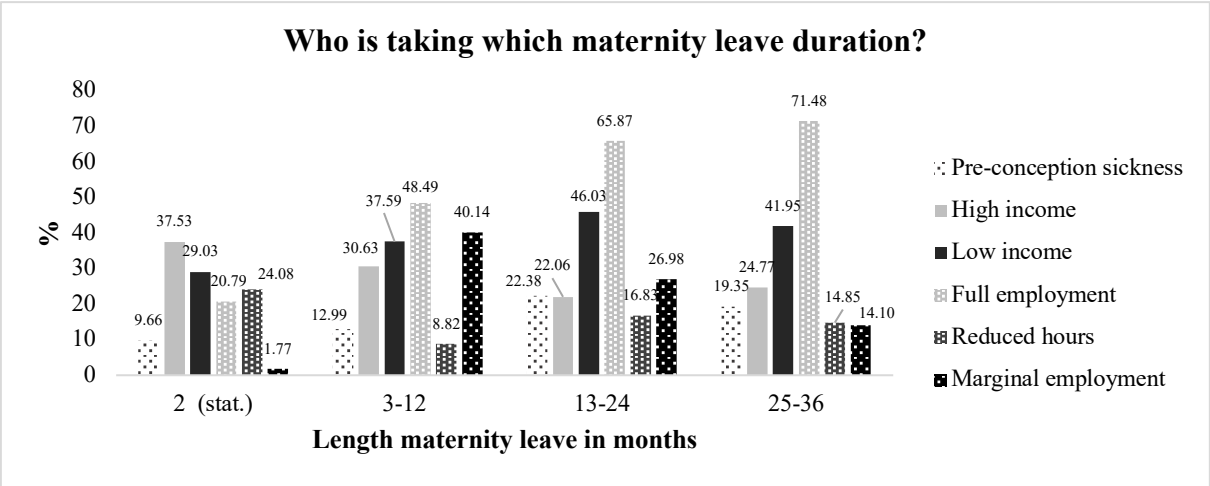
Note: Hierarchical build-up of the discrete-time logit regression models and included variables per model.

Using likelihood ratio tests, the improvement of the hierarchical model building by adding covariates was confirmed. Robustness checks and sensitivity analyses were applied to indicate the models' solidity and to identify those covariates to which the models are sensitive. Predictive margins calculated from the predictions of the discrete-time logit models are used to approximate the effect of *maternity leave* durations on sickness occurrence.

4. Results

The descriptive results (Figure 1) show that there are significant differences in the demographic characteristics of women choosing different *maternity leave* durations (*H1a*). When looking at pre-conception sickness, it becomes clear that the share of affected mothers represented in the *maternity leave* categories generally increases with the leave duration from 9.66 % within the statutory leave group to 22.38 % in the 13-24 months and afterwards slightly decreases to 19.35 % in the 25-36 months category. The mean *maternity leave* duration in months for mothers with pre-conception sickness (mean (M) = 18.63 months) is six months longer than for those without (M = 12.62 months) and this difference is significant. The majority of the women with above average income take the statutory leave with a share of 56.64 %. The longer leave categories are chosen relatively less often (10.08 % vs. 10.61 % vs. 22.67 %).

Figure 1: Health, income and employment characteristics of women by maternity leave durations



Note: Share of demographic characteristics within the maternity leave duration categories for the variables: pre-conception sickness, high income (above the mean), low income (below the median), full employment, reduced working hours), and marginal employment.

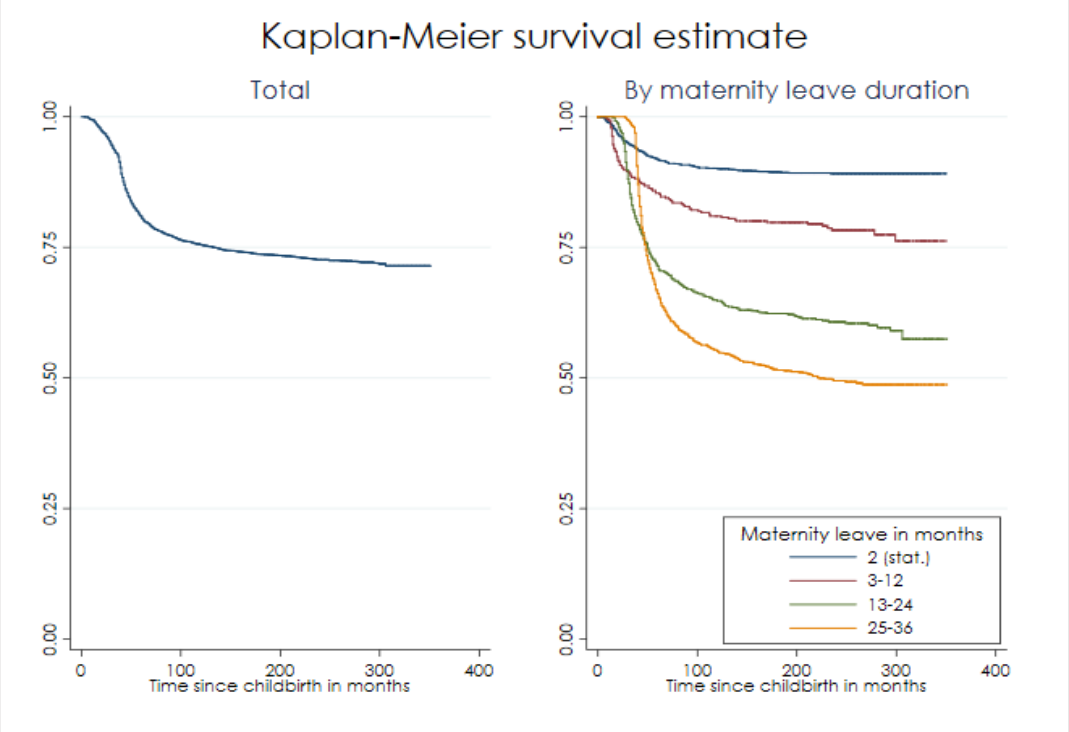
Source: VSKT 2015, own analysis

Also, women with an income above the mean of the distribution take significantly shorter *maternity leaves* (M = 10.62 months) than women earning below the mean (M = 14.79 months). Mothers earning below the median take significantly longer leaves (M = 16.01 months) than those equal and above the median income (M = 12.08 months). Regarding the post-*maternity leave* employment conditions, 45.3 % of the women who return to their pre-childbirth employment take the longest *maternity leave* duration category and also show significantly higher leave durations (M = 21.03 months) than women not returning to their full work immediately (M = 7.43 months). 59.65 % of mothers reducing their working hours are in the statutory leave group and take significantly shorter *maternity leaves* (M = 11.15 months) than women who do not reduce their working hours after returning from the leave (M = 14.05 months). Women who change from full to marginal employment after returning from *maternity leave* take significantly longer leaves (M = 17.8 months) than those who do not (M = 12.86 months). A similar conclusion

can be drawn when comparing the characteristics of women experiencing post-leave sickness with those who do not (*H1a*). 24.33 % of the sickness-experiencing mothers indicate pre-conception sickness. Mothers with pre-conception sickness also show significantly higher rates of sickness occurrence than those who have never been sick. Mothers who become sick also have a significantly lower mean age at first childbirth (M = 27.31 years) than those who are not (M = 28.77 years), indicate a significantly lower mean income than mothers not experiencing sickness, return significantly more often back to their full employment, reduce their working hours significantly more often, but do not change to marginal employment. These results indicate various differences between mothers taking different *maternity leave* durations and experiencing sickness or not. Subsequently, the hypothesis *H1a* can be confirmed. Also, the prevalence of post-*maternity leave* sickness differs between leave durations (*H1b*). The mean *maternity leave* duration is significantly longer for mothers experiencing sickness (M = 23.43 months) than for those who do not (M = 9.78 months). The sickness rates per woman increase with the length of maternity leave and 49.87 % of the mothers becoming sick take the longest leaves. This trend is also confirmed when looking at timing and frequency of sickness occurrences in the survival analysis. For that reason, the hypothesis *H1b* can be confirmed.

The results of the event history analysis further provide support for the hypotheses *H1a* and *H1b*. Figure 2 shows Kaplan-Meier survival curves indicating the women remaining in the sample without sickness occurrence over time. 70.22 % (811 cases) of all sickness occurred within the first 5 years (t = month 60) after the childbirth (t = month 0), and 89.87 % (1,038 cases) in the first 10 years (t = month 120). The *maternity leave* duration subsamples (right) show similar trends. The share of women experiencing no sickness decreases in the first five years of observation by 23.94 to 32.26% in the different groups. In the following five years, the decline decreases to 7.98 to 11.83 %. The monthly incidence rates of sickness occurrence increase gradually by the *maternity leave* duration and when looking at different maternal ages, pre-conception sickness, different post-*maternity leave* income and employment conditions shows significant differences in the survival analysis. For instance, mothers with pre-conception sickness show higher incidence rates than without in the Kaplan-Meier estimates. This again emphasises the varying characteristics between mothers who become sick and those who do not.

Figure 2: Kaplan-Meier survival curves total and by maternity leave durations



Note: Kaplan-Meier survival curves indicating how sickness occurs over the entire observation period and how many women remain in the sample without sickness occurrence by each time point for the entire sample (left) and by maternity leave durations (right).

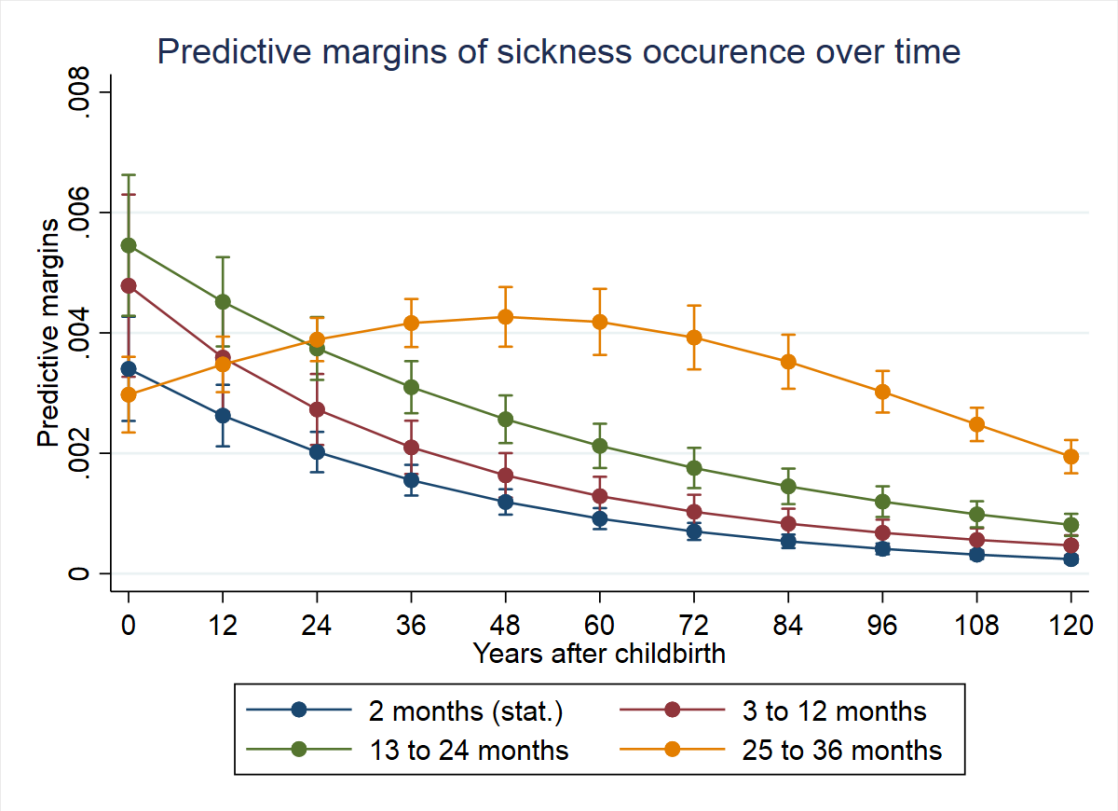
Source: VSKT 2015, own analysis

In accordance with the monthly time units used in the current analysis, predictive margins are calculated based on the regression coefficients as the monthly probabilities of experiencing sickness. The trend of the margins across the *maternity leave* categories does not differ between the regression models and shows increasing monthly probabilities with longer leave durations. The margins show that the average predicted probabilities of becoming sick in the following months increase with longer *maternity leave* duration. For that reason, the hypothesis *H2* cannot be accepted. To interpret the monthly margins, the measure numbers needed to treat based on the predictive margins as event rates can be used to get an impression of the effect size of the margins and the number of women those refer to. For the most complex regression model, the number of women who needed to take the 3-12 months leave to prevent one sickness occurrence in the next month is 2,571.36. For 13-24 months, it would be 1,338.87 and for 25-36 months it would be 744.77 women showing that the monthly effect on sickness probabilities of the different *maternity leave* durations differs.

Fig. 3 shows the margins for the full model over time (Figure 3), the differences in predicted sickness occurrences across different leave durations become clear. The monthly predictive margins of sickness occurrence decrease within the first 10 years after childbirth for all length categories, but the longer the leave the higher the (level of) predictive margins. Whereas the statutory 2-, 3-12- and 13-24-months leaves are close together, the difference of 25-36 months leave to the other categories is relatively large.

Between 36 and up to 72 months after the childbirth, which means during the years of Kindergarten, the differences are statistically significant. This confirms the observed association between *maternity leave* duration and probability of sickness occurrence.

Figure 3: Predictive margins of sickness occurrence over time by leave durations



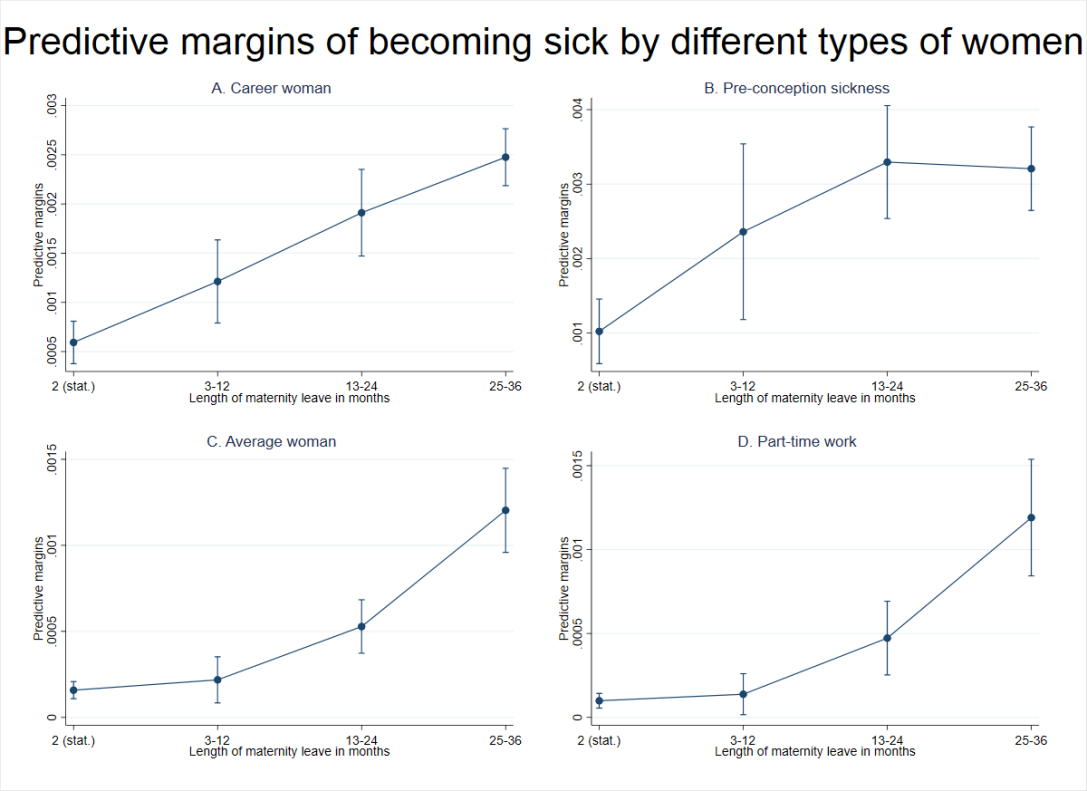
Note: The graph shows the monthly probabilities of sickness occurrence calculated by predictive margins for the least restricted regression model and how they develop over time (x-axis) for an observation period of 10 years by the length maternity leave in categories. The y-axis shows the monthly predictive margins.

Source: VSKT 2015, own analysis

To see differences in the characteristics of mothers, we compute margins at specific values, specifically we adjust the predictive for some combination of specific values in order to define different typologies of women. The first typology is "career-oriented"(A), which is defined by an income above the mean, a return to full-time employment after the *maternity leave*, and no serious pre-conception sickness incident. The second typology (B) is a woman who experienced pre-conception sickness. She returns to work after the *maternity leave* but with reduced working hours. Her income is estimated between the median and the mean income of the population. The third typology (C) represents the average woman in our sample, i.e. the one resulting from margins at the means. In other words, we set any variables to its mean values and this is what we called "C" typology, which differs from the general margins calculation without any characteristics specified by using the average characteristics, for instance a woman being born in 1970.37 and took 13.5 months of *maternity leave*. The fourth typology, (D) is a mother who changes into part-time employment after returning from her *maternity leave*. Her income is

estimated similar to type B. To simplify the comparison, all women (except the type C) are assumed to have their first child between 1992 and 2006 and being entitled for the conditions of German the *maternity leave* reform of 1992.

Figure 4: Predictive margins and 95 % CIs of maternity leave by different typologies of mothers



Note: The table shows the monthly probabilities of sickness occurrence calculated by predictive margins (y-axis) of the least restricted regression model for the different maternity leave durations in categories (x-axis) by different types of women. Type A (career-oriented woman) is characterised by full employment after the leave and a high income, B indicates pre-conception sickness, C has all characteristics on average, and D changes to part-time work after the leave.

Source: VSKT 2015, own analysis

Those margins at specific values are computed on the full model (4) (Figure 4). Type A indicates a similar trend of the predicted probabilities of sickness occurrence by *maternity leave* duration as observed in the base model but with slightly higher probabilities. The probabilities of becoming sick gradually increase with a longer *maternity leave* category. The same is observed for type B, but with even higher probabilities and a stagnation from 13-24 to 25-36 months of leave, which are more than the double of the margins in the unspecified prediction. The average woman (C) shows smaller probabilities of sickness occurrence, which also increase with the leave duration. The same pattern can be observed for type D but with slightly smaller predicted probabilities as for C. It can be concluded that mothers with different characteristics show different outcomes in terms of sickness probabilities. When linking these differences with the assumingly different initial conditions of the transition into a *maternity leave* length, those differ as well. As shown in this example, the different properties expressed in the analysis of specific types of mothers might influence the selection into *maternity leave* spells, which further

result in different health outcomes. Based on the differences in the predictive margins of sickness occurrence by characteristics and types of women, the hypothesis *H3* can be confirmed.

5. Conclusion

In this article, we address the following research question: *Under which conditions does the length of maternity leave affect the post-childbirth health outcomes for first-time mothers in Germany?* As one of a few studies, we investigate the association between *maternity leave* durations and maternal health using unique and detailed administrative data by the German Statutory Pension Fund. We find evidence for selection effects when interacting by different characteristics of mothers with *maternity leave* and conclude that the role of selection is relevant in the association between *maternity leave* durations and mothers' health. The analysis also shows that not all health effects can be explained by selection. As seen in Figure 3, the health effect of the different *maternity leave* durations on sickness occurrence probabilities gradually declines within 10 years after the return from *maternity leave*. Thereby, the effect size is ordered as the length of *maternity leave*; the longer the leave the higher the predictive margins. The leave category of 25-36 months leave shows especially high margins and also the distance to the next smaller leave category of 13-24 months is bigger than the ones between the other categories. The main addition in this model are the interaction effects between *maternity leave* duration, other control variables and time. When controlling for those interactions, it seems like selection is not the only driver of sickness occurrence in the longest leave group. On a more speculative note, we could explain the development of the sickness probabilities in the longest leave group over 10 years, linking this result with statistics from SVR (year), the longest leave group might show a higher number of (post-partum) depressions stimulating the longer *maternity leave* decision and causing longer recovery times and eventually relapses.

Other relevant selection mechanisms can be found in the *maternity leave* benefits and the post-leave employment conditions. The entitled benefit is supposed to support mothers' economic resources and proving beneficial for mothers' post-leave health outcomes, as also found in the literature (Bullinger, 2019; Ensminger & Juon, 2001; Hewitt et al., 2017; Morgenroth & Heilman, 2017). The monthly predicted probabilities of becoming sick for mothers being entitled to the parental allowance of the reform of 2007, which is higher and income-based calculated, are much lower than for mothers being only eligible for the means-tested benefit of 1992. Mothers in the high-income group show lower predicted probabilities of becoming sick for leaves up to 12 months but higher probabilities if the *maternity leave* exceeds one year compared to mothers earning less. This is confirmed by building typologies of mothers. Career-oriented women, for instance, have a high income and would have the highest economic loss when taking a leave under the conditions of the reform of 1992. Additionally, childcare amenities are easier accessible with higher income. And mothers without pre-conception sickness occurrence are probably of good health and decide on their leave duration without considering additionally needed recovery time to protect their own health. These results support the assumption of a positive effect of

economic benefits addressing the two mechanisms of *affordability* and *amortisation*, which both directly affect the selection into *maternity leave* durations. However, the income does not take the partner into account and the effect of income might be biased in the current analysis. The effect of the post-leave working conditions is demonstrated in the sensitivity analysis, in which especially the complex models were proven sensitive to changes in the employment condition variables emphasising their meaning for the probabilities of sickness occurrence. This is also shown in the literature (Benson et al., 2017); reduced working hours after a long *maternity leave* are associated with decreased mortality. The way of a return to the labour market seems to be relevant for mothers' post-leave health outcomes. On the other hand, this decision is not always up to the mothers' as reduced working hours cannot be utilised by everyone emphasising another argument for the relevance of selection in the *maternity leave*-mothers' health nexus.

Whilst the general trend shows increasing probabilities of sickness occurrence with longer *maternity leaves*, the differentiation of different typologies of women shows that this trend might differ between mothers. The experience of pre-conception sickness, for instance, causes generally higher and with the leave duration increasing probabilities of becoming sick. Similar results were also obtained by previous research (Guertzgen & Hank, 2018; McGovern et al., 1997). Nonetheless, other studies did not use as detailed data as in this paper, but the outcome variables were measured differently as well. Different results can be attributed to differences in accuracy and kind of measurement, for instance, objective or subjective health variables. For that reason, the selection effect in our study can be evaluated as even stronger since it refers to an objective measurement that only accounts for severe illness and not to minor sickness, for instance a flu. On the other hand, the sickness variable is not specific, which should always be considered when interpreting the effect of *maternity leave* durations on mothers' health, especially regarding the relevance of selection since this might affect the outcome differently when measuring for a different kind of illness. Estimating the association of *maternity leave* durations on different and less severe measures of health might lead to different results. In line with the data set's administrative purpose, only sickness incidents relevant for the calculation of old-age pensions are considered. This refers to sickness causing long-term inability to work. Even if the reason for the sick leave is unknown, it is certain that it is a serious one, which means that the association might even be underestimated. In other words, if we could have data also about less serious illness, we would probably find a stronger association. Referring to the report of the German expert council on the assessment of healthcare development (SVR) (2015), those serious sickness occurrences are mainly due to diseases of the musculoskeletal system and connective tissue, for instance carpal tunnel syndrome, (29.0 %) or psychological and behavioural disorders (23.1 %), such as depressions (SVR, 2015). This supports the assumption that many of the measured serious sickness occurrences are mental conditions, as indicated in the literature (Avendano et al., 2015; Benson et al., 2017; McGovern et al., 1997). Due to the lack of research on maternity leave-mothers' health association in countries with similar welfare amenities than Germany, a cross-national comparison with, for instance, Sweden or Denmark would elaborate on whether the selectivity

component is part of a generous *maternity leave* policy or unique in the case of Germany. Finally, to investigate the unique case of Germany to the fullest extent, the recent history of the reunification and the following cultural clash in terms of, for instance, family organisation should be included in an analysis. The differentiation might be beneficial to investigate differences in the perception of multiple role burdens, *maternal distress* and balancing motherhood and employment.

The present paper investigated the conditions of the length of *maternity leave* and its association with maternal health outcomes for first-time mothers in Germany. The study contributes an important insight: the relevance of the individual selection mechanism into leave durations. We show that the relationship of *maternity leave* durations and mothers' health in Germany is of a selective nature, which is emphasised by the effect of mothers' characteristics on the predicted probabilities of sickness occurrence differing across different maternity leave lengths. Mothers' characteristics are relevant in their maternity leave utilisation and therefore should be focused on in future policy reforms on *maternity leave* in Germany. The used objective health measurement takes only serious sickness into account, which might even lead to an underestimation of the health outcomes. The exclusive consideration of serious sickness causing incapacity for work leads to the assumption that less serious incidents could have preceded these. The relevance of this topic has also lately been emphasised by the EU directive on work-life-balance and the mandatory paternity leave (European Commission, 2017). To reach a just and equal maternal (health) protection for mothers, policies should focus on the selection component to improve mothers' health protection in the association with *maternity leave* durations working towards a selection into leave durations focusing on individual reconciliation. Our study elaborates on the *maternity leave*-mothers' health relationship in the very unique setting of Germany. Focusing on the policy context, the *maternity leave* entitlements are generous in a very high welfare context. Future research in similar welfare context, such as Sweden or Denmark, might show how *maternity leave* and mothers' health are related in cultures with less predominant traditional gender roles. Also, the investigation of less serious sickness incidents in the German context might give a more detailed picture on the selection component in the *maternity leave*-mothers' health nexus. Also, including household and partner information in the analysis could clarify the selection mechanisms and considerations of mothers.

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