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The Impact of Child and Maternal Health Indicators on Female Labor Force Participation After Childbirth – Evidence for Germany

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The Impact of Child and Maternal Health Indicators on Female Labor Force Participation After Childbirth

– Evidence for Germany –

Annalena Dunkelberg *

C. Katharina Spiess **

Abstract

This paper analyzes the influence of children's health and mothers' physical and mental well-being on female labor force participation after childbirth in Germany. Our analysis uses data from the German Socio-Economic Panel (SOEP) study, which enables us to measure children's health based on the occurrence of severe health problems including mental and physical disabilities, hospitalizations, and preterm births. Since child health is measured at a very young age, we can rule out any of the reverse effects of maternal employment on child health identified in US studies. Within a two-year time period, we investigate the influence of these indicators on various aspects of female labor force participation after childbirth, including continuous labor force participation in the year of childbirth and the transition to employment in the year following childbirth. Since the majority of women in Germany do not go back to work within a year after childbirth, we also investigate their intention to return to work, and the preferred number of working hours. We find that the child's severe health problems have a significant negative effect on the mothers' labor force participation and a significant positive effect on her preferred number of working hours, but that hospitalizations or preterm births have no significant effect. For the mothers' own health, we find a significant negative effect of poor mental and physical wellbeing on female labor force participation within a year of childbirth. To our knowledge, this is the first empirical study of this kind on data outside the US.

Keywords: female labour supply, childhealth, well-being

JEL classification: J22, J23, I 19

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1   Introduction*

In the last few decades, the labor force participation of mothers with young children has in-creased dramatically. While this trend has been seen among German mothers as well, the situation here is unique in two respects. First, the labor force participation of German mothers with very young children is relatively low in comparison to other Western European countries (see, e.g., OECD 2006). Second, it has remained virtually unchanged over the last 20 years: in West Germany, the percentage of mothers with children under the age of three active on the labor market, for example, has remained below 30% from 1985 to 2003 (Federal Ministry for Family, Seniors, Women and Youth, 2005)[1]. Today, it is more important than ever to identify the obstacles hindering these women from working. Policy-related explanations have sought to identify the roots of the problem in Germany's welfare state: in the strict maternity leave regulations, lack of child care options, and inflexible working hours (for an overview of the policy framework, see, e.g., Gornick and Meyers 2003). Nevertheless, individual factors such as poor health can present obstacles as well (Wolfe and Hill, 1995): on the one hand, poor maternal health can lead to higher physical and mental health risks at childbirth and increased stress in everyday life due to childcare, and on the other, poor health of the child can create increased demands regarding childcare. On average, the caregiving burden for children with health problems is higher, and these mothers can thus be expected to show a higher preference for staying home to care for the sick child. Apart from this direct effect, we might also expect to find indirect effects due to the lower availability and higher costs of daycare for unhealthy children (Brandon, 2000), also resulting in additional time costs (Leonard, Brust, and Sapi-enza, 1992), all of which may produce a negative impact on mothers' labor force participa-tion.

Apart from this, the subject of child health and its influence on female labor force participa-tion after childbirth is of growing importance due to the significant increase in child health problems in Germany—as in other countries—over recent decades (Kuhltau and Perrin,

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[1] Although the labour force participation among mothers in East Germany is substantially higher in general than among mothers in West Germany, this is not the case for mothers with very young children, whose labour force participation was just above 30% in 2003. This rate was much higher in the early nineties, however, and has decreased sharply in the last 20 years (see Bundesministerium für Familie, Senioren, Frauen und Jugend, 2005).

2001). One reason for this increase is actually rooted in the progress achieved in medical and pharmaceutical research, which has led to increased survival rates of infants with chronic diseases and congenital disabilities and babies born prematurely (Brandon and Hogan, 2001). To give an example, between 1960 and 2000, the mortality rate of infants in Western Germany decreased from 3.38 percent to 0.44 percent (Statistisches Bundesamt, 2001). Furthermore, asthma—the most common chronic disease in children—has more than doubled since 1990 in Western Germany (Hermann-Kunz, 2000). A further crucial aspect in the context of health indicators and their effect on maternal labor force participation is the fact that, in the long run, such a connection can lead to the persistence of a low socio-economic status from one generation to the next. Hogan, Rogers and Msall (2000) found, for example, that in the US, children with health problems more often come from poor or welfare-dependent families. Brandon and Hogan (2001) also found that the existence of health problems in both mothers and children has a negative effect on these women's ability to get off welfare. In Germany, however, the only empirical study done on this topic so far was unable to establish a connection between poverty and child health outcomes, except in the case of preterm births (Tamm, 2005).

The results for the US show that the reverse effect of labor on health might also play an important role, since lower household income due to decreased maternal labor market participation could lead to decreased investments in the family members' health, and thus, poorer health outcomes. This effect probably applies more to countries such as the US that lack universal health care coverage, however. The German health care system can therefore be expected to produce weaker or even non-existent effects, which may indeed explain the insignificant effects found in the study by Tamm (2005). According to the Survey of Income and Living Conditions (SILC), however, in 2005, about 22 percent of those respondents living close to the poverty line in Germany said their reasons for having not gone to the doctor when they needed to were financial in nature. Only seven percent those *not* living close to the poverty line stated financial reasons for not going to the doctor (Statistisches Bundesamt, 2006).

Other US studies, however, suggest a negative influence of women's high labor market participation on their children's health (e.g., Blau, Guilkey, and Popkin, 1996). Furthermore, Ruhm, 2000, found that a longer maternity leave has a positive influence on the child's health. He argues that working a large number of hours runs counter to the interests of the child and his or her development, and may even lead to health problems, due primarily to the decreased

amount of time left for these mothers to spend with their children. These various effects reveal some of the ambiguities in the relationship between child and maternal health and female labor market participation after childbirth. From a methodological point of view, these various effects can be described by the phenomenon of reverse causality, which constitutes a major issue in the research on female labor force participation and child health.

In this paper, we investigate the impact of child and maternal health problems on maternal labor force participation in Germany. Given Germany's universal health care coverage, our study applies to the specific context of a welfare state—a context in which the effects of (limited) financial resources on child health are clearly reduced. Child health in our study is measured shortly after childbirth, allowing us to reduce the problems of reverse causality since we can assume that maternal labor force participation has no effect on the newborn's health in the period immediately following childbirth.

The paper is structured as follows. We first give a brief overview of the previous research on child and maternal health indicators and their effects on maternal labor market outcomes. We focus on studies that are comparable with ours: empirical studies based on representative data sets. Then we describe our data set and the methodological approach in more detail. Finally, we present and discuss our results, and end by drawing conclusions.

2   Previous Research

There has been relatively little empirical research to date on the effects of child health on maternal labor market outcomes using large micro-datasets. The few existing studies of which we are aware are based exclusively on US data, and these have consistently found negative effects of child health on maternal labor force participation. Their results differ, however, depending on the group in question: for wives and female household heads the effects of child health have been found to be of differing magnitudes. The results for the effect on working hours are also somewhat inconclusive concerning the significance of the effect.

Some of the first studies of the influence of child health on the maternal labor supply were those by Salkever (Salkever 1980, 1982a, 1982b and 1990). In the last two of these, Salkever used the Survey of Income and Education (SIE) and found significant negative effects of child health on the probability of both wives and female household heads working, but no effects on their number of working hours. These results suggest that it is mainly the *decision* to work that is affected by children's health problems, but not the *number* of working hours. Norberg (1998), whose study was based on similar child health data to ours (see chapter 3.2)—namely, low birth weight, prolonged hospitalization after birth, and disabilities—investigated the influence on the mother's re-entry to the labor force up to five years after childbirth. On the basis of the NLSY (National Longitudinal Survey of Youth) of 1994, she found a significant negative effect of child health problems, as well as of the mother's own poor state of health, on the time of re-entry to the labor force.

A number of more elaborate studies concerning the influence of the child's health on the mother's labor supply have been conducted by Powers (Powers, 1999, 2001 and 2003), in all of which she controls for possible endogeneity of the health variables. This endogeneity problem can occur because measurement errors in health variables might be correlated with the working behavior of mothers. For example, working mothers might report a better health status than non-working mothers in order to justify either why they are working or why they are not. In her third study (Powers, 2003), Powers uses the Survey of Income and Program Participation (SIPP) from 1992 and 1993 to implement models of dynamic labor market outcomes—such as the transition from not working to working—that are less prone to endogeneity issues. In these studies, she finds some support for endogeneity, mainly for wives: in the

dynamic models the effects are smaller, and for wives the effects are no longer significant. She fails to find a significant effect on working hours for wives in all model specifications, suggesting that—at least for wives—the child's disability affects mainly the probability of working but not the number of hours. For female household heads, the effects on the probability of working and on working hours remain significant in all model specifications and are always larger than for wives. Again, she also finds a negative effect regarding the mothers' own poor state of health on their involvement in the labor force.

Another recent study is that of Corman, Reichman and Noonan (2004) based on the "Fragile Families and Child Wellbeing Study" covering the years 1998 to 2002. They, too, control for possible endogeneity of the child health variable. They investigate the influence of child health at a very young age (12 to 18 months) and use similar indicators of poor health to the ones we use: low birthweight, the existence of a severe disability and a variable indicating whether the child crawls yet at the age of one. Using the number of adoption agencies in town and the existence of a neonatal intensive care unit in the hospital where the child was born as instruments for the health variable, they do not find support for endogeneity of the health variable. Concerning maternal work behavior, they find significant negative effects of a child's disability on the probability of the mother working, as well as on the number of working hours for both wives and female household heads. Here again, the effects for female heads are stronger.

The study by Wolfe and Hill (1995), based on the 1994 SIPP, investigates the influence of child and maternal health indicators on different labor market outcomes of female household heads. They find a significant negative effect of mothers' poor health on their market wages, as well as a significant negative effect of problems with activities of daily living (ADL's) on maternal labor force participation. They also find a significant negative effect of children's health problems.

Summarizing the results of these studies, one can say that the more recent studies have generally found stronger effects of health problems for female household heads than for wives, inconsistent results for working hours regarding the degree of statistical significance, and no definite support for the issue of endogeneity of the health variables. The negative effects on the probability of working are always significant, however, and seem to be robust for both wives and female household heads.

3   Data, Method and Measures

3.1   Sample and estimation method

The data used for this study come from the German Socio-Economic Panel (SOEP), a panel study that has been running for 22 years in Germany[2]. The SOEP is a representative sample of private households living in Germany. It provides information on all household members above the age of 16. Since 2003, an additional questionnaire providing detailed information on health issues of newborns and their mothers has been included. The sample underlying our analyses consists of mothers of newborns from the 2003 to 2005 waves, resulting in a pooled sample of 797 observations. Mothers of twins are only counted once, with the characteristics of one or the other twin therefore being chosen randomly. For the 554 mothers who gave birth to a child in the year 2003 or 2004, we also had information on their working behavior in the year following childbirth. For the remaining mothers—those who gave birth in 2005—we had no information from the following wave at the time of our calculations.

In a first set of model specifications, we estimated the probability of a mother working in the year she gave birth. These estimations are based on our entire sample of mothers. A second set of models based on the sample of mothers who gave birth to a child in the year 2003 or 2004 and were not working in the year they gave birth estimates the probability that a mother starts working in the year following childbirth. Both sets of estimations use standard maximum likelihood estimations to estimate a Probit model (Greene, 2003).

Based on the sample of mothers not working in the year of childbirth, a third and fourth set of models was calculated. We estimate the probability of the intention to work in the future and the preferred number of working hours (see chapter 3.2). Both preferences are covered as categorical variables. Under a given normality of the error term, categorical variables can be analyzed using Ordered Probit models, and under specific assumptions, consistent estimates can be made using standard maximum likelihood methods (Greene, 2003). We use these estimation procedures to learn more about the intention to work. In the analyses presented, the marginal effects are calculated in each case for the probability of the highest category (intention to work "definitely yes" and preferred amount of work "full time job", respectively).

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[2] See Schupp and Wagner (2002) and http://www.diw.de/soep for more information on the SOEP.

3.2   Variables

The dependent variables in our models are dummy variables in the first two sets of models indicating whether a mother is working in the year she gave birth or whether she started to work in the year after childbirth. In our sample, the majority of mothers—namely, 86 percent—are not working in the year of childbirth. Thus in the year of childbirth, only the remaining 14 percent of the observed mothers are in the labor force, working 21.6 hours a week on average. 22 percent of the mothers not working in the year of childbirth made the transition to employment in the following year. The dependent variables in our third and fourth sets of models indicate the intention to work in the future. The two dependent variables of interest are categorical variables. The intention to work is measured on a four-category scale from "definitely no" to "definitely yes". The preferred amount of work is measured by the categories "not interested in working", "interested in a part-time job" or "interested in a full-time job". About 53 percent of the mothers not working in the year of childbirth report that they definitely intend to work in the near future, while only about 12 percent report that they definitely do not intend to work. Regarding the intended amount of work, about 17 percent of the mothers not working in the year of childbirth would prefer a full-time job in the near future, while about 60 percent would prefer a part-time job.

The independent variables of primary interest are the child's health and the mother's health indicators. We use the following child health indicators: (1) The existence of developmental dysfunctions or delays, disabilities or chronic conditions at the time of the interview, which took place in the first year of a child's life. In our sample, 7 percent of the observed infants are affected by such severe impairments. In the following, we refer to these children as disabled. (2) Whether there was at least one hospitalization within the first three months after childbirth, which was the case for 13 percent of the children in our sample. (3) Whether the child was identified as a preterm birth[3], which was the case for 14 percent of the children in our sample. Since premature infants more often require further hospitalization, our data suggest a connection between preterm births and poor child health outcomes (significant on the 5 percent confidence level). It is assumed that hospitalizations and preterm births are reliable objective indicators for the child's health, as well as the existence of disabilities, since the mothers should rely on the doctor's diagnosis when reporting whether their child had a dis-

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[3] In Germany preterm birth is defined as birth before the end of the 37th week of pregnancy or birthweight of less than 2,500 gramms.

ability. This is a very plausible assumption, as the German health system offers preventive medical check-ups for very young children on a regular basis starting at birth. These statutory check-ups are free of charge and their results are documented in a medical record booklet that is kept by the family. Almost 98 percent of all mothers in our sample reported that they or their child had made these check-ups. We therefore assume that, at least for the child's health indicators, potential problems of endogeneity in the health variables can be ruled out in the present study. The fact that a mother's report of her child's health could indeed be endogeneous with respect to maternal characteristics has been observed by Angel and Worobey (1988), among other authors. They found that single mothers reported a poorer general physical health of their children than mothers in intact marriages, whereas a mother's overall depression score was one of the most important determinants of a child's reported health. All health indicators in our study refer to the first year of a child's life. Therefore, we argue that the problem of reverse causality should not be any significant problem in our study, since we are able to observe indicators for a child's health around the time of birth, and investigate the influence of these indicators on maternal work behavior in the following two years. This is one advantage of the data we use over other studies on this subject.

As mother's health indicators, we use self-reported physical as well as mental wellbeing at the time of birth, which are sum scores consisting of the wellbeing in the last three months before childbirth and the well-being in the three months after childbirth. Four categories range from "very good" to "very poor" in each case, resulting in two sum score variables with seven categories. We treat these variables as continuous variables. In our sample, 10 percent of the mothers report relatively low (three lowest categories) physical mental wellbeing, while 7 percent report relatively low (three lowest categories) mental wellbeing.

The other control variables we use cover the standard range of other socio-demographic and socio-economic variables used in labor supply models for women with children (for an overview, see, e.g., Killingsworth and Heckman, 1986). A key variable in such labor market models is the potential wage a mother could earn on the labor market. We use the hourly wage of a mother in the year of childbirth and impute wages for mothers not working during this year, or for those where wage information is missing. The wage estimation is implemented on the basis of all women between 17 and 45 years in the specific year. The imputation is made using a two-step Heckman selection model (Heckman, 1979) with age (also squared), work experience (also squared), years of education, the highest professional degree, living in East-

ern Germany, and living in a large city as explanatory variables in the wage equation. Additionally, the number of children under the age of 16 living in the household, having at least one child under the age of three, additional household income, the presence of a person in need of care in the household, the regional unemployment rate[4], and the mother's general state of health enter into the participation equation as exclusion variables[5].

The following variables enter the models on maternal working behavior in addition to the mother's wage: a dummy variable indicates if a mother was working in the year preceding childbirth. In addition to mother's age, education and nationality, we control for the living arrangement of the mother, namely whether she has a partner living in the same household. In this case, substitution possibilities exist with respect to child care. The sample size is too small to conduct separate analyses for wives and female household heads. We control for the age of the newborn child, the number of children under the age of 16, and the existence of another child under the age of 3, as child care for younger children is more time-intensive than for older children. The set of independent variables also covers exogenous household income. Since women in Eastern Germany still show higher labor market participation than their counterparts in West Germany, and since the provision of publicly financed day care is also much higher in the East (especially for children below the age of three), we control for this regional difference although we cannot distinguish between the effect of day care supply and that of labor market attachment. Furthermore, day care provision is higher in bigger cities. This is captured by a variable controlling for the size of the city where the mother lives. Using a pooled sample, we also control for the calendar year in which the mother gave birth.

With this set of dependent and independent variables, we estimated a total of 20 different models. The models differ in the sets of dependent variables used due to collinearity problems using the restricted sample of mothers not working in the year of childbirth.

Summary statistics of all variables included in the models are provided in the appendix in Table A1.

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[4] Regional data at the county level can be provided upon request on the premises of DIW Berlin.

[5] The results of these estimations can be provided by the authors upon request.

4   Results

The results of our estimations are summarized in the following in Tables 1 and 2. We present the effects for the independent variables of primary interest only. Tables 3 to 6 present the entire estimations for selected models, namely the models that include the information on a child's disability as a health indicator. As it turned out, this is indeed the most powerful health indicator (see below)[6]. Table 1 summarizes the effects of child health indicators on maternal labor force participation. The first model, which estimates the probability of a mother working in the same year she gave birth, shows a statistically significant effect of the child's severe health problems on this probability. Mothers whose child has a severe health problem have almost 6 percentage point lower probability of working than mothers with healthy children. The other health indicators show no statistically significant effect. The probability that a mother will start working in the year after childbirth is not significantly correlated with any of the child health indicators in our models. The same is true for the model with intention to work as a dependent variable. However, the preferred working time is statistically influenced by a child's severe health problems: mothers whose children have severe health problems have a 15 percentage point higher probability of preferring full-time work. This effect might indicate that mothers with a disabled child perceive their child's disability as an obstacle to work during the child's infancy, but thereafter want to work even more than the reference group. One explanation for this might be that they think they have to catch up for their time out of the labor force. Overall, the various models show that the indicator of severe health problems is the most powerful indicator for child health with respect to the mother's work behavior. Concerning hospitalizations and preterm births, the results suggest that these indicators measure only temporary health constraints that do not influence the mother's work behavior in the first years of a child's life.

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[6] In these models, the mother's health is covered by a general health variable, namely the general health status measured on a five-category scale.

Table 1:
Statistical significance of the effects of child's health indicators for the different model specifications

Dependent variable	Independent variables (marginal effects)		
	Severe health problems (disabled child)	Preterm birth	Hospitalization
Working in year of birth	-0.057** (N=618)	0.004 (N=607)	-0.046 (N=610)
Transition to work in year after birth	-0.026 (N=311)	-0.159 (N=305)	-0.076 (N=306)
Intention to work	0.114 (N=561)	-0.092 (N=551)	-0.045 (N=552)
Preferred amount of work	0.182*** (N=583)	-0.014 (N=573)	0.032 (N=573)

Notes: *** - 1%, ** - 5%, * - 10% confidence level.

Source: SOEP 2003-2005, authors' calculations.

Regarding the effects of the mother's own state of health (poor physical and mental wellbeing) on their work behavior, the results are summarized in Table 2.

Table 2:
Statistical significance of the effects of maternal health indicators for the different model specifications

Dependent variable	Independent variables (marginal effects)	
	Physical well-being	Mental well-being
Working in year of birth	-0.015** (N=614)	-0.019** (N=614)
Transition to work in year after birth	0.025 (N=309)	0.017 (N=309)
Intention to work	0.021 (N=556)	-0.007 (N=556)
Preferred amount of work	0.004 (N=578)	-0.003 (N=578)

Notes: *** - 1%, ** - 5%, * - 10% confidence level.

Source: SOEP 2003-2005, authors' calculations.

The probability of working in the year of childbirth is statistically influenced by the physical and mental wellbeing of the mother. The better her wellbeing is, the higher her probability of working in the year of childbirth. The mother's general health status, which functions as a control variable in the models with child health indicators, does not have any statistically

significant effect. It has to be mentioned here that the negative effects of the mother's wellbeing on her probability of working could be prone to endogeneity. This would also be the case if mothers reported better wellbeing to justify working or worse wellbeing to justify not working.

Regarding the effects of the other independent variables (see Tables 3 to 6), with only one exception we found no unexpected results that contradict other studies on mothers' work behavior. As expected, the actual or potential wage has a positive effect on the probability of working, as does maternal employment preceding the year of childbirth. Exogenous household income has a negative effect on the probability of working. Concerning non-working mothers' intention to work and their preferred working time, the number of children has a statistically negative effect, while East German mothers have a higher intention to work. Having many children seems to be the one indicator that keeps mothers from participating in the labor force.

Furthermore, we found a statistically significant positive effect of the partner living in the same household, which indicates that partners may facilitate maternal employment by helping with child care. Concerning the mother's level of education, our finding that mothers with a university degree stay at home in the child's first year more often seems counterintuitive; we had expected that education would have a positive effect on maternal work behavior. One explanation for this might be that highly educated mothers are more concerned about the child's wellbeing (Ruhm, 2000) and therefore decide to stay at home. We also found the expected positive effect of the child's age in months, and the expected negative effect of having another child under the age of three years living in the household. The mother's age has no statistically significant effect. This result appears plausible given that the relatively low variance in age among mothers with very young children: about 90 percent of these mothers are between 24 and 38 years of age.

Table 3:
Probability of working in the year of birth, Probit model (marginal effects), health indicator: child's disability

Variable	Coefficient	marginal Effect	z-value
Child disabled	-0.87**	-0.057	-1.96
Mother's state of health	0.10	0.011	0.87
Not working in year preceding birth	-1.24***	-0.130	-5.00
Log. hourly wage	1.76***	0.215	5.57
No professional degree	-0.85*	-0.067	-1.67
University degree	-0.67***	-0.062	-2.90
Age of mother	-0.04*	-0.005	-1.87
Other hosuehold income (in 1,000 Euro)	0.11*	0.014	1.76
Living in East Germany	0.33	0.046	1.57
Living in a big city	-0.13	-0.016	-0.84
non-German nationality	-0.20	-0.022	-0.71
Partner living in household	-0.02	-0.003	-0.07
Number of children	0.03	0.003	0.24
Another child under age 3	-0.01	-0.006	-0.14
Child's age (in months)	0.09***	0.012	4.24
Year of birth 2004	-0.28	-0.032	-1.54
Year of birth 2005	-0.10	-0.012	-0.48

Notes: N=618, *** - 1%-, ** - 5%-, * - 10%-confidence level.

Source: SOEP 2003-2005, own calculations.

Table 4:
Probability of transition to work in the year following birth, Probit model (marginal effects), health indicator: child's disability

Variable	Coefficient	marginal Effect	z-value
Child disabled	-0.12	-0.013	-0.14
Mother's state of health	0.21	0.006	1.07
Not working in year preceding birth	-0.87***	-0.204	-3.99
Log. hourly wage	0.41	0.099	1.43
No professional degree	-1.04***	-0.177	-2.67
University degree	0.19	0.048	0.77
Other household income (in 1,000 Euro)	0.04	0.011	0.56
Living in East Germany	0.63***	0.178	2.81
Living in a big city	0.09	0.227	0.51
non-German nationality	0.05	0.022	0.5
Partner living in HH	0.71	0.014	0.21
Number of children	0.07*	0.122	1.67
Another child under age 3	-0.80	0.017	0.61
Child's age (in months)	0.02*	-0.130	-1.65
Year of birth 2004	-0.27*	0.049	1.85

Notes: N=309, *** - 1%, ** - 5%, * - 10% confidence level. Due to the small sample size not the entire set of covariates could be used as in the model presented in table 4. - Source: SOEP 2003-2005, authors' calculations.

Table 5:
Probability of working in the future "definitely yes", Ordered Probit Model (marginal effects), health indicator: child's disability

Variable	Coefficient	marginal Effect	z-value
Child disables	0.30	0.103	1.15
Mother's state of health	-0.08	-0.029	-1.04
Not working in year preceding birth	-0.50***	-0.198	-4.5
Log. hourly wage	0.47**	0.189	2.12
University degree	0.26	0.100	1.42
Other household income (in 1,000 Euro)	-0.11*	-0.044	-1.89
Living in Eastern Germany	0.77***	0.285	5.36
Number of children	-0.31***	-0.121	-5.39
Another child under age 3	0.24	0.095	1.26
Child's age (in months)	0.03**	0.013	2.4
Year of birth 2004	0.22*	0.086	1.8
Year of birth 2005	0.21*	0.083	1.67

Notes: N=561, *** - 1%, ** - 5%, * - 10% confidence level. Due to the small sample size not the entire set of covariates could be used as in the model presented in table 4. - Source: SOEP 2003-2005, authors' calculations.

Table 6:

Probability to prefer a "full-time job" in the future, Ordered Probit Model (marginal effects), health indicator: child's disability

Variable	Coefficient	marginal Effect	z-value
Child disabled	0.59***	0.182	2.72
Mother's state of health	-0.03	-0.006	-0.38
Not working in year preceding birth	0.13	0.030	1.14
Log. hourly wage	0.18	0.042	0.92
University degree	0.03	0.007	0.18
Other household income (in 1,000 Euro)	-0.19***	-0.045	-3.58
Living in Eastern Germany	0.52***	0.139	4.11
Number of children	-0.25***	-0.060	-4.44
Another child under age 3	0.28	0.079	1.54
Child's age (in months)	0.02*	0.005	1.7
Year of birth 2004	0.15	0.036	1.23
Year of birth 2005	0.17	0.040	1.37

Notes: N=583, *** - 1%, ** - 5%, * - 10% confidence level. Due to the small sample size not the entire set of covariates could be used as in the model presented in Table 4.

Source: SOEP 2003-2005, authors' calculations.

5   Conclusions

This study has investigated the influence of child and maternal health indicators on several outcomes of female labor market behavior after childbirth. We have focused almost exclusively on child and maternal health indicators at the time of the child's birth: for children, these include the existence of severe health problems such as disabilities, developmental dysfunctions, chronic conditions, hospitalizations, and preterm birth, and for mothers, poor physical and mental well-being at the time of childbirth. The impact of these indicators on maternal work behavior is investigated within the two years following childbirth using the labor force participation in the year of childbirth and the transition to work in the following year as dependent variables. Since the majority of mothers do not work in the year of childbirth, we also investigated the intention of non-working mothers to return to work in the future and their preferred number of working hours. Our analyses are based on the SOEP, a representative panel data set for Germany. To our knowledge, this study is the first to investigate the relationship between child and maternal health indicators on female labor force participation after childbirth based on a representative micro-dataset in a country other than the US. This research question enables us to obtain important insights into the question of whether a different political setting—namely, that of the German welfare state—leads to significantly different results. This question is of particular interest in our context, given the stark differences between health care in the US and the German health care system, which provides universal coverage including preventative health care check-ups for children starting at birth. Given this research context, our study can help policy-makers to reduce problems of reverse causality and endogeneity with respect to child health, and can offer important insights from a methodological viewpoint as well. Furthermore, our restriction to the child's health status around the time of birth could further diminish the problems of reverse causality.

We find significant effects concerning children's severe health problems, but fail to find any significant effects for hospitalizations or preterm births. On the one hand, these results might indicate that hospitalizations or preterm births merely constitute temporary health issues that do not affect maternal work behavior in the longer term of the first two years after childbirth. On the other hand, our analysis is restricted to short-term effects, and does not cover the long-term effects of these health indicators. However, a child's severe health problems significantly decrease the mother's labor force participation in the year of childbirth. Another interesting

effect is that the child's bad health also increases the probability that the mother prefers full-time work in the near future. These results indicate that a child's severe health problems constitute an obstacle to maternal employment in the year of childbirth. It might be that taking care of a disabled child is perceived by mothers as more stressful than taking care of a healthy child, and mothers therefore hope to "escape'" the emotional strain through full-time work. Regarding the mother's own state of health, we found physical and mental wellbeing to have an effect, but were unable to rule out a possible endogeneity issue here.

From a policy point of view, the results indicate the importance of providing support for mothers with very young children who want or need to work for financial reasons. On the one hand, these mothers need support in coping with their own health problems. On the other hand, they need affordable, high-quality child-care options for children with disabilities. These conclusions are underlined by Engelbert's (1989) findings that in Germany, children with health problems are cared for mainly within the family, and in fact, mainly by mothers themselves. Also, more flexible work arrangements enabling mothers to work from home would help those with disabled children to participate to some degree in the labor force.

With respect to future research, further analyses based on more waves of the SOEP would be useful to verify these results based on a larger sample size. This would allow us to differentiate our estimations between mothers living with their partners and single mothers. Given the results of US studies, this differentiation seems important. Another open question is how the child's health influences the mother's working behavior in the long run, a question that we can begin to answer as further waves of the SOEP become available. Since some health problems such as learning and speech disorders can only be identified in older children, the influence of these health problems on the maternal labor supply should be investigated in mothers with older children. However, it should be kept in mind that the problem of reverse causality increases in importance the later in life health status is observed.

Appendix

Table A-1:
Descriptive statistics of independent variables, N=797

	Mean	Std.dev.
Health Indicators		
Severe impairment (%)	6.82	
Hospitalization (%)	12.07	
Preterm birth (%)	13.85	
Physical wellbeing within 3 months before birth (%)		
Very good	25.5	
Good	54.57	
Poor	16.76	
Very poor	3.17	
Physical wellbeing within 3 months after birth (%)		
Very good	20.88	
Good	60.62	
Poor	16.07	
Very poor	2.42	
Mental wellbeing within 3 months before birth (%)		
Very good	30.8	
Good	55.49	
Poor	11.17	
Very poor	2.54	
Mental wellbeing within 3 months after birth (%)		
Very good	24.49	
Good	59.47	
Poor	13.81	
Very poor	2.24	

Table A-1 continued

	Mean	Std.dev.
Other variables		
Not working in year preceding birth (%)	36.6	
Log. Hourly wage (gross wage, imputed)	12.07	7.43
Highest professional degree (%)		
University degree	23.32	
Other professional degree	59.89	
No professional degree	17.04	
Mother's age (year)	31.15	5.57
Monthly net household income (€)	2,286	978
Living in Eastern Germany (%)	21.65	
Living region (%)		
Big city	55.84	
Small city	31.83	
Rural region	12.32	
Non German nationality (%)	13.96	
Partner living in household (%)	91.04	
Number of children	1.75	0.87
Other child under age 3 in household	9.09	
Child's age in year of birth (months)	7.15	3.88
Child's age in year following birth (months)	19.42	4.28
Mothers' state of health (%)		
Very good	13.70	
Good	65.07	
Satisfactory	17.74	
Poor	3.38	
Bad	0.12	
Year of birth (%)		
2003	39.01	
2004	29.82	
2005	31.17	

Source: SOEP 2003-2005, authors' calculations.

References

Angel, R. and Worobey, J.L. (1988): Single Motherhood and Children's Health, in: Journal of Health and Social Behavior (29, 1: 38-52).

Blau, D.M., Guilkey, D.K., and Popkin, B.M. (1996): Infant Health and the Labor Supply of Mothers, in: Journal of Human Resources (31,1: 90-139).

Brandon, P. D. (2000): Child Care Uitilization among Working Mothers Raising Children with Disabilities, in: Journal of Family and Economic Issues (21,4: 343-364).

Brandon, P. D. and Hogan, D. P. (2001): The Effects of Children with Disabilities on Mothers' Exit from Welfare, Paper prepared for the research Institute "The Hard-to-Employ and Welfare Reform".

Bundesministerium für Familie, Senioren, Frauen und Jugend und Hans-Böckler-Stiftung, (2005): Erosion des männlichen Ernährermodells? Die Erwerbstätigkeit von Frauen mit Kindern unter drei Jahren, Berlin.

Corman, H., Reichman, N. E. and Noonan, K. (2004): Mothers' Labor Supply in Fragile Families: The Role of Child Health, in: National Poverty Center Working Paper, University of Michigan.

Engelbert, A. (1989): Behindertes Kind - Gefährdete Familien? Eine kritische Analyse des Forschungsbestandes, in: Heilppädagogische Forschung (15: 104-111).

Gornick, J.C. and Meyers, M.K. (2003): Families that Work: Policies for Reconciling Parenthood and Employment, New York.

Greene, W. H. (2003): Econometric Analysis, Prentice-Hall, New Jersey.

Heckman, J. (1979): Sample Selection Bias as a Specification Error, in: Econometrica (47,1: 153-161).

Herrmann-Kunz, E. (2000): Allergische Erkrankungen in Deutschland - Ergebnisse einer repräsentativen Studie, in: Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz (43: 400-406).

Hogan, D. P., Rogers, M. L., and Msall, M. E. (2000): Functional Limitations and Key Indicators of Well-Being in Children with Disabilities, in: Archives of Pediatrics and Adolescent Medicine (154: 1042-1048).

Norberg, K. (1998): The Effects of Daycare Reconsidered, NBER Working Paper 6769.

Killingsworth, M. R. and Heckman, J. (1986): Female Labor Supply: A Survey, in: Ashenfelter, O. und Layard, R.:Handbook of Labor Economics Elsevier Science Publishers.

Kuhltau, A. K. and Perrin, J. M. (2001): Child Health Status and Parental Employment, in: Archive of Pediatric Adolescent Medicine (155: 1346-1350).

Leonard, B., Brust, J. D., and Sapienza, J. J. (1992): Financial and Time Costs to Parents of Severely Disabled Children, in: Public Health Reports (107,3: 302-312).

OECD (2006): Starting Strong II. Early Childhood Education and Care, Paris.

Powers, E. T. (2003): Children's Health and Maternal Work Activity: Static and Dynamic Estimates under Alternative Disability Definitions, in: Journal of Human Resources (38,3).

Powers, E. T. (2001): New Estimates of the Impact of Child Disability on Maternal Employment, in: American Economic Review Papers and Proceedings (91,2: 135-139).

Powers, E. T. (1999): Child Disability and Maternal Labor Force Participation: Evidence from the 1992 School Enrollment Supplement to the Current Population Survey, Institute of Government and Public Affairs Working Paper, University of Illinois.

Ruhm, C. J. (2000): Parental Leave and Child Health, in: Journal of Health Economics (19,6: 931-960).

Salkever, D. S. (1990): Child Health Problems and Other Determinants of Single Mothers' Labor Supply and Earnings, in: Sivageldin, I., Sorkin, A. und Frank, R., Eds.: Research in Human Capital and Development, JAI Press, London.

Salkever, D. S. (1985): Parental Opportunity Costs and Other Economic Costs of Children's Disabling Conditions, in: Hobbs, N. und Perrin, J.M., Eds.: Issues in the Care of Children with Chronic Illness, Jossey-Bass Publishers, San Francisco.

Salkever, D. S. (1982a): Children's Health Problems and Maternal Work Status, in: Journal of Human Resources (17, 1: 94-109).

Salkever, D. S. (1982b): Children's Health Problems: Implications for Parental Labor Supply and Earnings, in: Economic Aspects of Health (17, 1: 221-251).

Salkever, D. S. (1980): Effects of Children's Health on Maternal Hours of Work: A Preliminary Analysis, in: Southern Economic Journal (57: 156-166).

Statistisches Bundesamt (2006): Armut und Lebensbedingungen, Ergebnisse aus Leben in Europa für Deutschland 2005.

Statistisches Bundesamt (2001): Fachserie 1, Reihe 1.

Tamm, M. (2005): The Effect of Poverty on the Health of Newborn Children, Evidence from Germany, RWI-Discussion Papers, Number 33.

Wolfe, B. L. and Hill, S. C. (1995): The Effect of Health on the Work Effort of Single Mothers, in: Journal of Human Resources (30, 1: 41-62).