Maternal Employment, Life Satisfaction, and Child Developmental Outcomes

Econometric Analyses Based on the German Socio-Economic Panel Study (SOEP)

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Chapter 1

Introduction

1.1 Motivation

In most Western countries, women and, in particular, mothers have increased their participation in the labor market over the last decades. Maternal employment is an important topic, not just in economic research, but also in the public debate, because of its consequences for individual life as well as for the economy as a whole. At the same time, questions about children's early development, its determinants and long-term consequences are increasingly dominating research and public discourse. Family policy measures, both for supporting working parents and for improving early education and care, are vigorously debated. The implementation of a wage-dependent parental leave benefit and the decision to gradually increase child care provision are the most prominent examples of policy reforms in Germany in the last years.[1]

[1] See the German laws *Gesetz zum qualitätsorientierten und bedarfsgerechten Ausbau der Tagesbetreuung für Kinder (Tagesbetreuungsausbaugesetz—TAG)* of 2004, the *Gesetz zum Elterngeld und zur Elternzeit (Bundeselterngeld- und Elternzeitgesetz—BEEG)* of 2006, and the *Kinderförderungsgesetz (KiföG)* of 2008.

Questions about maternal employment and child outcomes are closely related and family policy instruments often affect both. Blau and Currie (2004) highlight, for instance, that the role of child care is twofold as, on the one hand, it makes it feasible for parents to be employed and, on the other hand, it may enhance child development—in particular for disadvantaged children. Another example of an effective policy instrument is maternal leave, which, on the one hand, allows mothers to keep their job positions during the time of birth-related leave and, on the other hand, allows mothers to spend time with their young children, which might enhance child development. Because of this interrelationship, it is useful to analyze questions in the field of maternal employment and child outcomes in a common context.

Concerning the direct relationship, there is a large literature on the effects of maternal employment on child outcomes, primarily focusing on the US and the UK (e.g., Baum II 2003, Bernal 2008, Blau and Grossberg 1992, Brooks-Gunn et al. 2002, Gregg et al. 2003, Han et al. 2001, James-Burdumy 2005, Ruhm 2004, Waldfogel et al. 2002). This literature found evidence of a small negative effect of maternal employment, at least during the first year of a child's life. However, the effects are rather weak and the studies mostly suffer the problem of endogeneity of maternal employment. Addressing this problem and focusing on different countries, Canada and Denmark, Baker and Milligan (2010) and Würtz Rasmussen (2010) exploited parental leave reforms as natural experiments to analyze the effect of maternal employment. They conclude that there are no harmful effects on children.

Several explanations are provided in the literature to explain the weak or insignificant effects of maternal employment on child outcomes. These

include the increased income earned by employed mothers, the role of high-quality child care (especially in countries such as Denmark, where the child care system is well established), and fathers' increased involvement in child rearing in families with employed mothers (see, e.g., Gregg et al. 2003, Würtz Rasmussen 2010). These factors could offset the decreased amount of time that employed mothers spend with their children. Apart from these, one could think of another explanation for the "lacking" negative effects, an explanation related to non-pecuniary consequences of maternal employment. Participation in the labor market plays a prominent role for many women's subjective well-being and subjective well-being is likely to affect mothers' parenting behavior, which plays an important role in child development. Therefore, this doctoral thesis addresses the two questions of whether maternal employment affects subjective well-being and how mothers' subjective well-being is related to child outcomes.

Furthermore, previous studies have examined the determinants of maternal employment and child outcomes focusing on institutional and socio-economic factors (see Section 2.1, Section 4.1, and below in this Section for more details on this literature). However, both maternal labor supply and child outcomes might not only depend on institutional and socio-economic factors but also on individual differences captured by mothers' personality, so-called noncognitive traits. The role of mothers' noncognitive traits is the second focus of this work (besides mothers' subjective well-being) in the context of maternal employment and child outcomes.[2]

[2]The role of mothers' noncognitive traits on child outcomes is addressed only marginally in the context of the analysis of maternal well-being and child outcomes in Chapter 4, while the role of mothers' noncognitive traits on employment decisions is the main focus

The thesis is composed of three main chapters each containing quantitative empirical studies that focus on Germany and that are based on representative panel data.

In Chapter 2, I analyze the role of particular individual determinants for mothers' labor supply decisions. More concretely, the effect of women's noncognitive traits on the duration until return to employment after first childbirth are investigated.

Mothers' post-birth employment behavior is an important topic in economics because it affects future employment chances and wage profiles of individuals. The stability of the family income plays an important role, in particular for low-income families, and maternal employment is crucial for poverty prevention in these families. The depreciation of human capital due to long periods of non-participation is an enormous waste of resources both from the individual perspective as well as for the economy as a whole, in particular for highly qualified women. Also, non-pecuniary benefits of participation in the labor force play a role for a number of women.

Previous and recent studies in the field of mothers' return to employment have focused on the role of institutional factors as well as on socio-economic factors like educational attainment (e.g., Bergemann and Riphahn 2009, 2010, Burgess et al. 2008, Gutierrez-Domenech 2005, Ondrich et al. 2003, Kuhlenkasper and Kauermann 2010). However, the time until return to employment is likely to depend not only on institutional and socio-economic factors but also on maternal preferences. These are captured here by mothers' noncognitive traits. From a policy perspective, it is important to be

in Chapter 2.

aware of these differences when designing effective policy measures that allow for multiple options. One option for a new mother would be, for instance, to return quickly to employment and use institutional child care; another option would be to delay the return and extend maternal leave in cases where longer maternal care is preferred; a third option could be returning quickly to employment and benefit from the possibility of paternal leave.

Previous contributions to the economics of noncognitive skills found that these skills have a substantial effect on a number of social and economic outcomes, for some outcomes even a larger effect than cognitive skills (see Cunha and Heckman 2008). The question of the role of noncognitive skills for mothers' labor market participation behavior, however, has not yet been analyzed. My study thus links the existing literature on the determinants of mothers' return to employment with the literature on the economic consequences of noncognitive skills (for an overview of the latter, see Borghans et al. 2008).

Chapter 3 of this thesis investigates the effects of family-related nonparticipation and part-time employment on mothers' subjective well-being. This question is particularly relevant in the German context, as the maternal employment rate in Germany is with 68% (in 2007) lower than in many other European countries including the Scandinavian countries (76-83%), the Netherlands and Portugal (76%), France and Belgium (73%), the Baltic countries (73-80%), and even the otherwise conservative countries of Austria (72%) and Switzerland (70%).[3] Public support for working mothers is weak

[3]See OECD Family database, Chart LMF1.2.A: Maternal employment rates compared to female employment rates, 2007; maternal employment rate refers to mothers with children under 16 years.

in Germany. For example, child care availability, in particular for children under three, is much lower than in other European countries. In 2007 the enrollment rate of children under three in formal child care was 14% in Germany, while it was 63% in Denmark, 54% in the Netherlands, 45% in Sweden, 44% in Portugal, 43% in France, 42% in Norway, 42% in Belgium, and 40% in the UK[4] These figures indicate that combining motherhood and employment is particularly difficult in Germany.[5] Numerous mothers completely withdraw from the labor market for several years; others reduce working hours even though they would prefer to reconcile their familial duties with full-time employment. The inability to participate in the labor force or to increase working hours is likely to substantially reduce many mothers' subjective well-being. Chapter 3 of this work investigating the role of employment for mothers' happiness contributes to the literature on so-called "happiness economics" (see, e.g., Dolan et al. 2008, Di Tella and MacCulloch 2006, Frey and Stutzer 2002b, Layard 2005, Van Praag and Ferrer-i Carbonell 2004) focusing on the specific situation of mothers in Germany.

Although previous studies mostly use happiness indicators as an outcome measure, the influence of a person's subjective well-being on other individuals cannot be neglected. In particular for very close relationships, like mother–child relationships during the first years of a child's life, interaction effects are expected. In Chapter 4 of this work, I investigate the association between maternal life satisfaction and children's early developmental outcomes.

Early child outcomes have attracted increasing interest in the economic

[4]See OECD Family database, Chart PF3.2.A: Enrolment rates of children under age 6 in formal care or early education services, 2006.

[5]Further detail on the institutional background in Germany is provided in Section 3.1.

literature since Heckman and co-authors modeled human capital formation as a cumulative process in which early stages play a prominent role (Cunha and Heckman 2007, 2008). So far, economic studies have mostly concentrated on the role of objective measures such as income and maternal employment on child developmental outcomes (and mostly focused on the US). However, subjective factors are expected to have an influence as well. Psychologists using small and selective samples found indications that poor maternal well-being (depression), can significantly harm children's early development (Wiegand-Grefe et al. 2009, Zimmer and Minkovitz 2003). Based on a large and representative data set for Germany, the analysis in Chapter 4 of this thesis provides first evidence on the relationship between overall life satisfaction of mothers and their children's early developmental outcomes.

1.2 Methodology

The three main chapters of this work are based on quantitative empirical analyses using data from the German Socio-Economic Panel Study (SOEP), a representative longitudinal survey of private households in Germany (see Wagner et al. 2007). The survey commenced in 1984 and collects information on employment histories, education, income, and a variety of further objective and subjective indicators reflecting individual and family life circumstances.

One important feature of the SOEP survey is that it provides yearly information on overall life satisfaction of each adult respondent, a key variable used in the analyses of Chapters 3 and 4.

Furthermore, a special section included in the 2005 wave of the SOEP surveys a series of noncognitive traits, the Locus of Control and the Big Five personality traits. The Locus of Control is a measure of the degree to which an individual believes that success or failure in life follows from his own behavior or attributes versus the degree to which he feels that it is controlled by external forces (Rotter 1966). The Big Five personality inventory is a model in personality psychology by which personalities can be described by the five dimensions of Neuroticism, Openness to Experience, Conscientiousness, Extraversion, and Agreeableness (John and Srivastava 1999, McCrae and Costa Jr 1996, 1999). These measures are found to affect important economic and social outcomes like earnings and education (e.g., Coleman and DeLeire 2003, Wichert and Pohlmeier 2010, Heckman et al. 2006). The variables are included as key determinants in the analyses of Chapters 2 and 4 of this work.

An eminent feature of the SOEP is its longitudinal design. This allows for the control of time-constant unobserved individual heterogeneity, which is an important issue in the analysis of subjective well-being in Chapter 3. Furthermore, the longitudinal character of the data permits the study of individual labor market dynamics described by the duration of different states and the transition probabilities between them. This feature is explored in the analysis of mothers' return-to-work decisions in Chapter 2 of this work. The study in Chapter 4 benefits from the longitudinal design as it uses data on the development of children at several stages during early childhood. This is possible because of a series of questionnaires implemented in the SOEP gradually, starting in 2003, with the purpose of surveying the development of children

from the very beginning of their lives. The data include measures on the developmental functioning of 2–3-year-old children and the socio-emotional behavior of 5–6-year-old children, which are used as outcome variables. A number of additional indicators from the childhood questionnaires as well as from the main survey are incorporated in the analysis. The panel design of the survey allows for the accounting of family characteristics even before the child is born, which is a unique feature of the data permitting to prevent reverse causality bias.

The quantitative empirical analyses in the three chapters are carried out using microeconometric estimation techniques including survival analysis, fixed-effects (-ordered-logit) regression, and instrumental variable techniques. The formal estimation models and the interpretation of the estimation results are described in detail in the method and results sections of each chapter.

1.3 Main findings

In Chapter 2, providing an empirical analysis of the effect of noncognitive traits on the duration of mothers' leave after first childbirth, I find that women with a highly external Locus of Control (LOC) and women with a high score for the Big Five trait of Agreeableness delay their return to employment longer than women with low scores for these two traits.

The finding for LOC confirms expectations derived from the theoretical model by Coleman and DeLeire (2003) according to which individuals with an internal LOC expect greater returns to human capital investments and thus invest more. Women with an internal LOC expect greater returns to

labor market experience and thus minimize the duration of labor market non-participation after childbearing. The finding can also be explained by the fact that, expecting a higher impact of their own effort, mothers with an internal LOC are likely to put greater effort into finding solutions that reconcile work and family life. A third line of arguments for the same direction of the effect of LOC relates to findings of Noor (2002), who found that women with an internal LOC perceive lower work-family conflict. This could be another reason why women with a stronger internal LOC are ready to return to employment more quickly than women with a more external LOC.

The finding for the Agreeableness trait is consistent with the idea that agreeable women are more altruistic toward their spouse and other people, and thusly are more likely to set aside their own career ambitions. Also, agreeable women tend to avoid the work-family conflict and are more inclined to adapt to traditional social norms of family patterns.

The analysis contributes to the understanding that mothers have different preferences depending on their personality and thus various options are required for women returning to the labor market. Also, since previous studies found that education can influence noncognitive skills of children or adolescents (see Heckman et al. 2006), my analysis reveals the effects these (changed) noncognitive skills can have on later labor supply.

In Chapter 3, I find that a substantial share of mothers do not participate in the labor force due to family reasons and that these mothers are less satisfied with their lives than mothers engaged in full-time employment, even if unobserved individual heterogeneity is accounted for. Further, a large proportion of mothers in Germany, employed part-time, are found to experience

decreased life satisfaction compared to mothers in full-time jobs.

The reasons for the identified negative effects are found to be partly pecuniary, i.e., due to foregone earnings, and partly non-pecuniary, i.e., due to psychological costs. The happiness loss is particularly pronounced for women in low-income families and women who fear poor re-employment opportunities. Overall, unhappiness among the population of mothers is found to be to a larger degree due to family-related non-participation and part-time employment than to unemployment. This is insofar noteworthy as a number of studies found that unemployment is a considerable source of unhappiness. The study delivers an argument for improving policies that support women who want to combine motherhood and paid employment in Germany. The argument of mothers' subjective well-being is largely neglected in discussions about such policies.

In Chapter 4, investigating the association between maternal life satisfaction and child outcomes, I find that more satisfied mothers have children with better verbal skills at the age of 2–3 years and fewer socio-emotional problems at the age of 5–6 years. The relationship is found to be more pronounced for boys than for girls. Controlling for mothers' personality or mothers' cognitive skills does not alter these results. Overall, the estimated effects for mothers' life satisfaction on child outcomes is fairly high when compared to other determinants such as parental education, employment, and child care hours.

The underlying mechanisms between maternal well-being and child development are potentially threefold. First, maternal psychological well-being might affect the parenting behavior including the frequency of engaging in

verbal interactions and of making positive statements to the child (e.g., Barling et al. 1993). Second, referring to the attachment theory in developmental psychology, it is argued that a satisfied mother is more sensitive and responsive to her child, which influences the quality of the attachment between child and the main caregiver and which, in turn, affects the child's development. A third mechanism would be that happy mothers undertake more and higher quality activities with their children, which in turn stimulates their development. The latter mechanism was tested (to some extent) and found to explain a small fraction of the estimated effects. An important implication of the study is that policy measures improving mothers' well-being are beneficial for children as well. Since mothers are important for children's development, it might be useful to involve mothers—or in general parents—in child care centers (family centers) following, for instance, the example of Early Excellence Centres in the UK.

Chapter 2

Women's Noncognitive Skills and Return to Employment After Childbirth

2.1 Introduction

The aim of the analysis in this chapter is to investigate the role of mothers' noncognitive skills on the duration until return to employment after childbirth. On the one hand, noncognitive skills might affect the overall labor market attachment of women; on the other hand, noncognitive skills influence the attitude of women toward their children and their belief of how long a mother should be available full-time for her child. The research question of this study combines two strands of literature in economics: first, that of the determinants of mothers' return to employment after childbearing and second, that of the economic consequences of noncognitive skills.

There is a large literature on the determinants of mothers returning to employment after childbearing. Post-birth employment behavior matters because it affects future employment chances and wages since longer breaks reduce the amount of human capital (Beblo and Wolf 2002, Davies and Pierre 2005, Gutierrez-Domenech 2005, Lefebvre et al. 2009). Long periods of non-participation and the resulting devaluation of skills are an enormous waste of human capital resources, especially for highly educated women. Moreover, maternal employment plays an important role for holding stable the family income. Especially for low-income families, maternal employment is an important component of counteracting the risk of poverty.

Traditionally, studies in the field of mothers' return to employment after childbearing focus on incentive schemes, the role of labor market institutions, and educational attainment. The role of parental leave schemes and tax rules is investigated in a number of studies (e.g., Bergemann and Riphahn 2009, 2010, Burgess et al. 2008, Gutierrez-Domenech 2005, Ondrich et al. 2003). Kuhlenkasper and Kauermann (2010) focus on the role of individual and family-related factors like income, educational attainment, and labor market experience.

As far as I can determine, no previous study investigated the role of noncognitive traits in the context of mothers returning to employment.[1] Since noncognitive traits are expected to be related to both the behavior toward the labor market and toward a child, the research question is of great

[1]However, there is a study by Vogt and Pull (2010) analyzing the association between fathers' Big Five personality traits and their probability to take fathers' leave. They found a positive relationship with Neuroticism and Openness and a negative relationship with conscientiousness.

interest.

Literature on the economics of noncognitive skills found that these skills play an important role in economic and social success such as employment outcomes, educational attainment, and a variety of risky behaviors (Borghans et al. 2008, Heckman et al. 2006, Heckman and Rubinstein 2001). The term "noncognitive traits" refers to traits other than cognitive ability (IQ), that is, to traits that are sometimes also referred to as personality. These include, for example, perseverance, conscientiousness, belief in control over own life, self-esteem, extraversion, etc.[2]

Heckman et al. (2006) as well as Coleman and DeLeire (2003) found that teenagers with a high belief in internal control accumulated more schooling in the US. Focussing on Germany, Coneus et al. (2009) found that young adults with an internal LOC are less likely to dropout of school. Blomeyer et al. (2009) found that children with higher persistence scores in early childhood have better school grades at age eight and are more likely to enter the higher-track secondary school (*Gymnasium*) in Germany.

Concerning employment outcomes, a number of studies found that noncognitive traits are associated with earnings (Andrisani 1977, 1981, Cebi 2007, Flossmann et al. 2007, Heckman and Rubinstein 2001, Heckman et al. 2006, Heineck and Anger 2010, Mueller and Plug 2006, Nyhus and Pons 2005, Osborne Groves 2005). The studies of Uhlendorff (2004) and Uysal and Pohlmeier (2009) analyze the relationship between unemployment duration and noncognitive skills. Both found that the unemployed with an internal

[2]For a detailed discussion of the research on noncognitive skills, see Borghans et al. (2008).

LOC will find a new job more quickly than unemployed with a more external LOC. Furthermore, a number of studies in psychology investigated the relationship between personality traits and occupational attainment; for a review, see Roberts et al. (2007).

Although a number of studies investigated the impact of noncognitive traits on employment outcomes, little is known about its impact on labor supply, specifically the labor supply of women or, more specifically, of mothers. Two exceptions are the studies of Wichert and Pohlmeier (2010) as well as Heckman et al. (2006). Wichert and Pohlmeier (2010) analyze the impact of the Big Five personality traits on women's probability to participate in the labor market. They found a positive effect of the traits Conscientiousness and Extraversion and a negative effect of Neuroticism and Openness. Heckman et al. (2006) use the Rotter Locus of Control Scale and the Rosenberg Self-Esteem Scale to construct a single noncognitive skill index. Their results suggest that the impact of noncognitive skills on the employment probability is even greater than the effect of cognitive skills (in terms of one standard deviation change). The pattern is found to be more pronounced for women than for men.

An explanation for the gender difference might be the conflicting roles of employment and family. More frequently than men, women face the trade-off between family and career decisions; and the behavior toward the trade-off is likely to be influenced by noncognitive traits. To examine the issue in more detail, it appears useful to investigate the return-to-employment behavior of women after childbirth because new mothers face the family–career conflict to a particularly high extent. This is done in this chapter of the thesis.

The noncognitive traits focused on in this study are Locus of Control and the Big Five personality traits. The measures were used by previous economic studies and have been found to be important for economic outcomes (e.g., Coleman and DeLeire 2003, Heckman et al. 2006, Uhlendorff 2004, Wichert and Pohlmeier 2010).

Using data from the SOEP, I estimate the duration until return to employment after first childbirth. I concentrate on the first birth because transitions into employment after higher order births are much more complex to model as they are related to previous career interruptions due to previous births. Focusing on the first birth allows me to control for employment characteristics of the job prior to first birth and to neglect the dynamic process of the timing of further births and career interruptions. Nevertheless, I control for the fact that some women have a second child shortly after the first as this is likely to influence their return decision. The details are described in Section 2.3.2. The empirical strategy is to estimate a discrete semi-parametric survival model incorporating a discrete mixture distribution to summarize unobserved individual heterogeneity, as proposed by Heckman and Singer (1984). The results indicate that external LOC and Agreeableness are related to a late return to employment after childbirth.

The chapter is organized as follows: Section 2.2 specifies the concepts of noncognitive skill measures used in the analysis; Section 2.3 describes the data base and variables; Section 2.4 presents the estimation method; Section 2.5 presents and discusses the results as well as several robustness checks; Section 2.6 concludes.

2.2 The concept of noncognitive traits and the role on maternal employment decisions

I refer to two concepts of noncognitive skill measures, namely the Locus of Control (LOC) and the Big Five personality traits. The measures are used because these are found to be influential for a number of economic outcomes and because these are available in the nationally representative data set of the SOEP. In the following two subsections, the two concepts are presented and the expected effects on women's decision to return to employment after childbearing are discussed. Since so far little is known about the relationship between noncognitive skills and labor supply behavior, some of the expectations rely on theoretical arguments rather than on previous empirical evidence.

2.2.1 Locus of Control

The LOC is a measure of the "individual differences in a generalized belief for internal versus external control of reinforcement" (Rotter 1966, p. 1). It is a measure of the degree to which an individual perceives that success or failure in life follows from his own behavior or attributes versus the degree to which he feels that it is controlled by forces outside of himself and may occur independently of his own actions. If life events are perceived by a person as being contingent upon her own behavior or her own relatively permanent characteristics, this is labeled an *internal* LOC. If, on the other hand, life events are perceived by a person as the result of luck, chance, fate,

as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding her, this is labeled an *external* LOC.

There are several ways through which LOC could affect the time until return to employment after childbearing. First, I follow the line of argument by Coleman and DeLeire (2003), who assert that LOC affects the decision to invest in human capital through its impact on expected earnings. The authors develop a model of schooling decisions as a function of expected future earnings. They incorporate individual LOC in the model, arguing that the expected increase in future earnings induced by an extra year of schooling will be higher for individuals with a more internal LOC than for individuals with a more external LOC. A similar argumentation can be adopted for the investment in work experience, which, in addition to schooling, influences future earnings according to the Mincer model of earnings (Mincer 1958, 1974). The more quickly a woman returns to employment after childbearing the more work experience she will gain and thus the more human capital she will accumulate. Therefore, returning to employment shortly after childbirth can be interpreted as an investment in human capital. This interpretation is especially relevant as child-related career breaks usually occur during the early stages of a career when each year of work experience is still highly rewarded. Hence, one would expect LOC to affect the return decision of a woman after childbirth as follows: women with a more internal LOC should return more quickly than women with a more external LOC because they expect higher returns to work experience. If a woman believes that her future career depends to a large extent on luck or powerful others rather than on

her work experience, she might delay her return to employment longer than a woman who is convinced that her future career chances highly depend on her previous engagement in the labor market.

A second line of argument for the relationship between LOC and return to employment could be that women with a more internal LOC are more resolute in trying to find a solution that reconciles work and family life as they are more convinced that their effort will be successful. Women with an internal LOC might, for example, search more intensively for childcare and negotiate more aggressively with their employers on work conditions that are more compatible with family life. Women with a more external LOC on the other hand, are more likely to accept a situation where they are not able to combine paid work and family because they feel unable to change the situation.

Third, Noor (2002) found that LOC is correlated with the perception of work–family conflict in the sense that women with an internal LOC perceive a lower level of conflict. As women with an internal LOC perceive less work–family conflict, they are expected to return to employment more quickly than women with an external LOC.

A fourth argument for LOC being associated with the time until return to employment would be that LOC affects the job search intensity. Caliendo et al. (2010) found that external LOC is associated with a lower job search intensity by unemployed persons. A woman wanting to return to the labor market might take some time to find a job. I expect mothers with a more external LOC search less intensively and are likely to take more time to find a job. However, mothers in Germany usually have the right to return to their

previous position within three years after childbirth. Consequently, these women do not have to search for a new job when they want to return to the labor market. However, the right to return is relevant only in cases where the job does not expire in the meantime (temporary job). Furthermore, some jobs are not compatible with family life and the right to return is irrelevant in these cases as well. In these two cases, temporary jobs and incompatible jobs, the job search argument is relevant. I will return to the argument in the robustness section in this chapter.

A fourth argument, an argument with the opposite effect from the first three arguments, would be that women with a more internal LOC might care more about the specifics of how their children are raised. A woman with a more internal LOC might believe, to a higher degree, that her behavior and the maternal caring time influence the development of her child. She might prefer to care for her child herself full-time rather than giving the responsibility to someone else. This would imply that women with internal LOC will delay their return to employment. However, one could also argue in this context that caring women with internal LOC prefer to place their children in thoroughly evaluated, high quality care since care by professionals might stimulate the development of children more than full-time maternal care. In this case there is no reason for them to delay their return to employment.

2.2.2 The Big Five personality traits

The Big Five personality traits are a concept in personality psychology through which a personality can be described by the five dimensions *Neu-*

roticism (the opposite of *emotional stability*), *Openness to Experience*, *Conscientiousness*, *Extraversion*, and *Agreeableness* (John and Srivastava 1999, McCrae and Costa Jr 1996, 1999). The Big Five concept is among the best-established models in personality psychology and widely used in empirical research (Caspi et al. 2005). In the following, I describe the five personality dimensions and discuss how these might affect the decision of return to employment after childbirth. Typically there are several arguments pointing to different, opposite, effects. Which dominates is ultimately an empirical issue.

The trait *Neuroticism* characterizes how much individuals experience strong positive and negative emotions, i.e., their emotional stability. Individuals with a high score on Neuroticism do not cope well with stress; they worry a lot and get frustrated and nervous easily. Wayne et al. (2004) found that individuals with higher scores in Neuroticism perceive greater work–family conflict. They explain the result by arguing that neurotic people spend more time worrying or focusing on negative affects and thus use time less efficiently than emotionally stable persons. This, in turn, leads to time pressure and conflict between tasks. One could also think that neurotic people cope less well with occupational stress in general and therefore neurotic mothers delay returning to employment longer. Also, these mothers might worry a lot about their children and prefer to care for the child full-time as long as possible rather than trust non-maternal care options. The hypothesis that Neuroticism is associated with a delayed return to employment is consistent with the empirical result of Wichert and Pohlmeier (2010), who found that women (including mothers as well as childless women) with a

higher Neuroticism score are less likely to participate in the labor force.

An argument for the opposite effect of Neuroticism proposes that neurotic women worry also about their future job opportunities and are afraid that long career interruptions will lower their future wage profile and increase unemployment risk. This might lead them to return more quickly in order to minimize future disadvantages. The argument is connected to the result of Vearing and Mak (2007) who found that a high score of Neuroticism leads to a high work commitment (even an over-commitment).

The personality trait *Openness to Experience* describes how needy an individual is for changes and novelty and whether she has an active imagination and frequently comes up with new ideas. On the one hand, it is reasonable to expect that open women appreciate the change in life style resulting from having their first child. In general, open individuals might prefer not to be employed, thus having time for a variety of other activities. Accordingly, Wichert and Pohlmeier (2010) found that open women are less likely to participate in the labor force.

On the other hand, open women might be bored with a stay-at-home life style and exclusively caring for a child. Open persons might appreciate employment because it brings diversity to life. Also, one might expect that open persons are successful in their careers and enjoy their success and therefore will return more quickly after childbirth. The argument is driven by the result of Fietze et al. (2009), who found that the Big Five trait Openness to Experience is positively associated with occupying a management position.

Conscientiousness describes the way how people deal with problems. Conscientious people do things thoroughly, are organized, hard working, and

ambitious. On the one hand, Conscientiousness is associated with a higher attachment to the labor market. Conscientious women might, to a higher degree, feel responsible for their job tasks and therefore return to employment relatively quickly after childbirth. Wichert and Pohlmeier (2010) found that conscientious women are more likely to participate in the labor force in general. Conscientiousness is also likely to increase career success and thereby also job attachment. Ham et al. (2009) found that conscientious women are more likely to be in white collar occupations than blue collar ones. Fietze et al. (2009) and Trzcinski and Holst (2010) found that, for women, Conscientiousness is positively associated with occupying a management position. Being successful and occupying responsible positions, conscientious women are expected to tend to return to their job more quickly after childbirth.

Furthermore, Wayne et al. (2004) found that conscientious women perceive lower levels of work–family conflict. This could be due to the fact that conscientious people use their time efficiently and thus reduce time pressures. This argument leads to the hypothesis that Conscientiousness is associated with a speedy return to employment.

Although not empirically studied, theoretically an argument for the opposite effect is as follows: if conscientious women feel particularly responsible for the development of their children, they might decide to delay their return to employment in order to be available to care for the child as long as possible. However, against this explanation one could argue that conscientious mothers might admit that high-quality institutional care is more beneficial for a child than full-time maternal care and therefore they might opt for an early entry into such an institution. This would allow them to return to

employment quickly.

The Big Five trait *Extraversion* captures how an individual behaves among others. A person with a high level of Extraversion is outgoing, talkative, and sociable. One would expect extraverted women to enjoy the social contact brought by employment, that is, enjoy being with colleagues and business clients rather than staying at home. Wichert and Pohlmeier (2010) found that extraverted women are, in general, more likely to participate in the labor force. The psychological study of Caspi et al. (1988) found that women with a childhood history of shyness, which could be interpreted as an opposite construct to Extraversion, are more likely to have either no work history at all or to terminate employment with marriage or childbirth and do not ever re-enter the labor force. Furthermore, Wayne et al. (2004) found that Extraversion is positively related to the perception of work–family facilitation. They claim that extraverted people have higher levels of energy and experience more positive affect across all life domains. Therefore extraverted mothers can be expected to return to employment relatively shortly after childbirth.

Arguing for the opposite effect, one could think that extraverted women prefer not to be employed in order to have time to spend with friends and other parents. Extraverted women with a young child might enjoy making acquaintance of other parents and having time to share experiences. This implies that extraverted women delay their return to employment longer than more introverted individuals.

A person with a high *Agreeableness* score is altruistic, has a forgiving nature, and is considerate and kind to others. Agreeable women tend to

be altruistic towards their spouse and others, and therefore are more likely to set aside their own career ambitions. Moreover, agreeable women might avoid the work–family conflict, which is likely to arise for employed women with young children. Thus, agreeable women might be more likely to adopt traditional social norms that a mother with a young child should stay at home and is rather family-oriented than career-oriented. Trzcinski and Holst (2010) found that Agreeableness is negatively associated with years in a management position. The result could be due to both, lower labor market orientation or lower career success (which might of course be related). Both lead me to expect that agreeable women stay a longer time at home when having a child. Wichert and Pohlmeier (2010) did not find a significant relationship between the trait Agreeableness and the probability to participate in the labor force for women. The pattern could be different, however, when focusing on mothers rather than on all women.

2.3 Data

As discussed in Chapter 2.1, the empirical analyses are based on data from the SOEP. In the sample used for this chapter's analyses, I include women who had their first child between 1992 and 2007 and were employed prior to first childbirth.

Since I focus on the return decision after childbirth, I do not account for selection into motherhood. The fertility decision itself is likely to depend on noncognitive traits and, thus, the population of mothers is not representative of all women. However, the research question I focus on is the return-to-

employment decision of the selected population of mothers. The research question itself implies that I do not intend to generalize the results to the overall population of women.

A similar argument applies for the selection of women employed prior to childbirth: I focus on the *return* decision of mothers, that is, the decision to re-enter employment after childbirth and therefore I concentrate on women who were employed prior to childbirth.[3] Certainly, the population of mothers being employed prior to childbirth is a selective one. However, women who are not employed prior to childbirth have a very low labor market attachment, were unemployed, were still in education, or have some other reasons (e.g. health reasons) not to participate in the labor force. For this special group of women, the decision to enter employment after childbirth is assumed to be different than for other women and it might be difficult to find common factors that influence the decision. Therefore, I concentrate on the more homogeneous group of women who were employed prior to childbirth, even though I am addressing only a select group. Women who were employed prior to childbirth are most likely to transition to employment in a relatively short period of time and for them it appears interesting to find out who takes more or less time than others. In an extension in Section 2.5.2, the model is estimated for the full sample, including mothers who were not employed prior to childbirth. The results differ only slightly.

Women's employment status are observed on a monthly basis in the data from the fourth month after childbirth until they return to employment or

[3]Previous studies like Kuhlenkasper and Kauermann (2010) undertake a similar selection.

until they are censored. The first three months after childbirth are ignored because new mothers have protection leave (*Mutterschutz*) for the first eight weeks after a regular birth and for the first twelve weeks after a multiple birth or a preterm birth.

Censoring generally occurs when the current end of the survey, at the end of 2007, is reached and no transition into employment is observed. Censoring also occurs when a respondent leaves the survey or fails to respond to a survey sometime following birth but before a transition into employment is observed. Individuals for whom a transition into unemployment[4] or education is observed (before a transition into employment is observed) are discarded from the sample.[5]

In total, the sample contains 14,981 person-month observations from 695 individuals observed between a minimum of one and a maximum of 162 monthly spells (corresponds to 13.5 years). For 532 individuals (77%) a transition into employment is observed, on average, after 20 months (s.d. 22.95). The remaining 163 individuals (23%) are censored, with a mean number of spells of 28 (s.d. 36.87).

2.3.1 Measures of noncognitive traits

As previously discussed, I use two types of noncognitive skill measures, LOC and the Big Five personality traits. The LOC measure is based on five items

[4]A person is defined unemployed if she has been registered as unemployed with the Employment Office.

[5]This is done because the transitions into and out of unemployment and into and out of education must be treated differently than a return to employment. Nevertheless, in an alternative specification in Section 2.5.2 I estimated a model including women who enter unemployment or education instead of entering employment or before being censored (86 individuals). The main results are largely unchanged.

surveyed in the 2005 wave of the SOEP. The items were answered on 7-point Likert type scales (1 "disagree completely" to 7 "agree completely"). A list of the items (English translation) with means and standard deviations of the non-standardized scores is presented in Table 2.1. The LOC measure used for the estimations is the average of the standardized (to mean zero and standard deviation one) scores of the five items.[6] The variable is to be interpreted in the way that the higher the score, the more external the LOC.

For the Big Five personality traits, the 2005-wave of the SOEP survey provides a set of fifteen items—three for each of the five dimensions. They were, like the LOC items, answered on a 7-point Likert type scale (1 "does not apply to me at all" to 7 "applies to me perfectly"). A list of the items (English translation) as well as the means and standard deviations of the (non-standardized) scores are presented in Table 2.1.[7] The variables for the five dimensions used in the estimations below are the average of the standardized answer scores. The correlations between the different measures, i.e., between the five dimensions of the Big Five personality traits and the LOC measure, are presented in Table 2.6 in the Appendix.

Since non-cognitive traits are surveyed only once in the SOEP, namely in the 2005 wave, I have to assume that the traits are stable over time. This is a sufficiently plausible assumption since psychologists widely agree upon the mean-level and rank-order stability of personality traits in adulthood (Caspi et al. 2005, Costa Jr and McCrae 1994, Fraley and Roberts 2005, McCrae and

[6] A similar measure has been used by Coleman and DeLeire (2003) with the LOC-items from the National Educational Longitudinal Study (NELS) and by Cebi (2007) with the LOC-items from the National Longitudinal Survey of Youth (NLSY).

[7] For more information on the implementation of the Big Five traits in the SOEP survey as well as on the reliability and validity, see Dehne and Schupp (2007).

Table 2.1: Summary statistics of the items of the Big Five personality traits and of Locus of Control

Item	Mean	s.d.
Locus of control (LOC)		
How my life goes depends on me (reversed)	2.443	1.198
What a person achieves in life is above all a question of fate or luck	3.564	1.639
I frequently have the experience that other people have a controlling influence over my life	2.940	1.585
The opportunities that I have in life are determined by the social conditions	4.535	1.408
I have little control over the things that happen in my life	2.475	1.392
Big Five personality traits:		
I see myself as someone who...		
Neuroticism:		
worries a lot	4.911	1.621
gets nervous easily	3.826	1.621
is relaxed, handles stress well (reversed)	3.600	1.451
Openness:		
is original, comes up with new ideas	4.685	1.364
values artistic experiences	4.223	1.785
has an active imagination	4.960	1.521
Conscientiousness:		
does a thorough job	6.278	0.898
tends to be lazy (reversed)	5.832	1.430
does things effectively and efficiently	5.922	0.975
Extraversion:		
is communicative, talkative	5.794	1.139
is outgoing, sociable	5.348	1.391
is reserved (reversed)	4.135	1.701
Agreeableness:		
is sometimes somewhat rude to others (reversed)	5.170	1.626
has a forgiving nature	5.463	1.281
is considerate and kind to others	5.951	0.996

Note: The figures refer to the non-standardized answer scores ranging from one to seven (7-point Likert scale). N = 695 individuals. Source: SOEP 2005, author's calculations.

Costa 1994, McCrae and Costa Jr 1996, 2003, Roberts and DelVecchio 2000). Heckman et al. (2006) as well as Coleman and DeLeire (2003) make similar assumptions as their measures of noncognitive traits are only available for single waves of their respective data sets, too. Nevertheless, I estimate a robustness test in this respect, which is discussed below. The results suggest that the findings are robust.

2.3.2 Control variables

In addition to the above given noncognitive measures, a number of socio-economic and demographic control variables are included in the model. For the choice of these covariates I follow the previous literature on mothers' return to employment cited in Section 2.1. The covariates included are age at first birth, age squared, education, labor market experience (in years),[8] log of hourly wage prior to childbirth, log of the net inflation-adjusted other household income (in Euros), partner status, whether other adults are living in the household, region (East versus West Germany), migration background, health, whether the woman has a second child within three years after the first birth,[9] and year dummies for the year of the first birth.[10]

[8]In separate tests, tenure with the same employer is controlled for, however the results do not change and the model does not improve with the variable.

[9]I tried a number of different ways to account for having another child within a short period of time; I controlled for different dummy variables for having a second or third child within different periods of time and for the spacing between children (in months) and the spacing squared. The main results are always largely the same.

[10]In an alternative specification I combined the year dummies into groups of dummies that reflect institutional changes; these were 1992 as the reference group, 1993-2000 as a second group (child rearing benefits (*Erziehungsgeld*) for children born after 1992 are paid 24 instead of 18 months), 2001-2006 (mother and father are both simultaneously eligible for the child rearing leave (*Erziehungsurlaub*) and the possibility to work up to 30 hours during the child rearing leave), 2007 (implementation of a wage-dependent parental benefit rule, the *Elterngeld*). The estimation results for the alternative specification are

Table 2.2: Summary statistics of covariates

	Mean	s.d.
External LOC	-0.055	0.592
Neuroticism	-0.041	0.738
Openness	0.016	0.785
Conscientiousness	0.045	0.733
Extraversion	0.064	0.785
Agreeableness	-0.008	0.705
Age first birth	29.033	4.263
$(\text{Age})^2/1000$	0.861	0.255
Educational degree		
University	0.191	0.394
Vocational	0.714	0.452
No degree	0.095	0.293
Experience	7.492	4.331
Prior wage	11.866	5.935
Other income	2398.6	1132.4
Partner in HH	0.938	0.241
Other adults in HH	0.024	0.155
East Germany	0.210	0.408
Migration background	0.096	0.295
Health	3.807	0.759
2^{nd} child w/in 3 years	0.282	0.450

Note: N = 695 individuals. Source: SOEP 1994–2007, author's calculations.

Since the covariates are surveyed on a yearly basis, these are taken from the latest interview year (i.e., when the transition into employment or censoring is observed) and are included in the survival model as time-constant covariates. Exact definitions of the covariates are given in Table 2.7 in the Appendix. Summary statistics for the covariates are reported in Table 2.2.

2.4 Estimation method

I estimate a Prentice and Gloeckler (1978) model incorporating a discrete mixture distribution to summarize unobserved individual heterogeneity, as proposed by Heckman and Singer (1984). The model is suitable for analyzing interval-censored (monthly) data. The non-parametric modeling of the baseline hazard and the non-parametric approach of characterizing the unobserved heterogeneity allows for a high degree of flexibility in the model.

While the available data are interval-censored, I suppose an underlying continuous survival time model which can be summarized by the hazard rate $\theta(t, X)$. Suppose that the hazard rate satisfies the proportional hazards assumption

$$\theta(t, X) = \theta_0(t) \exp(\beta' X)$$

where $\theta_0(t)$ is the baseline hazard depending on time t but not on the covariates X. β describes the parameter vector to be estimated. The proportional hazards property of the model implies that absolute differences in

very similar to the more flexible specification of controlling for each year.

the covariates imply proportionate differences in the hazards at each t. The hazard ratio for two individuals who are identical on all covariates but x_k, is

$$\frac{\theta(t, X_1)}{\theta(t, X_2)} = \exp(\beta_k[x_{k1} - x_{k2}])$$

where X_1 and X_2 are the covariate vectors of individual 1 and 2, respectively, and x_{k1} and x_{k1} is the kth covariate for individual 1 and 2, respectively. Given that each time interval in the data is of unit length (one month), and using the complementary log-log transformation,[11] the discrete time hazard can be written as

$$h(j, X) = 1 - \exp[-\exp(\gamma_k D_k + \beta' X)]$$

where j is the spell (number of months after childbirth minus three). The baseline hazard of the model is not specified parametrically, that is, I estimate a semi-parametric hazard model. The duration dependency of the hazard rate is contained in $\gamma_k D_k$, where D_k is an indicator equal to one if month j lies within the k^{th} group of months and zero otherwise. That is, the model contains one dummy variable for each group of months but not for each month; otherwise the model would be overloaded and could not be estimated with the available data. The groups of months are defined as follows: the first group includes months four to six (the first three months are omitted because return is only considered from the fourth month onward as previously described), the second group includes months seven to nine, the third months ten to twelve; from the second to the fourth year each group

[11] For the transformation see, for example, Jenkins (2005, p.41-42).

embraces six months; from the fifth to the seventh year each group embraces twelve months; from the eighth to the ninth year each group embraces 24 months; the last group encompasses all remaining months. The classification of increasing intervals is chosen because the number of women returning to employment per month decreases with the order of spells. The parameters γ are estimated by the model along with the parameters β.

To allow for unobserved heterogeneity without assuming a specific distribution for the random effect, it is assumed that there are two types of individuals in the population. The idea is incorporated by allowing the intercept β_0 to vary between the two classes, i.e.,

$$h_1(j, X) = 1 - \exp\left[-\exp(\gamma_k D_k + \beta_{01} + \beta' X)\right]$$

$$h_2(j, X) = 1 - \exp\left[-\exp(\gamma_k D_k + \beta_{02} + \beta' X)\right]$$

where $\beta' X$ does no longer contain an intercept. The likelihood contribution of a person with spell length j months is

$$L = \pi L_1 + (1 - \pi) L_2$$

where

$$L_1 = \left(\frac{h_1(j, X)}{1 - h_1(j, X)}\right)^c \prod_{m=1}^{j} \left[1 - h_1(m, X)\right]$$

$$L_2 = \left(\frac{h_2(j, X)}{1 - h_2(j, X)}\right)^c \prod_{m=1}^{j} \left[1 - h_2(m, X)\right]$$

where π is the probability of belonging to type 1, and c is the censor-

ing indicator. The parameters π, β_{01}, and β_{02} are estimated by the model together with β and γ.

2.5 Estimation results

2.5.1 Main results

The estimation results of the model given above are reported in Table 2.3. Column 1 contains the results of the estimation without control variables; column 2 contains the results of the estimation with control variables. The estimated coefficients of the noncognitive skill variables are similar in both models and suggest that external LOC and Agreeableness have negative effects on the hazard rate of return to employment. Women with a high belief in external control and highly agreeable women delay their return to employment longer than individuals with a more internal LOC and less agreeable women.

The coefficients of the control variables in model 2 mostly show the expected sign, pointing to the reliability of the estimation; household income other than own labor income is associated with a delayed return to employment, while own wage is related to a quicker return; the variables having a partner, living in East Germany, and having a university degree are related to a higher risk to return.

Table 2.3: Estimation of the duration until return to employment after first childbirth: discrete semi-parametric hazard estimation incorporating unobserved heterogeneity with a discrete mixture distribution

	(1)		(2)		(3)		(4)	
	coeff	se	coeff	se	coeff	se	coeff	se
External LOC	-0.244**	(0.087)	-0.251**	(0.092)	-0.410*	(0.195)	-0.843**	(0.148)
Neuroticism	0.075	(0.077)	0.065	(0.086)	0.075	(0.127)	-0.057	(0.180)
Openness	0.036	(0.073)	-0.004	(0.085)	0.051	(0.161)	0.028	(0.431)
Conscientiousness	0.116	(0.080)	0.121	(0.097)	0.121	(0.116)	-0.144	(0.173)
Extraversion	0.056	(0.068)	0.077	(0.069)	0.120	(0.154)	0.022	(0.100)
Agreeableness	-0.192*	(0.077)	-0.220**	(0.078)	-0.340*	(0.146)	-0.461*	(0.205)
Age at first birth			0.022	(0.136)	-0.016	(0.241)	0.010	(0.357)
$(\text{Age})^2/1000$			-0.556	(2.270)	-0.022	(4.163)	-1.088	(6.007)
University degree			0.651**	(0.191)	1.132**	(0.370)	1.116+	(0.640)
No degree			0.173	(0.181)	0.286	(0.245)	0.529	(0.651)
Experience			-0.028	(0.022)	-0.030	(0.043)	-0.085	(0.066)
log(Prior wage)			0.563**	(0.158)	0.927**	(0.351)	1.991**	(0.479)
log(Other income)			-0.650**	(0.124)	-1.079**	(0.321)	-1.419**	(0.160)
Partner in HH			0.512*	(0.242)	1.125*	(0.527)	1.232**	(0.384)
Other adults in HH			0.519	(0.545)	1.312+	(0.687)	1.995**	(0.595)
2^{nd} child w/in 3 yrs			-0.456**	(0.151)	-0.605**	(0.190)	-1.419**	(0.459)
East Germany			0.608**	(0.217)	0.633**	(0.234)	1.255**	(0.444)
Migration background			-0.160	(0.308)	-0.288	(0.355)	-0.351	(0.282)
Health			0.117	(0.079)	0.169	(0.153)	0.423	(0.335)

Table continues..

Continued Table 2.3

	(1)		(2)		(3)		(4)	
	coeff	se	coeff	se	coeff	se	coeff	se
Year dummies	Yes		Yes		Yes		Yes	
_cons	-4.130**	(0.354)	-1.418	(2.168)	1.581	(3.836)	2.843	(6.313)
z_1	4.390**	(0.260)	4.393**	(0.668)	0.020	(0.318)	8.618**	(0.702)
p_1	-1.829**	(0.169)	-1.977**	(0.380)	0.578	(0.721)	-0.785**	(0.218)
z_2					4.779**	(0.436)	2.416**	(0.502)
p_2					-0.949	(0.578)	0.116	(0.195)
z_3							-1.066**	(0.278)
p_3							0.826**	(0.201)
Log likelihood	-2198.61		-2128.44		-2124.10		-2112.18	
AIC	4441.22		4356.87		4352.19		4332.36	
BIC	4608.74		4737.60		4748.14		4743.54	

Note: Standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. N = 14981 person-month observations from 695 individuals. Source: SOEP 1994–2007, author's calculations.

To account for unobserved heterogeneity two mass points are included in the models in column 1 and 2. To test for this specification, the model is re-estimated twice allowing for three and four mass points (column 3 and 4, respectively). The signs and significance levels of most coefficients are similar to those in the reference model in column 2. However, the standard errors of all coefficients are larger and not all mass points are significantly different from zero. The information criteria do not unambiguously point to an improvement of the model. Finally, I refer to model 2 as the main model containing the most reliable results.

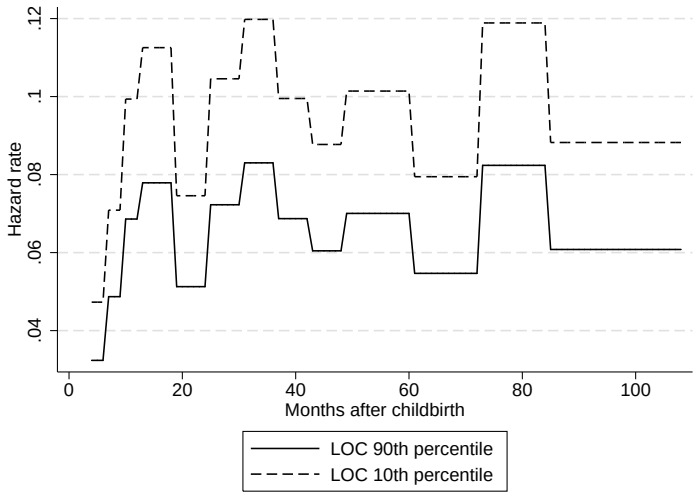
The proportional hazard model implies that the effects of the covariates on the hazard rate are proportional and do not depend on the duration j. Hence, a one-standard deviation decrease in the LOC score (decrease by 0.592 points, i.e. moving to a more internal LOC) leads, *ceteris paribus*, to an increase in the hazard rate to return by 16 percent according to the results in column 2 of Table 2.3. Moving from the 90th percentile of LOC to the 10th percentile increases the hazard rate by 47 percent.

To illustrate the result, Figure 2.1 plots the hazard functions for two individuals who are equal in all characteristics except LOC. The non-binary covariates other than LOC are set to their mean and the (sets of) dummy variables are set to their modal value, that is, vocational degree, having a partner, no other adults in the household, living in West Germany, no migration background, no second child within three years. Changing these covariates would not change the pattern of the graph but only rescale it—due to the proportional hazards feature of the model. The solid line in the graph relates to a person with high external LOC (90th percentile), the dashed line

to a person with low LOC (10th percentile). The solid line is always below the dashed line, thus illustrating that a person with high external LOC is less likely to return to employment in each period, given that she has not returned until that period.

The step pattern of the graph is a result of modeling the duration dependency by groups of months, as discussed in Section 2.4. The first peak of the hazard function is at the time span of months 13 to 18 suggesting that there is a relatively high probability of returning to employment in the first half of the second year after childbirth. The second peak is observed in the graph during months 31 to 36, that is, in the second half of the third year after childbirth. This is plausible as the legal right to return to the previous job vanishes after three years and many women return before their time is up. The last peak of the hazard function is observed when the child is six years old, which is the usual school entry age in Germany. The irregular pattern of the hazard function confirms the importance to model duration dependency non-parametrically.

The result can likewise be illustrated by survival functions. Figure 2.2 plots the survival functions for two individuals with 90th-percentile LOC (solid line) and 10th-percentile LOC (dashed line), respectively. The former is always above the latter, thus indicating that a mother with a highly external LOC is more likely to "survive", i.e., to remain out of the labor force, until a given point in time than a person with a more internal LOC. The probability to return to employment within twelve months after childbirth, for instance, is 37 percent for a woman with a LOC score at the 90th percentile, while it

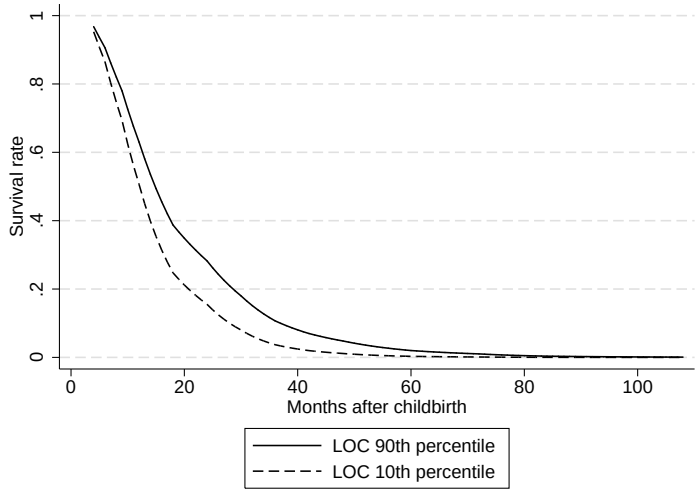


Note: The estimated parameters of model 2 of Table 2.3 are used to calculate the hazard functions. All non-binary covariates other than LOC are set to their mean, the (sets of) dummy variables are set to their modal value, that is, vocational degree for education, having a partner, no other adult living in the household, living in West Germany, no migration background, no second child within three years.

Figure 2.1: Hazard function by level of LOC

is 49 percent for a woman with a LOC score at the 10th percentile.[12] The median return time for a woman with a LOC score at the 90th percentile is estimated to be 15 months, while the median return time for a woman with a LOC score at the 10th percentile is 13 months.

The finding confirms the expectation that women with a more internal LOC will return to employment more quickly. This might be due to their greater willingness to invest in human capital or to their lower perceived work–family conflict and greater resoluteness when looking for solutions to combine work and family.



Note: The estimated parameters of model 2 of Table 2.3 are used. The covariates other than LOC are set analogously to Figure 2.1.

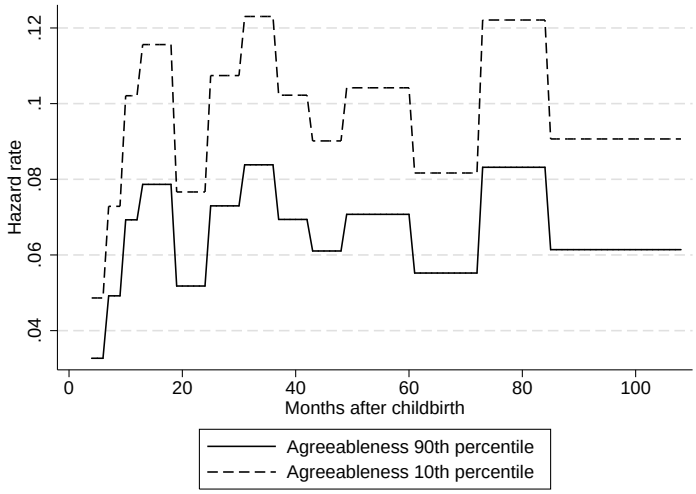
Figure 2.2: Survival function by level of LOC

Concerning the Big Five personality traits, the results in Table 2.3 suggest that highly agreeable women delay their return to employment longer than

[12]The numbers appear fairly high; however, recall that the sample is not representative for all mothers as it includes only women employed prior to childbirth and excludes women who enter unemployment or education after childbirth.

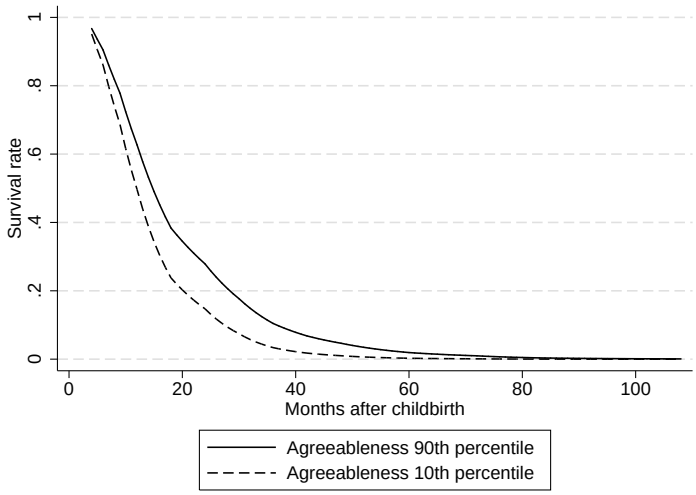
less agreeable women. A one-standard deviation decrease in the Agreeableness score (decrease by 0.705 points) leads, *ceteris paribus*, to an increase in the hazard rate by 17 percent according to the estimates in column 2 of Table 2.3. Moving from the 90th percentile of Agreeableness to the 10th percentile increases the hazard rate by 50 percent. Analogously to the effect of LOC, the effects of Agreeableness on the hazard and survival functions are illustrated in Figures 2.3 and 2.4, respectively. A person with high Agreeableness (90th percentile) always has a lower hazard rate and a higher survival rate than an otherwise identical person with a low score on Agreeableness (10th percentile). The probability to return to employment within twelve months after childbirth is 37 percent for a person with an Agreeableness score at the 90th percentile, while it is 50 percent for a person with an Agreeableness score at the 10th percentile. The median return time for a person with an Agreeableness score at the 90th percentile is 15 months while for a person with an Agreeableness score at the 10th percentile it is 12 months.

Since I do not control for cognitive ability directly (as there is no measure for it in the data set), one could argue that the noncognitive measures pick up the effect of cognitive ability (Coleman and DeLeire 2003). Cognitive ability is rewarded on the labor market and the (expected) wage decreases the duration of the child-related leave. However, since I control for the wage earned prior to childbirth, this potential bias effect is minimized.



Note: The estimated parameters of model 2 of Table 2.3 are used. The covariates other than Agreeableness are set analogously to Figure 2.1.

Figure 2.3: Hazard function by level of Agreeableness



Note: The estimated parameters of model 2 of Table 2.3 are used. The covariates other than Agreeableness are set analogously to Figure 2.1.

Figure 2.4: Survival function by level of Agreeableness

2.5.2 Robustness tests

In a first series of robustness tests the model is estimated with a parametrically specified random effect. Given that the hazard function is

$$h(j, X) = 1 - \exp[-\exp(\gamma_k D_k + \beta' X + u)]$$

where u is an individual effect and $u = log(v)$, I estimate the model first with v Gamma distributed, second with u Normal distributed with mean zero, and third with $u = 0$, that is, without any random effect. The results of the three estimations are reported in Table 2.4. Note that there is no change in the signs and significances compared to the main model in column 2 of Table 2.3. However, the magnitudes differ; the coefficients are much larger when u is assumed to be Normally distributed and slightly smaller when no random effect is assumed to exist. Finally, assuming no specific parametric distribution for the random effect as is done in the main model is the most flexible and therefore the preferred specification.

A number of further specifications are estimated in order to check the robustness of the results. First, an explanation for the above findings could be that women with certain noncognitive traits select themselves into specific job types—e.g., civil service or self-employment—and that these job types are, at the same time, more compatible with a longer or shorter leave. If this is the case, then the noncognitive traits would not directly affect the decision to return to employment but rather indirectly through the choice of the job type. To check for this possibility, I introduce into the model a set of variables characterizing the job type occupied prior to childbirth; these are civil ser-

Table 2.4: Estimation of the duration until return to employment: discrete semi-parametric hazard estimation with distributional assumption for the random effect

	(1) v Gamma distributed		(2) u Normal distributed with mean zero		(3) $u = 0$ (no random effect)	
	coeff	se	coeff	se	coeff	se
External LOC	-0.290*	(0.121)	-0.688**	(0.252)	-0.223**	(0.084)
Neuroticism	0.121	(0.097)	0.294	(0.199)	0.089	(0.074)
Openness	-0.035	(0.095)	-0.144	(0.193)	-0.032	(0.067)
Conscientiousness	0.095	(0.096)	0.243	(0.199)	0.093	(0.075)
Extraversion	0.093	(0.093)	0.250	(0.193)	0.070	(0.064)
Agreeableness	-0.215*	(0.102)	-0.454*	(0.209)	-0.170*	(0.076)
ln_varg	-0.395	(0.470)				
lnsig2u			2.438**	(0.193)		
Log likelihood	-2160.78		-2138.23		-2163.85	

Note: All models include the same control variables as model 3 of Table 2.3 though not all coefficients are reported here. Standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. N = 14981 person-month observations from 695 individuals. Source: SOEP 1994–2007, author's calculations.

vant, self-employed, white collar worker (reference category), and blue collar worker. Additionally, working hours categories are introduced; these are full-time (reference category), part-time, and marginal hours. The results with the additional covariates are reported in column 1 of Table 2.5. Although it emerges that some of the variables have additional predictive power—self-employed women appear to return to employment more quickly—the main results remain stable.

Second, I argued before that the finding that individuals with an internal LOC return to employment more quickly might be due to their greater willingness to invest in human capital and their greater resoluteness when looking for solutions to combine work and family and lower perceived work–family conflict. However, as discussed in Section 2.2, another explanation for the finding could be that individuals with a more internal LOC search

more intensively for a job and therefore return more quickly to employment (Caliendo et al. 2010). Also, certain noncognitive traits might be rewarded on the labor market such that women with these traits will more easily find a new position after their period of child-related leave. However, since mothers in Germany are usually entitled to return to their previous job within three years after childbirth, the explanation is only applicable for women who are not able to return to their previous job position. This is the case for women who had temporary jobs and whose contracts expired during the time of leave.[13] If the alternative explanation is the only reason for the finding, removing all individuals who had a temporary job prior to childbirth from the sample would eliminate the effects of the noncognitive traits on the hazard. This is tested by estimating a model that includes only individuals who were employed on a permanent basis prior to childbirth and only for the initial 3-year period after childbirth. The results of the estimation are reported in column 2 of Table 2.5. Although the sample is reduced to 7,325 person-month observations from 490 individuals, the results remain largely robust and similar in magnitude compared to the main model.

A third robustness test refers to the concern of endogeneity of the noncognitive traits with childbirth. So far, I assume that the noncognitive traits are constant over time for each individual. This is necessary because the Big Five personality traits and the LOC were surveyed in the 2005 wave of the SOEP. However, it is possible that mothers of children with special characteristics, like poor health, may become more external in their LOC

[13]However, in some jobs mainly in the public sector, one can add the time of leave to the end of a temporary contract.

and, at the same time, extend their leave. Dunkelberg and Spiess (2007), for example, found that women's labor supply is correlated with their children's health conditions. This would bias my results. This is an issue because most births in the sample occur before 2005 and thus the noncognitive traits are surveyed in most cases when the child is already born. Therefore, it cannot be excluded that the characteristics of the child affect both the noncognitive traits and the time until return to employment.

To check for this bias, at least with respect to LOC, I use a LOC version from the 1999 wave of the SOEP, when the same items as in 2005 were surveyed, but with a 4-point scale instead of a 7-point scale. In the robustness test, I substitute the 2005 LOC with the 1999 version of the LOC and only include in the sample those women who had their first child after 1999. This is to ensure that the characteristics of the child do not influence the LOC score. The reduced sample contains only 4,662 person-month observations from 288 individuals. Unfortunately, the small sample size prevents estimation of the above mixed model. Instead I estimate a model with v Gamma distributed as it is shown above to produce similar results. The Big Five personality traits are not included in the estimation since this would reduce the sample to an even smaller size. Also, it would bias the results as the Big Five traits were only surveyed in 2005, which for most women is after their first childbirth. However, it is tested and found that removing the Big Five personality variables from the main model does not substantially change the estimated effect of LOC on the hazard rate.

Table 2.5: Estimation of the duration until return to employment after first childbirth: discrete semi-parametric hazard estimation—robustness tests

	(1)		(2)		(3)		(4)		(5)		(6)	
	coeff	se	coeff	se	coeff	se	coeff	se	coeff	se	coeff	se
External LOC	-0.400*	(0.156)	-0.263*	(0.119)			-0.228+	(0.118)	-0.298*	(0.117)	-0.168*	(0.074)
External LOC 99					-1.043**	(0.389)						
Neuroticism	0.196	(0.173)	0.133	(0.116)			0.025	(0.098)	0.166+	(0.093)	0.063	(0.065)
Openness	-0.147	(0.183)	0.019	(0.106)			0.071	(0.095)	-0.058	(0.124)	0.007	(0.062)
Conscientiousness	0.091	(0.099)	0.011	(0.132)			0.182*	(0.089)	0.116	(0.092)	0.130*	(0.066)
Extraversion	0.161	(0.117)	0.100	(0.083)			0.004	(0.079)	0.098	(0.094)	0.104+	(0.059)
Agreeableness	-0.238*	(0.100)	-0.310**	(0.110)			-0.300**	(0.092)	-0.206+	(0.108)	-0.169*	(0.070)
Part-time	-0.273	(0.247)										
Marginal hours	-0.773	(0.637)										
Civil servant	0.047	(0.268)										
Self-employed	1.603**	(0.615)										
Blue-collar	-0.328	(0.214)										
Partner's LOC							-0.010	(0.026)				
Partner's Neuro							0.038	(0.030)				
Partner's Open							-0.023	(0.034)				
Partner's Consc							-0.021	(0.031)				
Partner's Extra							0.005	(0.028)				
Partner's Agree							0.029	(0.033)				
Log likelihood	-2149.54		-1201.04		-782.48		-1724.01		-2467.30		-2840.03	
No. pers-mon obs	14981		7325		4662		12226		19312		23570	
No. individuals	695		490		288		539		781		952	

Note: In all models but (3) the unobserved effect is accounted for by a discrete mixture distribution; model (3) incorporates the unobserved effect by v Gamma-distributed. All estimations contain the same control variables as model 3 of Table 2.3. Standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

The results using the 1999 LOC are reported in column 3 of Table 2.5.[14]. The coefficient related to LOC is negative and significant as in the main model; only the magnitude of the effect is much larger but with a higher standard error due to the reduced sample size. The test shows that the previously estimated effects are unlikely to be due to an endogeneity effect resulting from child characteristics.

A fourth robustness test addresses the assortative mating of partners. One can think of partners matching systematically according to certain patterns of personality traits. Also, the traits of the partner might play a role for the labor supply of women. Rammstedt and Schupp (2008) and Botwin et al. (1997) found that there is assortative mating based on Agreeableness, Conscientiousness, and Openness to Experience, while less on Extraversion and Neuroticism. Little et al. (2006) found that the correlations between partners were significant for Conscientiousness, Openness to Experience and Neuroticism but not for Extraversion and Agreeableness. Even though assortative mating is found to be rather modest for most personality traits compared to other characteristics like educational level and religious affiliation (Hur 2003), I address the issue of potential bias due to assortative mating by including the partners' noncognitive traits as additional covariates in the estimation model. Since only women with a partner and whose partners' noncognitive traits are observed in the data can be included in the estimation, the sample size decreases to 525 individuals. The results are reported in column 4 of Table 2.5. No significant effect of the partners' noncognitive traits can be

[14]The results of a model with u Normal distributed and a model without random effect are not much different.

identified. The effects of the women's LOC and Agreeableness are largely the same as in the main estimation. In addition, the trait Conscientiousness appears to be significant in this estimation, pointing to conscientious mothers returning to employment more quickly.

The last two estimations are to test the robustness with respect to the selection of the sample. In column 5 of Table 2.5 the sample is enlarged by including also women who enter unemployment or education at some stage after childbirth and before a transition to employment is observed or before censoring occurs. The effects of LOC and Agreeableness are again similar to the main model. In addition the effect of Neuroticism is significant at the 10% level in this specification.

Column 6 of Table 2.5 gives the results of an estimation with an enlarged sample including women who were not employed prior to childbirth but were in education (57), unemployed (36), not participating (32), or for whom the information on employment status prior to childbirth is missing (53). The control variable wage is dropped from the model since it is, naturally, not available for individuals who were not employed. The estimated effects of LOC and Agreeableness on the hazard rate are again largely similar, although slightly smaller in absolute size. In addition, the coefficients of Conscientiousness and Extraversion turn into significant positive effects in this enlarged sample.

2.6 Conclusion

The present study investigates the effect of noncognitive traits on the duration of mothers' leave after first childbirth. Using data from the SOEP, I estimate a discrete semi-parametric survival model incorporating a discrete mixture distribution to summarize unobserved individual heterogeneity. The results indicate that women with high belief in external control and agreeable women delay their return to employment longer than women with lower scores in these traits.

The finding for LOC are explained by the fact that individuals with an internal LOC are more likely to invest in labor market experience as they expect higher returns in terms of future earnings (Coleman and DeLeire 2003). An alternative explanation would be that women with an internal LOC are more likely to make an effort to find a solution to reconcile work and family life as they are confident that a solution will be found and as they perceive lower work–family conflict (Noor 2002). The finding for the trait Agreeableness is consistent with the expectation that agreeable women tend to be altruistic towards spouses and other people, thusly they are more likely to set aside their own career ambitions. Another explanation for the relationship is that agreeable women tend to avoid the work–family conflict and are more inclined to adapt to traditional social norms of family patterns.

The analyses in this chapter contribute to understanding the impact that individual traits other than cognitive abilities have on economic outcomes. Although there are no direct policy implications from this finding, it is important to understand the mechanisms influencing maternal decisions before

designing policy measures. Preferences differ between women and political decision makers should allow for different options.

Furthermore, noncognitive traits are not determined from birth but develop during adolescence and young adulthood more than cognitive skills (Cunha and Heckman 2007, 2008). A number of surrounding factors like education (Heckman et al. 2006) influence the development of noncognitive traits. It is easy to imagine, for example, that education contributes to people developing a more internal LOC. Beyond the acquisition of qualifications and its signaling effect, schooling can influence a number of noncognitive skills. Hence, it is interesting to understand the effect these skills have on later outcomes like labor supply decisions of mothers.

Appendix

Table 2.6: Cross-correlations between measures of noncognitive skills

	External LOC	Neuroticism	Openness	Conscientiousness	Extraversion	Agreeableness
External LOC	1.000					
Neuroticism	0.294	1.000				
Openness	-0.130	-0.105	1.000			
Conscientiousness	-0.135	-0.113	0.198	1.000		
Extraversion	-0.206	-0.241	0.380	0.221	1.000	
Agreeableness	-0.132	-0.149	0.168	0.320	0.136	1.000

Note: N = 695 individuals. Source: SOEP 1994–2007, author's calculations.

Table 2.7: Variable definitions

Variable	Definition
Socio-economic and demographic characteristics	
Age first birth	Age at first childbirth
Educational degree	
University	Indicator variable equal to one if the highest educational degree is a university degree (*Universität, Hochschule, Fachhochschule*)
Vocational	Indicator variable equal to one if the highest educational degree is a vocational degree (*Berufsausbildung, Lehre*) (Omitted category)
No degree	Indicator variable equal to one if the person has no professional degree, i.e., neither a university degree nor a vocational degree
Noncognitive traits	
External LOC	*Locus of Control*: Average of the standardized answer scores of the five related items given in Table 2.1; a high value reflects strong belief in external control of reinforcement
Neuroticism	Big Five personality trait *Neuroticism*: Average of the standardized answer scores of the three related items given in Table 2.1
Openness	Big Five personality trait *Openness*: Average of the standardized answer scores of the three related items given in Table 2.1
Conscientiousness	Big Five personality trait *Conscientiousness*: Average of the standardized answer scores of the three related items given in Table 2.1
Extraversion	Big Five personality trait *Extraversion*: Average of the standardized answer scores of the three related items given in Table 2.1
Agreeableness	Big Five personality trait *Agreeableness*: Average of the standardized answer scores of the three related items given in Table 2.1
log(Other income)	Natural logarithm of the inflation-adjusted (to the base year 2001) net household income net of own labor earnings, in Euros per month

Table continues..

Continued Table 2.7

Partner in HH	Indicator variable equal to one if the women is living with a partner in the same household
Other adults in HH	Indicator variable equal to one if one or more other adults (apart from a partner) are living in the same household
East Germany	Indicator variable equal to one if the woman lives in East Germany (former German Democratic Republic)
Migration background	Indicator variable equal to one if the women has a migration background
Health	Health status on a self-rated scale taking on values from 1 (bad) to 5 (very good)
2^{nd} child w/in 3 yrs	Indicator variable equal to one if the woman has a second child within four years after the first childbirth
log(Prior wage)	Natural logarithm of the inflation-adjusted (to the base year 2001) gross hourly wage before childbirth, in Euros (only for women who were employed prior to childbirth)
Experience	Number of years of labor market experience prior to childbirth
log(Prior wage)	Natural logarithm of the inflation-adjusted (to the base year 2001) gross hourly wage before childbirth, in Euros

Chapter 3

The Effect of Non-Participation and Part-Time Employment on Maternal Life Satisfaction

3.1 Introduction

There is a large and growing literature in economics on the determinants of subjective well-being.[1] In particular, many economists have investigated the impact of unemployment on happiness measures such as life satisfaction and typically found a substantial negative effect. The reason for this is that unemployed individuals do not choose to be unemployed but their status is the result of a lack of demand for their labor force. Unemployed persons are prevented from adopting their preferred employment status and, therefore,

[1]For a general survey on happiness research in economics and other disciplines, see, for example, Di Tella and MacCulloch (2006), Dolan et al. (2008), Frey and Stutzer (2002b,a), Kahneman et al. (1999), Layard (2005), Van Praag and Ferrer-i Carbonell (2004).

experience a deterioration of subjective well-being. The consequences of unemployment have been found to have a harmful impact on happiness even when income is kept constant, that is, even the pure non-pecuniary effect of unemployment on life satisfaction is negative. In other words, even when the income of a person becoming unemployed was fully compensated, his or her happiness would decrease. Some well-known empirical studies in this field are Clark (2003, 2006), Clark and Oswald (1994), Winkelmann and Winkelmann (1998).

In this chapter, I argue that labor market non-participation and part-time employment might also be involuntary for some individuals. Specifically, in Germany this is the case for many mothers who do not manage to reconcile (full-time) employment with parenthood. This means that many mothers are not able to take up employment (non-participating mothers) or increase their working hours (mothers employed part-time) though some of them might wish to do so. One of the reasons for this situation is insufficient appropriate childcare and full-day school availability. Mothers who face family constraints in this way are expected to experience a deterioration of life satisfaction in a similar way as has been found for unemployed. The purpose of this study is to investigate empirically whether (a) many mothers face such constraints and are therefore out of the labor force or in part-time employment and (b) whether this leads to a substantial deterioration of life satisfaction.

Using data from the SOEP, I reveal that a large share of women with children under the age of 14 years do not participate in the labor force because of family reasons, while another substantial proportion are in part-time employment. Estimating fixed-effects models and controlling for an extensive

set of socio-economic and demographic characteristics, the results are as follows: first, mothers who are out of the labor force due to family reasons and mothers in part-time employment are significantly less happy than mothers in full-time employment. Second, it is found that both the pecuniary effects (forgone earnings) and the non-pecuniary effects (psychological costs) play a substantial role. Third, the effects are particularly harmful for mothers in low-income households and for mothers who are afraid of poor job opportunities. Overall, the issue of family-related non-participation and part-time employment is revealed to have more harmful consequences (in terms of effects on happiness) for mothers than unemployment. The findings provide an important argument in favor of policies that support parents wishing to combine employment and family.

The chapter is organized as follows: Section 3.2 discusses why parenthood represents a serious constraint on the employment decisions of many mothers in Germany. Section 3.3 provides an overview over previous studies in the field of non-participation, part-time employment, and life satisfaction and outlines the contribution of this study to the literature. Section 3.4 presents the data and some descriptive evidence. Section 3.5 presents and discusses the results. Section 3.6 concludes.

3.2 Background

Many mothers in Germany face family constraints which prevent them from taking up employment or from working more hours though they may wish to

do so.[2] One of the most prominent factors in the context of family constraints on maternal employment is the relatively poor availability of childcare, particularly for children under the age of 3 and for schoolchildren. Schoolchildren in Germany traditionally only attend classes during the morning and many schools do not even provide lunch for their students.[3] Most children between 3 and 6 years attend a daycare center, however in most cases they only attend for half a day.[4] The overall poor availability of daycare for children—particularly in West Germany—has often been criticized, e.g., by the OECD (2004). A recent study by Wrohlich (2008) has shown that the poor childcare availability is not due to a lack of demand but to a restricted supply policy. In assessing the demand for and the supply of subsidized childcare in Germany, the author found that more than 50 percent of children aged 0–3 years and about ten percent of children aged 4–6 years were waiting for a childcare place. This was found even without taking into account the excess demand for full-time daycare by children who are already in part-time care. A survey undertaken by the Forsa-Institute (2004) highlights the same problem, revealing that for 32 percent of parents with children under 14 years it is/was very hard to find a daycare place for their child.

This excess demand for childcare is a result of the German childcare system. There is no free entry into the childcare "market" since municipalities

[2]The reason for focusing on mothers rather than on fathers is that it is empirically proven that in Germany it is still mostly the woman rather than the man who is the child's main caregiver and who withdraws from the labor market or reduces working hours if necessary.

[3]For more information on the half-day schooling system in Germany see, for example, Beblo et al. (2005), Gottschall and Hagemann (2002), Radisch and Klieme (2003).

[4]A detailed description of current childcare usage in Germany by age, childcare hours, and state is provided by Spiess et al. (2008).

decide on the funding, the regulation, and the market entrance, and, furthermore, are themselves providers of daycare services. Private for-profit providers (as opposed to non-profit providers which are highly regulated) are almost nonexistent on the German childcare market and provide only about one percent of the total number of all daycare places. Furthermore, the predominantly supply-oriented funding system has not provided adequate incentives for providers to design their services according to parental needs (e.g., concerning opening hours).[5] The inflexibility of opening hours also contributes to the serious constraints experienced by many parents in their employment decisions.[6]

Given the German institutional setting, the question of availability of childcare plays a more important role in the context of employment decisions made by parents than the cost of daycare, which might have an impact in other countries (see, e.g., Connelly 1992, Powell 1997, Ribar 1995). Empirical studies on Germany have actually found a link between the local availability of daycare and maternal labor supply: based on SOEP data, Spiess and Büchel (2003) found a positive association between the local availability of childcare places (places in the so-called *Kindergarten*) and the proportion of full-time places among them, on the one hand, and employment levels among women with children aged 3–6 years, on the other hand. Beblo et al. (2005), analyzing the labor supply of mothers with school children, found a positive association between the local availability of full-day schools and

[5]Some German states have already changed to a demand-oriented funding system; prominent examples are Hamburg and Berlin (Spiess 2008).

[6]A current and detailed overview of the German childcare system is provided by Spiess (2008).

maternal employment. Both studies suggest that childcare is an important constraint on mothers' employment behavior. This is also consistent with a recent survey conducted by the Forsa-Institute (2008), in which 44 percent of mother-respondents stated that they would have liked to work (more hours) but the current childcare situation did not allow them to do so.

Apart from childcare availability, there are also other factors that influence whether a mother is actually able to reconcile (full-time) employment and family. Those are, for instance, whether she or her partner has the possibility of following a flexible working schedule or of working from home and whether they have access to informal childcare options. The latter largely depends on their social networks (relatives, friends, neighbors); support from a nearby grandmother frequently plays an important role in this context (see, e.g., Attias-Donfut et al. 2005). Finally, whether a mother is actually able to work (the number of hours she wants to) depends on a complex range of factors, and, furthermore this situation may alter over time for each individual as the number and age of children and surrounding conditions change. If a mother would prefer to work but cannot reconcile employment and family, she is likely to experience decreased life satisfaction. The same would be true for part-time mothers who would prefer to work full-time. The question is addressed empirically in this chapter of the thesis.

3.3 Previous evidence and present study contribution

The large body of literature in the field of employment status and subjective well-being deals with the impact of unemployment on life satisfaction. Empirical studies found substantial negative effects which are typically attributed to a reduction in the social networks and self-esteem usually provided by employment (see, e.g., Clark 2003, 2006, Clark and Oswald 1994, Winkelmann and Winkelmann 1998). Even though Winkelmann and Winkelmann (1998, p. 6) conclude that "it is 'joblessness' that matters, not just unemployment", there is much less empirical evidence on the relationship between non-participation and subjective well-being, and findings are ambiguous. In this section, only studies applying panel methods are cited because only these studies control for individual heterogeneity, which has been found to be highly important in the context of subjective well-being (see Ferrer-i Carbonell and Frijters 2004).

Analyzing data from the SOEP, Winkelmann and Winkelmann (1998) found that non-participation is negatively related to men's life satisfaction. Concentrating on couple families in Australia, Booth and van Ours (2009) arrived at the same conclusion for males. Moreover, the authors concluded that there is a gender difference, as they found that women are happier in non-employment (including non-participation as well as unemployment) than in full-time employment. In contrast, analyzing British panel data, the same authors found different results depending on the parental status of a couple (Booth and van Ours 2008). Their results suggested that mothers

and fathers who work full-time are more satisfied than non-working parents. For childless women and men, however, they found no significant impact of employment, as compared to non-employment, on life satisfaction.

Evidence for the relationship between part-time employment and subjective well-being is also rather ambiguous. Using data from the SOEP, Meier and Stutzer (2008) found an inverse U-shaped relationship between working hours and life satisfaction with maximum satisfaction experienced at 44 working hours per week. This would suggest that individuals in part-time employment are less happy than individuals in full-time employment. Using a sample of employed individuals from the BHPS, Bardasi and Francesconi (2004) found no significant relationship between part-time work and life satisfaction, neither for men nor women. The findings of Booth and van Ours (2009), however, suggest that part-time employed women are more satisfied with their lives than full-time employed women, while men are happier in full-time employment. In contrast, Booth and van Ours (2008) came to the conclusion that both women and men with children are happier in full-time than in part-time employment. For childless individuals, they found no significant effect.

This paper contributes to the existing literature with the following: firstly, I differentiate between unemployment and non-participation and further, within the group of non-participants, I distinguish between family-related non-participation, labor market related non-participation (discouraged workers), and those individuals who do not intend to enter employment. This allows me to analyze the specific impact of family-related non-participation on mothers' life satisfaction. As to my knowledge, this is the first paper

investigating this issue.

Secondly, I analyze both the pecuniary and the non-pecuniary effect of non-participation and part-time employment on happiness. All previously cited studies estimate only the pure non-pecuniary effects by including the total household income as a control variable in their models. Since individuals' own labor earnings are part of the total household income, the latter is endogenous in employment status. Since a mother who does not manage to combine (full-time) employment with family life, although she would like to, has to bear both the non-pecuniary (psychological) as well the pecuniary consequences (foregone earnings). Both effects are of interest in this analysis. For this purpose, I begin by estimating the total effect using the *residual* household income (total household income net of own labor earnings) as a control variable in my estimation models. At a further stage of the analysis, the residual household income is substituted by the total household income and, thus, I am able to estimate the pure non-pecuniary effect, which can then be compared with the non-pecuniary effect of unemployment on life satisfaction estimated by previous studies.

3.4 Data and descriptive evidence

Using data from the SOEP, I include data for the years from 1994 to 2007,[7] and restrict the sample to mothers of working age (20 to 65 years) who are neither in education nor retired and who have at least one child younger than

[7]Data for the years before 1994 is not included because some socio-economic variables (namely whether an individual is actively looking for work, self-reported health, and disability) are missing from the earlier waves. Also, data for East Germany is only available from 1992 on.

14 years.[8] The resulting sample is an unbalanced panel comprising 28,429 person-year observations from 5,706 individuals.

3.4.1 Life satisfaction

For measuring subjective well-being, I use an 11-point score of life satisfaction, based on the SOEP question "How satisfied are you with your life, all things considered?". Respondents were instructed to choose a number ranging from 0 (completely dissatisfied) to 10 (completely satisfied). The mean for this sample is 7.05, the modal response score is eight.

3.4.2 Employment status

In the first step, I define the five categories 'out of labor force', 'short part-time employment' (1–19 weekly working hours), 'long part-time employment' (20–34 weekly working hours), 'full-time employment' (35 or more weekly working hours), and 'unemployment'. Unemployment is defined according to ILO norms.[9] 39 percent of the mothers in the sample are out of the labor force, 37 percent are employed part-time, 18 percent are employed full-time, and seven percent of the women in the sample are unemployed (see Table 3.1).[10]

[8]This age group is chosen because children of around this age are supposed to require (at least some) daytime care. This is also the age range for which the German Youth Institute (DJI) collects data on childcare usage.

[9]According to the ILO definition, an individual is considered unemployed if he/she (1) reported not to be in gainful employment or self-employment at the time of the interview, (2) had actively sought work during the four weeks prior to the date of the interview, and (3) is available for work within the next two weeks.

[10]The figures refer to person-year observations. The proportions are roughly in line with the official statistics of the German Microcensus from the Federal Statistical Office, according to which, in 2007, 37 percent of women with children under the age of 15 are out

Table 3.1: Employment status of mothers with children under 14 years

	Observations	Percent
Out of labor force		
Family reasons	6,293	22.14
Labor market reasons	1,865	6.56
No intention to work	2,787	9.80
Short part-time employment	4,223	14.85
Long part-time employment	6,163	21.68
Full-time employment	5,137	18.07
Unemployment	1,961	6.90
Total	28,429	100.00

Source: SOEP 1994–2007, author's calculations.

In the second step, the group of non-participants is further divided into three subgroups: the first contains individuals who do not participate for family reasons, the second includes individuals who do not participate for labor market reasons (discouraged workers), and the third comprises all remaining individuals, that is, those who do not intend to work either now or in the future. These three subgroups are constructed using the SOEP questions on an respondent's intention to and availability for work. These are "Do you intend to engage in paid employment (again) in the future?" and "If someone offered you an appropriate position right now, could you start working within the next two weeks?". Those who intend to work but are not able to take up employment are assumed to have family reasons for not participating (first subgroup). For those who intend to work and are also able to start work, non-participation is apparently related to the job market situation, that is, they are defined as discouraged workers[11] (second

of the labor force, 41 percent are employed part-time, 15 percent are employed full-time, and seven percent are unemployed.

[11]This corresponds to the ILO definition of discouraged workers. The difference between discourage workers and the unemployed is that discouraged workers are not actively looking

subgroup).[12] Those who do not intend to work (and therefore are not asked to answer the question about availability for work) are summarized in the third subgroup group 'no intention to work'.[13]

The first subgroup—non-participants for family reasons—is the subgroup of interest for this study. Since these women intend to return to employment but are currently not able to take up a position even if it was offered, the job market situation (discouraged worker phenomenon) cannot be the reason for them being out of the labor force. The reason for non-participation is, therefore, most likely to be motherhood. If the majority of these women are happy to be currently out of the labor force, one should not find a detrimental correlation with life satisfaction. If, however, at least some of them are involuntarily outside the labor force, i.e., would prefer to be employed if they could reconcile it with their motherhood, one would expect to find a negative association with life satisfaction. One other potential explanation as to why a mother would be in this subgroup, could be that she currently has severe health problems and, therefore, reports not to be able to take up employment even if a job was offered. Since health conditions are likely to affect happiness, this would then bias the results. However, health status is

for work.

[12]The reason for being a discouraged worker could, theoretically, also be related to motherhood. This might be the case if a mother left the labor market to raise children and subsequently, due to the long period of non-employment, becomes a discouraged worker. This can, however, only be speculation and, therefore, I focus on the first subgroup for this study.

[13]Unfortunately, there is no explicit information available in the data set as to *why* an individual does not participate in the labor force. Also, while it is documented whether a child is enrolled in a daycare institution, there is no information on whether a child who is not in care actually applied for a childcare place but was not accepted, or whether a child was offered only half-day care where full-day care was needed. This would provide the researcher with more precise information on whether family constraints actually prevent a mother from entering gainful employment.

included in the estimation models as a control variable and, furthermore, a robustness test, discussed below, shows that the findings are not affected by a health bias.

The frequency distributions of the three non-participation subgroups as well as the other employment status types are presented in Table 3.1. Note that a large proportion of mothers (22.14 percent) are out of the labor force due to family reasons. Within an equivalent sample of childless women,[14] only two percent would be classified in this group, i.e., reported not to be able to take up employment even if an appropriate job was offered. For these few childless women, the reason for not being able to work is mostly related to health problems, care for an elderly person, or pregnancy: twelve percent of the childless women who reported not to be able to take up employment are disabled, 33 percent have bad or very bad health, six percent live in the same household as a person in need of care, and 17 percent are expecting a child in the coming year. Among the sample of mothers who are currently not able to enter employment, these figures are much lower: one percent (disability), eight percent (bad health), two percent (living in the same household as a person in need of care), and eight percent (expecting a child in the coming year), respectively. For mothers, these characteristics are very similar for both non-participants and those in employment, while for childless women the aforementioned characteristics differ remarkably between non-participants and women in employment (cf. Table 3.8 in the Appendix).

It would be interesting to divide the group of part-time employed mothers

[14]With "an equivalent sample of childless women" I refer to a sample of women from the same SOEP-waves (1994-2007), same age group (20-65 years), and same selection conditions (not in education, not retired), who do not have a child younger than 14 years.

in an analogous way to the group of non-participating women (i.e., according to their intention and ability to take up a full-time job) in order to differentiate between family reasons, job market reasons (no appropriate full-time job found), and general preferences for part-time employment. Unfortunately, it is not possible to differentiate within the group of part-time employed women in this way because part-time employed respondents in the SOEP are not asked about their ability to take up full-time employment if a full-time job was offered.[15]

3.4.3 Control variables

In order to analyze the effect of non-participation and part-time employment on life satisfaction in a multiple regression model, I introduce a number of socio-economic and demographic characteristics that are likely to be correlated with employment status as well as with life satisfaction. In line with previous studies, I introduce the following covariates: (log of) net residual household income (in Euros and inflation-adjusted to the base year 2001) which is calculated as the total household income net of own labor earnings,[16] age, age squared, migration background, highest educational degree

[15]There is an SOEP question on the desired number of working hours. However, the question is posed in a way that respondents report their optimal working hours in the actual situation and not in a situation where appropriate childcare is available and other conditions are satisfied (that are in reality, currently not fulfilled). For this reason, the item is not helpful in the context of this paper.

[16]The residual household income may underestimate the counterfactual household income (meaning the income the household would have if the mother was not employed) because in some cases social benefits would replace (part of) the mother's earnings. However, this is only a problem for low-income households. If, in a robustness test, those households are dropped from the sample, the main results remain largely unchanged. The married couples-tax splitting system in Germany does not present a major problem in this context because the net labor earnings of the women are in most cases calculated in such a way that they correspond to the amount by which the household income would be lowered

(university degree, vocational degree, no professional degree), whether a person in need of care lives in the same household, disability (a binary variable taking on the value one if the woman is disabled or if, due to medical reasons, her ability to work is limited), self-rated health on a 5-point scale, the size of the municipality in which the household is located (urban area, between rural and urban area, rural area), whether the individual is self-employed,[17] whether the individual will have a child in the coming year,[18] partner status (partner in household, no partner, partner lives in a different household), the number of children younger than 14, the age of the youngest child (<1 year, 1–2 years, 3–6 years, and 7–13 years), and year dummies. Table 3.2 gives summary statistics for these covariates as well as for the life satisfaction variable.

3.5 Estimation results

3.5.1 Total effects

Column 1 of Table 3.3 gives the results of a pooled least-squares regression (OLS) of life satisfaction on employment status and the above given covariates.[19] It emerges that mothers employed full-time (reference category) are, *ceteris paribus*, most satisfied with their lives, while not participating in the

if the women were not employed (because the women are in most cases in *Steuerklasse 5*).

[17]Dropping the self-employed from the sample in a robustness check did not change the main results.

[18]It might be important to control for this since the variable is likely to be correlated with both subjective well-being and employment status. This could then establish a spurious correlation between non-participation and life satisfaction.

[19]The complete results including the coefficients of the covariates are available from the author upon request.

Table 3.2: Summary statistics of life satisfaction and control variables

	Mean	s.d.
Life satisfaction	7.049	1.698
Residual HH income	2371.4	1416.1
Total HH income	2881.2	1501.9
Age	35.95	6.411
Migration background	0.199	0.399
Education		
University degree	0.165	0.371
Vocational degree	0.629	0.483
No professional degree	0.206	0.404
Person in need of care in HH	0.017	0.131
Disabled	0.018	0.134
Self-rated health	2.369	0.819
East Germany	0.218	0.413
Size of the municipality		
Urban area	0.513	0.500
Between rural and urban area	0.349	0.477
Rural area	0.139	0.346
Self-employed	0.043	0.204
Have a child in the coming year	0.044	0.205
Partner status		
Partner in HH	0.896	0.305
Partner outside the HH	0.034	0.181
No partner	0.070	0.254
Number of children		
One child	0.330	0.470
Two children	0.434	0.496
Three or more children	0.236	0.424
Age of the youngest child		
$<$ 1 year	0.100	0.300
1–2 years	0.187	0.390
3–6 years	0.281	0.450
7–13 years	0.431	0.495

Note: 28429 person-year observations. Source: SOEP 1994–2007, author's calculations.

labor force is associated with a life satisfaction score decreased by .24 points on the 11-point satisfaction scale. Short and long part-time employment are associated with a decrease in life satisfaction by .20 and .09 points, respectively.

Psychological literature has found that individual personality traits exert a strong influence on self-reported happiness (e.g., Diener and Lucas 1999). If these unobserved personality traits also have an impact on employment status, a pooled OLS regression produces biased estimates. Concretely, if inherently unhappy individuals are more likely to be out of the labor force or to be employed part-time, the negative effects of being out of the labor force and being employed part-time on life satisfaction will be overestimated. Applying panel methods helps to remove this self-selection problem, which has been shown to be important when analyzing the determinants of subjective well-being (see Ferrer-i Carbonell and Frijters 2004). Hence, it is appropriate to employ a fixed-effects-least-squares estimation (short: fixed-effects estimation), results are reported in column 2 of Table 3.3.[20] [21]

The coefficients related to non-participation and part-time employment are still negative and significantly different from zero and are even greater in magnitude than the OLS results. This suggests that, in contrast to unemployment (where the coefficient has decreased in the FE model as compared

[20] Using this approach, only individuals observed in at least two time periods contribute to the estimation. This slightly reduces the sample to 27,542 person-year observations (4,778 individuals).

[21] An F-test confirms that unobserved individual effects exist and a Hausman specification test testing between a fixed-effects model and a random-effects model reveals that the individual effects are not random but correlated with the observed explanatory variables. Hence, a fixed-effects rather than a random-effects specification is the appropriate method to use. The results from the random-effects model are not reported here but available from the author upon request. They are very similar to the fixed-effects results.

to the OLS model), there is no self-selection into non-participation and part-time employment that would have produced spurious negative correlations with life satisfaction. In fact, mothers outside the labor force have, *ceteris paribus*, a life satisfaction score which is, on average, .28 points lower than that of mothers who are in full-time employment.

In models 1 and 2 in Table 3.3, the life satisfaction scale has been interpreted as a cardinal scale, however, strictly speaking, it is only an ordinal scale. Therefore, to check whether assuming equal distances between the scores (which is implicitly done by using the fixed-effects-least-squares approach) causes bias, I also apply a conditional estimator for the fixed-effects-ordered-logit model, which has been proposed by Ferrer-i Carbonell and Frijters (2004) and which has already been applied in the context of life satisfaction analyses by Booth and van Ours (2008, 2009), Frijters et al. (2004a,b). Results using this approach are reported in column 3 of Table 3.3. The problem with this estimation strategy is that it is not possible to calculate marginal effects and the magnitude of the coefficients cannot be interpreted.[22] However, note that the signs and significances and even the relative magnitudes of the coefficients in model 3 are very similar to those in model 2. This is consistent with the findings of Ferrer-i Carbonell and Frijters (2004), who establish that it is less important whether one applies methods for ordinal or cardinal data but that it is crucial to control for individual fixed effects.

[22]The estimation strategy is as follows: the life satisfaction scale is transformed into a binary scale using individual thresholds (in this case individual means). The new binary variable is then estimated using the fixed-effects estimator by Chamberlain (1980). Hence, it is not possible to calculate marginal effects without making an extra assumption, for example, that the individual fixed-effect is zero (see Ferrer-i Carbonell and Frijters 2004)).

Table 3.3: Estimation of life satisfaction: total effects (pecuniary and non-pecuniary)

	(1) OLS	(2) FE	(3) FEOL	(4) OLS	(5) FE	(6) FEOL
Employment status: (ref.: full-time employment)						
Out of labor force (OLF)	-0.24**	-0.28**	-0.43**			
	(0.03)	(0.05)	(0.07)			
OLF Family reasons				-0.25**	-0.27**	-0.42**
				(0.04)	(0.05)	(0.08)
OLF Labor market reasons				-0.34**	-0.33**	-0.52**
				(0.04)	(0.05)	(0.09)
OLF No intention to work				-0.13**	-0.19**	-0.28**
				(0.04)	(0.06)	(0.08)
Short part-time employment	-0.20**	-0.24**	-0.34**	-0.20**	-0.23**	-0.34**
	(0.03)	(0.05)	(0.07)	(0.03)	(0.05)	(0.07)
Long part-time employment	-0.09**	-0.12**	-0.24**	-0.09**	-0.11**	-0.24**
	(0.03)	(0.04)	(0.07)	(0.03)	(0.04)	(0.07)
Unemployment	-0.89**	-0.57**	-0.80**	-0.89**	-0.57**	-0.81**
	(0.05)	(0.06)	(0.08)	(0.05)	(0.06)	(0.08)
No. of obs	28429	27542	26149	28429	27542	26149
No. of individuals		4778	4275		4778	4275

Note: Pooled OLS estimations (model 1 and 4), fixed-effects-least-squares estimations (model 2 and 5), and fixed-effects-ordered-logit estimations (model 3 and 6) of life satisfaction. All models contain the following additional covariates: net residual household income, age (only the pooled OLS models), age squared, migration background (only the pooled OLS models), highest educational degree (university degree, vocational degree, no professional degree), whether a person in need of care lives in the same household, disability, health status, and year dummies. Robust standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

Having split the non-participation group into the aforementioned subgroups (see Table 3.1), the results are reported in columns 4 to 6 of Table 3.3. Column 4 contains the results from an OLS model, column 5 those from a fixed-effects-least-squares model, and column 6 from a fixed-effects-ordered-logit model. The subgroup of main interest for this paper is that of non-participants for family reasons. The estimation results of all three models show that women outside the labor force because of family reasons are significantly less happy than full-time employed women. The pooled OLS model (the fixed-effects model) suggests that their life satisfaction score is .25 (.27) points lower than that of full-time employed mothers. The coefficients are significantly lower than those from the 'OLF no intention to work' group. The results are robust in all three models (even though the coefficients in the fixed-effects-ordered-logit model are not equal to the marginal effects and, thus, cannot be interpreted in a straightforward way).

The findings of this analysis cannot be attributed to between-individual heterogeneity because the models have been estimated with a fixed-effects approach and, thus, all time-invariant unobserved heterogeneity has been controlled for. Hence, personality traits that might influence both the employment decisions and the reported life satisfaction do not bias the results. If, however, there were external shocks during the observation period affecting both life satisfaction and employment status, this could bias the results. Having another child or becoming pregnant is an example of an event that is likely to affect both employment status and happiness. However, firstly, this has easily been controlled for in the estimations above. Secondly, it can be shown that pregnant women and women with a newborn child are even

more satisfied and, at the same time, less likely to participate in the labor force and, therefore, not perfectly controlling for this rather attenuates the findings. Another shock that might distort the results could be health: if a sudden disease makes an individual less happy and, at the same time, makes her withdraw from the labor market or reduce working hours, the impact of non-participation and part-time employment on life satisfaction would be overestimated. In order to check the robustness of the results with respect to health conditions, I re-estimated the models in a robustness check, keeping in the sample only those women who reported to have "good" or "very good" health. The main results did not appear to be different.

In order to illustrate the magnitude of the effects on life satisfaction, I compute equivalent unemployment rates. An equivalent unemployment rate is meant to be the unemployment rate that would produce the same amount of unhappiness as the actual observed rate of women outside the labor force for family reasons. Since the estimated effect of unemployment is -.571 (6.90 percent of mothers are unemployed) and the effect of not being able to work is -.271 concerning 22.14 percent of the mothers, the equivalent unemployment rate amounts to 10.4 percent. This means that the actual level of happiness in the sample of mothers is the same as would have been predicted for a sample of mothers where another 10.5 percent were unemployed (in addition to the actual observed 6.9 percent unemployed). In other words, enabling the mothers not participating in the labor force for family reasons to take up employment would increase the overall happiness level by the same amount as if one reduced the unemployment rate by 10.5 percentage points (which is not possible because the rate is only 6.9 percent). This illustrates that,

among mothers, involuntary non-participation because of family constraints produces more unhappiness overall than unemployment.

Doing the same for part-time employment (short and long), the equivalent unemployment rate would be another 10.4 percent (= (0.234∗14.85%+0.114∗ 21.68%)/0.571). However, as indicated before, this rate is less meaningful for interpretation in the context of family constraints because it is unclear how many part-time employed women would actually prefer to work full-time and how many of those are working part-time due to family reasons rather than job market constraints (cannot find a full-time job). These subgroups could be disentangled for non-participants but not for part-time employed individuals.

3.5.2 Non-pecuniary effects

So far, I have estimated the *total* effects of non-participation and part-time employment on happiness and these total effects include a pecuniary part (due to forgone earnings) and a non-pecuniary part (psychological costs). The question arises as to whether there are actually any pure non-pecuniary effects of non-participation and of part-time employment on happiness (as previous studies have found for unemployment) or whether the estimated effects are exclusively due to pecuniary reasons. In order to identify the pure non-pecuniary effects, I re-estimate the models replacing *residual* household income by *total* household income within the set of covariates. This corresponds to the specification used in previous studies (see Section 3.3). The results from this alternative specification are shown in Table 3.4, where col-

umn 1 gives the results from a fixed-effects-least-squares model and column 2 gives the results from a fixed-effects-ordered-logit model.[23] As expected, the coefficients decrease in absolute value compared to Table 3.4. This establishes that part of the effects were due to forgone income. Nevertheless, the coefficient related to non-participation due to family reasons is still significantly smaller than zero in both models. The coefficient related to short part-time employment is also significantly negative in both models while the coefficient related to long part-time employment is significant only in the fixed-effects-ordered-logit model. The findings suggest that, while forgone earnings are responsible for part of the deterioration of happiness, non-pecuniary (psychological) effects also play an important part in the relationship between employment and happiness.

The explanation for the existence of psychological costs of family-related non-participation may be similar to the reasons for the psychological costs of unemployment discussed by Feather (1990). Employment usually expands people's social networks and enhances self-esteem. Furthermore, especially for women with young children, employment may be a welcome 'distraction' from caring for children and from household tasks. Moreover, knowing that career opportunities decrease during the period of non-participation might affect satisfaction with life. The question as to whether the fear of not finding a job is a major reason for the decreased happiness will be addressed further below.

One explanation for the psychological costs of part-time employment

[23]OLS results are no longer reported because unobserved individual effects have been attested to exist.

Table 3.4: Estimation of life satisfaction: non-pecuniary effects

	(1) FE	(2) FEOL
Employment status: (ref.: full-time employment)		
OLF Family reasons	-0.13**	-0.23**
	(0.05)	(0.08)
OLF Labor market reasons	-0.19**	-0.33**
	(0.05)	(0.08)
OLF No intention to work	-0.06	-0.11
	(0.06)	(0.09)
Short part-time employment	-0.15**	-0.22**
	(0.05)	(0.07)
Long part-time employment	-0.07	-0.17*
	(0.04)	(0.07)
Unemployment	-0.43**	-0.61**
	(0.05)	(0.08)
No. of obs	27542	26149
No. of individuals	4778	4275

Note: Fixed-effects-least-squares estimation (model 1), and fixed-effects-ordered-logit estimation (model 2) of life satisfaction. All models further contain the covariates given in the note of Table 3.3 but substituting log of residual income by log of total household income. OLF = out of labor force. Robust standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

might be the job quality. Part-time jobs frequently require lower skill and responsibility levels than full-time positions. The poorer quality of part-time jobs as compared to full-time jobs may be an important reason for the deterioration of life satisfaction. As already mentioned, unlike with non-participation it is, unfortunately, not possible to distinguish underemployed individuals (individuals who canot find a full-time job) from those who are employed part-time due to family reasons, nor from those who generally prefer to work part-time. From the results it can only be concluded that, on average, part-time employment is negatively associated with life satisfaction.

The findings of this study disagree with some previous studies which have found either no (Bardasi and Francesconi 2004) or a positive (Booth and van Ours 2009) association between women's non-participation and part-time employment, on the one hand, and life satisfaction, on the other hand. The main reason for the new findings might lie in the institutional realities and social norms in most parts of Germany, where non-participation and part-time employment for family reasons is particularly prevalent. It is likely that at least some of these mothers want to be employed (more hours) but are not able to reconcile family and employment. This may be less relevant in other countries with a different institutional and social background. The difference between the findings from the two studies by Booth and Van Ours (Booth and van Ours 2008, 2009), which are based on British and Australian panel data, respectively, also indicates that the context of the country studied influences the results.

3.5.3 Heterogeneous effects

One reason why mothers outside the labor force for family reasons experience lower happiness could be that they fear that they would not find a job after the period of non-participation. In order to explore whether these worries play a major role, I introduce interaction effects with self-assessed job opportunities. Respondents were asked the following questions (even though they were currently not looking for a job): "If you were currently looking for a new job: is it, or would it be easy, difficult or almost impossible to find an appropriate position?". Among the mothers who do not participate due to family reasons, 75 percent reported that it would be difficult or almost impossible and 25 percent thought that it would be easy to find an appropriate position. The percentage of those who would find it difficult to find a job, appears to be fairly high, remembering that these women are neither unemployed nor discouraged workers. Among those who would find it easy find a job, many have children under 3 years, which means that their response is likely to be related to the parental leave rule in Germany. According to this rule, mothers have the right to return to their previous position within three years of childbirth.[24] In order to investigate the question as to whether women who are afraid of not finding a job after the period of non-participation are mostly affected by decreased happiness, I interact the variable 'out of labor force for family reasons' with the variable 'difficult to find employment'. The

[24]However, this rule is, naturally, only useful for women who have been employed prior to birth. Also, women who were employed with a temporary contract are in a different situation since employers do not have to extend temporary contracts expiring during the parental leave time.

results from fixed-effects regressions are reported in Table 3.5.[25] Column 1 gives the total effects (pecuniary and non-pecuniary) since residual household income is controlled for; column 2 gives the pure non-pecuniary effects as total household income is controlled for instead. The results reveal that opportunities to re-enter employment play a substantial role. The interaction effect 'OLF FR * difficult to find employment' is significantly negative. This suggests that non-participation triggers much higher unhappiness for those mothers who do not have a guaranteed job which they can return to as compared to mothers who know that they would easily find a job or mothers who are able to return to their previous job as soon as they decide to. Note that the interaction effect is still smaller than zero in column 2 of Table 3.5. That means that the difference in the effects for mothers with good and poor employment opportunities is due to a difference in the non-pecuniary effects and not to the current forgone earning. As mentioned above, among mothers who do not participate because of family reasons, the largest proportion (three-quarters) think that it would be difficult to find an appropriate job and, thus, this large group experiences high losses in life satisfaction.

In order to explore further heterogeneity among social groups, I have interacted the variables 'out of labor force for family reasons', 'short part-time employment', and 'long part-time employment' with several characteristics, those being: income, partner status, age of the youngest child, education, region (East versus West Germany), and age of the mother. The results

[25] Only fixed-effects-least-squares models are reported because interaction effects are difficult to interpret in non-linear models, especially in the fixed-effects-ordered-logit model. Nevertheless, estimates from the latter model look very similar and are available from the author upon request.

Table 3.5: Estimation of life satisfaction, including an interaction effect with re-employment opportunities

	(1) Total effect	(2) Non-pec. effect
Main effects of employment status: (ref.: full-time employment)		
OLF Family reasons	-0.15*	-0.00
	(0.06)	(0.06)
OLF Labor market reasons	-0.33**	-0.19**
	(0.05)	(0.05)
OLF No intention to work	-0.19**	-0.06
	(0.06)	(0.06)
Short part-time employment	-0.23**	-0.14**
	(0.05)	(0.05)
Long part-time employment	-0.11**	-0.07
	(0.04)	(0.04)
Unemployment	-0.58**	-0.43**
	(0.06)	(0.05)
Interaction effect:		
OLF FR * difficult to find empl	-0.16**	-0.17**
	(0.05)	(0.05)
No. of obs	27542	27542
No. of individuals	4778	4778

Note: Fixed-effects estimations of life satisfaction. Model 1 further contains the covariates given in the note of Table 3.3, model 2 contains the same covariates but log of residual income is substituted by log of total household income (in order to estimate the pure non-pecuniary effects). OLF = out of labor force, OLF FR = out of labor force for family reasons. Robust standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

with interactions with income are reported in Table 3.6. Again, column 1 gives the total (pecuniary and non-pecuniary) effects and column 2 gives the pure non-pecuniary effects. It appears that being outside the labor force for family reasons is significantly more detrimental to happiness for low income groups than for middle or high income groups.[26] Also the negative effect of part-time employment is more pronounced for low-income groups. Long part-time employment even appears not be detrimental for middle and high-income groups, but only for low-income groups. This can be seen from the insignificant main effect of long part-time employment and significantly negative interaction effect 'LPT * low income' (column 1 of Table 3.6). The differences between income groups are mainly due to more negative pecuniary effects. This can be seen from column 2, where the pure non-pecuniary interaction effects are much smaller and mostly not significantly different from zero.

The results from models allowing for interactions with the age of the youngest child are reported in Table 3.6. For mothers with a child under 3 years, short part-time employment appears to be less harmful than for mothers with older children. This interaction effect is also significant in column 1 and 2. It is, therefore, due to a difference in the non-pecuniary effect. This finding appears plausible. When children are very young, more mothers might be happy working for few hours outside the home. As soon as the children grow older, career dissatisfaction may emerge and some women might wish to work more hours. If this is not possible (due to a lack of

[26]The segmentation into low-income and high-income groups has been effectuated using the 25th and the 75th percentile of the distribution of residual household income.

Table 3.6: Estimation of life satisfaction, including interaction effects with income groups

	(1) Total effect	(2) Non-pec. effect
Main effects of employment status: (ref.: full-time employment)		
OLF Family reasons	-0.23**	-0.12*
	(0.05)	(0.05)
OLF Labor market reasons	-0.30**	-0.19**
	(0.06)	(0.05)
OLF No intention to work	-0.16*	-0.05
	(0.06)	(0.06)
Short part-time employment (SPT)	-0.19**	-0.12*
	(0.05)	(0.05)
Long part-time employment (LPT)	-0.07	-0.03
	(0.05)	(0.05)
Unemployment	-0.56**	-0.44**
	(0.06)	(0.05)
Interaction effects:		
OLF FR * low income	-0.20**	-0.11
	(0.07)	(0.07)
SPT * low income	-0.20*	-0.16+
	(0.08)	(0.08)
LPT * low income	-0.10+	-0.09
	(0.06)	(0.06)
OLF FR * high income	0.06	0.02
	(0.05)	(0.05)
SPT * high income	0.07	0.03
	(0.05)	(0.05)
LPT * high income	0.00	-0.03
	(0.05)	(0.05)
No. of obs	27542	27542
No. of individuals	4778	4778

Note: Fixed-effects estimations of life satisfaction. Model 1 further contains the covariates given in the note of Table 3.3, model 2 contains the same covariates but log of residual income is substituted by log of total household income (in order to estimate the pure non-pecuniary effects). OLF = out of labor force, OLF FR = out of labor force for family reasons. Robust standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

support with childcare, for example), they feel increasingly dissatisfied.

Regressions allowing for interactions with partner status, educational degree, East Germany, and mothers' age did not yield significant results for the interaction terms. Hence, for reasons of brevity, these results are not shown here but available from the author upon request. These interactions being insignificant does not mean that there is no difference in the occurrence of non-participation and part-time employment between East and West Germany, for example. On the contrary, the difference in the occurrence is fairly high: while in West Germany, 25 percent of all mothers are outside the labor force for family reasons, in East Germany this is only true for 13 percent. Also, while in West Germany, 18 percent of mothers are in short part-time jobs, in East Germany, it is only four percent. The full-time rate among mothers in East Germany is much higher (39%) than in West Germany (12%). However, the insignificant interaction effects suggest that as soon as a mother is out of the labor force (or in part-time employment), the negative effect on life satisfaction is similar in East and West Germany.

3.6 Conclusion

This paper analyzes the consequences of family-related non-participation and part-time employment on mothers' life satisfaction. While there is a fairly substantial literature on the impact of unemployment on happiness, to my knowledge, no previous study has addressed the question of how family-related non-participation affects happiness. This appears to be a relevant question in the context of mothers in Germany, where it is particularly dif-

Table 3.7: Estimation of life satisfaction, including interaction effects with age of youngest child

	(1) Total effect	(2) Non-pec. effect
Main effects of employment status: (ref.: full-time employment)		
OLF Family reasons	-0.33**	-0.19*
	(0.08)	(0.08)
OLF Labor market reasons	-0.33**	-0.19**
	(0.06)	(0.05)
OLF No intention to work	-0.18*	-0.05
	(0.06)	(0.06)
Short part-time employment (SPT)	-0.29**	-0.20**
	(0.06)	(0.06)
Long part-time employment (LPT)	-0.13*	-0.08
	(0.05)	(0.05)
Unemployment	-0.57**	-0.43**
	(0.06)	(0.05)
Interaction effects:		
OLF FR * child <3 years	0.07	0.07
	(0.08)	(0.08)
SPT * child <3 years	0.15+	0.15+
	(0.08)	(0.08)
LPT * child <3 years	-0.02	-0.02
	(0.08)	(0.08)
OLF FR * child 3–6 years	0.10	0.11
	(0.08)	(0.08)
SPT * child 3–6 years	0.07	0.07
	(0.06)	(0.06)
LPT * child 3–6 years	0.05	0.05
	(0.06)	(0.06)
No. of obs	27542	27542
No. of individuals	4778	4778

Note: Fixed-effects estimations of life satisfaction. Model 1 further contains the covariates given in the note of Table 3.3, model 2 contains the same covariates but log of residual income is substituted by log of total household income (in order to estimate the pure non-pecuniary effects). OLF = out of labor force, OLF FR = out of labor force for family reasons. Robust standard errors are in parentheses. + p<0.10, * p<0.05, ** p<0.01. Source: SOEP 1994–2007, author's calculations.

ficult to reconcile (full-time) employment with motherhood. This does not only concern mothers of very young children but even those with young school children because, traditionally, most schools in Germany are half-day schools that do not provide afternoon classes, care, or lunch for their students.

I use data from the SOEP and apply fixed-effects-least-squares and fixed-effects-ordered-logit techniques to estimate the effect of mothers' non-participation and part-time employment on life satisfaction. The results suggest that mothers outside the labor force for family reasons and mothers employed part-time are less satisfied with their lives than mothers employed full-time. This pattern is particularly pronounced for mothers in low-income households. Non-participation is found to be especially harmful for mothers who fear that it will be difficult to find a job after the period of family-related non-participation. The effects are split up into pecuniary effects (forgone earnings) and non-pecuniary effects (psychological costs), both of which are substantial. Overall, among mothers, family-related non-participation and part-time employment are revealed to decrease happiness much more than unemployment does.

The findings provide another argument in favor of improving policies that enable parents to reconcile work and family life. This claim is not new but the argument is rather unusual. Improving mothers' well-being should be a very obvious argument if the ultimate political aim is to improve general well-being in the country. Advocates of policies supporting parental employment otherwise often refer to the overall economic benefit (imminent scarcity of skilled labor) and to the beneficial educational effect of early institutional care (however, there is still a large debate on whether and to what extent

preschool care is beneficial for children, but this question is not the issue of this paper). The aspect of mothers' subjective well-being has not yet featured significantly in this debate. Since mothers have to bear not only the pecuniary but also the psychological costs (including fear of future job disadvantages) if family duties prevent them from taking up employment or from increasing working hours, the government should place more emphasis on supporting parental employment than on replacing income. This does not mean that all mothers should be pushed into employment. However, it does mean that mothers who wish to be employed should be supported in realizing their wishes. Also, part-time employment might be a solution for some mothers but the results in this paper suggest that it is not the optimal solution for all women who are currently employed part-time. One reason for the harmful effect of part-time employment on happiness could be that reducing working hours from full-time to part-time in many jobs also implies a reduction in competencies and challenging contents. Even for employees who stay at the same job position, many employers reduce not only working hours but also their trust into employees and interpret their new family orientation as a sign of low career ambitions. Finally, there is still more research needed on the relationship between part-time employment and happiness and on the attributes that make part-time perceived as a beneficial solution.

Appendix

Table 3.8: Percentage of employed women versus women in the category 'OLF for family reasons' with certain characteristics, by parental status

	Mothers		Childless women	
	OLF Family reasons	Employed	OLF Family reasons	Employed
Person in need of care in HH	1.9%	1.4%	5.9%	1.7%
Disabled	1.3%	2.0%	12.3%	6.2%
Bad or very bad health	7.9%	8.9%	32.9%	12.2%
Have a child in the coming year	8.0%	2.9%	17.1%	2.1%

Note: OLF = out of labor force. Source: SOEP 1994–2007, author's calculations.

Chapter 4

Maternal Life Satisfaction and Child Developmental Outcomes

4.1 Introduction

In the recent economic literature, skill formation has been modeled as a cumulative process over the life cycle (Cunha and Heckman 2007, 2008, Heckman 2007, 2008). In these models, stages of early childhood play a particularly important role. The importance of the early years of life for the formation of human capital has heightened interest among economists in explaining skill formation in early childhood. So far, economic studies have explained child outcomes mostly by objective measures like income (Taylor et al. 2004), maternal employment (James-Burdumy 2005, Baum II 2003), and formal child care (Elder and Lubotsky 2009, Fitzpatrick 2008, Havnes and Mogstad 2009, Magnuson et al. 2007). This chapter of the thesis contributes to the literature by investigating the role of mothers' subjective well-being (namely mothers'

life satisfaction) in their children's early skill formation. The question is important because part of the effects on child outcomes found by other studies might be driven by maternal well-being. It might not be the mother's employment but rather her satisfaction with life that affects a child's development. Belsky (1984) points out that parental stress is a risk factor in children's development. This means that the quality of parental investments in children can be measured not only by objective factors like employment or child care hours but also by parents' subjective well-being.

Measures of subjective well-being have traditionally been used by psychologists to analyze the impact of major life events on individual well-being (e.g., Diener et al. 2006, Lucas 2007). In the last twenty years, happiness research has been growing not just in sociology and psychology but also in economics, where the role of factors like income and unemployment in individuals' life satisfaction has been analyzed (for an overview, see for instance, Di Tella and MacCulloch (2006), Dolan et al. (2008).

Yet to our knowledge no economic study to date has addressed the question of how child outcomes might be related to mothers' subjective well-being. However, several psychological studies investigated the effects of a pathological form of low subjective well-being, namely postnatal depression, on child outcomes (for recent surveys, see Wiegand-Grefe et al. (2009), Zimmer and Minkovitz (2003). They found that depression and depressive symptoms have deleterious effects in several domains: the mother-child relationship, parenting practices, family functioning, and the child's general development. Depression, however, is a very extreme form of individual well-being (very low well-being). In this study, we refer to self-reported well-being data from

a broader (nationally representative) group of mothers with young children using the SOEP. We focus on mothers' rather than on fathers' well-being because in most cases the mother is still the main caregiver for the young child.

The chapter is organized as follows: in Section 4.2 we explain the underlying mechanisms through which mothers' subjective well-being might affect children's skill formation. In Section 4.3 we describe the data set and in Section 4.4 we present the estimation method. The results and robustness tests are presented and discussed in Section 4.5. In Section 4.6 we outline our conclusions.

4.2 Mechanisms by which mothers' subjective well-being could affect child development

If mothers' overall life satisfaction is associated with child developmental functioning and non-cognitive skill outcomes, the question arises what are mechanisms that might be responsible for the possible association. From a psychological point of view, the relationship could be explained in several ways. First, the psychological well-being of parents has been found to be associated with parenting behavior, which in turn influences child development. Barling et al. (1993) compared the effect of experimentally induced positive and negative mood on mother-son interactions. They found that in the positive mood condition, mothers were more likely to engage in general verbal interaction and to make positive statements to their children. Jouriles

et al. (1989) also found indications of a significant relationship between maternal psychological well-being and positive parenting. MacEwen and Barling (1991) provide empirical evidence that the more negative the parents' mood, the more they tended to reject and punish their children. Further, the more rejecting the parent, the higher the child was rated on anxiety and withdrawal as well as on conduct disorder, attention, and immaturity.

A second potentially important mechanism underlying the relation between maternal well-being and child outcomes is the security of the attachment between child and main caregiver. The attachment theory in developmental psychology states that the mother-child relationship—that is, the attachment between mother and child—plays a crucial role in the child's earliest years (Bowlby 1969). The quality of attachment influences important aspects of the child's early development, determining verbal skills and behavioral outcomes. A child's attachment behavior is formed largely during the first year of life and depends on the caregiver's sensitivity and responsiveness in social interactions with the infant (Grossmann and Grossmann 1996, Sroufe 1990). A mother's sensitivity and responsiveness, in turn, is influenced by distal factors like her psychological well-being. Belsky (1997) found that secure attachments are fostered when mothers are psychologically healthy and feel supported emotionally as well as instrumentally. He also concluded that mothering behavior is an important determinant of attachment security, more important than, for example, infant temperament.

Attachment theory posits that the quality of the attachment has different effects on various child outcomes. Given the importance of parent–child verbal communication in the development of attachment security (Oppenheim

and Waters 1995), the child's language development is considered to have a particularly strong relationship to attachment security. Abundant evidence of this is found in the empirical attachment literature in psychology (e.g., Van Ijzendoorn et al. 1995, Korntheuer et al. 2007, Meins 1997, Moss and St-Laurent 2001). Further, the attachment literature postulates that attachment provides a secure base from which the infants explore the environment, generating stimulation that promotes cognition development. Some empirical studies have identified a link between attachment behavior and children's cognitive development, but the link seems to be less pronounced than for the specific dimension of language development (Van Ijzendoorn et al. 1995, Korntheuer et al. 2007). Moreover, there is a substantial literature in developmental psychology on the role of early attachment insecurity as a risk factor for child behavioral outcomes (e.g., Bates and Bayles 1988, Glogger-Tippelt et al. 2007, Lyons-Ruth et al. 1993, Main et al. 1985). In the present study, we assess the correlation between maternal well-being and different dimensions of child development; these include verbal competencies, activities of daily living, motor skills, and social skills of children aged 2–3 years as well as the socio-emotional behavior of children aged 5–6 years.

Since attachment theory suggests that more satisfied mothers are more sensitive and responsive to their children and that their children therefore form more secure attachments, we expect to find an empirical link between maternal life satisfaction and child developmental outcomes. To directly analyze whether the channel for the relationship is in fact the quality of the attachment, we would need a measure of attachment quality. However, to our knowledge, there is no large and representative data set available that

contains such a measure. Nevertheless, our research question is of great interest for the understanding of early skill formation; no previous study has analyzed a representative data set to address this question.

A third possible explanation for the impact of maternal life satisfaction on child outcomes is the number and quality of activities mothers undertake with their children.[1] First, happy mothers might spend more time on activities with their children (reading, playing, going for walks, etc.) than unhappy mothers, and family activities have been shown to stimulate child development (Becker 2010). Second, if the mother is happy, one could hypothesize that mother-child interactions during any activity would be more intense and of better quality. Reissland et al. (2003), for instance, found a significant correlation between the mother's psychological well-being and the quality of her reading and speaking to the child during picture-book sessions. This would lead us to expect that the verbal skills of a child with a happy mother are stronger than those of a child with an unhappy mother. Further, if a happy mother goes to the playground or on a walk with the child more frequently, one would expect the child to have stronger motor skills as well.

Again, it is difficult to directly analyze the question of whether the frequency, intensity, and quality of activities is the decisive channel for a correlation between maternal well-being and child outcomes, since, to our knowledge, large and representative surveys do not provide sophisticated measures for the frequencies of joint activities or the quality of the mother-child interaction during such activities. However, the SOEP survey used here offers a

[1] Felfe and Hsin (2009) assume the same underlying mechanism for an explanation why maternal work characteristics might influence children's development.

crude measure of the frequency of some specific activities that mothers undertake with their children. Hence we are able to—at least partly—address the question of whether the frequency of activities with the child is one of the underlying mechanisms determining the relationship between maternal life satisfaction and child outcomes.

The above discussion theorizes as to why mothers' life satisfaction might affect their children's developmental outcomes. We suggest three different mechanisms that might correlate with each other. However, the reverse could be true as well, that is, a child's development could affect the mother's life satisfaction. On the one hand, one might think of a case where the mother is worried about her child's slow development and her overall life satisfaction decreases as a result. On the other hand, a mother who is very proud of her child's positive development might report higher overall well-being. Thus the analysis carried out here has to deal with the problem of reverse causality. We address the issue methodologically with an instrumental variable approach, using as an instrument the mother's life satisfaction before the birth of the child (for more details, see Section 4.4).

4.3 Data

In 2003, a new series of questionnaires for surveying the development of children from the very beginning of their lives was implemented in the SOEP. The first of the questionnaires (Q1) is given to mothers of newborn children and was first implemented in 2003. In 2005, a follow-up questionnaire (Q2) was distributed to mothers of children aged 2–3 years old and has been

administered to all mothers with children in this age group every year since 2005. It gathers information on the child's skill development as well as on health, child care arrangements, and the mother's activities with the child. The most recent follow-up questionnaire (Q3) was introduced in 2008 to collect data about children aged 5–6 years old.[2] It collects information on the child's socio-emotional behavior, health, child care arrangements, and the mother's activities with the child.

In this study, we use data from all of the new SOEP mother-child questionnaires. In order to control for socio-economic and demographic characteristics, we also use personnel and household-specific data from the main SOEP survey referring to periods before and after the birth of each child. Figure 4.1 illustrates the time horizon of the data used in our analysis. Period t indicates the point in time with respect to the birth of the child. Period $t = 0$ indicates the period when the child was a newborn and when the first mother-child-questionnaire was answered by the mother. In period $t = 2$, that is, when the child was 2–3 years old, the second age-specific questionnaire was answered, which contains our first set of child outcome measures. In our sample, the total number of observations for $t = 2$ is 764 (after dropping observations with missing values in some variables). Period $t = 5$ indicates the period when the child was 5–6 years old and our second set of child outcome measures is collected. The sample size for $t = 3$ is 159 (again after dropping observations with missing data). This sample is much smaller due to the fact that the collection of data for 5–6-year-olds started in

[2]For more information about the mother-child questionnaires in the SOEP, see Schupp et al. (2008) and Siedler et al. (2009).

the year 2008 and thus only one cohort is available yet. The periods $t = -1$ and $t = -2$ refer to the time before the birth of the child, that is, when the woman was pregnant (in most cases), $t = -1$, and before the woman became pregnant, $t = -2$.

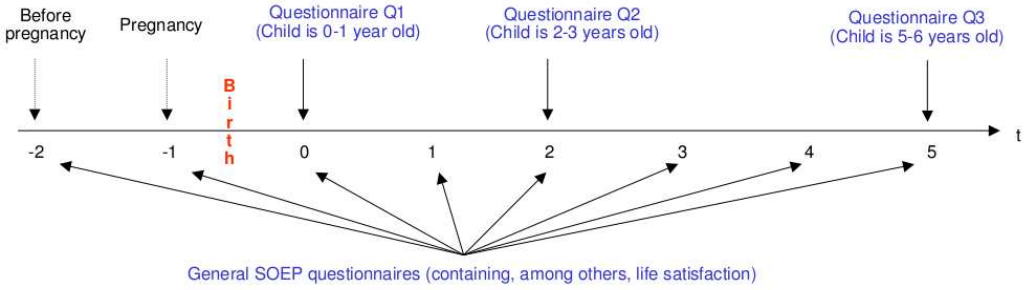


Figure 4.1: Time horizon of the data

In the following, we present the child outcome measures, the measure of maternal life satisfaction, and the control variables we use in our analysis.

4.3.1 Child outcome measures

We use two groups of child outcome measures: one group of measures for the adaptive behavior of 2–3-year-old children and another group of measures for the socio-emotional behavior of 5–6-year-old children. The *adaptive behavior* of the 2–3 to three-year-old children is measured with a modified version of the German Vineland Adaptive Behavior Scale (VAB) proposed by Sparrow et al. (1984). The scale is designed to be self-completed by the mother of the child. We construct the so-called "VAB scores" using a total of 20 items reflecting the mother's rating of the child's functional development. The items refer to the skill attainment of a child in four domains: verbal skills,

activities of daily living, motor skills, and social skills. We use the four domain-specific VAB scores, which are each based on five items, as well as a total VAB score, which is the sum of the four domain-specific scores. The four domain-specific VAB scores range from 0 to 10, the total VAB score ranges from 0 to 40.[3] Summary statistics for the VAB scores are given in Table 4.1.[4] The German version of the scale has been proven to be a valid measure in the study by Tietze (1998). Previous studies that used the VAB scores from the SOEP to analyze early child outcomes include Cawley and Spiess (2008), Coneus and Pfeiffer (2007), Coneus and Sprietsma (2009).

Table 4.1: Summary statistics of the VAB scores ($t = 2$)

	Mean	s.d.
Verbal skills	8.967	1.521
Activities of daily living	6.346	2.373
Motor skills	8.072	1.740
Social skills	8.787	1.565
Total VAB score	32.171	5.339

Note: The four domain-specific scores can take on values between 0 and 10, the total VAB score can take on values between 0 and 40 (cf. Appendix A). N = 764. Source: SOEP 2005–2008, authors' calculations.

The second measure of child outcomes—the *socio-emotional behavior* (SEB) of 5–6-year-old children—is based on a modified version of the Strength and Difficulties Questionnaire (SDQ) proposed by Goodman (1997). The scale was also designed to be self-completed by mothers.[5] The SOEP version of the SDQ contains 17 items referring to five dimensions: emotional symptoms

[3]For a more detailed description of the Vineland Adaptive Behavior measure in the SOEP, see Schmiade et al. (2008).

[4]The relevant items from the SOEP questionnaire (English translation) are provided in the Appendix to this chapter.

[5]Other studies use an additional version of the SDQ scale that is designed to be completed by teachers, but this version is not available in the SOEP.

(3 items), conduct problems (2 items), hyperactivity/inattention (4 items), peer relationship problems (4 items), and prosocial behavior (4 items).[6] The scores of the first four dimensions are added together to generate the Total Difficulties Score. We further generate the binary variable "normal" taking on the value 1 if the Total Difficulties Score is between 0 and 13 (the child is "normal" according to the concept of Goodman (1997)) and the value 0 if the Total Difficulties Score is 14 or larger (the child is "borderline" or "abnormal" according to Goodman (1997)). The score of the fifth dimension, the Prosocial Behavior Score, ranges from 0 to 10. Summary statistics of the SEB scores are given in Table 4.2. The SDQ scale and specifically the parent-rating version is an established tool in psychology and psychiatrics to measure behavioral problems of children. Goodman (1997) provides validation studies of the survey-based measure in general, and Klasen et al. (2000) undertake a systematic validation of the German version of the SDQ. The parent-rating version of the SDQ has been used by numerous previous studies to evaluate the link between mothers' characteristics and children's behavioral outcomes; some examples are Currie and Lin (2007), Kelly et al. (2009), McMunn et al. (2001), O'Connor et al. (2002), Reissland et al. (2007).

4.3.2 Mothers' subjective well-being

The explanatory variable of main interest in this study is mother's subjective well-being. We use an 11-point life satisfaction measure. The variable is available at each period t relevant for our analysis, that is, in the periods

[6]The relevant items of SOEP questionnaire Q3 (English translation) are provided in the Appendix to this chapter.

Table 4.2: Summary statistics of the SEB scores ($t = 5$)

	Mean	s.d.
Total Difficulties Score	10.376	5.694
"Normal" behavior	0.692	0.463
Prosocial Behavior Score	7.534	1.501

Note: The Total Difficulties Score can take on values between 0 and 40, the binary variable "Normal" behavior takes on the value one if the Total Difficulties Score is between 0 and 13 and zero otherwise, the Prosocial Behavior Score can take on values between 0 and 10 (cf. Appendix A). N = 159. Source: SOEP 2008, authors' calculations.

from $t = -2$ to $t = 5$. We use different specifications of the life satisfaction variable in our estimation models. First, we use contemporaneous life satisfaction, that is, life satisfaction in the same period in which the child outcome is measured. This is life satisfaction at $t = 2$ (denoted by LS_2) when estimating the VAB of 2–3-year-old children and life satisfaction at $t = 5$ (denoted by LS_5) when estimating the SEB of 5–6-year-old children. Second, we use the one-year-lagged life satisfaction score LS_1 and LS_4 for the VAB and the SEB estimation, respectively. In a third specification we use the mothers' life satisfaction in the child's first year of life (denoted by LS_0). Fourth, we use mean life satisfaction over the periods after the birth of the child, that is, the mean over the periods $t = 0$ to $t = 2$ (denoted by $LS_{\overline{02}}$) for the VAB estimation and the mean over the periods $t = 0$ to $t = 5$ (denoted by $LS_{\overline{05}}$) for the SEB estimation. In order to address the issue of reverse causality, we estimate a fifth and a sixth specification of the models, where we use life satisfaction before pregnancy (denoted by LS_{-2}) as an instrument for the contemporaneous life satisfaction and for the mean life satisfaction, respectively. Table 4.3 presents summary statistics of the

different life satisfaction variables.

Table 4.3: Summary statistics of the life satisfaction variables

	Mean	s.d.	N
LS_5	7.208	1.595	159
LS_4	7.237	1.631	156
LS_2	7.268	1.623	764
LS_1	7.221	1.681	751
LS_0	7.507	1.595	726
LS_{-2}	7.471	1.534	616
$LS_{\overline{05}}$	7.286	1.284	150
$LS_{\overline{02}}$	7.339	1.332	716

Source: SOEP 2001–2008, authors' calculations.

4.3.3 Control variables

In our regression models we control for a number of socio-economic and demographic characteristics related to the mother and the child. Control variables related to the mother are age, age squared, highest educational degree (categories university degree, vocational degree (omitted category), no professional degree), partner's highest educational degree (categories university degree, vocational degree (omitted category), no professional degree, no partner in household), employment status (not employed (omitted category), employed part-time, employed full-time), inflation-adjusted net household income (in Euros per month), and an indicator of whether a language other than German is usually spoken in the household. Covariates related to the child are age in months, age squared, gender, a dummy indicating whether the child has had a disease or dysfunction, and the number of hours per week the child spends in a day-care center or in family day care. Summary

statistics of the control variables are given in Tables 4.15 and 4.16 in the Appendix.

4.4 Estimation method

4.4.1 Estimation of the adaptive behavior of 2–3-year-old children

To analyze the association between mothers' life satisfaction and the adaptive behavior of 2–3-year-old children (VAB scores), we estimate the following equation by least squares

$$VAB_j = \alpha_{jt} LS_t + \beta_{jt} X + \varepsilon_{jt} \tag{4.1}$$

where VAB_j is the VAB score for domain j, $j \in \{verbal, daily, motor, social, total\}$, LS_t is the life satisfaction at period t, $t \in \left\{2, 1, 0, \overline{02}\right\}$, X is a set of control variables, and ε_{jt} is an error term.

The parameter α_{jt} can be estimated consistently if the error term ε_{jt} is exogenous to LS_t, given X. This is not the case if the effect is reverse causal. If a child who is developing well (high VAB scores) makes her mother proud and therefore the mother reports higher life satisfaction, α_{jt} will not be estimated consistently. This would mean that LS_t does not affect VAB_j but vice versa. Expressed formally, if ε_{jt} contains "maternal pride", which is higher for a child's higher VAB_j and which is at the same time correlated with the reported life satisfaction LS_t, the estimate of α_{jt} will be biased. Assuming that pride is positively correlated with both VAB_j and LS_t, OLS

estimation produces upward biased estimators of α_{jt}. To address the problem, we instrument LS_t, $t \in \left\{2, \overline{02}\right\}$ by LS_{-2}, which is the life satisfaction of the mother in the period before she became pregnant with the child.[7] LS_{-2} is uncorrelated with the mother's later pride in the child's positive developmental outcomes. Moreover, LS_{-2} is usually highly correlated with LS_t, $t \in \left\{2, \overline{02}\right\}$ and is therefore a strong instrument.[8]

Apart from the problem of reverse causality, the IV estimation also removes all potential bias due to changes that have affected the family since the birth of the child and that might have influenced both the mother's life satisfaction and her child's development. Further, the IV approach remedies the problem of measurement error in the explanatory variables, which plays an important role in the context of our analysis. One reason why measurement error is an important issue here is that the observed variable LS_t is a mother's evaluation of her life satisfaction at a specific day in period t, while we intend to measure her overall and true life satisfaction during the whole period (year), which could be denoted by LS_t^*. It is the latter unobserved variable which is hypothesized to be related to child development rather than LS_t, which might be more fluctuating being effected by random factors like the weather. LS_t can only serve as a proxy for the latent variable LS_t^*. The problem of measurement error can be formally described as follows. We intend to estimate the following equation

[7] For the general use of instrument variables techniques, see, for example, Greene (2008) or Wooldridge (2009).

[8] Estimating the equations $LS_2 = \pi_1 LS_{-2} + \pi_2 X + \upsilon_1$ and $LS_{\overline{02}} = \pi_3 LS_{-2} + \pi_4 X + \upsilon_2$, we obtain $\pi_1 = 0.4132$ (0.0410) and $\pi_3 = 0.3948$ (0.0366). This proves that LS_{-2} is partially correlated with LS_2 and $LS_{\overline{02}}$, which is a precondition for using LS_{-2} as an instrument.

$$VAB_j = \alpha_{jt} LS_t^* + \beta_{jt} X + \varepsilon_{jt}. \tag{4.2}$$

The observed life satisfaction score LS_t is related to LS_t^* according to

$$LS_t = LS_t^* + \zeta_t \tag{4.3}$$

where ζ_t is an error term, namely the measurement error. Substituting equation (4.3) into equation (4.2) yields

$$VAB_j = \alpha_{jt} LS_t + \beta_{jt} X + (\varepsilon_{jt} - \alpha_{jt}\zeta_t). \tag{4.4}$$

Even if the measurement error ζ_t is independent of LS_t^*, estimating equation 4 by ordinary least squares will produce an inconsistent estimator of α_{jt} because the regressor LS_t is correlated with the error term ω, where $\omega = \varepsilon_{jt} - \alpha_{jt}\zeta_t$, through ζ_t. Since ω is negatively correlated with LS_t, the OLS estimator of α_{jt} will be biased towards zero (attenuation bias).[9] In contrast, instrumenting LS_t by LS_{-2} will produce consistent estimates under the assumption that ζ_{-2} is independent of ζ_t, $t \in \{2, \overline{02}\}$.

As illustrated, the IV approach remedies the issue of reverse causality and that of measurement error in the life satisfaction variable. However, there could still be unobserved heterogeneity that affects both the mother's baseline level of life satisfaction (i.e., even life satisfaction before pregnancy) and her child's developmental outcomes. If such unobserved heterogeneity exists, even the IV estimates will be biased. This is why we cannot ultimately

[9]For a more detailed description of the impact of measurement error in explanatory variables, see, for example, Greene (2008, chapter 5).

claim to identify a causal effect, although we conduct several robustness tests to exclude some concrete sources of heterogeneity that might be thought of driving our findings.

4.4.2 Estimation of the socio-emotional behavior of 5–6-year-old children

For our analysis of the socio-emotional behavior (SEB) of 5–6-year-old children, we estimate the following equation

$$SEB_j = \gamma_{jt} LS_t + \delta_{jt} X + \nu_{jt} \tag{4.5}$$

by OLS if $j = 1$, where $SEB_1 = TotalDifficultiesScore$. We estimate equation (4.5) by a binary probit model if $j = 2$, where $SEB_2 = normal$ (a dummy variable taking on 1 if the child is classified as "normal" and 0 if it is classified as "borderline" or "abnormal"). If $j = 3$, where $SEB_3 = ProsocialBehaviorScore$, we estimate equation (4.5) by OLS. LS_t in equation (4.5) is life satisfaction at time t, $t \in \left\{5, 2, 0, \overline{05}\right\}$.

In a further step, we again instrument LS_t ($t \in \left\{5, \overline{05}\right\}$) by LS_{-2} in order to remove the reverse causality problem and at the same time the attenuation bias due to measurement error.[10]

[10] Estimating the equations $LS_5 = \theta_1 LS_{-2} + \theta_2 X + \psi_1$ and $LS_{\overline{05}} = \theta_3 LS_{-2} + \theta_4 X + \psi_2$ by least squares, we obtain $\theta_1 = 0.2860$ (0.0696) and $\theta_3 = 0.3819$ (0.0598). This proves that LS_{-2} is partially correlated with LS_5 and $LS_{\overline{05}}$.

4.5 Estimation results

4.5.1 Maternal life satisfaction and the adaptive behavior of 2–3-year-old children

Table 4.4 gives the results of the estimations of the four domain-specific and the total VAB scores. The models include the mother's contemporaneous life satisfaction and the set of control variables described in section 4.3. The coefficient related to the mother's life satisfaction is significantly positive for the estimations of verbal, motor, and social skills as well as for the total VAB score. This suggests that more satisfied mothers have children with better verbal, motor, and social skills. Note that in Table 4.4, life satisfaction is the maternal characteristic most clearly correlated with child outcomes (in terms of significance)—even more than parental education or income.

From these results, however, it is not possible to determine whether the effects are causal (that is, the skills are higher *because* the mother is more satisfied), reverse causal (the mother is more satisfied because the skills of the child are highly developed), or whether there are unobserved confounding factors that influence both the children's skill attainment and mothers' life satisfaction. Examples of such confounding factors could be the mother's personality or her cognitive ability. We will return to this aspect when we discuss our robustness tests.

To address the issue of reverse causality we estimate different specifications of the models using, instead of contemporaneous life satisfaction (LS_2), lagged life satisfaction (LS_1 and LS_0) and mean life satisfaction ($LS_{\overline{02}}$), and

Table 4.4: Estimation of the VAB scores of children aged 2–3 years

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score
LS_2	0.122**	0.064	0.115**	0.068+	0.369**
	(0.039)	(0.054)	(0.040)	(0.037)	(0.119)
Age of mother	-0.083	-0.081	-0.012	0.071	-0.105
	(0.098)	(0.142)	(0.118)	(0.104)	(0.327)
(Age of mother)^2	0.001	0.001	0.000	-0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
University degree	0.144	-0.110	0.061	-0.026	0.068
	(0.128)	(0.225)	(0.173)	(0.137)	(0.488)
No professional degree	-0.270	0.614*	0.099	-0.109	0.334
	(0.178)	(0.248)	(0.193)	(0.176)	(0.559)
Partner university degree	0.238+	-0.234	-0.046	-0.122	-0.165
	(0.138)	(0.219)	(0.176)	(0.152)	(0.501)
Partner no professional degree	-0.077	-0.038	-0.235	-0.204	-0.554
	(0.186)	(0.296)	(0.258)	(0.217)	(0.715)
No partner	-0.214	0.354	0.434+	-0.125	0.449
	(0.211)	(0.307)	(0.231)	(0.214)	(0.666)
Part-time employed	0.206+	0.311+	0.273*	0.032	0.821*
	(0.125)	(0.178)	(0.131)	(0.131)	(0.407)
Full-time employed	0.031	0.682**	-0.106	-0.026	0.581
	(0.180)	(0.261)	(0.228)	(0.177)	(0.637)
Household income (in logs)	-0.149	0.028	0.409*	0.203	0.491
	(0.186)	(0.244)	(0.199)	(0.178)	(0.640)
Other language	-0.285+	0.071	-0.185	-0.056	-0.455
	(0.167)	(0.221)	(0.166)	(0.160)	(0.530)
Age of child	0.422**	0.664**	0.317+	0.449**	1.852**
	(0.143)	(0.222)	(0.176)	(0.167)	(0.432)
(Age of child)^2	-0.005*	-0.007*	-0.003	-0.006*	-0.020**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)
Child is male	-0.166	-0.984**	-0.053	-0.439**	-1.643**
	(0.102)	(0.152)	(0.118)	(0.108)	(0.340)
Disease or dysfunction	-0.229*	-0.099	-0.166	-0.013	-0.508
	(0.112)	(0.153)	(0.122)	(0.114)	(0.362)
Formal child care (hrs/week)	0.004	0.024**	0.005	0.017**	0.050**
	(0.004)	(0.006)	(0.005)	(0.004)	(0.014)
Constant	2.116	-6.868	-3.119	-2.980	-10.852
	(3.239)	(4.894)	(3.827)	(3.408)	(10.436)
N	764	764	764	764	764
Adjusted R^2	0.111	0.215	0.114	0.083	0.202
F	6.066	16.310	7.607	5.467	12.986

Note: Least squares estimations of the domain specific VAB scores and the total VAB score. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

also applying an IV approach. The results are summarized in Table 4.5. Each cell in the table contains the results of a separate regression of the child outcome variable (given at the top of each column) on the life satisfaction variable (given in the rows). All models additionally contain the variables controlled for in the estimations given in Table 4.4. For the sake of brevity, the estimated coefficients of the control variables are not presented in this or any of the following tables.

Life satisfaction lagged one year (LS_1) and life satisfaction in the child's first year of life (LS_0) are both also significant predictors for the children's verbal, motor, and social skills as well as for the total VAB score. Note that LS_1 seems to be a weaker predictor of child developmental outcomes in $t = 2$ than LS_2, while the coefficients related to LS_0 are even larger and "more significant" than those related to LS_2. Since attachment behavior develops mainly in the first year of life, the result points to attachment quality being the underlying mechanism. We estimate a fourth specification of the model introducing the mean life satisfaction, $LS_{\overline{02}}$. The variable turns out to be the best predictor (among the life satisfaction variables) of the verbal, motor, and social skills as well as of the total VAB score. This suggests that the constant level of maternal life satisfaction plays an important role in their children's development. This could be due to the attachment quality that develops to a large extent in the first but also in the following years of the child's life, but other mechanisms could also play a role. We will return to this aspect at the end of this subsection.

To exclude the possibility of reverse causality of our results, we estimate an IV model using maternal life satisfaction before pregnancy as an instru-

ment for LS_2 and $LS_{\overline{02}}$. The results are given in rows 5 and 6 of Table 4.5. The coefficients are again significantly positive for verbal and motor skills as well as for the total VAB score and even larger than the coefficients estimated by OLS. This suggests that the relationship was not (or at least not predominantly) upward biased due to reverse causality but rather downward biased (i.e., attenuated) due to measurement error in the life satisfaction variable. Only the coefficients for social skills (column 4) are no longer significant in the IV models. One explanation could be that reverse causality plays a role in the estimation of the social skill score. However, since the point estimates in the IV models have not decreased much in magnitude compared to the OLS results, while only the standard errors have increased sharply due to the generally lower efficiency of IV estimations, one should be cautious with interpretation here. In any case, the relationship for verbal and motor skills is found to be more robust.

In order to illustrate the magnitude of the estimated association of mothers' life satisfaction and children's verbal skills, we express the results in terms of "equivalent age variations" (EAV). An equivalent age variation gives the number of months of age that are predicted to increase the child's skills to the same extent as one point (or one standard deviation) in the mother's life satisfaction. We use the age of the child for the illustration of the magnitude of the effects because age turned out to be a very good predictor for most VAB scores. This can be seen from the highly significant coefficients related to age in Table 4.4. The coefficients suggest that one month of age increases the verbal score of a child at mean age (33.25 months) by 0.09. Hence, an increase in mother's life satisfaction (LS_2) by one point on the

Table 4.5: Estimation of the VAB scores, different specifications of mothers' life satisfaction

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
LS_2	0.122**	0.064	0.115**	0.068+	0.369**	764
	(0.039)	(0.054)	(0.040)	(0.037)	(0.119)	
LS_1	0.096*	-0.006	0.083*	0.062+	0.235*	751
	(0.038)	(0.051)	(0.038)	(0.037)	(0.117)	
LS_0	0.155**	0.033	0.109*	0.125**	0.422**	726
	(0.045)	(0.055)	(0.050)	(0.045)	(0.151)	
$LS_{\overline{02}}$	0.188**	0.019	0.153**	0.126*	0.486**	716
	(0.050)	(0.069)	(0.053)	(0.051)	(0.169)	
LS_2 (IV)	0.388**	-0.044	0.262*	0.109	0.714*	604
	(0.124)	(0.139)	(0.112)	(0.110)	(0.343)	
$LS_{\overline{02}}$ (IV)	0.397**	-0.081	0.267*	0.115	0.698+	592
	(0.131)	(0.147)	(0.118)	(0.117)	(0.366)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of controls listed in Table 4.4. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

11-point scale is equivalent to the child aging about 1.4 months (EAV = 0.122/0.09 = 1.363; cf. Table 4.6, column 1). Increasing a mother's life satisfaction by one standard deviation (= 1.623 points) is equivalent to the child aging 2.2 months (Table 4.6, column 2). When we refer to $LS_{\overline{02}}$ instead of LS_2, the EAVs are even higher, namely 2.7 and 3.6 months, respectively. The EAVs based on the IV estimates are much higher. Since measurement error makes the OLS estimates to be biased toward zero, we trust the IV estimates rather than the OLS coefficients. Increasing a mother's mean life satisfaction by one point (one standard deviation) would then be equivalent to a child aging 6.4 months (8.5 months). Given that half a year is a very long time in the life of a 2–3-year-old child, the magnitude of the result is remarkable. The comparison with the effect of age is not meant to suggest

that the effect of low life satisfaction is compensated for as the child grows older. On the contrary, due to the self-productivity of early skills and given that there might be sensitive periods for the acquisition of some skills the effects might be even larger in the long run.

A similar interpretation of the effect of maternal life satisfaction on motor skills in terms of an equivalent age variation is not possible because age is not found to have a significant effect on motor skills in most of our specifications (in Table 4.4 age is significant on the 10% level; in the IV estimations of motor skills—not shown here—the coefficient related to age is not significant at any conventional significance level). For social skills, we do not interpret our findings by EAVs because the association between life satisfaction and social skills is not stable as they are not significantly different from zero in the IV estimations, which are our preferred specifications. The results for verbal skills, in contrast, are the most robust findings.

Some studies on early attachment behavior of children reported gender differences suggesting that boys are more vulnerable than girls. For instance, Collin (1996) argues that the gender difference is of indubitable importance and that it agrees with the general body of child development research. We check the importance of gender differences in our context of mothers' life satisfaction by estimating the VAB scores separately for boys and girls. The results presented in Table 4.7 reveal a noticeable difference between the two groups. For boys, the coefficients for the association between mothers' life satisfaction and their children's verbal, motor, and social skills are large and highly significant, while for girls the coefficients are mostly not significant or only on the 10% level. This means that boys not only have lower VAB scores

Table 4.6: Equivalent age variations (EAV) for the association between mothers' life satisfaction and verbal skills of children aged 2–3 years

	EAV for the change of LS by 1 point	EAV for the change of LS by 1 s.d.
LS_2	1.363	2.212
$LS_{\overline{02}}$	2.725	3.628
LS_2 (IV)	3.899	6.329
$LS_{\overline{02}}$ (IV)	6.403	8.526

Note: The *EAV* gives the number of months of age that are predicted to increase the child's skills to the same extent as one point (or one standard deviation) in maternal life satisfaction according to the estimates in Table 4.5. The *EAV* is calculated as follows: *EAV = MELS/MEage*, where *MELS* is the marginal effect of mother's life satisfaction on a child's verbal skills (given by the coefficients in Table 4.5, column 1) and *MEage* is the marginal effect of one month of age of a child (at mean age), *MEage* is 0.090, 0.069, 0.099, and 0.062 in the estimations with *LS2*, $LS_{\overline{02}}$, *LS2* (IV), and $LS_{\overline{02}}$ (IV), respectively. S.d. is the standard deviation of the life satisfaction score. The standard deviation of *LS2* is 1.623, the s.d. of $LS_{\overline{02}}$ is 1.332. Source: SOEP 2001–2008, authors' calculations.

(which has been shown by the negative coefficient of the covariate "male" in Table 4.4) but are also more sensitive to their mothers' well-being.

Robustness tests

As already mentioned, it is difficult to distinguish between a causal effect of mothers' life satisfaction on their children's development and endogeneity effects through unobserved heterogeneity. There could be outside factors that influence both mothers' life satisfaction and their children's VAB simultaneously and thus bias the estimated effect. We test two factors that could enhance such bias: mothers' personality and mothers' cognitive ability.

Empirical studies have shown that personality is an important predictor of subjective well-being (Diener and Lucas 1999). If mothers with cer-

Table 4.7: Estimation of the VAB scores, by gender

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Boys						
LS_2	0.159**	0.049	0.090+	0.102+	0.400*	371
	(0.057)	(0.073)	(0.052)	(0.056)	(0.163)	
$LS_{\overline{02}}$	0.249**	0.026	0.148*	0.205**	0.629**	345
	(0.073)	(0.098)	(0.069)	(0.077)	(0.237)	
LS_2 (IV)	0.552**	0.127	0.237+	0.279+	1.195*	292
	(0.186)	(0.180)	(0.135)	(0.164)	(0.468)	
$LS_{\overline{02}}$ (IV)	0.555**	0.073	0.217	0.310+	1.155*	283
	(0.191)	(0.184)	(0.135)	(0.168)	(0.480)	
Girls						
LS_2	0.062	0.071	0.116+	0.015	0.263+	393
	(0.044)	(0.081)	(0.061)	(0.043)	(0.156)	
$LS_{\overline{02}}$	0.104+	-0.006	0.125	0.023	0.246	371
	(0.060)	(0.098)	(0.081)	(0.057)	(0.217)	
LS_2 (IV)	0.096	-0.316	0.219	-0.122	-0.122	312
	(0.141)	(0.199)	(0.178)	(0.128)	(0.462)	
$LS_{\overline{02}}$ (IV)	0.073	-0.368+	0.235	-0.181	-0.240	309
	(0.158)	(0.221)	(0.198)	(0.140)	(0.511)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 4.4. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

tain personality traits systematically report higher life satisfaction scores and also have children with better developmental outcomes (no matter whether the children actually are better or the mothers only evaluate them as better), our estimates are biased. For instance, Nigg and Hinshaw (1998) found a significant association between mothers' personality traits and children's non-cognitive skill outcomes. Also, some individuals might tend to rate survey questions systematically higher than other individuals, that is, they tend to see things optimistically when rating themselves or their children's outcomes. This reflects certain personality traits of these individuals. For example, individuals with a high tendency of neuroticism are likely to rate scores lower than individuals with a weaker tendency in this personality dimension. Although we use an established scale to measure the adaptive behavior of children with a mother survey, we further test whether we can find hints for such an upward bias in the rating of mothers. To do this, we introduce mothers' personality traits as an additional set of covariates in our estimation models. We use the Big Five personality traits, a concept in personality psychology according to which a personality can be fully described by the five dimensions of openness, conscientiousness, extraversion, neuroticism, and agreeableness.[11] The results including the additional covariates are reported in Table 4.8. The least squares estimates still suggest a strong positive correlation between mothers' life satisfaction (LS_2 and $LS_{\overline{02}}$) and children's verbal and motor skills. In the IV results, only the coefficient from the estimation

[11]For the concept of the Big Five in personality psychology, see McCrae and Costa Jr (1996, 1999), John and Srivastava (1999). For more information on the specific implementation of the Big Five traits in the SOEP survey, see Dehne and Schupp (2007). Summary statistics of the personality scores are reported in Table 4.17 in the Appendix.

of verbal skills remains robust. As argued above, this is likely to be due to the lower efficiency of IV estimations compared to least squares estimations. The even larger point estimate from the IV models suggests that reverse causality is not a problem but that measurement error might cause an attenuation bias in the OLS estimates. Overall, the relationship between mothers' life satisfaction and children's verbal and motor skills decrease slightly but are still positive and significant. The findings suggests that personality is not a major confounding factor when estimating the relationship between mother's life satisfaction and verbal and social skills of 2–3-year-old children. The effect on social skills is less robust to this sensitivity test.

Another source of heterogeneity could be mothers' cognitive ability. Previous studies have shown that mothers' ability is related to child outcomes (through genetic endowments or educational quality).[12] If mothers with higher cognitive skills are also more satisfied with their lives, our results are biased. To test this possible influence we introduce two test scores of mothers' cognitive ability in our models, one for crystallized intelligence and one for fluid intelligence.[13] Since the tests have been carried out for only a small percentage of SOEP respondents, our sample is reduced from 764 to only 161 observations. The results of the estimations controlling for the cognitive ability test scores are reported in Table 4.9. The point estimates do not decrease systematically compared to the main results in Table 4.5.

[12]Cunha and Heckman (2008) found that mothers' cognitive skills positively affect children's cognitive skills but not children's non-cognitive skills, using US panel data. Anger and Heineck (2009), using SEOP data, found evidence of an intergenerational transmission of cognitive skills.

[13]See Schupp et al. (2008) for a detailed description of the two ability tests. Summary statistics of the test scores are reported in Table 4.17 in the Appendix.

Table 4.8: Estimation of the VAB scores controlling for mothers' personality

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Openness	0.037*	0.040+	0.038*	0.042*	0.157**	
	(0.017)	(0.024)	(0.017)	(0.017)	(0.051)	
Conscientiousness	0.022	0.021	0.055*	0.040+	0.139*	
	(0.023)	(0.032)	(0.025)	(0.024)	(0.070)	
Extraversion	0.000	-0.002	-0.001	-0.001	-0.003	
	(0.017)	(0.025)	(0.019)	(0.018)	(0.057)	
Neuroticism	0.015	-0.005	-0.001	0.002	0.011	
	(0.016)	(0.023)	(0.017)	(0.018)	(0.055)	
Agreeableness	-0.002	0.049	-0.024	-0.018	0.005	
	(0.025)	(0.031)	(0.023)	(0.025)	(0.074)	
LS_2	0.104**	0.020	0.089*	0.041	0.253*	697
	(0.038)	(0.060)	(0.044)	(0.041)	(0.128)	
$LS_{\overline{02}}$	0.135**	-0.062	0.100+	0.066	0.239	677
	(0.049)	(0.072)	(0.055)	(0.052)	(0.165)	
LS_2 (IV)	0.377*	-0.170	0.141	0.049	0.397	591
	(0.147)	(0.156)	(0.115)	(0.131)	(0.390)	
$LS_{\overline{02}}$ (IV)	0.382*	-0.232	0.142	0.043	0.335	581
	(0.160)	(0.165)	(0.123)	(0.140)	(0.423)	

Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 4.4 as well as the five personality traits. The coefficients of the personality traits reported here stem from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

The coefficients related to $LS_{\overline{02}}$ in the OLS estimations of verbal and motor skills become even larger. The IV estimates from the estimations of verbal skills also increase while those from the estimations of motor skills become insignificant. Again, the results for verbal skills appear to be most robust. Since the estimations in Table 4.9 are very inefficient due to the small sample size, one should be careful in interpreting the magnitude of the coefficients. Nevertheless, from the general trend in the results we can conclude that mothers' cognitive ability does not appear to be a serious source of bias in estimating the association between mothers' subjective well-being and children's developmental functioning at age 2–3.

Although one should be careful with the interpretation of the results, from the general trend in the results we can conclude that mothers' cognitive ability does not appear to be a serious source of bias in estimating the association between mothers' subjective well-being and children's developmental functioning at age 2–3.

As mentioned above, we cannot claim to identify causal effects. However, we have shown that two potentially important sources of heterogeneity—mothers' personality and mothers' cognitive ability—are not driving our results. The associations between mothers' overall life satisfaction and children's verbal and motor skills remain remarkable.

Underlying mechanisms

In Section 4.2 we discussed several mechanisms by which mothers' subjective well-being could have an impact on children's skill formation. One mechanism could be that more satisfied mothers spend more time undertaking

Table 4.9: Estimation of the VAB scores controlling for mothers' cognitive ability

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Crystallized intelligence	0.011	0.003	-0.018	-0.008	-0.012	
	0.009	0.020	0.011	0.012	0.039	
Fluid intelligence	-0.002	-0.041+	-0.011	0.008	-0.046	
	0.011	0.021	0.011	0.013	0.039	
LS_2	0.085	0.168	0.162*	0.073	0.488*	161
	0.104	0.119	0.064	0.078	0.229	
$LS_{\overline{02}}$	0.285*	0.268	0.203*	0.203+	0.960**	145
	0.132	0.173	0.079	0.113	0.318	
LS_2 (IV)	0.446*	0.790*	0.138	0.027	1.400**	116
	0.183	0.310	0.215	0.177	0.522	
$LS_{\overline{02}}$ (IV)	0.565*	0.947*	0.158	0.036	1.705*	115
	0.220	0.387	0.273	0.220	0.691	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 4.4 as well as the two cognitive ability scores. The coefficients of the cognitive ability scores reported here stem from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

skill-enhancing activities with their children. This is what we test in the following. In the SOEP mothers were asked how often they were involved in certain activities with their children within the previous two weeks. We use the information to construct three variables: *activities outdoors*, *activities indoors*, and *social activities*. The variables contain higher values the more frequently a mother is involved in such activities with her child. The relevant part of the questionnaire and details on how the variables are constructed as well as summary statistics for the activity variables (Table 4.18) are provided in the Appendix to this chapter. The results of the estimations controlling for the three activity variables are presented in Table 4.10. The coefficients of the activity variables show the expected positive signs, especially for the expected domains (e.g., social activities are positively related to social skills).

This suggests that the variables are constructed in a sensible way and are meaningful in predicting children's early development. Nevertheless, the estimated coefficients related to life satisfaction are still very similar to the main results in Table 4.5. This suggests that the association between mothers' life satisfaction and children's skill attainment is not (or only to a very limited extent) mediated by the time spent in the activities. The underlying mechanism that explains the rest of the association is not observed here. It might be related to the quality of the mother-child interaction, or, even more specifically, the quality of their attachment, which is influenced by the quality of the mother-child interaction. However this latter hypothesis cannot be explicitly tested by our data.

Table 4.10: Estimation of the VAB scores controlling for activities with the child

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Activities outdoors	0.015	0.163*	-0.017	-0.040	0.121	
	0.045	0.070	0.051	0.049	0.151	
Activities indoors	0.133**	0.022	0.091**	0.067*	0.313**	
	0.027	0.040	0.029	0.028	0.094	
Social activities	0.062	0.083	0.032	0.122*	0.299+	
	0.048	0.079	0.058	0.050	0.163	
LS_2	0.104**	0.036	0.104*	0.066+	0.310**	744
	0.039	0.055	0.040	0.037	0.118	
$LS_{\overline{02}}$	0.152**	-0.004	0.141**	0.118*	0.407*	699
	0.049	0.071	0.054	0.051	0.170	
LS_2 (IV)	0.362**	-0.115	0.263*	0.130	0.640+	590
	0.122	0.143	0.116	0.112	0.349	
$LS_{\overline{02}}$ (IV)	0.354**	-0.136	0.254*	0.118	0.590	579
	0.129	0.151	0.121	0.118	0.368	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 4.4 as well as the three activity variables. The coefficients of the activity variables reported here stem from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

4.5.2 Maternal life satisfaction and the socio-emotional behavior of 5–6-year-old children

In this section we analyze the association between mothers' life satisfaction and the socio-emotional behavior (SEB) of 5–6-year-old children. Table 4.11 gives the results for the least squares estimations of the Total Difficulties Score (column 1) and the Prosocial Behavior Score (column 3) as well as of a probit estimation of the probability of a child being "normal" compared to being "borderline" or "abnormal" according to the SEB classification (see Section 4.3). Despite the small sample size of only 159 observations, we find significant results suggesting that more satisfied mothers have children with lower Total Difficulties Scores and with a higher probability to be "normal". The results suggest that increasing maternal life satisfaction by one point (on the 11-point scale) would raise the probability of a child being normal by 6.8 percentage points. Increasing mothers' life satisfaction by one standard deviation (s.d. = 1.5954) would increase the probability by 10.8 percentage points.

Analogously to Section 4.5.1, we estimate different specifications of the model using lagged life satisfaction (LS_4), life satisfaction in the child's first year (LS_0), and mean life satisfaction ($LS_{\overline{05}}$). The results are summarized in Table 4.12. Lagged life satisfaction is a significant predictor for the Total Difficulties Score of a child and for the probability of a child being normal. Mothers' life satisfaction when the child is a newborn (LS_0) is a significant predictor only in the least squares model. Mean life satisfaction (here: $LS_{\overline{05}}$) is again the best predictor, having a highly significant effect for both the

Table 4.11: Estimation of the SEB scores of children aged 5–6 years

	Total Difficulties Score (OLS)	"Normal" behavior (Probit: marg. eff.)	Prosocial Behavior Score (OLS)
LS_5	-0.846*	0.068*	0.163+
	(0.340)	(0.028)	(0.087)
Age of mother	0.124	-0.079	0.312
	(0.964)	(0.086)	(0.261)
(Age of mother)2	-0.003	0.001	-0.004
	(0.013)	(0.001)	(0.004)
University degree	-0.120	-0.132	0.312
	-1.180	(0.136)	(0.326)
No professional degree	1.738	0.029	-0.068
	-1.759	(0.132)	(0.422)
Partner university degree	0.632	-0.095	-0.666*
	-1.117	(0.125)	(0.316)
Partner no professional degree	1.083	-0.025	-0.625
	-1.518	(0.141)	(0.459)
No partner	5.070**	-0.431**	-0.885+
	-1.763	(0.156)	(0.462)
Part-time employed	-0.336	0.043	-0.588*
	-1.110	(0.096)	(0.281)
Full-time employed	1.005	0.054	-0.477
	-1.480	(0.122)	(0.382)
Household income (in logs)	2.720+	-0.253+	-0.196
	-1.379	(0.135)	(0.378)
Other language	1.428	-0.057	-0.379
	-1.284	(0.112)	(0.343)
Age of child	1.159	-0.209	-0.160
	-3.232	(0.283)	-1.107
(Age of child)2	-0.010	0.002	0.001
	(0.023)	(0.002)	(0.008)
Child is male	1.758*	-0.201**	-0.441+
	(0.877)	(0.076)	(0.235)
Disease or dysfunction	2.280*	-0.158+	0.106
	-1.105	(0.081)	(0.328)
Formal child care (hrs/week)	-0.025	0.002	0.014
	(0.032)	(0.003)	(0.009)
Constant	-42.763		7.634
	-114.072		-38.592
N	159	159	159
Adjusted/pseudo R^2	0.134	0.168	0.042

Note: Results in column 1 and 3 from least squares estimations, results in column 2 from a probit estimation. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

Total Difficulties Score and the binary estimation of being "normal". This again suggests that the baseline level of maternal life satisfaction rather than maternal life satisfaction in a specific period is important for the development of the non-cognitive skills analyzed here.

In the last two rows of Table 4.12, we show the results of the IV estimations using mother's life satisfaction before pregnancy as an instrument to eliminate a potential reverse causality problem and attenuation bias due to measurement error. In the IV estimations the standard errors increase to a level where the marginal effects are no longer significant. This is likely to be due to the efficiency loss implied by IV estimations and to the very small sample size, which for the IV estimations even had to be reduced to 125 and 120 observations for the models with LS_5 and $LS_{\overline{05}}$, respectively.[14] Although not significant, the point estimates of the life satisfaction effect do not decrease compared to the least squares and probit estimates, and we should therefore not conclude that reverse causality plays a substantial role here. In any case the OLS and probit results have to be interpreted with caution.

In column 3 of Tables 4.11 and 4.12 the Prosocial Behavior Score of 5–6-year-old children is estimated. The results in Table 4.11 suggest that more satisfied mothers have more prosocial children. However, Table 4.12 reveals that only in few specifications are the estimates significantly different from zero. The association does not appear to be robust.

Estimating the above models separately for boys and girls (as done for the

[14]The reduction of the sample size is due to the fact that some women have not yet been observed in $t = -2$, i.e., seven years before the collection of their children's SEB in $t = 5$.

Table 4.12: Estimation of the SEB scores, different specification of mothers' life satisfaction

	Total Difficulties Score (OLS)	"Normal" behavior (Probit: marg. eff.)	Prosocial Behavior Score (OLS)	N
LS_5	-0.846*	0.068*	0.163+	159
	(0.340)	(0.028)	(0.087)	
LS_4	-0.593*	0.063**	0.121	156
	(0.296)	(0.024)	(0.079)	
LS_0	-0.851*	0.037	0.172*	158
	(0.349)	(0.025)	(0.083)	
$LS_{\overline{05}}$	-1.305**	0.108**	0.161	150
	(0.413)	(0.036)	(0.103)	
LS_5 (IV)	-1.899	0.125	-0.030	125
	(1.229)	(0.088)	(0.283)	
$LS_{\overline{05}}$ (IV)	-1.056	0.076	-0.033	120
	(0.842)	(0.072)	(0.187)	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 4.11. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

VAB scores) is problematic because the statistical reliability of the results is questionable due to the very small sample size. When estimating separate samples anyway, we observe a similar pattern to the one above where boys' outcomes are much more clearly associated with maternal life satisfaction than girls' outcomes. However, because of the very small sample size, one should be cautious in making interpretations based on these results.[15]

Robustness tests

Analogously to the analysis of the adaptive behavior, we check our results with respect to maternal personality traits because one could argue that personality might influence both mothers' life satisfaction and children's socio-emotional behavior, which would lead to a bias in our results. Also, as argued above, women with certain personality traits might in general tend to rate higher scores in surveys when evaluating their own or their children's outcomes. Even though the parent-rating version of the SDQ measure has been proven to be a valid tool and has been used widely in the literature (see Section 4.2), we again include the five dimensions of the Big Five personality traits in our models. The results are reported in Table 4.13. The estimated marginal effects of maternal life satisfaction on the outcomes slightly decrease in absolute values. According to these results, raising a mother's contemporaneous life satisfaction by one point would increase the probability of her child being "normal" by 5.6 percentage points (compared to 6.8 percentage points in the results without personality traits, see Table 4.12). For $LS_{\overline{05}}$, the increase in probability falls from 10.8 to 6.4 percentage points (column

[15]The estimation results by gender are available from the authors upon request.

2 in Table 4.13 compared to Table 4.12). The results from the least squares regressions of the Total Difficulties Score are also slightly attenuated (column 1 in Table 4.13). As above, the standard errors produced by IV estimations are too high for the effects to be statistically significant although the point estimates have not decreased.

Table 4.13: Estimation of children's SEB controlling for mothers' personality

	Total Difficulties Score (OLS)	"Normal" behavior (Probit: marg. eff.)	Prosocial Behavior Score (OLS)	N
Openness	-0.132	0.005	-0.004	
	(0.148)	(0.012)	(0.035)	
Conscientiousness	-0.244	0.028+	0.053	
	(0.195)	(0.016)	(0.058)	
Extraversion	-0.096	0.011	-0.022	
	(0.171)	(0.013)	(0.043)	
Neuroticism	0.152	-0.014	0.006	
	(0.140)	(0.012)	(0.035)	
Agreeableness	-0.213	0.011	0.186**	
	(0.184)	(0.016)	(0.049)	
LS_5	-0.616+	0.056*	0.154+	156
	(0.360)	(0.029)	(0.088)	
$LS_{\overline{05}}$	-0.832+	0.064+	0.105	148-157
	(0.446)	(0.037)	(0.115)	
LS_5 (IV)	-1.492	0.108	-0.093	123
	(1.225)	(0.090)	(0.275)	
$LS_{\overline{05}}$ (IV)	-0.837	0.072	-0.131	118
	(0.905)	(0.071)	(0.208)	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 4.11 as well as the five personality traits. The effects of the personality traits reported here stem from the estimations with LS_5. ** p<0.01, * p<0.05, + p<0.10. Source: SOEP 2001–2008, authors' calculations.

Finally, we still have to admit that though we have shown that the as-

sociation between maternal life satisfaction and children's socio-emotional behavior is not mainly driven by the mother's personality, we cannot rule out that other sources of endogeneity play a role in this context. One other source could be mothers' cognitive ability, which we have tested in the context of the adaptive behavior of 2–3-year-old children. Unfortunately, we are not able to test this in the context of the socio-emotional behavior of 5–6-year-old children because the sample would be reduced to a size that can no longer be estimated because the cognition data is available only for a limited subsample of respondents.

Underlying mechanisms

In the following, we analyze the mechanism through which mothers' life satisfaction is associated with children's SEB. Again we introduce the frequency of activities a mother undertakes with her child, using the variables "activities outdoors", "activities indoors", and "social activities". In Table 4.14 we present the results of the estimations with the activity variables. The association between mothers' life satisfaction and children's SEB is very similar to the main findings in Table 4.12. One of the effects estimated by IV is even significantly different from zero in this specification. This means that the frequency of activities a mother undertakes with her child is not the (only) channel through which mothers' life satisfaction affects children's SEB. The true channel is not explicitly observed and could (as above) be speculated to be the quality of the mother-child interaction or the quality of the attachment.

Table 4.14: Estimation of children's SEB controlling for activities with the child

	Total Difficulties Score (OLS)	"Normal" behavior (Probit: marg. eff.)	Prosocial Behavior Score (OLS)	N
Activities outdoors	-0.077	0.029	-0.004	
	0.363	0.031	0.101	
Activities indoors	-0.125	-0.008	0.169**	
	0.181	0.017	0.054	
Social activities	0.717	-0.077*	-0.009	
	0.438	0.039	0.120	
LS_5	-0.767*	0.050	0.123	127
	0.375	0.031	0.100	
$LS_{\overline{05}}$	-1.444**	0.099*	0.183	121
	0.469	0.045	0.122	
LS_5 (IV)	-2.125+	0.065	0.130	102
	1.210	0.089	0.264	
$LS_{\overline{05}}$ (IV)	-1.194	0.014	0.080	98
	0.861	0.075	0.186	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 4.11 as well as the activity variables. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors are in parentheses. Source: SOEP 2001–2008, authors' calculations.

4.6 Conclusion

Previous research has shown the importance of early childhood for the overall development of human skills. Economic studies have found that factors like parental employment, household income, and formal child-care affect children's development, and psychologists have revealed that maternal depression can have deleterious effects on early childhood outcomes. We contribute to the body of literature by analyzing the relationship between mothers' overall life satisfaction and the early childhood outcomes of their children. To our knowledge this is the first study to investigate the relationship between mothers' overall life satisfaction and early childhood outcomes.

Our results indicate that the more satisfied a mother, the better the verbal and motor skills of her 2–3-year-old child and the more "normal" the socio-emotional behavior of her 5–6-year-old child. The relationship is more pronounced for boys than for girls. Using mothers' life satisfaction before the birth of her child as an instrument, we can exclude the problem of reverse causality. Addressing the issue of further individual heterogeneity, robustness tests indicate that neither mothers' personalities nor their cognitive abilities are the main drivers of the results. Still, we cannot ultimately claim to identify causal effects because unobserved heterogeneity could not be completely excluded. Nevertheless, the effect of mothers' subjective well-being on child outcomes is amazingly high compared to other factors like parental education, employment, and hours in child care. One underlying mechanism by which maternal life satisfaction might affect child outcomes is the quality of the attachment (referring to the attachment theory in developmental psy-

chology). If more satisfied mothers are more sensitive and responsive to their children, this boosts the quality of attachment between a young child and her mother and allows the child to develop better. Another mechanism might be the quality of mother-child interaction during activities the mother engages in with her child, or, more generally, the more beneficial parenting behavior of happy mothers compared to unhappy mothers.

From a policy point of view, our findings have important consequences for the debate about family policies. Some conservative voices postulate that mothers nowadays are egoistic thinking more about their careers than about their children. If, however, a mother's career plays an important role in her life satisfaction and a mother's life satisfaction affects her child's outcomes, the claim becomes pointless. After all, policies that improve the subjective well-being of mothers may in turn be beneficial for their children's development. Policies, for example, that help mothers combine family and employment are likely to improve their subjective well-being because they help them to have the freedom of choice whether entering employment or not.

Appendix

Vineland Adaptive Behavior (VAB) of children aged 2–3 years (SOEP questionnaire Q2):

Below is the full text (English translation) of the relevant part of the SOEP questionnaire Q2 that was used to create the measures of the Vineland Adaptive Behavior (VAB) for 2–3-year-old children.

> For parents, it is always a big event when their child learns something new. Please tell us what those new things are in the case of your child. (Rate child's ability to perform each task as either "yes", "to some extent", or "no")
>
> *Talking*:
>
> V.1. Understands brief instructions such as "go get your shoes".
>
> V.2. Forms sentences with at least two words.
>
> V.3. Speaks in full sentences (with four or more words).
>
> V.4. Listens attentively to a story for five minutes or longer.
>
> V.5. Passes on simple messages such as "dinner is ready".
>
> *Activities of daily living*:
>
> ADL.1. Uses a spoon to eat, without assistance and without dripping.
>
> ADL.2. Blows his/her nose without assistance.
>
> ADL.3. Uses the toilet to do "number two".

ADL.4. Puts on pants and underpants the right way around.

ADL.5. Brushes his/her teeth without assistance.

Movement:

M.1. Walks forwards down the stairs.

M.2. Opens doors with the door handle.

M.3. Climbs up playground climbing equipment and other high playground structures.

M.4. Cuts paper with scissors.

M.5. Paints/draws recognizable shapes on paper.

Social relationships:

S.1. Calls familiar people by name; for example, says "mommy" and "daddy" or uses the father's first name.

S.2. Participates in games with other children.

S.3. Gets involved in role-playing games ("playing pretend").

S.4. Shows a special liking for particular playmates or friends.

S.5. Calls his/her own feelings by name, e.g., "sad", "happy", "cared".

The answers to each item are coded to 2 ("yes"), 1 ("to some extent"), and 0 ("no"). The answers are summed up to construct the four domain-specific scores verbal skills, activities of daily living, motor skills, and social skills, which hence can each take on values between 0 and 10. The four domain-

specific scores are further summed up to obtain the total VAB score, which might take on values between 0 and 40.

Socio-Emotional Behavior (SEB) of children aged 5–6 years (SOEP questionnaire Q3):

Below is the full text (English translation) of the relevant part of the SOEP questionnaires Q3 that was used to create the measures of the Socio-Emotional Behavior (SEB) for 5–6-year-old children.

> To what extent do or don't each of the following statements apply to your child? For each answer, think about your child's behavior in the last six months. (Answer "not at all", "somewhat true", or "completely true")
>
> My child...
>
> 1. is thoughtful.
> 2. is restless, hyperactive, can't sit still long.
> 3. likes to share with other children (sweets, toys, crayons, etc.).
> 4. often has tantrums, is quick-tempered.
> 5. is a loner, usually plays alone.
> 6. is helpful when others are hurt, sick, or sad.
> 7. is always fidgety.
> 8. often fights with or picks on other children.
> 9. is often unhappy or downcast, cries a lot.

10. is generally well-liked by other children.

11. is easily distracted, unfocused.

12. is nervous or clinging in new situations, easily loses self-confidence.

13. is often teased or picked on by others.

14. often helps others of his/her own accord (parents, teachers, children).

15. gets along better with adults than with children.

16. has many fears, gets scared easily.

17. finishes what he/she starts, can concentrate for a long time.

The answers to each item are coded as 0 ("not at all"), 1 ("somewhat true") and 2 ("completely true"). Thirteen of the items form the four dimensions: emotional symptoms (items: 9, 12, 16), conduct problems (items: 4, 8), hyperactivity/inattention (items: 2, 7, 11, 17), and peer relationship problems (items: 5, 10, 13, 15). The four dimensions are equally weighted to construct the Total Difficulties Score, which ultimately takes on values between 0 and 40. The four items 1, 3, 6, and 14 are used to construct the Prosocial Behavior Score; the score is coded to take on values between 0 and 10.

Activities of children aged 2–3 and 5–6 years (SOEP questionnaires Q2 and Q3):

Below is the full text (English translation) of the relevant parts of SOEP questionnaires Q2 and Q3 that were used to create the variables measuring

Table 4.15: Summary statistics of control variables at $t = 2$

	Mean	s.d.
Characteristics of the mother:		
Age (in years)	33.395	5.690
Education:		
University degree	0.237	0.425
Vocational degree	0.596	0.491
No professional degree	0.168	0.374
Education of the partner:		
University degree	0.264	0.441
Vocational degree	0.521	0.5
No professional degree	0.105	0.306
No partner in HH	0.11	0.313
Employment:		
Not employed	0.531	0.499
Part-time	0.329	0.47
Full-time	0.14	0.347
Net HH income (Euros/month)	3042.153	1736.641
Other language	0.191	0.393
Characteristics of the child:		
Age (in months)	33.249	3.968
Male	0.486	0.500
Disease or dysfunction	0.461	0.499
Formal child care (hrs/week)	10.677	14.317

Note: N = 764. Source: SOEP 2001–2008, authors' calculations.

Table 4.16: Summary statistics of control variables at $t = 5$

	Mean	s.d.
Characteristics of the mother:		
Age (in years)	36.428	5.252
Education:		
University degree	0.22	0.416
Vocational degree	0.679	0.468
No professional degree	0.101	0.302
Education of the partner:		
University degree	0.239	0.428
Vocational degree	0.522	0.501
No professional degree	0.088	0.284
No partner in HH	0.151	0.359
Employment:		
Not employed	0.296	0.458
Part-time	0.547	0.499
Full-time	0.157	0.365
Net HH income (Euros/month)	3346.723	1641.201
Other language	0.182	0.387
Characteristics of the child:		
Age (in months)	69.415	3.933
Male	0.516	0.501
Disease or dysfunction	0.774	0.420
Formal child care (hrs/week)	21.786	13.733

Note: N = 159. Source: SOEP 2001–2008, authors' calculations.

Table 4.17: Summary statistics of the Big Five personality traits at $t = 2$ and $t = 5$ and of the cognitive ability test scores at $t = 2$

	Mean	s.d.	N	Min	Max
	$t = 2$				
Openness	13.766	3.628	701	3	21
Conscientiousness	17.660	2.751	703	4	21
Extraversion	15.024	3.335	702	5	21
Neuroticism	12.521	3.582	704	3	21
Agreeableness	16.701	2.759	699	8	21
Crystallized intelligence	27.845	10.931	161	1	55
Fluid intelligence	30.342	9.311	164	10	52
	$t = 5$				
Openness	13.943	3.505	157	4	21
Conscientiousness	18.101	2.499	158	8	21
Extraversion	15.389	3.176	157	6	21
Neuroticism	12.302	3.650	159	3	21
Agreeableness	16.790	2.552	157	10	21

Note: The Big Five personality traits were incorporated in the SOEP questionnaire in 2005. The crystallized and the fluid intelligence scores are test scores from two mini IQ tests that have been carried out with part of the SOEP in 2006. For a detailed documentation of the IQ tests, see Schupp et al. (2008). We have to assume for our estimations that the personality and IQ scores are stable over time. Source: SOEP 2005-2006, authors' calculations.

the frequency of joint activities.

> How many times in the last 14 days have you or the main caregiver done the following activities together with your child? (Answers "daily", "several times a week", "at least once a week", "never")
>
> 1. singing children's songs with or to the child
> 2. taking walks outdoors (only in Q2)
>
> outdoor activities (walks or similar activities) (only in Q3)
>
> 3. painting or doing arts and crafts
> 4. reading or telling stories (only in Q2)
>
> reading or telling stories in German (only in Q3)
>
> reading or telling stories in another language (only in Q3)
>
> 5. looking at picture books (only in Q2)
> 6. going to the playground
> 7. visiting other families with children
> 8. going shopping with the child
> 9. playing card games or games of dice (only in Q3)
> 10. visit a children's theater, circus, museum, exhibition, or the like (only in Q3)

The answers to the items are coded as 3 ("daily"), 2 ("several times a week"), 1("at least once a week"), and 0 ("never"). Items 2 and 6 are summed up to obtain the variable "activities outdoors", items 1, 3, 4, 5, and 9 are summed

up to obtain the variable "activities indoors" and items 7, 8, and 10 are summed up to obtain the variable "social activities". Summary statistics of the variables for the samples at $t = 2$ and $t = 5$ are presented in Table D1.

Table 4.18: Summary statistics of the activity variables

	Mean	s.d.	N	Min	Max
	t=2				
Activities outdoors	4.111	1.286	756	0	6
Activities indoors	9.192	2.352	754	0	12
Social activities	2.833	1.133	760	0	6
	t=5				
Activities outdoors	3.758	1.313	157	0	6
Activities indoors	7.807	2.570	135	1	15
Social activities	2.987	1.077	151	1	6

Source: SOEP 2005–2008, authors' calculations.

Chapter 5

Conclusion

5.1 Summary of findings and policy implications

Questions around maternal employment and early childhood development are gaining in importance both in economic research and in the public debate. In this thesis, I analyze specific determinants and consequences of maternal employment as well as of child outcomes, thereby putting an emphasis on subjective well-being as a determinant and an outcome, as well as on the noncognitive traits of individuals.

In Chapter 2, I analyze the effect of noncognitive traits on the duration of mothers' leave after first childbirth. I find that women with a highly external Locus of Control (LOC) and women with a high score for the Big Five trait of Agreeableness delay their return to employment longer than women with low scores in these traits.

The finding for LOC confirms expectations derived from the theoretical model by Coleman and DeLeire (2003), according to which individuals with

an internal LOC expect greater returns to human capital investments and therefore invest more. In the case of my study, I hypothesize that women with an internal LOC expect higher returns to labor market experience and thus minimize the duration of labor market non-participation after childbearing. Another reason for the finding might by that, expecting a higher impact of their own effort, mothers with an internal LOC are likely to put greater effort into finding solutions that reconcile work and family life. A third line of arguments for the same direction of the effect of LOC relates to findings of Noor (2002), who found that women with an internal LOC perceive lower work-family conflict. This could be another reason why women with a stronger internal LOC are ready to return to employment more quickly than women with a more external LOC.

The finding for the Agreeableness trait is consistent with the idea that agreeable women are more altruistic toward their spouse and other people, and thusly are more likely to set aside their own career ambitions. Also, agreeable women tend to avoid the work-family conflict and are more inclined to adapt to traditional social norms of family patterns.

Personality differences have not yet been taken into account in the otherwise frequently addressed topic of mothers' return-to-employment decisions. However, the question is relevant since it is important to be aware of individual differences in preferences depending on noncognitive traits when designing family policy measures. The institutional environment should offer various options for mothers—and in general for parents—including early child care options for quick returners, maternal leave rules for mothers who prefer to delay their return to employment as well as fathers' leave options.

Furthermore, noncognitive skills are not completely determined by genes but influenced by the social environment during childhood (Heckman et al. 2006, Cunha and Heckman 2007, 2008). In this context, education is likely to play a substantial role. If, for instance, schooling duration and quality increases an individual's belief in internal control, it would at the same time boost maternal labor supply. This reveals another policy dimension of the relationship between noncognitive skills and maternal labor supply.

In Chapter 3 of this work I investigate the impact of family-related non-participation and part-time employment on mothers' subjective well-being. I find that a substantial share of mothers do not participate in the labor force due to family reasons and that these women are less satisfied with their lives than mothers engaged in full-time employment. Another large proportion of mothers in Germany, employed part-time, are found to experience decreased life satisfaction compared to mothers in full-time jobs as well.

The reasons for the identified negative effects are partly pecuniary, i.e., due to foregone earnings, and partly non-pecuniary, i.e., due to psychological costs. The happiness loss is found to be particularly pronounced for women in low-income families and women who are afraid of poor re-employment opportunities. Overall, unhappiness among the population of mothers is to a larger degree due to family-related non-participation and part-time employment than to unemployment. This is noteworthy considering that a number of studies found that unemployment is a substantial source of unhappiness.

The results of the study provide an argument for improving the support to parents who want to be employed. As it is found that in Germany many mothers—not just with very young children, but even with school-

aged children—are not able to reconcile employment with their care duties and therefore experience decreased happiness, improvements are required. This does not mean that the ultimate political aim should be that all mothers become employed full-time, but those who wish to participate in the labor force (full-time) should be supported. This would not only alleviate the demographic situation by allowing qualified women to enter the labor market, but it would also directly improve the subjective well-being of many mothers. Employment is not only an important factor for economic growth, it also plays a crucial role for the meaning in the lives of many individuals. The (albeit slightly changing) institutional setting in Germany still prevents many women from developing their abilities in a longer perspective in the labor market, to benefit fully from their human capital investments, and thus to reach certain life goals.

One of the most important measures supporting parents in reconciling work and family is the provision of appropriate child care, especially daycare for children under three, full-day daycare options for children in older age groups, and after school care or full-day schools for schoolchildren. For children of Kindergarten-age in Germany, i.e. 3–6 years, many institutions offer only (or mostly) half-day care which, in many cases, does not even allow mothers to take up a regular part-time job once commuting time is included. Children at the age of 6 and older in Germany usually attend half-day schools that provide neither lunch nor afternoon classes or care for the students. This is an obstacle for many mothers of school-aged children wanting full-time employment. Furthermore, not only is the availability of child care and flexibility of opening hours crucial, but also the quality of the

institutions. Providing child care that parents do not trust and thus do not use would barely improve the situation. Whether, how much, and what kind of external child care are beneficial or harmful to children's development is a different question that is not discussed in this study.

Other ways to facilitate work-family reconciliation include creating incentives for employers to provide a family-friendly environment, which might include, for example, flexible working hours, home office arrangements, and the provision of firm-base child care. Also, certain policy changes could stimulate fathers' involvement in child care and thus relieve mothers' (double) burden. Since 2007, the law on parental leave includes two months exclusively reserved for each parent. These are only some measures that would reduce the family-work conflict for mothers and, consequently, improve their happiness.

Chapter 4 of this dissertation contributes to the literature on early childhood development by investigating the association between maternal life satisfaction, on the one hand, and the developmental functioning of 2–3-year-old children and the socio-emotional behavior of 5–6-year-old children, on the other hand. The results of the study indicate that more satisfied mothers have children with better verbal skills and lower socio-emotional problems. The relationship is found to be more pronounced for boys than for girls. Overall, the estimated effects for mothers' life satisfaction on child outcomes is fairly high when compared to other determinants such as parental education, employment, and child care hours.

The underlying mechanisms between maternal well-being and child development could be threefold. First, maternal psychological well-being might

affect the parenting behavior including the frequency of engaging in verbal interactions and of making positive statements to the child (e.g., Barling et al. 1993). Second, referring to the attachment theory in developmental psychology, it is argued that a satisfied mother is more sensitive and responsive to her child, which influences the quality of the attachment between child and the main caregiver and which, in turn, affects the child's development. A third mechanism would be that happy mothers undertake more and higher quality activities with their children, which in turn stimulate their development. The latter mechanism was tested (to some extent) and found to explain a small fraction of the estimated effects.

An important implication of the study in Chapter 4 is that any policy measure improving mothers' well-being is, at the same time, to some extent beneficial for their children. As one example, support centers for families improve, if they are effective, not only parents' lives but also children's development. Also, it would be helpful to integrate parents in institutional child care centers as it has been done in Early Excellence Centres in the UK and in the Head Start program in the US, which were both designed to focus on children at risk (e.g., Currie and Thomas 1995). A model program of an Early Excellence Centres is already implemented in Berlin, Germany.[1]

Furthermore, as found in Chapter 3, employment plays an important part in many mothers' lives and improving the possibilities to reconcile work and family would improve mothers' subjective well-being and therefore also improve children's developmental outcomes. Certainly, this mechanism is unlikely to be the only one at work in this context, as, for example, working

[1] See www.early-excellence.de.

mothers often use non-parental child care and this is likely to have direct effects on child development. However, the relevance and potential mechanism of maternal subjective well-being is largely ignored in the debate about family policies even though it is likely to play a non-negligible role.

5.2 Further research steps

Further research directions that follow from my work and that remain for future work are threefold: First, one important issue is the role of fathers. In this work I concentrated on *mothers'* employment and *mothers'* subjective well-being with this focus justified by the fact that mothers are principally the main caregiver for children in Germany. Nevertheless, fathers are likely to influence to some extent both child outcomes and maternal employment decisions. Fathers' life satisfaction, noncognitive skills, and employment behavior are likely to be related to the mothers' behavior and children's development. The question of fathers' role is especially relevant as paternal involvement in child rearing has been found to be higher in families where the mother is employed (Gregg et al. 2003) and maternal employment has increased over time. Fathers' involvement in child rearing is also likely to rise as a consequence with the 2007 inclusion of paternal leave in Germany's parental leave law.

The second direction that future research should address is the role of (changing) social norms or "identity" as termed by Akerlof and Kranton (2000).[2] The existence of social norms might induce psychological costs for

[2]Akerlof and Kranton (2000) incorporate identity into a general model of behavior and

employed mothers. In many regions in Germany, labeling mothers who work in early years of their children's life as a bad mother (*"Rabenmutter"*) is still anchored to some extent in the society. Following the model of Akerlof and Kranton, social norms affect women's payoffs from labor market participation and as a consequence affect their labor supply. Since social norms develop over time and are influenced by institutional changes, the question arises how these changing social norms affect maternal labor supply the payoffs (or gains in life satisfaction) from being employed. Furthermore, men could also be affected by changes in social norms as, for example, it might become easier for them to take child related leave. Whether and how this affects their life and job satisfaction would be an interesting topic as well. Overall, a connected question would be how the social-norm induced changes in parents' behavior and well-being affects children's later outcomes. Not only child care use but also a more equal division of parenting and more men entering professions in child care or education might have consequences for children's development. The latter relates to the recent debate in Germany about boys lacking behind girls and the suggestion that boys need male role models (see, e.g., BMFSFJ 2010).

A third research direction following from my work would be an explicit evaluation of the effects of recent policy reforms in Germany such as the parental leave reform of 2007[3] and increased provision of child care[4] on par-

demonstrate how identity influences economic outcomes through, among others, identity-based payoffs derived from people's actions.

[3]See the German law *Gesetz zum Elterngeld und zur Elternzeit (Bundeselterngeld- und Elternzeitgesetz—BEEG)* of 2006.

[4]See the German laws *Gesetz zum qualitätsorientierten und bedarfsgerechten Ausbau der Tagesbetreuung für Kinder (Tagesbetreuungsausbaugesetz—TAG)* of 2004 and the *Kinderförderungsgesetz (KiföG)* of 2008.

ents' employment, parents' subjective well-being, and child outcomes. The consequences of the parental leave reform on maternal employment has already been addressed by Bergemann and Riphahn (2009, 2010), who found indications that certain groups of mothers returned to work more quickly. The consequences of similar policy reforms are analyzed in other countries (such as the effect of parental leave reforms on child outcomes in Denmark and Canada) by Baker and Milligan (2010) and Würtz Rasmussen (2010). However, the particular institutional context varies between countries and this institutional context plays a decisive role here. Therefore, it would be interesting to analyze the specific effects of the recent reforms in Germany.

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German Summary

In den letzten Jahren und Jahrzehnten ist die Frauen- und insbesondere die Müttererwerbsquote in den meisten westlichen Ländern deutlich angestiegen. Fragen zu Determinanten und Konsequenzen von Müttererwerbstätigkeit werden seither in der Öffentlichkeit sowie in der Forschung zunehmend diskutiert. Diese Entwicklung hat sowohl mit der demographischen Entwicklung und der damit verbundenen prognostizierten Knappheit von Fachkräften auf dem Arbeitsmarkt als auch mit dem Wandel der Geschlechterrollen in der Gesellschaft zu tun.

Gleichzeitig ist die Bedeutung von frühkindlicher Entwicklung in den letzten Jahren zunehmend in das öffentliche Bewusstsein getreten. Dies hängt teilweise damit zusammen, dass Familien mit erwerbstätigen Müttern meist auf nichtelterliche Betreuungsformen zurückgreifen. Welche Auswirkungen diese Betreuung – je nach Art und Qualität der Betreuung – auf die unterschiedlichen Aspekte frühkindlicher Entwicklung hat und welche Konsequenzen wiederum die frühe Entwicklung für spätere Indikatoren wie Bildungs- und Arbeitsmarkterfolge hat, wird zunehmend von Wissenschaftlern unterschiedlicher Disziplinen untersucht.

Anknüpfend an diese Diskussionen werden in der vorliegenden Arbeit

verschiedene Determinanten und Konsequenzen der Müttererwerbstätigkeit und der frühkindlichen Entwicklung analysiert. Die Arbeit setzt sich aus drei quantitativ-empirischen Studien zusammen, die auf Daten des Sozio-oekonomischen Panels basieren, einer repräsentativen Wiederholungsbefragung von Haushalten in Deutschland.

In Kapitel 2 untersuche ich den Einfluss nichtkognitiver Fähigkeiten von Müttern auf die Lnge des Zeitraums, bis sie nach der Geburt eines Kindes in den Arbeitsmarkt zurückkehren. Die meisten ökonomischen Studien zu Determinanten des Wiedereinstiegs von Müttern in den Beruf konzentrieren sich auf die Anreizwirkungen von sozial- und arbeitsmarktpolitschen Instrumenten. Auch die Rolle individueller Faktoren wie des Bildungsabschlusses wurde bereits empirisch untersucht; der Einfluss der sogenannten nichtkognitiven Fähigkeiten fand dabei jedoch bisher noch keine Berücksichtigung.

Die Bedeutung von nichtkognitiven Fähigkeiten wird in den letzten Jahren zunehmend von der ökonomischen Forschung untersucht. Der Begriff "nichtkognitive Fähigkeiten" oder "nichtkognitive Eigenschaften" beschreibt in dieser Literatur sämtliche individuellen Merkmale, die nicht kognitiver Natur (wie z.B. die Intelligenz) sind. Diese beinhalten beispielsweise Eigenschaften wie Durchhaltevermögen, Extraversion und Geduld. Empirische Studien haben gezeigt, dass nichtkognitive Fähigkeiten einen bedeutenden Einfluss auf den sozialen und ökonomischen Erfolg von Individuen haben und ihr Einfluss teilweise sogar größer ist als derjenige von kognitiven Fähigkeiten.

Die nichtkognitiven Fähigkeiten, die ich in meiner Studie analysiere, sind zum einen die Kontrollüberzeugung (Locus of Control) und zum anderen das Fünf-Faktoren-Modell aus der Persönlichkeitspsychologie (Big Five Person-

ality Traits). Die Kontrollüberzeugung ist ein Indikator für das Ausmaß, mit dem eine Person glaubt, dass Ereignisse vom eigenen Verhalten oder eigenen Fähigkeiten (internaler Locus of Control) und nicht vom Zufall oder von anderen Personen (externaler Locus of Control) abhängen. Das Fünf-Faktoren-Modell ist ein Modell aus der Persönlichkeitspsychologie, das fünf Hauptdimensionen der Persönlichkeit postuliert, nämlich Neurotizismus, Offenheit für Erfahrungen, Gewissenhaftigkeit, Extraversion und Verträglichkeit.

Die Ergebnisse meiner Analysen zeigen, dass Frauen mit einer stark internalen Kontrollüberzeugung schneller in die Erwerbstätigkeit zurückkehren als Frauen mit einer eher externalen Kontrollüberzeugung. Dieses Ergebnis entspricht theoretischen Überlegungen, denen zufolge Personen mit einer stärker internalen Kontrollüberzeugung einen größeren Einfluss der eigenen Erwerbserfahrung auf zukünftige Arbeitsmarkterfolge erwarten. Aus diesem Grund sind sie geneigt, nach der Geburt eines Kindes früher ins Erwerbsleben zurückzukehren, um negative Auswirkungen einer langen Erwerbspause zu vermeiden. Des Weiteren kann argumentiert werden, dass Frauen mit einer stärker internalen Kontrollüberzeugung größere Anstrengungen unternehmen, Lösungen für die Vereinbarung von Familie und Beruf zu finden, weil sie eher davon überzeugt sind, dass diese Anstrengungen erfolgreich sein werden.

Bezüglich des Fünf-Faktoren-Modells zeigen die Ergebnisse, dass Frauen mit einer stärker ausgeprägten Verträglichkeit ihre Erwerbstätigkeit länger unterbrechen als Frauen mit einer geringeren Ausprägung dieser Eigenschaft. Die Befunde können damit erklärt werden, dass “verträglichere” Frauen altruistischer gegenüber ihrem Partner und anderen Personen sind und deswe-

gen eher ihre eigenen Karriereambitionen zurückstellen, um die Betreuung ihres Kindes zu übernehmen. Verträgliche Personen haben zudem ein stärkeres Harmoniebedürfnis und vermeiden möglicherweise Konflikte, die durch die Vereinbarung von Beruf und Familie entstehen; sie passen sich damit eher an ein traditionelles Rollenmuster an, bei dem die Frau für Kindererziehung und der Mann für die Einkommensgenerierung zuständig ist.

Aus den Ergebnissen der Studie kann geschlussfolgert werden, dass nicht nur äußere Anreizsysteme die Dauer der Erwerbsunterbrechungen von Müttern beeinflussen, sondern auch ihre nichtkognitiven Eigenschaften. Dies sollte bei der Entscheidung über politische Maßnahmen zur Förderung von Müttererwerbstätigkeit berücksichtigt werden, damit unterschiedliche Lebensentwürfe ermöglicht werden.

Des Weiteren sind in diesem Zusammenhang frühere Forschungsergebnisse relevant, die besagen, dass nichtkognitive Fähigkeiten nicht unwesentlich von äußeren Faktoren wie dem familiären und (bildungs-) institutionellen Umfeld beeinflusst werden. Wenn Bildung beispielsweise die Kontrollüberzeugung in Richtung einer mehr internalen Kontrollüberzeugung beeinflusst, ist bei einer allgemeinen Bildungsexpansion ceteris paribus ein Anstieg in der Erwerbstätigkeit von jungen Müttern zu erwarten.

In Kapitel 3 dieser Arbeit wird ein anderer Aspekt von Müttererwerbstätigkeit beleuchtet, nämlich der des Einflusses auf die allgemeine Lebenszufriedenheit der Mütter. In Deutschland sind weniger Mütter erwerbstätig als in vielen anderen europäischen Ländern. Institutionelle Regelungen wie das steuerliche Ehegattensplitting, aber auch das in vielen westdeutschen Regionen relativ geringe Angebot an Kinderbetreuung – insbesondere für unter

Dreijährige, aber auch Ganztagsbetreuung für Kindergartenkinder, Nachmittagsbetreuung für Schulkinder und Ganztagsschulen – führen zu einer besonders schlechten Vereinbarkeit von Familie und Beruf in Deutschland. Dies führt dazu, dass viele Mütter nicht oder nur in Teilzeit erwerbstätig sind, obwohl manche gerne eine Erwerbstätigkeit aufnehmen bzw. ihre Arbeitsstunden erhöhen würden. In diesem Kapitel analysiere ich empirisch die Auswirkungen von familienbedingter Nichterwerbstätigkeit und Teilzeiterwerbstätigkeit von Frauen mit Kindern unter 14 Jahren auf ihre Lebenszufriedenheit. Damit knüpfe ich an die Literatur der sogenannten "Happiness Economics" an, die den Nutzen von Individuen durch direkte Befragungen der allgemeinen Lebenszufriedenheit operationalisiert.

Meine Analysen zeigen, dass ein erheblicher Anteil der Mütter in Deutschland familienbedingt nichterwerbstätig ist und dass diese Mütter eine signifikant geringere Lebenszufriedenheit aufweisen als Vollzeit erwerbstätige Mütter. Die Auswertungen zeigen außerdem, dass zahlreiche Mütter Teilzeit erwerbstätig sind und dass auch diese Gruppe mit ihrem Leben weniger zufrieden ist als Vollzeit erwerbstätige Mütter. Etwa die Hälfte des Verlustes an Lebenszufriedenheit ist auf monetäre Effekte – durch das entgangene Einkommen – zurückzuführen, die andere Hälfte auf direkte, psychologische Effekte. Insgesamt kann gezeigt werden, dass der Verlust an Lebenszufriedenheit wegen familienbedingter Nichterwerbstätigkeit und wegen Teilzeiterwerbstätigkeit in der betrachteten Bevölkerungsgruppe größer ist als die Zufriedenheitseinbußen durch Arbeitslosigkeit. Dies ist ein auffallendes Ergebnis, wenn man berücksichtigt, dass der Großteil der Literatur im Bereich der "Happiness Economics" sich auf die Auswirkungen von Arbeit-

slosigkeit konzentriert hat.

Die Implikationen der Studie besagen, dass weitere Maßnahmen zur Förderung der Vereinbarkeit von Familie und Beruf nicht nur im Hinblick auf den demographischen Wandel und den damit verknüpften Mangel an qualifizierten Arbeitskräften förderlich wären, sondern dass sie auch direkt die Lebensbedingungen von Müttern, gemessen an ihrer subjektiven Lebenszufriedenheit, verbessern würden.

Kapitel 4 dieser Arbeit knüpft an die Literatur der Determinanten frühkindlicher Entwicklung an, deren Analyse in der Ökonomie zunehmend an Bedeutung gewonnen hat. Die Anzahl von Studien in diesem Bereich ist angewachsen, insbesondere seit Heckmann und Koautoren die Bildung von Humankapital als einen dynamischen Prozess modelliert haben, in dem der frühkindlichen Phase eine herausragende Bedeutung zukommt.

Entgegen bisheriger Studien, die den Einfluss von objektiven Faktoren wie Einkommen, Bildung und Erwerbstätigkeit der Eltern auf die Entwicklung von Kindern untersucht haben, analysiere ich den Effekt eines subjektiven Maßes, nämlich der mütterlichen Lebenszufriedenheit. Die Ergebnisse der Studie zeigen einen signifikant positiven Zusammenhang zwischen der mütterlichen Lebenszufriedenheit und den verbalen Fähigkeiten von Zwei- bis Dreijährigen. Des Weiteren kann gezeigt werden, dass Kinder von zufriedeneren Müttern im Alter von fünf bis sechs Jahren weniger sozio-emotionale Auffälligkeiten vorweisen als Kinder von unzufriedeneren Müttern. Insgesamt sind die Zusammenhänge für Jungen deutlicher als für Mädchen.

Aus theoretischer Sicht können unterschiedliche (miteinander verknüpfte) Mechanismen die identifizierten Zusammenhänge erklären. Zum einen ist bei

zufriedeneren Müttern ein positiveres Verhalten dem Kind gegenüber zu erwarten, in dem Sinne, dass zufriedene Mütter häufiger in verbale Interaktionen mit dem Kind treten und mehr positive Aussagen dem Kind gegenüber machen. Ein zweiter Erklärungsansatz stützt sich auf die Bindungstheorie aus der Entwicklungspsychologie. Er besagt, dass zufriedenere Mütter sensibler auf Bedürfnisse des Kindes reagieren und ihre Kinder damit eine sicherere Bindung zur Mutter aufbauen können. Die Qualität der Mutter–Kind-Bindung hat wiederum einen bedeutenden Einfluss auf die Entwicklung von Kindern, insbesondere in den ersten Lebensjahren. Ein dritter Erklärungsansatz postuliert, dass zufriedenere Mütter häufiger Aktivitäten mit ihren Kindern unternehmen, wie beispielsweise Spielplatzbesuche, Vorlesen und kulturelle Aktivitäten, die wiederum die Entwicklung der Kinder fördern.

Wichtige Implikationen der letzten Studie sind, dass Maßnahmen, die zu einer verbesserten Situation von Müttern führen, damit auch gleichzeitig für die Entwicklung von Kindern förderlich sind. Dazu zählen sowohl Beratungsstellen für Familien mit Problem wie auch Maßnahmen zur Verbesserung der Vereinbarkeit von Familie und Beruf. Wenn zum Beispiel die erhöhte Verfügbarkeit von Kinderbetreuungseinrichtungen dazu führt, dass eine Mutter entsprechend ihren Wünschen in ihren Beruf zurückkehren kann und sich damit ihre Lebenszufriedenheit erhöht (ein Zusammenhang, der in Kapitel 3 dieser Arbeit untersucht wurde), dann verbessern sich damit auch die positiven Entwicklungschancen ihres Kindes. Zusätzlich müsste bei diesem Beispiel allerdings noch der Einfluss der Kinderbetreuung auf die kindliche Entwicklung berücksichtigt werden; dieser Zusammenhang ist je-

doch nicht Gegenstand der aktuellen Studie.

Aus der vorliegenden Arbeit ergeben sich weitere Forschungsfragen, die insbesondere drei Bereiche betreffen. Zum einen ist die Rolle der Väter für die untersuchten Zusammenhänge noch relativ wenig erforscht und es stellt sich insbesondere die Frage, in welchem Maße sich diese Rolle über die Zeit verändert hat. Eine weitere Frage betrifft die Rolle der (sich verändernden) sozialen Normen für das Erwerbsverhalten von Müttern und fr die frühkindlichen Bildungschancen. Ein dritter Bereich, der weitere Forschungsarbeit verdient, sind die direkten Auswirkungen der jüngsten Politikreformen – insbesondere des Elterngeldes, der Elternzeit und des Ausbaus von Betreuungsangeboten für unter Dreijährige – auf das Erwerbsverhalten von Eltern, ihre Zufriedenheit und auf die Bildungserfolge von Kindern. Diese Fragen sind vor allem deswegen relevant, weil sich soziale Normen und die Beteiligung von Vätern bei der Erziehung über die letzten Jahre und Jahrzehnte verändert haben. Diese Entwicklung steht möglicherweise mit der gestiegenen Müttererwerbstätigkeit sowie mit manchen in den letzten Jahren implementierten politischen Maßnahmen in Zusammenhang.

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Academic Curriculum Vitae

For reasons of data protection the CV is not included in the online version.

Publications

Refereed Journal Articles

- Maternal Life Satisfaction and Child Outcomes: Are They Related? (with C. Katharina Spiess). *Journal of Economic Psychology 32*(1), 2011, 142–158. http://dx.doi.org/10.1016/j.joep.2010.10.001

- Wie hängen familiale Veränderungen und das mütterliche Wohlbefinden mit der frühkindlichen Entwicklung zusammen? (with Frauke Peter and C. Katharina Spiess) *Vierteljahrsheft zur Wirtschaftsforschung 79*(3), 2010, 27–44.

- The Chernobyl Disaster, Concern About the Environment, and Life Satisfaction. *Kyklos—International Review for Social Science 63*(1), 2010, 1–8.

Working Papers

- Women's Noncognitive Skills and Return to Employment After Childbirth. Working paper online at http://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.359339.de/berger_eea_2010.pdf.

- Maternal Life Satisfaction and Child Outcomes: Are They Related? (with C. Katharina Spiess). SOEPpaper no. 242, 2009, DIW Berlin.

- Maternal Employment and Happiness: The Effect of Non-Participation and Part-Time Employment on Mothers' Life Satisfaction. DIW Discussion Paper no. 890 and SOEPpaper no. 178, 2009, DIW Berlin. (under review).

- Overcoming Disparities and Expanding Access to Early Childhood Services in Germany: Policy Considerations and Funding Options (with C. Katharina Spiess and Olaf Groh-Samberg). UNICEF Innocenti Research Centre Working Paper IWP-2008-03, Florence.

- Die öffentlich geförderte Bildungs- und Betreuungsinfrastruktur in Deutschland: Eine ökonomische Analyse regionaler und nutzergruppenspezifischer Unterschiede (with C. Katharina Spiess and Olaf Groh-Samberg). UNICEF Innocenti Research Centre Working Paper IWP-2008-03, Florence.

- A Note on the High Stability of Happiness: The Minimal Effects of a Nuclear Catastrophe on Life Satisfaction. DIW Discussion Paper No. 803 and SOEPpaper no. 109, 2008, DIW Berlin.

- The Power of Monthly Data in the GSOEP: How the Chernobyl Catastrophe Affected People's Life Satisfaction and Environmental Concerns. SOEPpaper no. 73, 2007, DIW Berlin.