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Essays on the impact of income on family and child well-being

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Abstract

In this dissertation I offer three independent studies that each contribute to the literature on the impact of income on family and child well-being. I present three essays that investigate three different contexts and sources of income variation. First I investigate the extent to which an unconditional cash transfer to families in Germany that is intended to benefit children actually translates into an improvement in the circumstances related to child well-being. Next I analyze how shocks to mothers' earnings impact their demand for health inputs during pregnancy, and how this affects the health of the newborn child. The fourth chapter focuses on a non-cash transfer program. I investigate whether families who are receiving food stamp benefits may be disadvantaged compared to higher income families due to the fact that those families who receive food stamps necessarily incur a time cost of food preparation when using food stamps to purchase food.

Chapter 1. Introduction

This dissertation consists of three essays that each contribute to the literature on the impact of income on family and child well-being. In the second chapter, I investigate the extent to which an unconditional cash transfer to families in Germany that is intended to benefit children actually translates into an improvement in the circumstances related to child well-being. In the third chapter, I analyze how shocks to mothers' earnings impact their demand for health inputs during pregnancy, and how this affects the health of the newborn child. The fourth chapter focuses on a non-cash transfer program. I investigate whether families who are receiving food stamp benefits may be disadvantaged compared to higher income families due to the fact that those families who receive food stamps necessarily incur a time cost of food preparation when using food stamps to purchase food.

1.1 The Impact of the German Child Benefit on Child Well-Being

The German Child Benefit ("Kindergeld") is paid to legal guardians of children as a cash benefit and the amount of the benefit does not depend on household income or other household characteristics. In the second chapter of this dissertation I present a study that employs exogenous variations in the amount of child benefit received by households in Germany to investigate the extent to which these various changes have translated into an improvement in the circumstances of children related to their well-being. I use the German Socio-Economic Panel to estimate the impact of a given change in the child benefit on food expenditures of households, the probability of owning a home, the size of the home, as well as the probability of parents' smoking, alcohol consumption, and parents' social activities such as traveling, visiting movie theaters, going to pop concerts, attending classical music concerts or other cultural events. I also test for the existence of a labeling effect, which would suggest that families treat general household income different from income that is received with no strings attached, but is understood to be used for benefit of their children.

Child benefit programs from countries other than Germany have been studied in the previous literature. However, there are several aspects of my study that make an important contribution to the literature. First, I am able to very cleanly identify the effect of child benefit on the outcomes of interest because the longitudinal nature of the data set I am using allows me to exploit within-family variations in the child benefit. Holding constant all time invariant unobservable household characteristics is a significant improvement over previous studies, which have struggled in their cross-sectional research designs to separate the effects of changes in the child benefit from other changes in family characteristics. Moreover, I am able to investigate whether parents may use the child benefit for their own personal entertainment purposes, such as for going to the movie theater, attending pop music concerts, or participating in cultural events. These outcomes have not been studied in the previous literature.

1.2 The Impact of Mothers' Earnings on Health Inputs and Infant Health

In Chapter 3 I investigate the impact of mothers' earnings on birth weight of infants. I also analyze the impact of income on mothers' consumption of prenatal medical care, and mothers' propensity to smoke and drink during pregnancy. The paper uses state- and year-specific skill-biased technology shocks as an instrument for mothers' earnings and employs a two-sample instrumental variables strategy. I use nearly 85 million records of births between 1978 and 2004 from the Natality Detail files along with the CPS Annual Demographic Files from the same period. I classify mothers by education and marital status and investigate separately for each type of mother the impact of an increase in income on the demand for health inputs, as well as the effect of increases in income on infant health.

There are several novel aspects to this study. First, in this study I use the universe of all births in the United States observed at the individual level. This allows for a direct investigation of health outcomes (such as birth weight) and health input demand (such as prenatal care, cigarette smoking, and alcohol consumption) in the population of infants born the United States between 1978 and 2004, and it eliminates the need for standard errors in my regressions. Second, using a measure of state-level skill-biased technology change as an instrument for mothers earnings allows me to deal with the endogeneity of income in an instrumental variables framework. Unobservable characteristics of mothers' that determine her income are likely correlated with other unobservable characteristics that determine health input demand and efficiency in birth weight production. Therefore finding an appropriate instrument for income is essential. Income measures are not available in the universe of birth certificates, but I am able to combine information from the Current Population Survey's Annual Demographic File with the birth certificate data in a two sample two-stage least squares empirical strategy.

1.3 Food Stamps and the Time Cost of Food Preparation

In the fourth chapter I use a structural model of time allocation between household production and market work in order to estimate the shadow wage of household production. I combine data from the American Time Use Survey and the Current Population Survey's Food Security Supplement to estimate the time cost as well as the total cost of food preparation at home. Using information on whether a household received food stamp benefits, I compare actual food stamp recipients' time cost to those who do not receive food stamp benefits. Previous literature that also uses American Time Use Survey data suggests that "typical" food stamp recipients incur a higher time cost of preparing food at home. I cannot confirm this finding using actual data on food stamp recipients and non-recipients. In fact, the lower shadow wage of household production of food stamp recipients more than offsets the larger amount of time spent preparing food at home, generating lower time cost of food preparation for them. This study informs the debate about the future of the US Supplemental Nutritional Assistance Program.

The findings of the three studies are summarized in Chapter 5.

Chapter 2. The Impact of the German Child Benefit on Child Well-Being

2.1 Introduction

The parents of children in Germany receive a monthly child benefit ("Kindergeld") for every child. This benefit is not means-tested and all German and EU citizens living in Germany qualify for it.[1] The Child Benefit is at the core of all family support policies in Germany and the Federal Constitutional Court has confirmed that it is intended to ensure that children's needs are met in terms of nutrition, housing, clothing, personal hygiene, and heating (Bundesverfassungsgericht, 1998). Since the benefit is not provided in-kind but rather as a cash transfer to the parents, how much of the additional income is actually used to improve the well-being of children remains an open empirical question.

While there exists some literature investigating the impact of child benefit systems in different European countries and Canada, this study is the first to investigate the impact of child benefit income on various dimensions of household expenditures and parental behavior in Germany. More importantly, this paper contributes to the literature by cleanly identifying the effect of the child benefit. I use a panel data set of households and exploit exogenous intra-household variation in the amount of the benefit to isolate its effect on the outcomes of interest. Using within-household variation of child benefit income in a panel of households and controlling for various time-varying household characteristics overcomes the identification problem of separating the effect of a child benefit from the effects of differences in the number of children, ages of children, and other confounding factors noted in the previous literature (Edmonds, 2002).

Standard economic theory of consumer choice predicts that the source of any additional household income is irrelevant in determining how that additional income is spent. If families maximize a joint utility function, then a cash transfer shifts out the family budget constraint and the change in expenditures resulting from the shift in the budget constraint does not depend on the source of the additional income. An increase in child benefit will result in the same Engel curves as would an increase in other types of household income.[2] However,

[1] Parents who are German citizens but live abroad may be eligible if they earn income that is fully taxable in Germany. Non-EU citizens may be eligible for child benefit depending on their immigration status. The details of the eligibility rules can be found in §62 Einkommensteuergesetz (EStG) and §1 Bundeskindergeldgesetz (BKGG).

[2] Households do no necessarily have to make decisions as a unit for this result to hold: Becker (1981) describes a model in which one person in the household controls all household resources, but is altruistic toward other members of the family. In this case a different intra-household distribution of income does also not result in different consumption patterns for the household. On the other hand, the model developed by Lundberg and Pollack (1993) predicts that cash transfer payments to the mother and payments to the father can imply different consumption patterns for the household (also see Browning et al., 1994). Lundberg et al. (1997) and Schady and Rosero (2008) provide empirical support for the theoretical results of Lundberg and Pollack (1993).

Thaler (1990) provides evidence suggesting that individuals do not treat cash income from different sources as perfectly substitutable (also see Thaler, 1999). He argues that "mental accounts" attach labels to income from different sources and that the marginal propensity to consume may be different for each of the income sources.

The labeling effect described by Thaler (1990) has been studied empirically in the context of child benefit. Kooreman (2000) used repeated cross sections of Dutch consumer expenditure surveys to investigate the effect of the Dutch child benefit system on parents' spending behavior. He found that the effect of an increase in child benefit income on child clothing expenditures is larger than the effect of an increase in income from other sources on child clothing expenditures for households with only one child. Kooreman suggested that this may be caused by a labeling effect, where parents keep "mental accounts" as proposed in Thaler (1990). However, in Kooreman's study this labeling effect vanished in households with more than one child: larger Dutch families did not distinguish between child benefit income and income from other sources. In a related study, Edmonds (2002) used cross-sectional household data of the Slovenian child benefit program from 1993 to investigate the impact of the child benefit on household expenditures for food, tobacco, alcohol, and clothing. He found no significant effect of child benefit income for any of the above expenditures and concluded that there was no labeling effect.

Most recently, Blow et al. (2012) examined the United Kingdom's Child Benefit program. They studied the time period of 1980-2000 and relied on variation in the real child benefit due to the fact that the government imperfectly accounted for inflation when adjusting the nominal child benefit, and that the amount of child benefit received for the first child increased considerably on two occasions due to a policy change. They found that up to half of a marginal dollar of an increase in the UK child benefit is spent on alcohol. Changes in the UK's Child Benefit policies have also been used by Lundberg et al. (1997) to show that expenditure patterns are different when the child benefit is paid to the mother, compared to when it is paid to the father. They show that expenditures on women's and child clothing increased when a reform of the UK's system transferred the payout of the benefit from the head of household to the mother.[3]

Given these sharply different results, this paper adds to the evidence on the effects of child benefit income. Data limitations prevent me from analyzing the impact of child benefit on expenditures for child-specific goods, such as toys or child clothing. Instead, I estimate a number of household-level equations explaining households' choices regarding food expenditures and housing. I also investigate individual-level equations to see how parents' consumption patterns change in response to changes in child benefit. In particular, I investigate whether variations in child benefit impact parents' consumption of cigarettes and alcohol, parents' personal entertainment activities, participation in cultural events, as well as vacation travel. Some of these commodities are clearly unrelated to child well-being; others could be related, as I explain later in this section. The results provide insights into whether the child benefit is spent according to the intention of the policy maker.

There is a strong relationship between food expenditures and child well-being, as well as between the housing arrangement of families and child well-being. Food expenditures are

[3]Also see Milligan and Stabile (2011), who examined the impact of province level variations of the child benefit in Canada on child outcomes.

directly related to food security (Nord et al., 2010).[4] Furthermore, previous work has shown that food expenditures are highly correlated with dietary quality. For example, Mabli et al. (2010) found that food expenditures of low income households are positively related to the proportion of fruit and vegetables in the households' diet, nutrient density, and expenditure shares of foods recommended for frequent consumption. The authors also found that energy density and expenditure shares on foods that are not recommended for frequent consumption decrease in food expenditures. Since the well-being of children improves when they are eating a healthier diet at home, it is important to investigate how child benefit income affects per person food expenditures in the household.

Regarding housing outcomes, Green and White (1997) found substantial effects of home ownership on child outcomes. In particular, they found that residential stability associated with home ownership is correlated with higher school attainment of children, keeping family income constant. Aaronson (2000) confirms this finding after accounting for more detailed observable family characteristics and attempting to control for endogeneity of homeownership. In addition to ownership, the size of the home also plays a role in child well-being. Crowding occurs when the physical size of the home is too small for the number of family members, and Goux and Maurin (2005) find a negative causal effect of overcrowded housing conditions on academic performance of children. I estimate the impact of child benefit on the probability of home ownership, as well as the size and number of rooms in a home.

Since the child benefit is fungible, parents may use child benefit to support their consumption of cigarettes and alcohol, or other commodities that are unrelated to the well-being of children. It is not the intention of the policy maker to encourage parents to smoke or drink alcohol, and therefore I also estimate a number of individual-level equations explaining parents' smoking and drinking behavior. The literature on the economics of smoking finds the income elasticity of smoking cigarettes varies systematically over time and across countries (Cheng and Kenkel, 2010; Wilkins et al., 2001). There is a strong income gradient in cross sections indicating that lower income individuals are more likely to smoke in the United States, as well as in Germany (Chaloupka and Warner, 2000; Nocon et al., 2007). At the same time, recessions (i.e. time periods when average incomes are low) are associated with improvements in health behaviors such as smoking and drinking (Ruhm, 2000, 2005), Chaloupka and Grossman (1997) showed that income is positively associated with smoking for youths, and Kenkel et al. (2011) found that smoking is a normal good for low income households with children. In order to test whether child benefit contributes to parents smoking or drinking, I estimate the impact of child benefit on smoking participation, the number of cigarettes smoked (conditional on smoking), as well as the probability of regularly consuming alcohol.

In addition to the health behaviors related to smoking and drinking, I test whether parents use the benefit to pay for their social activities and personal entertainment activities. These activities include visits to the movie theater or pop music concerts, attending the opera, public lectures, or participating in other cultural events, as well as making excursions or taking short vacation trips. The personal entertainment activities of the parents, such as going to the movies or pop music concerts are unrelated to child well-being. On the other

[4] This relationship can be considered mechanical: Food security arises due to a lack of resources (and specifically due to a lack of money) to purchase food.

hand, making excursions or going on day trips may include trips to the zoo or amusement parks. Therefore, this activity may be positively related to the well-being of children.

Using data from the German Socio-Economic Panel from 1998 to 2009, I find that households largely use the child benefit as intended by the policy maker. Households respond to increases in child benefit income by increasing per capita food expenditures. Specifically, households spend between 49 and 74 cents out of each additional Euro of child benefit on food. This effect is larger for low-income households compared to high-income households. Outcomes related to housing also improve, especially for parents with younger children. Additional child benefit income is associated with a marginally larger home, and an increased likelihood to own a home instead of renting. I do not find any evidence that parents increase smoking or drinking alcohol in response to increases in child benefit. However, parents of older children (at least 18 years old) who still receive child benefit are more likely to use child benefit for their own social activities and are more likely to attend pop concerts, go to the movies, or go to the opera/theater at least once a month. When investigating whether there is a difference in how low income household respond to an increase in child benefit, I find that low income households have larger increases in per capita food expenditures, but the magnitude of the effect is smaller for housing conditions compared to households who are not at risk of poverty.

I also find evidence for a significant labeling effect. Households spend more of every marginal Euro of child benefit on improving nutritional quality and on improving housing conditions, in comparison to an additional Euro from other sources of income.

The remainder of this paper is structured as follows. Section 2.2 describes the background of the child benefit in Germany. Section 2.3 presents the empirical strategy and describes the data. I discuss the results in section 2.5 and provide robustness checks in section 2.6. Section 2.7 concludes.

2.2 Background of the Child Benefit in Germany

The basic idea of the child benefit in Germany is as follows:[5] The living wage of an individual or couple is not subject to income tax and only income that exceeds the level of living wage ("Grundfreibetrag") is taxable.[6] Households with children are eligible for an additional tax deduction for each child ("Kinderfreibetrag"), but this additional deduction is not considered when calculating tax withholdings. Instead, families with children receive a monthly child benefit in cash. The cash benefit is strictly a function of the number of children; that is, household income or other considerations are irrelevant. All children are generally eligible until they turn 18 years old. Thereafter, the parents may still receive child benefit for the child until the child turns 25 if certain conditions regarding employment status and earnings of the child are met. For instance, a family may continue to receive child benefit for a child

[5] In this section I describe the child benefit system in place during 1996–2011. See Ruhl (1994) for an interesting historical perspective on different approaches to family policy in Germany starting with the early 1900s.

[6] This is equivalent to a "personal exemption" in the U.S. income tax system.

older than 18 years if the child still attends school or university.[7] Conditional on the number of children, the child benefit amount is exogenous and does not depend on any other family characteristics. This means that a household with two children pays the same amount of income tax as a childless but otherwise identical household with identical income; yet, the household with children receives the cash child benefit while the childless household does not.

At the end of the year, the Tax Office calculates the total yearly amount of cash child benefit received by the household, and it also calculates the potential tax savings if the child deduction would have been taken instead. For most households the total yearly cash child benefit they received throughout the year exceeds the tax savings that would have resulted from claiming the child deduction. In this case the household keeps the excess amount as a transfer payment ("Förderanteil"). For households with very high income, the tax savings from taking the child deduction exceeds the total yearly child benefit. In this case, the household claims the deduction and pays back any child benefit received.[8] The Tax Office determines *ex officio* whether the child benefit or the child deduction results in larger savings for the household and therefore this choice is not subject to household decision or to errors by the filing household. In monetary terms, direct government expenditures due to the child benefit and the child deduction were €38.5 billion in 2009 (about 1.6% of GNI), €36.9 billion of which were for the cash benefit and the remaining 1.7 billion for the tax deduction (Bundesministerium der Finanzen, 2010).

Taxable income is not directly observed in the data and is difficult to accurately impute. Moreover, due to changes in the tax schedule and changes in the amount of the allowed deduction, the taxable household income threshold, beyond which taking the tax deduction provides a larger benefit in comparison to taking the cash payment, varies slightly over time. Therefore, in this paper I use only the cash amount of child benefit that is paid out to everyone throughout the year. Ignoring the possibility that households with high income may have received an additional benefit when filing their tax return means that the amount of cash child benefit paid throughout the year can be considered a lower bound. In 2009, there were 17.7 million children eligible for child benefit in Germany and only 11.8% of those children lived in households with sufficiently high household income to be considered for the tax deduction instead of the cash benefit (Bundesministerium der Finanzen, 2010). Since the majority of households receive the cash benefit, I do not expect that using the lower bound of benefit received will have an impact on the results presented below.

[7]The precise conditions to be able to receive the benefit beyond the 18th birthday of the child changed over time and are not considered in this paper.

[8]The current system of receiving a large cash benefit, *or* a tax deduction has been in place since 1996. Prior to 1996, households received both a tax credit *and* a (much smaller) cash benefit payment. Previous studies have used changes in the child benefit law as an exogenous source of income variation. For example, Tamm (2008) used the 1996 change in the law as a "natural experiment" that increased income for households with children. He used this natural experiment to determine that income is not causally related to school choice in Germany.

2.3 Empirical Strategy

I estimate household-level specifications as well as individual-level specifications. The outcomes of interest used in this paper that are observed at the household level are real per capita monthly food expenditures of the household, the probability that the household rents their home, the size of the home measured in square meters, the number of rooms in the home, and the amount of rent paid per month for renters. Smoking and drinking relates to the behavior of individual persons and therefore the unit of observation is the individual parent. I estimate equations describing the probability that a parent smokes, the daily number of cigarettes that a parent consumes conditional on smoking, as well as the probability that a parent regularly consumes alcohol. I also estimate at the individual level the probability that parents attend pop concerts or go to the movies at least once a month, the probability that parents go to classical concerts or attend other cultural events at least once a month, and the probability that parents go on excursions or short vacation trips at least once a month.

Let the outcome of interest k of household j during time t be described by the equation

$$Outcome_{kjt} = f_k \left(Y_{jt}; \mathbf{Z}_{jt} \right), \tag{2.1}$$

where Y_{jt} is the real net monthly household income of household j during year t and $\mathbf{Z}_{jt}$ contains other exogenous time-varying characteristics of the household. If real monthly net household income consists of the child benefit, y_{jt}, and income from other sources, m_{jt}, then

$$Outcome_{kjt} = f_k \left(y_{jt}, m_{jt}; \mathbf{Z}_{jt} \right). \tag{2.2}$$

Kooreman (2000), Edmonds (2002), and Blow et al. (2012) assume that $f_k(\cdot)$ is linear, and that y and m are additively separable. This means that these papers test for a labeling effect of child benefit by comparing the coefficients of y and m in a linear regression of expenditures on y, m, and control variables.

Using a comparison of the coefficients of y and m from a linear regression to identify a labeling effect relies on the assumption that child benefit income and income from other sources are additively separable. This is a strong assumption that deserves careful attention. Child benefit income increases households' unearned income and therefore may have an impact on labor supply decisions. Theoretically, increases in unearned income result in a decrease in labor supply and there have been several studies that lend empirical support to this theoretical prediction specifically in the context of child benefit. For example, Tamm (2009) provided evidence to suggest that the reform of the German child benefit system resulting in a substantial increase of child benefit payments from 1995 to 1996 reduced the labor supply of single mothers and mothers with a working spouse. Analyzing the data from the Canadian child benefit for 1947-1999, McNown and Ridao-Cano (2004) found that increases in child benefit reduced female labor supply in Canada.[9]

[9] Researchers who are not specifically concerned with analyzing the effects of child benefit have also recognized that the labor supply effect of child benefit is important. For example, Blundell and Hoynes (2004) investigated whether a shift of the United Kingdom's welfare policy toward in-work benefits between 1980 and 2000 had a positive effect on labor markets. The authors recognized that an increase in the universal child benefit over the same time period may have offset some of the positive impact of the shift toward in-work benefits on labor supply.

Out of the previous literature on the impact of child benefit discussed above, only Kooreman (2000) explicitly discusses labor supply concerns. Motivated by the work of Browning and Meghir (1991) who investigated the separability of commodity demands from labor supply, Kooreman (2000) checked the robustness of his results by estimating expenditure equations that include as an explanatory variable a dummy for mothers' labor market participation, instrumented by mothers' education level[10]. However, the choice of the instrument is crucial in order to identify the correct mechanism through which household income may change (Moffitt, 2005). The concern is that child benefit acts as a budget shifter: keeping constant wage, it can affect labor supply due to a shift in unearned income. Under this scenario, an increase in child benefit can decrease labor supply, which in turn can lower household income. Since child benefit is determined strictly by the number of children in the household, it is orthogonal to any other household characteristics, including mothers' education level. Even if education is a valid instrument for household income, instrumenting household income with mothers' education does not address the fact household income may change due to a decrease in labor supply in response to an increase in child benefit.

Due to the fact that child benefit is exogenous to everything except for the number of children in the household, finding a good instrument is challenging. In order to nonetheless address any concerns regarding the potential labor supply effects of the variations in child benefit, the main results presented in this paper are based on regressions that use the lagged value of household income as the measure of household income. Child benefit can only affect labor supply contemporaneously and in the future, and current year child benefit does not influence labor supply decisions in the previous year. At the same time, household income is expected to be highly correlated across years within the same household. Variations of this specification are explored in the robustness checks section.

I estimate the following empirical counterpart of Equation (2.2)

$$Outcome_{kjt} = \alpha_k y_{jt} + \beta_k m_{j(t-1)} + \mathbf{Z}_{jt}\delta_k + \mu_{kj} + \nu_{ks} + \tau_{kst} + \varepsilon_{kjt}, \tag{2.3}$$

where $\mathbf{Z}_{jt}$ contains time varying observable characteristics of household j as well as controls for local macroeconomic conditions captured by state level unemployment rates and an indicator for whether Germany was in a recession during the time of the interview. μ_j is a vector of household fixed effects so that the effect of child benefit can be identified from variation in the child benefit within the households over time. ν_s is a set of indicators for the state of residence of the household to account for systematic differences in behavior across regional areas, and τ_{st} represents the set of region specific time trends to capture systematic variation over time in each region. ε_{kjt} is an idiosyncratic error term.

When the outcome of interest is observed at the individual level instead of the household level (e.g. for equations describing smoking participation, number of cigarettes smoked, and the probability of regularly consuming alcohol) then Equation (2.3) becomes

$$Outcome_{kit} = \alpha_k y_{jt} + \beta_k m_{j(t-1)} + \mathbf{Z}_{ijt}\delta_k + \mu_{ki} + \nu_{ks} + \tau_{kst} + \varepsilon_{kit}, \tag{2.4}$$

[10]Edmonds (2002) also instrumented other income, although his primary concern was measurement error in household income. He used as instruments an indicator for whether or not the household is active in the informal sector, regular employment, entrepreneurial activities, receiving fixed incomes, and number of persons eligible for the child benefit. While Blow et al. (2012) wrote about comparing the marginal propensities to spend out of child benefit and other income, they actually used total expenditure less child benefit rather than income in their estimations.

where the subscript i denotes the individual. Note that in this individual-level fixed effects specification the income variables m_{jt} and y_{jt} are still observed at the household level, and $\mathbf{Z}_{ijt}$ now also contains time-varying exogenous characteristics of the individual in addition to the household-level characteristics used in the specification of equation (2.3).

The main results of this paper are obtained by estimating specifications according to Equation (2.3) and Equation (2.4).[11] To address concerns regarding the impact of child benefit on fertility, I estimate specifications separately for households that have one child and households that have two children. Households that have one child and households with two children account for 85 percent of the observations in my sample and therefore estimating specifications separately for households with three children or households with four or more children would result in insufficient sample sizes. Therefore, in addition to estimating specifications separately for households with one child and households with two children, I estimate specifications using data on households with a varying number of children over time. In those specifications I include a control variable for the number of children in the household.

I also estimate specifications separately for families that have young children and families that have older children. Families may receive the child benefit until the child is 25 years of age. I define a household with young children to be a household in which the youngest child is less that 18 years old. Equivalently, a household with old children is a household whose children are all at least 18 years of age. Distinguishing between households with old children and households with young children is interesting for two reasons. First, the child benefit is meant to ease the financial burden of raising children and to ensure that the needs of children in terms of nutrition and housing are met. Younger children will have different needs in that regard compared to older children. For example, older children are more likely to live outside of the home of the parents and no longer eat their meals at home.[12] Second, in 2012 a change in the child benefit law expanded the eligibility criteria for children over the age of 18, while not affecting younger children.[13] If parents of older children behave systematically different from parents of younger children in terms of how child benefit is spent, then identifying this systematically different behavior will be important in the context of the new child benefit law.

2.4 Data

I use data from the German Socio-Economic Panel (SOEP) to estimate specifications according to equation (2.3) and (2.4). The SOEP is a longitudinal data set that has been in place since 1984, with additional samples taken in 1993, 1998, 2000, and 2006 to counter

[11] I will also report results of regressions that include contemporaneous child benefit and household income as a robustness check.

[12] During the sample period used in this study, a child that is older than 18 but less than 25 years of age may be eligible for child benefit while the child continues her education and the child's own income falls below a threshold level

[13] Specifically, the requirement that a child's own income falls below a certain threshold has been removed. Since the change of the law took effect in 2012, it cannot be considered in this study and will be the subject of future research.

sample attrition.[14] Among many other detailed household characteristics and individual characteristics of each household member, the data also contain information regarding the amount of child benefit received, as well as the number of children in the household (see Wagner et al., 2007).[15]

The child benefit in Germany has been administered in its current form since 1996, and therefore the sample period used in this paper is very similar to the time period during which the current child benefit policy has been in effect.[16] Some of the outcomes that I consider in this paper are not available in all years of the survey and I will use only data from the years 1998-2009 in this paper due to data availability. While households were asked about their housing situation in every survey year 1998-2009, data regarding food expenditures have only been collected in the years 1998, 2000, 2001, 2003, 2005, and 2007. Parents were asked about their smoking behavior in 1999, 2001, 2002, 2004, 2006, and 2008, and about their drinking behavior in 2006 and 2008. Individuals indicated whether they go to the movies or to pop music concerts at least once a month and whether they attend cultural events at least once a month during the survey years 1998, 1999, 2001, 2003, 2005, and 2007–2009. Information on excursions and short vacation trips is available for the survey years 1998, 2003, and 2008. I do not hold my sample constant, but estimate all specifications using all available data.

Table 2.1 presents summary statistics and description of the variables used in this study. Panel (a) summarizes household-level variables and Panel (b) summarizes variables observed at the individual level. I use only data on households with children and I exclude families that have multiple generations living in one household. The average child benefit received by households is substantial. Families receive on average 261.79 Euro per month in child benefit for an average of 1.73 children per household. This means that on average, child benefit income is equivalent to about 10 percent of other household income. The youngest child in households is on average just over ten years old and single parents make up about 14 percent of the sample. As shown in Panel (b) of Table 2.1, parents are on average about 41 years old and about 35 percent of parents are smokers.

Figure 2.1 shows that there is variation in the nominal amount and real amount of child benefit received over time, conditional on the number of children.[17] In terms of real 2005 Euros, a family with two children would receive €246.42 per month in 1998. By 2009, the amount of the child benefit increased by about 25% to €306.54 per month for exactly the same two children. Note also, that in real terms child benefit is not strictly increasing over time. The amount of real child benefit was actually highest in 2002.

[14]In addition, in 2002 there was a separate sample taken that targeted high income households. Due to the fact that the tax savings due to a tax credit may be larger than the sum of the monthly cash child benefit payments for this group, I exclude the 2002 high income sample from my estimations. My results are not sensitive to omitting or including this sample in the estimations.

[15]I use the official monthly amounts of child benefit for which households are eligible to correct for measurement error in the reported child benefit variable. Respondents are much less likely to commit an error when counting their children compared to remembering the precise amount of child benefit they receive.

[16]There was a change in 1996 in the way that the child benefit was administered in Germany. Prior to 1996, households received both a tax credit *and* a small cash benefit. From 1996 onward, the child benefit system has been administered according to the description in Section 2.2.

[17]The nominal changes of child benefit always took effect on January first of a given year.

Table 2.1: Summary Statistics

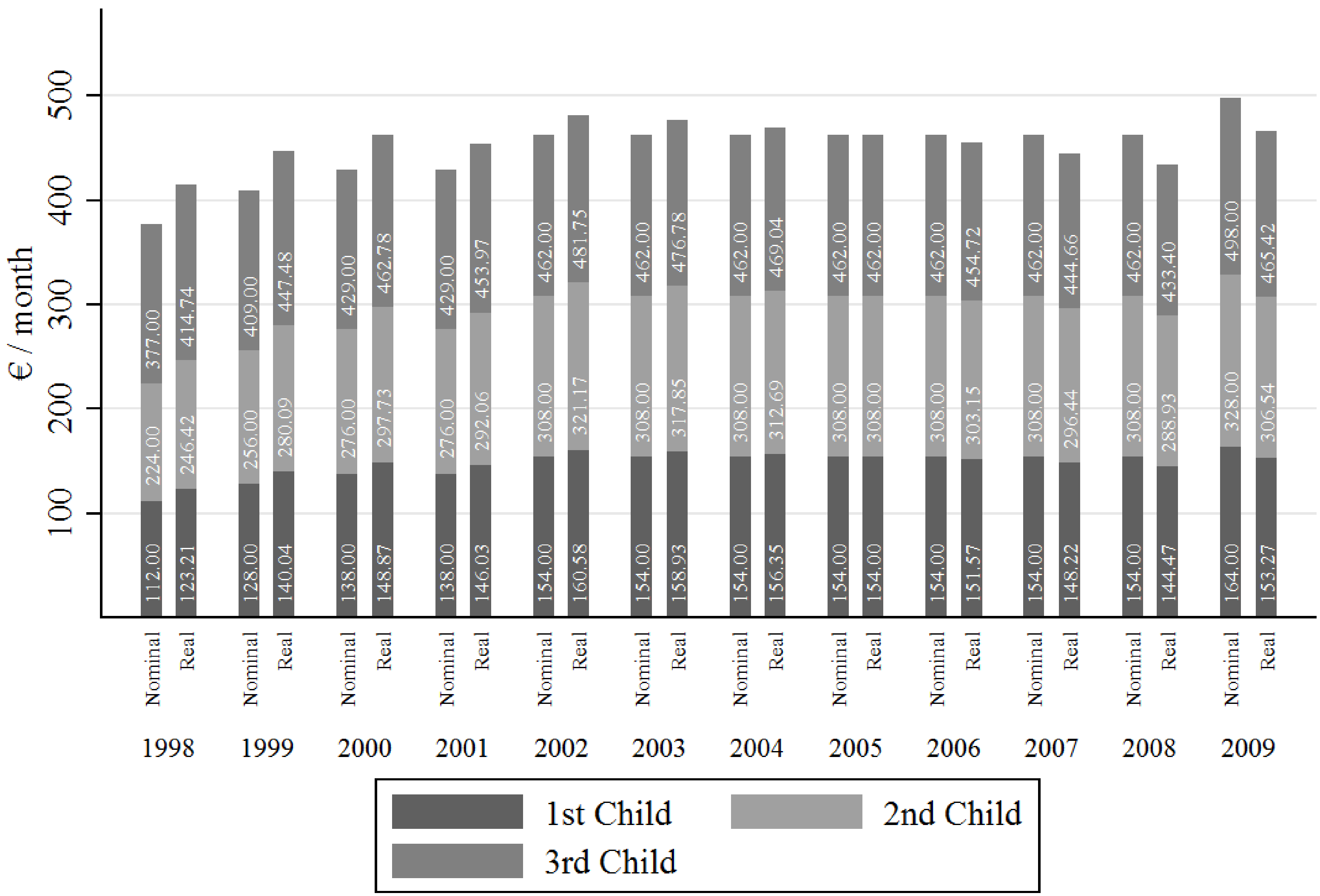
Panel (a) Variables Observed at the Household Level

Variable	Description	Mean	Std. Dev	Obs
Child Benefit	Real Child Benefit in 2005€/month	261.79	134.54	39,598
HH Income	Real Net Houshold Income in 2005€/month	2655.23	1424.60	38,084
Number of Children	Number of Children in Household for which child benefit is received	1.7322	0.8377	39,598
Only Child	Household has one child	0.4549	0.4980	39,598
Two Children	Household has two children	0.4012	0.4902	39,598
Three Children	Household has three children	0.1125	0.3160	39,598
Four or more Children	Household has at least four children	0.0313	0.1742	39,598
Single Parent	Single Parent	0.1387	0.3457	39598
Age of Youngest Child	Age of the youngest child in the household	10.276	6.739	39,598
Food Expenditure	Total per capita monthly expenditures on food in the household	148.59	67.77	20,590
Renter	Household rents or owns their residence (Rent=1/Own=0)	0.4543	0.4979	37,135
Size (m^2)	Size of the residence measured in square meters	112.74	41.98	37,136
Number of Rooms	The number of rooms in the home larger than 6 square meters	4.5681	1.6197	37,136
Rent/m^2	Rent per square meter in real 2005€/month	5.8539	1.9343	16,117
Unemployment Rate	State-level unemployment rate	10.260	4.379	39,598
Recession	Country is in recession in current year	0.4783	0.4995	39,598

Panel (b) Variables Observed at the Individual Level

Variable	Description	Mean	Std. Dev	Obs
Age	Age of Parent	40.88	8.33	70,875
Smoking	Parent Smokes	0.3535	0.4781	35,693
Number of Cigarettes	Number of Cigarettes smoked per day among smokers	16.2879	8.8358	7,985
Drinking	Parent regularly consumes alcohol	0.1506	0.3577	11,159
Movies or Pop Concerts	Parents go to the movies or pop music concerts at least once a month	0.2277	0.4194	44,089
Cultural Events	Parents attend cultural events such as classical music concerts, the opera, public lectures, or the theater at least once a month	0.1459	0.3531	44,111
Short Trips	Parents make excursions or take short vacation trips at least once a month	0.2577	0.4374	16,269

Note: Net HH Income does not include the Child Benefit. Real Child Benefit and real net household income were calculated using the overall consumer price index. Rent per square meter is deflated using the specific rent-and-utility price index. Summary statistics for housing related variables exclude households that have receiving subsidized public housing.



Note: Numbers inside the bars represent cumulative totals

Figure 2.1: Child Benefit Amounts, 1998-2009

It is important to re-emphasize that, conditional on the number of children, the change in child benefit is exogenous and does not depend on any other family characteristics. Issues regarding the take-up of social assistance may be a concern if, for instance, a welfare stigma discourages households to apply for support for which they may be eligible (Moffitt, 1983). In the context of the German child benefit these issues are irrelevant. Due to the universal eligibility of children, the child benefit is not considered social assistance in the same sense that welfare programs are considered social assistance, and it is not associated with welfare stigma (Frick and Groh-Samberg, 2007).

2.5 Main Results and Discussion

2.5.1 Food Expenditures

The first set of results pertains to per capita food expenditures of households. To the extent that per person monthly food expenditures of a household are correlated with the nutritional quality of the food consumed by that household, a positive impact of the child benefit on per capita food expenditures would indicate that the child benefit is used according to the intentions of policy makers. Total monthly household expenditures on food are observed in the survey years 1998, 2000, 2001, 2003, 2005, and 2007 and I construct a measure of per person food expenditures at the household level by dividing the total real monthly food expenditures of households by the number of household members.

Table 2.2 shows that per capita food expenditures increase significantly as child benefit increases. Point estimates of the effect range from an increase of per capita food expenditures by 40 cents per additional Euro of child benefit received for households with one child (Column 1), to about 13 cents per additional Euro of child benefit for households with two children (Column 2). Columns 3 – 6 report the impact of child benefit on per capita food expenditures for families with a different number of children over time, controlling for the number of children in the household. Point estimates range from an increase in per capita food expenditures by 15 cents for families with one or two children, to an increase of 21 cents for households with any number of children. These results are highly statistically significant, as well as economically significant.

Table 2.2 also present the results of estimating the impact of child benefit on per capita food expenditures separately for households that have young children (the youngest child is under the age of age 18) and households that have older children (the youngest child is at least 18 years old). The results for the entire sample are driven by households that have young children present: Regardless of the number of children in the household, the coefficient of child benefit is statistically insignificant for households with older children. The fact that child benefit has no effect on food expenditures in households with children older than 18 years of age is intuitive. Older children are less likely to eat at home because they are more likely to attend college, participate in job training and eat their meals outside of the home.

The results in Table 2.2 show that household income also positively impacts per capita food expenditures. However, the effect of child benefit income is significantly larger compared to the effect of income from other sources, indicating that there is a labeling effect in child benefit income with respect to food expenditures. An F-test rejects that the coefficient of

Table 2.2: The Impact of Child Benefit on Per Capita Monthly Food Expenditures in Households.

	Per Person Real Monthly Household Food Expenditures					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.3971***	0.1299***	0.1482***	0.1614***	0.1829***	0.2070***
	(0.1091)	(0.0391)	(0.0358)	(0.0323)	(0.0303)	(0.0272)
HH Income	0.0069***	0.0034*	0.0051***	0.0030*	0.0047***	0.0046***
	(0.0019)	(0.0014)	(0.0011)	(0.0012)	(0.0010)	(0.0009)
p(CB = HH Income)	0.0004	0.0013	0.0001	0.0000	0.0000	0.0000
Observations	6,942	6,856	13,798	8,803	15,745	16,295
Households with young children						
Child Benefit	0.4304***	0.1376***	0.1587***	0.1666***	0.1879***	0.1984***
	(0.1305)	(0.0405)	(0.0376)	(0.0332)	(0.0315)	(0.0281)
HH Income	0.0062*	0.0048***	0.0051***	0.0038**	0.0045***	0.0045***
	(0.0024)	(0.0013)	(0.0011)	(0.0012)	(0.0010)	(0.0010)
p(CB = HH Income)	0.0012	0.0011	0.0000	0.0000	0.0000	0.0000
Observations	5,067	6,292	11,359	8,182	13,249	13,793
Households with old children						
Child Benefit	0.5283	0.3169	0.3071	0.1256	0.3028	0.2763
	(0.3718)	(0.3532)	(0.2172)	(0.3003)	(0.2043)	(0.1998)
HH Income	0.0005	-0.0021	0.0010	-0.0022	0.0007	0.0006
	(0.0043)	(0.0027)	(0.0027)	(0.0027)	(0.0027)	(0.0026)
p(CB = HH Income)	0.1565	0.3680	0.1588	0.6710	0.1394	0.1679
Observations	1,406	355	1,761	391	1,797	1,800

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

child benefit and the coefficient of other household income are identical with a p-value of < 0.00. This is true for households with young children, as well as for the pooled sample of households with children of any age. Since the effect of child benefit on per capita food expenditures for households with older children is statistically insignificant, I do not find a labeling effect for these households.

Multiplying the average household size by the estimated increase in per capita food expenditures due to an increase in child benefit provides an estimate of how much total household food expenditures change in response to changes in child benefit. Households with only one child have 2.8 members on average. In this case the point estimate of the coefficient of child benefit indicates that a one Euro increase in child benefit would result in an increase of household food expenditures by more than one Euro. However, this point estimate is not statistically significantly larger from the value that would suggest that all additional child benefit is exhausted on food (p-value = 0.7141). Estimates for all other household sizes are very reasonable and they range from an increase in total food expenditure of 49 cents for every additional Euro of child benefit for households with one or two children, to and increase of 74 cents per additional Euro for households with any number of children.

2.5.2 Housing

In this section I investigate the impact of child benefit income on outcomes related to housing. In particular, I estimate the impact of the child benefit on the probability that the household owns or rents their residence, as well as on the size of the residence.[18] Questions about the residential details of the household are asked in every wave of the survey so that changes in the housing conditions of households can be tracked very precisely. Since most interviews in the SOEP are completed in the first quarter of each year,[19] I use the monthly amount of child benefit received during the previous calendar year in all specifications related to housing.[20] It is possible to purchase different food immediately in response to an income shock, but housing decisions are subject to lease contracts and it may take time to find a new home.

Table 2.3 shows that the probability of renting (versus owning) a home decreases in response to an increase in the amount of child benefit. With the exception of the specification that employs only households with two children (Column 2), this effect is statistically significantly different from zero regardless of the number of children in the household. The magnitude of the effect is also very consistent across family sizes: An increase in child benefit by about 100 Euro per month would be needed to increase the probability of home ownership by one percentage point. Increases in household income also make it less likely that a household rents their home, but the impact of an additional Euro in child benefit on the probability of home ownership is larger than the impact of an additional Euro in household income. Comparing the coefficient of child benefit and the coefficient of household income, an F-test rejects the hypothesis that the coefficients are equal with a p-value of at most 0.052 for all family sizes other than households with two children.[21]

[18] I exclude from the estimations households that live in public housing.

[19] Two thirds of all interviews are completed by March. By April about 80% of all interviews are completed.

[20] This also means that in order to account for the potential contemporaneous effect of child benefit on labor supply, I include household income lagged by two periods in all housing related estimations.

[21] In the interest of space, coefficients of control variables are not reported in the Tables, but are available

Table 2.3: The Impact of Child Benefit on the Probability that Households Rent Their Home.

	Probability of Being a Renter					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	-0.0001**	-0.0001	-0.0001***	-0.0001*	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HH Income	-0.0000***	-0.0000**	-0.0000***	-0.0000**	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0252	0.1539	0.0007	0.0522	0.0001	0.0002
Observations	10,829	11,628	22,457	14,875	25,704	26,581
Households with young children						
Child Benefit	-0.0002*	-0.0001	-0.0001**	-0.0001	-0.0001**	-0.0001**
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HH Income	-0.0000**	-0.0000**	-0.0000***	-0.0000**	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0394	0.3081	0.0169	0.1197	0.0064	0.0095
Observations	7,557	10,595	18,152	13,737	21,294	22,161
Households with old children						
Child Benefit	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HH Income	-0.0000*	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.8705	0.9440	0.5112	0.9891	0.4395	0.5022
Observations	1,775	425	2,200	463	2,238	2,242

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends.Specifications for Columns (3)-(6) also control for the number of children in the household.

The finding that increases in child benefit decrease the probability that household rent their home is driven by households with younger children. The bottom panel of Table 2.3 shows that for households with older children, increases in child benefit have no statistically significant effect on the probability of renting. At the same time, the impact of child benefit on the probability of renting for households with young children is generally statistically significant and of similar magnitude to the results for all households. It is intuitive that child benefit does not influence the decision to rent or own in the case of households with older children because children who are older than 18 years of age are very likely to move out of the house soon.

Owning a home compared to renting a home can be considered an improvement in the housing arrangement of a household, but home ownership by itself is not immediately related to the well-being of children. The size of the home is much more important to determine whether children are better off. Table 2.4 shows that a one Euro increase in child benefit is associated with a larger apartment by 0.0095 square meters for households with one child. This effect is statistically significant and the magnitude is consistent between specifications, ranging from an increase of 0.0094 square meters per Euro for families with two or three children, to an increase by 0.0145 square meters for households with one, two, or three children. In terms of square feet, this means that the average home size increases by about 10 - 16 square feet for a 100 Euro increase in child benefit.

In addition to the overall home size, I also consider the number of rooms in the home. In particular, if a child has a room to herself instead of sharing with siblings or other household members, this is a direct improvement in housing conditions related to child well-being. Table 2.5 present the impact of child benefit on the number of rooms larger than six square meters in the homes of households. The effect of child benefit is positive and generally highly statistically significant. The impact of child benefit on the number of rooms in the home is statistically insignificant only for households with one child. On the other hand, households with one child do increase the size of their home in square meters in response to increases in child benefit, as shown in Table 2.4. This difference in results is consistent with the idea that an additional room in the home will be more useful than additional square footage when there are more children in the household.

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upon request. All of the control variables in this specification have the expected signs. For example, single parents are more likely to rent their home, while households with a larger number of children are less likely to be renters. while statistically indistinguishable from zero, the point estimates of the coefficient of the state unemployment rate as well as the coefficient of the recession indicator are positive.

Table 2.4: The Impact of Child Benefit on the Size (Square Meters) of Homes of Households.

	Size of Home in Square Meters					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0095*	0.0079	0.0133***	0.0094*	0.0145***	0.0128***
	(0.0046)	(0.0045)	(0.0037)	(0.0043)	(0.0036)	(0.0034)
HH Income	0.0008*	0.0006	0.0009**	0.0009*	0.0011***	0.0012***
	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.0586	0.1045	0.0008	0.0516	0.0002	0.0007
Observations	10,829	11,628	22,457	14,875	25,704	26,581
Households with young children						
Child Benefit	0.0078	0.0089	0.0131**	0.0093	0.0127**	0.0108**
	(0.0056)	(0.0051)	(0.0044)	(0.0048)	(0.0040)	(0.0039)
HH Income	0.0006	0.0005	0.0008*	0.0010*	0.0011**	0.0011***
	(0.0004)	(0.0006)	(0.0004)	(0.0005)	(0.0003)	(0.0003)
p(CB = HH Income)	0.1960	0.0949	0.0049	0.0861	0.0041	0.0145
Observations	7,557	10,595	18,152	13,737	21,294	22,161
Households with old children						
Child Benefit	0.0036	-0.0033	-0.0009	0.0140	0.0035	0.0037
	(0.0086)	(0.0124)	(0.0065)	(0.0125)	(0.0064)	(0.0064)
HH Income	-0.0000	0.0001	0.0001	0.0003	0.0002	0.0002
	(0.0006)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.6754	0.7775	0.8750	0.2706	0.6073	0.5840
Observations	1,775	425	2,200	463	2,238	2,242

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

The significant positive impacts of child benefit on home size (Table 2.4) and the number of rooms in the home (Table 2.5) are driven by households who have children under the age of 18. As expected, the estimated magnitude of the impact of child benefit on housing related variables is very small. For example, the results from Table 2.5 suggest that a 100 Euro increase of child benefit increases the number of rooms in the homes of households by about 0.04 to 0.07 rooms, depending on the number of children in the family. However, on the margin additional child benefit results in improvements in the housing situation of households with children. Moreover, there is a statistically significant labeling effect for child benefit income: parents are more likely to use additional child benefit income than income from other sources to improve their housing situation.

There are two margins along which the child benefit may impact the consumption of housing services. First, a household may choose to buy instead of renting. Second, a household may "move up" to a larger or otherwise improved home. For those households that currently rent their home, an increase in income could result in changes along either margin. The household may decide to pursue home ownership, or they may choose to rent a larger residence. On the other hand, home owners are very unlikely to go back to renting a home due to changes in child benefit income. Moreover, since selling a home is more costly and time consuming than terminating a lease, it is also less likely that home owners will purchase a larger home due to the change in child benefit income. Since there may be systematic differences in how renters react to increased income compared to owners, I estimate separate regressions for renters and owners. Additionally, I estimate the impact of child benefit income on the amount of rent paid per square meter.[22] Rent per square meter can be interpreted as a measure of the quality of the home and an increase in child benefit or household income may lead to households choosing to live in an identical size, but higher quality home.

Tables 2.6 displays the results of estimating the impact of child benefit on rent per square meter for households who rent their home. Tables 2.7/B and 2.9/B present the results of estimating the impact of child benefit on the home size as well as the number of rooms in the home separately for those households who rent their home and for households who own their home. There is no statistically significant impact of child benefit on rent per square meter paid by households. Although insignificant, the point estimate of the coefficient of child benefit is positive in all specifications. With respect to the size of homes, comparing the impact of child benefit income between renters and owners shows that the effects of child benefit on apartment size are driven by renters. Table 2.7 shows that a one Euro increase in child benefit results in an increase in home size between 0.0093 and 0.0118 square meters for renters, depending on the number of children in the household. Again, this effect is driven by renters who have young children in the household. At the same time, there is no statistically significant effect of child benefit on the size of the home for home owners (Table 2.8). Results are very similar for the impact of child benefit on the number of rooms in the home for renters and owners. Table 2.9 shows that the number of rooms in the home increases for renters, and that this effect is driven by households with young children. On the

[22]Home ownership is not always associated with regularly recurring payments since a household may be paying a mortgage, but they may also have inherited the home, or paid off the home already in the past. Therefore, I do not have an equivalent to monthly housing payments available for owners.

Table 2.5: The Impact of Child Benefit on the Number of Rooms in the Homes of Households.

	Number of Rooms					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0003	0.0003*	0.0006***	0.0004**	0.0007***	0.0006***
	(0.0002)	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
HH Income	0.0000	0.0000**	0.0000***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.1662	0.0555	0.0002	0.0145	0.0000	0.0000
Observations	10,829	11,628	22,457	14,875	25,704	26,581
Households with young children						
Child Benefit	0.0003	0.0004*	0.0005**	0.0004*	0.0006***	0.0005***
	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
HH Income	0.0000	0.0000	0.0000*	0.0000**	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.2278	0.0301	0.0039	0.0290	0.0006	0.0025
Observations	7,557	10,595	18,152	13,737	21,294	22,161
Households with old children						
Child Benefit	0.0003	-0.0004	0.0004	-0.0004	0.0004	0.0004
	(0.0004)	(0.0007)	(0.0003)	(0.0005)	(0.0003)	(0.0003)
HH Income	0.0001*	0.0001***	0.0001**	0.0001***	0.0001**	0.0001**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6018	0.4553	0.2173	0.3300	0.2782	0.2595
Observations	1,775	425	2,200	463	2,238	2,242

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

other hand, the impact of child benefit on the number of rooms in the home is statistically insignificant in every specification for home owners, as shown in Table 2.10.

2.5.3 Parents Smoking and Drinking

Parents may use child benefit to support their smoking habits if child benefit income is fungible. Therefore, I report results on whether the child benefit has any impact on the probability that parents smoke. As described in Section 2.3, I use a panel of individuals instead of households for these estimations and I include individual level fixed effects. Using an individual-level fixed effects specification eliminates the need to include other important determinants of smoking such as age and education (Chaloupka and Warner, 2000; Cutler and Lleras-Muney, 2010) in the estimations. Since the average parent in my sample is 41 years old, there is not enough meaningful variation in education of individuals over time and any difference in education between parents will be captured by the individual fixed effect.[23] Child benefit is paid to the parents of a family and is not assigned to a particular individual parent in the family. Therefore, despite the fact that estimations are performed using individual-level data, child benefit enters the estimation equations at the household level.[24]

Table 2.11 presents estimates of the impact of child benefit income on the probability of smoking. There is no statistically significant impact of child benefit on smoking participation and there is no significant effect of household income on smoking participation either. While the impact of both child benefit and household income are statistically insignificant, it is interesting to note that the sign of the point estimate of the impact of household income is always negative, while there is no clear pattern for the coefficient of child benefit. If anything, this could indicate that smoking may be an inferior good for parents with children. Table 2.12 shows that child benefit does not impact smoking on the intensive margin either. I report only the impact of child benefit on the number of cigarettes smoked by parents who have one child, parents who have one or two children, and parents with any number of children because sample sizes are small for families with two children and for families with two or three children. Conditional on smoking, there is no change in the number of cigarettes consumed by parents in response to a change in child benefit, regardless of the number of children.

Table 2.13 present results on drinking behavior. The outcome is a dummy variable that is equal to 1 if the parent indicated to regularly consume either beer, wine, liquor, or mixed drinks and zero otherwise.[25] Blow et al. (2012) found that a large proportion of unexpected increases in child benefit income in the UK were spent on alcohol. While I do not have data on expenditures on alcohol, I am unable to find a significant impact on drinking behavior in

[23] Moreover, Goehlmann (2007) finds that smoking initiation among older individuals in Germany is not affected by education.

[24] Both parents in each household are included in the estimations individually, unless the family is headed by a single parent.

[25] The questionnaire includes separate questions for beer, wine, liquor, or mixed drinks. Respondents are asked to indicate whether they consume each of these types of beverages "Regularly", "Sometimes", "Rarely", or "Never". I consider parents to regularly drink alcohol and code the dummy variable equal to 1 if they indicated to "Regularly" consume any one or more of the above types of beverages. Results are robust to using different classification schemes.

Table 2.6: The Impact of Child Benefit on the Amount of Rent Paid per Square Meter.

	Rent Per Square Meter					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0002	0.0002	0.0002	0.0004	0.0003	0.0002
	(0.0004)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
HH Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.7124	0.5425	0.5487	0.1294	0.2816	0.4419
Observations	5,285	4,281	9,566	5,498	10,783	11,129
Households with young children						
Child Benefit	0.0004	0.0002	0.0002	0.0005	0.0004	0.0003
	(0.0004)	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
HH Income	0.0001	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.4535	0.4669	0.4916	0.0972	0.1228	0.1598
Observations	3,940	3,974	7,914	5,170	9,110	9,455
Households with old children						
Child Benefit	0.0022	0.0009	0.0016	-0.0004	0.0014	0.0014
	(0.0012)	(0.0023)	(0.0009)	(0.0020)	(0.0008)	(0.0008)
HH Income	-0.0000	0.0004**	0.0001	0.0003**	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0692	0.8277	0.0729	0.7257	0.0902	0.0902
Observations	684	116	800	123	807	807

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.7: The Impact of Child Benefit on the Size (Square Meters) of Homes for Households that Rent their Home.

	Size of Home in Square Meters (Renters)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0058	0.0076	0.0093*	0.0090*	0.0118**	0.0117***
	(0.0051)	(0.0049)	(0.0037)	(0.0042)	(0.0036)	(0.0030)
HH Income	0.0007	0.0013**	0.0012***	0.0015***	0.0014***	0.0014***
	(0.0004)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.3198	0.2014	0.0257	0.0778	0.0037	0.0007
Observations	5,488	4,522	10,010	5,787	11,275	11,626
Households with young children						
Child Benefit	0.0029	0.0061	0.0081*	0.0082	0.0106**	0.0104**
	(0.0053)	(0.0051)	(0.0040)	(0.0046)	(0.0040)	(0.0032)
HH Income	0.0006	0.0016**	0.0012**	0.0018***	0.0014***	0.0015***
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.6656	0.3684	0.0899	0.1598	0.0216	0.0065
Observations	4,105	4,203	8,308	5,447	9,552	9,902
Households with old children						
Child Benefit	-0.0092	-0.0018	0.0002	0.0007	0.0019	0.0019
	(0.0091)	(0.0034)	(0.0064)	(0.0039)	(0.0059)	(0.0059)
HH Income	-0.0001	-0.0009**	-0.0003	-0.0010***	-0.0003	-0.0003
	(0.0005)	(0.0002)	(0.0004)	(0.0002)	(0.0004)	(0.0004)
p(CB = HH Income)	0.3221	0.7906	0.9452	0.6775	0.7098	0.7098
Observations	704	121	825	128	832	832

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.8: The Impact of Child Benefit on the Size (Square Meters) of Homes for Households that Own their Home.

	Size of Home in Square Meters (Owners)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0022	-0.0022	0.0043	0.0012	0.0068	0.0058
	(0.0071)	(0.0052)	(0.0053)	(0.0049)	(0.0051)	(0.0051)
HH Income	-0.0003	-0.0004	-0.0002	-0.0002	-0.0001	-0.0000
	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.7243	0.7226	0.3897	0.7898	0.1761	0.2515
Observations	5,341	7,106	12,447	9,088	14,429	14,955
Households with young children						
Child Benefit	-0.0029	0.0007	0.0037	0.0014	0.0049	0.0040
	(0.0100)	(0.0059)	(0.0063)	(0.0055)	(0.0057)	(0.0060)
HH Income	-0.0006	-0.0008	-0.0008	-0.0004	-0.0004	-0.0004
	(0.0005)	(0.0006)	(0.0004)	(0.0005)	(0.0004)	(0.0004)
p(CB = HH Income)	0.8197	0.7911	0.4705	0.7492	0.3558	0.4665
Observations	3,452	6,392	9,844	8,290	11,742	12,259
Households with old children						
Child Benefit	-0.0011	-0.0084	-0.0043	0.0166	0.0018	0.0021
	(0.0106)	(0.0148)	(0.0084)	(0.0161)	(0.0086)	(0.0086)
HH Income	-0.0002	0.0001	0.0001	0.0005	0.0002	0.0002
	(0.0007)	(0.0005)	(0.0003)	(0.0005)	(0.0003)	(0.0003)
p(CB = HH Income)	0.9348	0.5609	0.5999	0.3149	0.8474	0.8257
Observations	1,071	304	1,375	335	1,406	1,410

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.9: The Impact of Child Benefit on the Number of Rooms in Homes of Households that Rent their Home.

	Number of Rooms (Renters)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0002	0.0004	0.0004**	0.0003	0.0005**	0.0005**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
HH Income	0.0000	0.0001	0.0000*	0.0000	0.0000*	0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.3403	0.1204	0.0077	0.1659	0.0027	0.0028
Observations	5,488	4,522	10,010	5,787	11,275	11,626
Households with young children						
Child Benefit	0.0002	0.0003	0.0004*	0.0002	0.0004*	0.0004*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	0.0000	0.0001	0.0000*	0.0000	0.0000*	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.4839	0.2508	0.0358	0.3961	0.0247	0.0326
Observations	4,105	4,203	8,308	5,447	9,552	9,902
Households with old children						
Child Benefit	-0.0002	0.0017	0.0002	0.0013	0.0002	0.0002
	(0.0006)	(0.0010)	(0.0004)	(0.0008)	(0.0003)	(0.0003)
HH Income	0.0000	0.0000	0.0000*	0.0000	0.0000*	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6309	0.0983	0.6319	0.1038	0.6612	0.6612
Observations	704	121	825	128	832	832

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.10: The Impact of Child Benefit on the Number of Rooms in Homes of Households that Own their Home.

	Number of Rooms (Owners)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	-0.0001	0.0002	0.0003	0.0004	0.0005**	0.0005*
	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.7191	0.5436	0.1090	0.1134	0.0109	0.0154
Observations	5,341	7,106	12,447	9,088	14,429	14,955
Households with young children						
Child Benefit	-0.0003	0.0003	0.0002	0.0004	0.0004	0.0003
	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	-0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6655	0.1955	0.4259	0.0946	0.0689	0.0995
Observations	3,452	6,392	9,844	8,290	11,742	12,259
Households with old children						
Child Benefit	-0.0001	-0.0010	0.0001	-0.0008	0.0001	0.0001
	(0.0006)	(0.0008)	(0.0004)	(0.0006)	(0.0004)	(0.0004)
HH Income	0.0000	0.0001***	0.0000*	0.0001***	0.0000*	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.8545	0.1519	0.8071	0.1725	0.9137	0.8823
Observations	1,071	304	1375	335	1,406	1,410

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.11: The Impact of Child Benefit on the Probability that Parents Smoke.

	Smoking Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Parents with children of any age						
Child Benefit	0.0002	0.0001	0.0002	-0.0001	-0.0001	-0.0001
	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
HH Income	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.7057	0.5492	0.4000	0.4765	0.6204	0.7265
Observations	12,756	13,157	25,913	16,973	29,729	30,773
Parents with young children						
Child Benefit	0.0002	0.0001	0.0001	-0.0002	-0.0002	-0.0001
	(0.0007)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.7791	0.6457	0.7993	0.4135	0.2854	0.3948
Observations	9,127	12,095	21,222	15,808	24,935	25,969
Parents with old children						
Child Benefit	-0.0004	0.0018	0.0008	0.0005	0.0003	0.0006
	(0.0014)	(0.0020)	(0.0008)	(0.0019)	(0.0008)	(0.0008)
HH Income	-0.0000*	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.7834	0.3769	0.3575	0.8085	0.6925	0.4418
Observations	2,785	685	3,470	757	3,542	3,550

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.12: The Impact of Child Benefit on the Number of Cigarettes that Parents Smoke.

	Number of Cigarettes Per Day		
	(1)	(2)	(3)
	Parents with		
	1 Child	*1 or 2 Children*	*Any Number of Children*
Parents with children of any age			
Child Benefit	-0.4689	-0.0405	-0.0139
	(0.5989)	(0.0291)	(0.0144)
HH Income	0.0001	0.0000	0.0000
	(0.0002)	(0.0001)	(0.0001)
p(CB = HH Income)	0.4336	0.1638	0.3353
Observations	3,185	5,861	6,907
Parents with young children			
Child Benefit	-1.0667	-0.0535	-0.0194
	(0.6309)	(0.0330)	(0.0153)
HH Income	0.0002	0.0001	0.0001
	(0.0002)	(0.0001)	(0.0001)
p(CB = HH Income)	0.0911	0.1045	0.2020
Observations	2,371	4,845	5,875
Parents with old children			
Child Benefit	-2.0466	-0.0173	0.0634
	(1.3411)	(0.1929)	(0.1251)
HH Income	-0.0003	-0.0001	-0.0001
	(0.0005)	(0.0005)	(0.0004)
p(CB = HH Income)	0.1277	0.9290	0.6121
Observations	604	729	740

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (2) and (3) also control for the number of children in the household.

response to changes in child benefit income. Note, however that respondents to the SOEP were asked about their drinking behavior only twice: in 2006 and 2008. During this time there was no change in nominal child benefit and the only identifying variation in child benefit comes from the fact that inflation decreased real child benefit between 2006 and 2008. Due to these data limitations results from the drinking behavior regressions should be taken with caution.

2.5.4 Parents' Social Activities

Individuals in the SOEP are also asked about leisure and social activities. In particular, individuals indicate how frequently they attend pop concerts or go to the movies, attend cultural events such as classical music concerts, the opera, public lectures, or the theater, and how frequently they make excursions or take short vacation trips. All household members who are at least 17 years old answer these questions. However, in order to investigate changes in consumption patterns of parents in response to changes in child benefit, I consider only parents in my estimations. If there is a labeling effect for child benefit, then we would not expect child benefit income to be used for parents' social and leisure activities. In particular, since the child benefit is meant to ensure the basic needs of children are met, a labeling effect would not earmark child benefit income for goods such as movie tickets or tickets to the opera. In order to estimate the impact of child benefit on participation in social activities such as going to the movies or attending pop concerts, and participating in cultural events such as classical music concerts, the opera, public lectures, or theater performances, I create a dummy variable for each individual parent that takes a value of one if the parent indicated to participate in such activities at least once a month, and zero otherwise. Similarly, I create a dummy variable that takes a value of one if the parent indicated to make excursions or go on short vacation trips at least monthly. The results presented here are robust to alternative definitions of this measure, for example a dummy variable indicating whether parents participate weekly rather than monthly.

Table 2.14 shows that parents do indeed use child benefit income to attend pop concerts or to go to the movies. The impact of child benefit on the probability of going to the movies or to pop concerts at least once a month is positive and highly statistically significant. Based on Table 2.14, a 10 Euro increase in child benefit results in an increased probability of attending pop concerts or the movies at least once a month by 1.3–3 percentage points, depending on the number of children in the household. The effect of child benefit is larger for parents who have children that are all older than 18 years of age. The probability of going to the movies or pop music concerts increases by 1.3–2.7 percentage points for an additional 10 Euros of child benefit for households with young children. For households with older children, the impact of child benefit is about four times larger. Depending of the number of children in the household, the probability of going to the movies or attending pop concerts at least monthly increases by 5.1–12 percentage points for a 10 Euro increase in child benefit. This means that parents use child benefit for their own entertainment to a larger extent when children are older, compared to when children are younger. Furthermore, the impact of an additional Euro of child benefit on the probability that parents go to the movies or to pop concerts at least once a month is statistically significantly larger than the impact of an additional Euro of household income.

Table 2.13: The Impact of Child Benefit on the Probability that Parents Regularly Drink Alcohol.

	Drinking Alcohol Regularly					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Parents with children of any age						
Child Benefit	-0.0357	0.0467	-0.0005	0.0042	0.0016	0.0007
	(0.0750)	(0.0758)	(0.0019)	(0.0029)	(0.0013)	(0.0010)
HH Income	0.0000*	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6339	0.5379	0.8082	0.1485	0.2289	0.4567
Observations	3,942	3,967	7,909	5,074	9,016	9,295
Parents with young children						
Child Benefit	-0.1051	0.0862	0.0010	0.0027	0.0021	0.0010
	(0.0789)	(0.0749)	(0.0021)	(0.0029)	(0.0015)	(0.0010)
HH Income	0.0000*	-0.0000*	-0.0000	-0.0000*	-0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.1832	0.2496	0.6430	0.3507	0.1489	0.3537
Observations	2,635	3,521	6,156	4,581	7,216	7,491
Parents with old children						
Child Benefit	-0.0167	-0.0460	0.0045	0.0007	0.0029	0.0030
	(0.0337)	(0.0376)	(0.0101)	(0.0010)	(0.0082)	(0.0043)
HH Income	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6201	0.2207	0.6595	0.5194	0.7225	0.4929
Observations	1,031	310	1,341	339	1,370	1,372

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.14: The Impact of Child Benefit on the Probability that Parents Go to the Movies or Attend Pop Music Concerts at least Once per Month

	Going to the Movies or Pop Music Concerts Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Parents with children of any age						
Child Benefit	0.0030***	0.0013***	0.0013***	0.0017***	0.0016***	0.0015***
	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
HH Income	-0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	15,952	16,394	32,346	21,120	37,072	38,364
Parents with young children						
Child Benefit	0.0027***	0.0013***	0.0013***	0.0017***	0.0016***	0.0016***
	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11,326	14,962	26,288	19,529	30,855	32,136
Parents with old children						
Child Benefit	0.0123***	0.0051**	0.0067***	0.0055***	0.0066***	0.0068***
	(0.0016)	(0.0017)	(0.0009)	(0.0015)	(0.0009)	(0.0009)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0024	0.0000	0.0003	0.0000	0.0000
Observations	3,546	953	4,499	1,053	4,599	4,605

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Similar results hold for parents participating in cultural events, such as going to classical concerts, the opera, public lectures, or the theater. As shown in Table 2.15, parents are more likely to attend such cultural events as child benefit increases. Regardless of the number of children in the family, child benefit is used to a greater extent for opera, theater, or public lectures by parents who have older children. The impact of child benefit on the probability of participating in cultural events is similar in magnitude, yet somewhat smaller, compared to the magnitude of the impact of child benefit on the probability of participating in other social events such as the movies or pop music concerts.

Increases in child benefit are also associated with an increased probability of going on excursions or short vacation trips at least once a month (Table 2.16). However, the estimated impact of child benefit is relatively small compared to the estimates of other activities discussed above. Moreover, contrary to the impact of child benefit on the probability of going to the movies or cultural events, the increases in the probability of going on excursions or short vacation trips due to an increase in child benefit are driven by households with younger children. Since excursions of parents with young children in the household include trips such as visits to the zoo, museums, or amusement parks together with children, this result indicates that child benefit is used for the benefit of children.

Parents respond individually to questions about how frequently they participate in the activities discussed above. It is likely, though not necessary, that parents go to the movies, concerts, and trips together as couples. In about 90 percent of cases, parents in the same households agree on whether they engage in these activities at least monthly.[26] The results in Tables 2.14, 2.15, and 2.16 are robust to restricting the estimation sample to only those cases in which parents both agree.[27]

2.6 Extensions and Robustness Checks

2.6.1 The Effect of Child Benefit by Household Income Level

I investigate whether the results reported above are different for low income household and high income households. This is relevant for two reasons: First, the political debate surrounding income transfers intended for children in Germany often involves claims that households with low income and low socio-economic status may be more likely to spend benefit money for items that are inconsistent with the intentions of the policy maker (see for example Dassler, 2009). Second, the previous literature has found that the effects of household cash transfers differ depending on household's initial socio-economic status. For example, Akee et al. (2012) investigated the impact of exogenous household income transfers for American Indian households in North Carolina and found differential impact of the additional income on child nutrition, depending on the initial socio-economic status of the household receiving the transfer.

[26] Parents agree about going to the movies or pop music concerts at least monthly in 87% of all cases, agree about participating in cultural events at least monthly in 93% of all cases, and agree about making excursions or short trips at least monthly in 84% of all cases.

[27] Tables with results of restricting the estimation sample those cases in which parents both agree are omitted in the interest of space. Those results are available upon request.

Table 2.15: The Impact of Child Benefit on Cultural Events Attended by Parents (Opera, Classical Music Concerts, Public Lectures, Theater.)

	Attending Cultural Events (Opera, Classical Music Concerts, Public Lectures, Theater) Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Parents with children of any age						
Child Benefit	0.0023***	0.0011***	0.0011***	0.0016***	0.0014***	0.0013***
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
HH Income	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	15,963	16,396	32,359	21,122	37,085	38,379
Parents with young children						
Child Benefit	0.0025***	0.0009***	0.0010***	0.0015***	0.0014***	0.0013***
	(0.0004)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
HH Income	-0.0000*	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	11,333	14,963	26,296	19,530	30,863	32,146
Parents with old children						
Child Benefit	0.0096***	0.0052**	0.0062***	0.0067***	0.0066***	0.0063***
	(0.0014)	(0.0018)	(0.0009)	(0.0016)	(0.0009)	(0.0009)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000
Observations	3,551	953	4,504	1,053	4,604	4,610

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.16: The Impact of Child Benefit on the Probability that Parents Make Excursions or Go on Short Vacation Trips at least Once per Month.

	Making Excursions or Going on Vacation Trips Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Parents with children of any age						
Child Benefit	0.0012	0.0008	0.0010**	0.0007*	0.0008**	0.0006*
	(0.0009)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.2038	0.0780	0.0025	0.0331	0.0054	0.0208
Observations	5,833	5,948	11,781	7,689	13,522	13,975
Parents with young children						
Child Benefit	0.0028*	0.0007	0.0011**	0.0006	0.0008*	0.0006*
	(0.0013)	(0.0005)	(0.0004)	(0.0004)	(0.0003)	(0.0003)
HH Income	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0264	0.1566	0.0059	0.1349	0.0181	0.0352
Observations	4,147	5,401	9,548	7,079	11,226	11,674
Parents with old children						
Child Benefit	-0.0044	0.0068	-0.0008	0.0068	-0.0009	-0.0008
	(0.0035)	(0.0048)	(0.0018)	(0.0048)	(0.0018)	(0.0017)
HH Income	0.0003**	0.0001	0.0002*	0.0001	0.0002*	0.0002*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
p(CB = HH Income)	0.1912	0.1638	0.5994	0.1631	0.5540	0.5566
Observations	1,277	346	1,623	384	1,661	1,663

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

I am able to test whether low-income or high-income household respond differently to changes in child benefit. In order to define what constitutes a low-income household, I refer to the European Union's definition of being at risk of poverty (Eurostat, 2012). Accordingly, I classify a household to be low-income if the household that has a net household income of less than 60 percent of the median household income of households in my sample. I create a dummy variable that takes a value of one if a household's net income is less than 60 percent of the median household income in my sample, and zero otherwise.

In order to investigate whether low-income households respond differently to exogenous changes in child benefit, I estimate a version of equation (2.3) that includes an interaction term of Child Benefit income and the dummy variable indicating whether or not a household is low-income.[28] The results are presented in Table 2.17 and Table 2.18. In the interest of space, I present in these tables only the results for estimations that pool households with different number of children, and I control for the number of children in the household in each regression.

Column 1 of Table 2.17 shows that per monthly capita food expenditures are about 23 Euros less for low-income households compared to higher income households. An additional Euro of Child Benefit income increases per capita food expenditures by about 20 cents, but this increase is significantly higher for low income households. The interaction term is statistically significant at the one percent level and it is economically significant as well. Low income households increase their spending on food by about 4 cents more per capita compared to higher income households. Columns 2-4 of Table 2.17 show that low-income households are more likely to rent their residence and have a smaller home on average, though this difference is not statistically significantly different from zero. Low income have about 0.1 fewer rooms in their home compared to higher income households, and the coefficient is statistically significant at the ten percent level. Additional child benefit income improves housing conditions, as does additional household income from other sources. The sign, magnitude, and statistical significance of the effects are similar to the effects presented in the main results. However, regarding housing outcomes, the interaction terms of child benefit and the indicator for whether a household is low-income is statistically insignificant.

Table 2.18 presents the results for individual level outcomes. In the smoking and drinking equations (Columns 1 and 2) the coefficient of the dummy variable indicating that a household is low-income is negative but statistically insignificant. Similar to the main results, there is no effect of child benefit on smoking or drinking behavior of the parents. The interaction term is also statistically insignificant, suggesting that in terms of smoking and drinking there is no difference in the response to increases in child benefit by parents from low-income households or high-income households. Regarding personal entertainment activities of the parents, Column 3 shows that parents are more likely to make a visit to the movie theater at least monthly when child benefit increases. This collaborates the main results. However, I do not find any evidence suggesting that parents from low-income households behave different compared to parents from higher income households. The same is true for the probability that parents participate in cultural activities at least monthly (Column 4) and

[28]It is also possible to separately estimate all of the above equations for the subsample of low-income households. In the interest of power of the estimations, I present here only the results of estimating equation (2.3) with the interaction term.

Table 2.17: The Impact of Child Benefit on Food Expenditures and Housing Conditions (by Household Income Level)

	(1) Food Expenditures	(2) Renter	(3) House Size (Renters)	(4) Number of Rooms (Renters)
Low Income	-23.4832***	0.0191	-1.9707	-0.1046*
	(4.5048)	(0.0142)	(1.2355)	(0.0473)
Child Benefit	0.1986***	-0.0001***	0.0135***	0.0005**
	(0.0293)	(0.0000)	(0.0033)	(0.0002)
Low Income × Child Benefit	0.0416***	0.0000	-0.0016	0.0000
	(0.0125)	(0.0000)	(0.0041)	(0.0000)
HH Income	0.0042***	-0.0000***	0.0014***	0.0000**
	(0.0010)	(0.0000)	(0.0003)	(0.0000)
N	14,991	26,157	11,479	11,479

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. The variable *Low Income* is a dummy variable that takes a value of 1 if a household had a net income of less that 60 percent of the median household income for families of the same size.

that they probability that parents make day trips or excursions at least monthly (Column 5).

2.6.2 Different Specifications

In order to test the robustness of the results obtained in this paper, I estimate several alternative specifications. My main results are based on specifications that include the lagged value of household income as a measure of other income. This avoids the potential bias introduced into the model if child benefit income affects labor supply and therefore wage income in the current period. Since the previous literature did not consider this potential confounding and estimated specifications that included contemporaneous child benefit income and household income, I examine whether any of my results change when I also use contemporaneous child benefit income and household income such that

$$Outcome_{kjt} = \alpha_k y_{jt} + \beta_k m_{jt} + \mathbf{Z}_{jt}\delta_k + \mu_{kj} + \nu_{ks} + \tau_{kst} + \varepsilon_{kjt}, \tag{2.5}$$

where outcomes are determined by child benefit (y) and current income (m).

Moreover, if additional child benefit income indeed causes a decrease in labor supply and therefore a decrease in household income, then γ is negative in

$$m_{jt} = \gamma y_{jt} + \mathbf{Z}_{jt}\lambda + \nu_{jt}, \tag{2.6}$$

Table 2.18: The Impact of Child Benefit on Parents' Smoking, Drinking, Personal Entertainment, Participation in Cultural Activities, and Excursions (by Household Income Level)

	(1) Smoking	(2) Drinking	(3) Monthly Movie Theater Visits	(4) Monthly Cultural Activity Participation	(5) Monthly Excursions
Low Income	-0.0255	-0.0112	-0.0232	-0.0207	0.0291
	(0.0172)	(0.0284)	(0.0185)	(0.0143)	(0.0417)
Child Benefit	-0.0001	0.0008	0.0015***	0.0013***	0.0005*
	(0.0001)	(0.0010)	(0.0001)	(0.0001)	(0.0003)
Low Income × Child Benefit	0.0001	0.0000	0.0001	0.0001	-0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)
HH Income	-0.0000	0.0000	-0.0000	-0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
N	30,323	9,173	37,793	37,812	13,758

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. The variable *Low Income* is a dummy variable that takes a value of 1 if a household had a net income of less that 60 percent of the median household income for families of the same size.

where m_{jt} is household income (minus child benefit) in household j during year t, y_{jt} is child benefit in household j during year t, and $\mathbf{Z}_{jt}$ is a vector of exogenous household characteristics. Substituting (2.6) back into Equation (2.5) results in

$$Outcome_{kjt} = (\alpha_k + \beta_k \gamma)\, y_{jt} + \mathbf{Z}_{jt}\,(\delta_k + \beta_k \lambda) + \mu_{kj} + \nu_{ks} + \tau_{kst} + \eta_{kjt}. \tag{2.7}$$

Therefore, I also estimate reduced form specifications according to Equation (2.7) that only include child benefit on the right hand side. Since γ is expected to be negative if there is a significant impact of child benefit on household income, then for normal goods I expect the reduced form coefficient to be smaller in magnitude compared to the estimates of the main results. For inferior goods (when β_k is negative) the magnitude of the reduced form coefficient would be larger. In the interest of space, I only report results of the robustness checks for regressions that include children of any age. Separate results for families with young children and families with older children are available upon request.

Regarding per capita food expenditures, the results obtained by estimating Equation (2.5), where I include contemporaneous household income rather than lagged household income, provides very similar estimates compared to the main results (See Table 2.19). Furthermore, the small differences between the estimates of the coefficient of child benefit do not appear to be systematic. For households with only one child and households with two or three children, the coefficient of child benefit is smaller when estimating Equation

Table 2.19: Robustness Checks of the Impact of Child Benefit on Per Capita Monthly Food Expenditures in Households.

	Per Person Real Monthly Household Food Expenditures					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.3616***	0.1306***	0.1664***	0.1612***	0.1972***	0.2222***
	(0.0927)	(0.0374)	(0.0333)	(0.0310)	(0.0285)	(0.0260)
HH Income	0.0111***	0.0056***	0.0089***	0.0054***	0.0081***	0.0077***
	(0.0015)	(0.0015)	(0.0010)	(0.0012)	(0.0010)	(0.0009)
p(CB = HH Income)	0.0002	0.0009	0.0000	0.0000	0.0000	0.0000
Observations	8,980	7,987	16,967	10,255	19,235	19,880
Reduced Form (Equation 2.7)						
Child Benefit	0.4004***	0.1421***	0.1853***	0.1708***	0.2119***	0.2309***
	(0.0925)	(0.0369)	(0.0330)	(0.0307)	(0.0282)	(0.0255)
Observations	9,294	8,298	17,592	10,634	19,928	20,590

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

(2.5) (reported in Table 2.19) in comparison to Equation (2.3) (Table 2.2), whereas for all other household sizes the coefficient is larger. However, there is a systematic difference in the magnitude of the household income variable. Using contemporaneous household income and child benefit in the regression increases the point estimate of the impact of household income on per capita food expenditures. The magnitude of the difference is not enough to erase the labeling effect: An F-test of whether the coefficient of child benefit and the coefficient of household income are equal rejects the null hypothesis with a p-value of < 0.00 regardless of family size.

The results of estimating the reduced form are also presented in Table 2.19. The estimate of the impact of child benefit on per capita food expenditures from the reduced form equation is very similar to the estimate from the main results. Interestingly, the impact of child benefit

on per capita food expenditures is larger in the reduced form specification compared to the specifications that include a measure of household income. However, the difference between the coefficients is small.

I also check whether my results are robust to running specifications that use the logarithm of per capita food expenditures as the outcome variable. Table 2.20 shows that per capita food expenditures increase between 0.08% and 0.25% for an additional Euro of child benefit, depending on the number of children in the household. The impact of child benefit is statistically significant for households with young children and households with children of any age. Similar to the main results where I use the level of per capita food expenditure as the outcome variable presented in Table 2.2, the impact of child benefit for households with older children is statistically insignificant. The magnitude of the impact of child benefit is also very similar in the log-linear specification compared to the main results. For example, the estimated 0.08% increase in per capita food expenditures for an additional Euro in child benefit for households with two children (Column 2 in Table 2.20) translates into an increase in per capita food expenditures by 11.2 cents over a mean of 140.03 Euros. This is very similar to the estimate of 12.99 cents per additional Euro in child benefit from Column 2 of Table 2.2.

Housing related results are also robust to using different measures of household income. Tables 2.21 – 2.23 show the results of estimating the impact of child benefit on the probability of being a renter, the size of the home in square meters, as well as the number of rooms in the home when using contemporaneous household income as the measure of household income as depicted in Equation (2.5), and when estimating the reduced form specification shown in Equation (2.7). The impact of child benefit on each of the outcomes is consistent with the main results and numerically very similar. Table 2.23 shows that the reduced form estimate of the impact of child benefit on the number of rooms in the house is smaller than the estimate of the impact of child benefit when household income is included in the regression. This is as expected, although the difference is very small.

Tables 2.24 and 2.25 show that there is no impact of child benefit on the probability that parents smoke that parents frequently consume alcohol regardless of the measure of household income. With the exception of households with only one child present, the impact of household income on smoking remains statistically insignificant when contemporaneous child benefit and household income are used in the estimation. In the reduced form specifications, the impact of child benefit on smoking is statistically insignificant regardless of the number of children in the household, and there is no pattern in the sign of the point estimates.

Regarding parents' social activities, Table 2.26 and Table 2.27 show that there is little difference in the impact of child benefit between the main results based on Equation (2.3) and the results of estimating specifications including contemporaneous child benefit and household income according to Equation (2.5). Estimating the reduced form specification also produces results that are consistent with the main results. When using contemporaneous child benefit and household income in the specification, the impact of an additional Euro of household income on the probability of participating in cultural events is generally positive and statistically significant. The impact of an additional Euro of household income on the probability that parents go the movies or pop music concerts at least once a month is also positive and statistically significant for households with two or three children. This result is expected. However, in the specifications using the lagged value of household income,

Table 2.20: Robustness Check:The Impact of Child Benefit on Per Capita Monthly Food Expenditures in Households using a log specification.

	Log Per Person Real Monthly Household Food Expenditures					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Households with children of any age						
Child Benefit	0.0025***	0.0008**	0.0010***	0.0011***	0.0012***	0.0010***
	(0.0006)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	0.0000***	0.0000*	0.0000***	0.0000*	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0031	0.0000	0.0000	0.0000	0.0000
Observations	6,942	6,856	13,798	8,803	15,745	16,295
Households with young children						
Child Benefit	0.0030***	0.0009**	0.0011***	0.0011***	0.0012***	0.0010***
	(0.0007)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
HH Income	0.0000**	0.0000**	0.0000***	0.0000**	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0001	0.0029	0.0000	0.0000	0.0000	0.0000
Observations	5,067	6,292	11,359	8,182	13,249	13,793
Households with old children						
Child Benefit	0.0026	0.0024	0.0017	0.0011	0.0016	0.0013
	(0.0018)	(0.0022)	(0.0012)	(0.0019)	(0.0011)	(0.0011)
HH Income	0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.1565	0.2749	0.1388	0.5624	0.1554	0.2362
Observations	1,406	355	1,761	391	1,797	1,800

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Table 2.21: Robustness Checks of the Impact of Child Benefit on the Probability that Households Rent their Home.

	Probability of Being a Renter					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	-0.0001**	-0.0001**	-0.0002***	-0.0001**	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
HH Income	-0.0000***	-0.0000***	-0.0000***	-0.0000***	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0054	0.0284	0.0000	0.0134	0.0000	0.0000
Observations	13,191	12,871	26,062	16,459	29,650	30,617
Reduced Form (Equation 2.7)						
Child Benefit	-0.0001**	-0.0001*	-0.0001***	-0.0001**	-0.0001***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Observations	13,654	13,389	27,043	17,079	30,733	31,718

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

the impact of lagged household income was statistically indistinguishable from zero in all cases. Since going to the movie theater and participating in cultural events are expected to be normal goods, the former result is more intuitive and the specification using contemporaneous child benefit and household income may be preferred to the specification that uses the lagged value of household income.

Since the reduced form estimates, as well as the estimates obtained from regressions that include contemporaneous child benefit and household income are qualitatively and quantitatively similar to the main results, I conclude that the impact of child benefit on household income through the channel of labor supply is negligible.

Table 2.22: Robustness Checks of the Impact of Child Benefit on the Size (Square Meters) of Homes of Households.

	Size of Home in Square Meters					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0092*	0.0094*	0.0153***	0.0109**	0.0161***	0.0150***
	(0.0046)	(0.0043)	(0.0036)	(0.0040)	(0.0034)	(0.0032)
HH Income	0.0014***	0.0008	0.0014***	0.0011**	0.0014***	0.0015***
	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0003)
p(CB = HH Income)	0.0858	0.0473	0.0001	0.0159	0.0000	0.0000
Observations	13,191	12,871	26,062	16,459	29,650	30,617
Reduced Form (Equation 2.7)						
Child Benefit	0.0070	0.0087*	0.0138***	0.0104**	0.0150***	0.0144***
	(0.0042)	(0.0042)	(0.0035)	(0.0040)	(0.0033)	(0.0031)
Observations	13,654	13,389	27,043	17,079	30,733	31,718

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

2.7 Conclusion

The German child benefit is intended to ensure that children's needs in terms of nutrition and housing (among other things) are met. Since the benefit is paid in cash and is fungible, I investigate whether parents really do use the child benefit for its intended purpose. I find that households primarily increase their per capita food expenditures in response to exogenous increases in child benefit, which should improve nutrition. Households spend on average between 49 and 74 cents out of every additional Euro of child benefit on food. This effect is larger for low-income households compared to high-income households. Households that meet the European Union's definition of being at-risk of poverty spend about 4 more

Table 2.23: Robustness Checks of the Impact of Child Benefit on the Number of Rooms in the Homes of Households.

	Number of Rooms					
	(1)	(2)	(3)	(4)	(5)	(6)
	Families with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0004	0.0004**	0.0007***	0.0005***	0.0007***	0.0007***
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
HH Income	0.0000**	0.0000**	0.0000***	0.0000**	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0853	0.0084	0.0000	0.0019	0.0000	0.0000
Observations	13,191	12,871	26,062	16,459	29,650	30,617
Reduced Form (Equation 2.7)						
Child Benefit	0.0002	0.0005**	0.0006***	0.0005***	0.0007***	0.0007***
	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	13,654	13,389	27,043	17,079	30,733	31,718

Note: All specifications include household fixed effects. Standard errors clustered at the household level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Households with young children have at least one child under the age of 18 living in the households. Families with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Child Benefit is lagged by one year. Household income is lagged by two years. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

cents of every additional Euro of child benefit on food, compared to the increase in food expenditures for households not at-risk of poverty. Households also use child benefit to improve their housing conditions: they are more likely to own their home instead of renting, and are more likely to live in a larger home if they are renters.

I also find that there is a significant labeling effect for the child benefit, indicating that households treat child benefit income differently compared to income from other sources. An increase in child benefit income leads to larger improvements in nutrition and housing conditions compared to an identical increase in general household income. This is consistent with the evidence obtained in the previous literature for the Dutch child benefit. I find no evidence that child benefit increases smoking of parents and, contrary to evidence from the

Table 2.24: Robustness Checks for the Impact of Child Benefit on the Probability that Parents Smoke.

	Smoking Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0003	0.0002	0.0002	-0.0000	-0.0000	0.0000
	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
HH Income	0.0000*	-0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.6272	0.2834	0.2752	0.9199	0.9953	0.7319
Observations	15,131	14,014	29,145	18,074	33,205	34,329
Reduced Form (Equation 2.7)						
Child Benefit	0.0002	0.0002	0.0002	-0.0001	-0.0000	-0.0000
	(0.0005)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Observations	15,718	14,643	30,361	18,824	34,542	35,693

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

United Kingdom, I do not find that child benefit income causes parents to consume more alcohol.

Table 2.25: Robustness Checks of the Impact of Child Benefit on the Probability that Parents Drink Alcohol Regularly.

	Drinking Alcohol Regularly					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	-0.0664	0.0362	-0.0004	0.0039	0.0012	0.0007
	(0.0911)	(0.0725)	(0.0017)	(0.0026)	(0.0012)	(0.0009)
HH Income	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.4665	0.6174	0.8026	0.1413	0.3131	0.4083
Observations	4,789	4,395	9,184	5,624	10,413	10,727
Reduced Form (Equation 2.7)						
Child Benefit	-0.0679	0.0361	-0.0012	0.0032	0.0005	0.0004
	(0.0857)	(0.0719)	(0.0016)	(0.0026)	(0.0012)	(0.0008)
Observations	4,948	4,619	9,567	5,894	10,842	11,159

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

I find that parents use child benefit for their personal entertainment activities and their own social activities that are unrelated to the well-being of children. As child benefit income increases, parents are more likely to go to the movies or to attend pop music concerts at least once a month. They are also more likely to attend cultural events such as classical music concerts, the opera, public lectures, or theater performances. Parents also use child benefit to make excursions and to take short vacation trips.

Since parents may be eligible for child benefit up to the point when their child is 25 years old, I investigate whether parents of older children respond differently to changes in child benefit compared to parents of younger children. Per capita household expenditure on food does not increase for households in which all children are older than 18 years of age, while it does for households with younger children. Similarly, the impact of child benefit on housing

Table 2.26: Robustness Checks of the Impact of Child Benefit on the Probability that Parents Go to the Movies or Attend Pop Music Concerts at least Once per Month.

	Going to the Movies or Concerts Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0028***	0.0011***	0.0011***	0.0016***	0.0014***	0.0014***
	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
HH Income	-0.0000	0.0000	0.0000	0.0000*	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	18,834	17,368	36,202	22,305	41,139	42,512
Reduced Form (Equation 2.7)						
Child Benefit	0.0027***	0.0011***	0.0011***	0.0016***	0.0014***	0.0014***
	(0.0004)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Observations	19,529	18,062	37,591	23,158	42,687	44,089

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

related variables is not statistically significant for households in which the children are older than 18 years of age. This is not surprising because older children are less likely to live in their parents' household for long periods of time compared to younger children.

Interestingly, compared to the parents of younger children, parents whose children are more than 18 years old are more likely to use child benefit for their personal entertainment activities such as the movies or pop music concerts, and they are more likely to use child benefit to attend cultural events such as classical music concerts, the opera, or the theater. On the other hand, parents are more likely to use child benefit to go on day trips or short vacations when children are young. Given this may include outings to the zoo and to amusement parks, this is not necessarily detrimental for the well-being of young children.

Table 2.27: Robustness Checks of the Impact of Child Benefit on the Probability that Parents Go to the Opera or to Public Lectures at least once per Month.

	Going to the Opera or Attending Public Lectures Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0025***	0.0010***	0.0010***	0.0015***	0.0013***	0.0012***
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
HH Income	0.0000	0.0000	0.0000**	0.0000*	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	18,848	17,373	36,221	22,311	41,159	42,533
Reduced Form (Equation 2.7)						
Child Benefit	0.0026***	0.0011***	0.0011***	0.0015***	0.0014***	0.0013***
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Observations	19,546	18,067	37,613	23,162	42,708	44,111

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Since it is the explicit intention of the policy maker to ensure the well-being of children in terms of nutrition and housing, these results show that the child benefit does indeed have the desired effect for families with non-adult children. Parents improve nutrition and housing conditions in response to an increase in child benefit when children are young, and parents do not use the child benefit to increase smoking or drinking. Once children are older, however, parents no longer improve nutrition and housing conditions when child benefit increases. Rather they use the child benefit for their own social activities and entertainment, i.e. they increase expenditures on goods that are assignable directly to the parents, not the children.

Table 2.28: Robustness Checks of the Impact of Child Benefit on the Probability that Parents Make Excursions or Go on Short Vacation Trips at least Once per Month.

	Making Excursions or Going on Vacation Trips Once a Month					
	(1)	(2)	(3)	(4)	(5)	(6)
	Parents with					
	1 Child	*2 Children*	*1 or 2 Children*	*2 or 3 Children*	*1, 2, or 3 Children*	*Any Number of Children*
Contemporaneous Child Benefit and Household Income (Equation 2.5)						
Child Benefit	0.0012	0.0007	0.0010**	0.0006	0.0006*	0.0005*
	(0.0009)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
HH Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
p(CB = HH Income)	0.1936	0.0813	0.0019	0.0759	0.0263	0.0528
Observations	6,951	6,387	13,338	8,221	15,172	15,670
Reduced Form (Equation 2.7)						
Child Benefit	0.0016	0.0006	0.0009**	0.0005	0.0006*	0.0004
	(0.0009)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Observations	7,212	6,650	13,862	8,550	15,762	16,269

Note: All specifications include individual fixed effects. Standard errors clustered at the individual level are in parenthesis. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. p(CB = HH Income) is the p-value of an F-test testing the null hypothesis that the coefficient of Child Benefit (CB) equals the coefficient of other household income. Parents with young children have at least one child under the age of 18. Parents with older children have children who are all at least 18 years of age. Household income does not include the Child Benefit. Both Child Benefit and Household Income are Measured in Real 2005 €. Household income is lagged by one year. Other controls included in each specification are single parent indicators, a quadratic term in the age of the youngest child, the state level unemployment rate, dummy variables for whether the country was in a recession during a sample year, dummy variables for states, as well as state-specific year trends. Specifications for Columns (3)-(6) also control for the number of children in the household.

Chapter 3. The Impact of Mothers' Earnings on Health Inputs and Infant Health

3.1 Introduction

Child health is an important ingredient in human capital formation and poor health at birth in impacts adult outcomes. For example, low birth weight reduces educational attainment (Case et al., 2005; Currie and Hyson, 1999). Low birth weight also has a negative impact on labor market outcomes (Black et al., 2007; Currie and Hyson, 1999) and on health in adulthood (Behrman and Rosenzweig, 2004).

The seminal work of Grossman (1972) provides the theoretical framework of a human capital model though which the production of health can be analyzed. In this model individuals' health capital depreciates over time and gross investment in health can be produced by a household production function that uses the person's own time, and health inputs such as medical care and healthy diet. Health inputs may include those with negative marginal products such and cigarette and alcohol consumption.[1] The initial health endowment is an important determinant of the future stock of health. This endowment is not only determined by genetics, but it can be impacted by in-utero exposure to disease, and detrimental environmental factors such as air pollution (Almond, 2006; Currie and Walker, 2011).

In this context it is important to investigate, both from a scientific and public policy perspective, the extent to which an increase in maternal income during pregnancy impacts infant health. The issue, however, is complicated because of the endogeneity of income. For example, in the analysis of the impact of mother's income on birth outcomes, it is difficult to find exogenous variations in income that could help identify the causal impact of income on birth weight. Consequently, one line of research has focused on aggregate units such as the rate of low birth weight infants at the state level, and analyzed how this aggregate is impacted by state unemployment rates. For example, Dehejia and Lleras-Muney (2004) found that higher unemployment rates were associated with improved health outcomes of infants as measured by the prevalence of the rate of low birth weight. This result is consistent with the findings of Ruhm (2000), who found that health behaviors improved during bad economic times, leading to improved health outcomes. In the context of birth weight, there are two channels through which earnings may affect birth weight. First, if child health is a normal good, then an increase in income increases the derived demand for health inputs. Mothers may increase the consumption of prenatal care, and they may initiate prenatal medical care earlier during the pregnancy. In this case, increases in prenatal care consumption will lead to increases in birth weight. On the other hand, prenatal care is a time intensive activity and an increase in the opportunity cost of time may result in mothers seeking less prenatal

[1] As described in Almond and Currie (2011), different approached to health production exist; e.g. Heckman (2007)

care. Dehejia and Lleras-Muney (2004) show that the average number of prenatal care visits by pregnant women increases during times of high unemployment and they argue that the decline in the opportunity cost of time during recessions (when incomes go down) is the underlying reason for this decline. They report that a one percentage point increase in the unemployment rate results in a 0.26-0.5 percent reduction in the prevalence of low birth weight rate, and they attribute the improvement of birth outcomes to the implied increase of prenatal care consumption. However, as pointed out by Lindo (2011), Dehejia and Lleras-Muney (2004) are not able to isolate the impact of income on infant health from the impact of other factors that are associated with periods of high unemployment.

Almond et al. (2011) explained the county-level average birth weight as a function of the introduction of the Food Stamp Program (FSP) in the 1960s. Exploiting the fact that the FSP became operational in different counties in different time periods, they find that FSP had a positive impact on birth weight, with larger impacts among African American mothers. Although food stamps can be used only to purchase certain food items, Hoynes and Schanzenbach (2009) report that the food stamp recipients behave as if the benefits were paid in cash, suggesting that the receipt of food stamps is equivalent to an income transfer. On the other hand, Hoynes and Schanzenbach (2012) find that the food stamp program leads to reductions in employment and hours worked, especially among families headed by single women. They show that the impact on the treated is 500-600 fewer hours of work per year. This suggests that the increase in disposable income due to the food stamp receipt is counterbalanced to some extent by a decline in labor supply triggered by the food stamp program, and therefore the net effect on household income may be not substantial.

Hoynes et al. (2012) use changes in the Earned Income Tax Credit (EITC) policy to identify exogenous changes in income. They use birth certificate data collapsed into cells defined by state, month, parity of birth, education, marital status, race, and age of the mother to identify the amount of EITC for which the family is eligible. Using a difference in difference specification to capture the effect of an expansion of the EITC in 1993, the authors conclude that increases in EITC income result in a lower incidence of low birth weight as well as an increase in mean birth weight.

An alternative strategy to investigate the impact of income on infant health involves using micro data, and finding arguably exogenous variations in income. One such example is Lindo (2011) where the job loss of a husband in the past is used as an exogenous shock to household income. Using data from the Panel Study of Income Dynamics and controlling for individual fixed effects, the paper found that a husband's job loss in the past has a strong egative effect on infant health, reducing birth weight by about 4.5 percent. Although this is an interesting result, the magnitude of the decline in income due to job loss is unknown, so is the extent to which job loss is correlated with stress in the household, which can also have a detrimental effect on birth outcomes. Along the same lines, Chung and Kim (2012) used payouts of dividends from the Alaska Permanent Fund during the 1980s as a source of exogenous variation in family income and found a very small positive effect of family income on birth weight. The magnitude of the effect was very small: about 14 grams of additional birth weight per one thousand dollars of additional income.

In this paper I employ data from the United States Detail Natality files for the period of 1978 to 2004 and use information on nearly 85 million births to estimate the causal impact of mothers' earnings at the time of conception on the birth weight of the newborns using

an instrumental-variables strategy. Because earnings of pregnant women may be correlated with unobserved attributes that may also impact birth outcomes, I use state level skill-biased technology as an instrument for earnings. As earnings information is not available on birth certificates, I use micro data from the CPS for the same time period to estimate first-stage earnings equations. The reduced form equations are based on birth certificates where birth weight of the newborn depends on exogenous mother characteristics and the state-level skill-biased technology parameter. This two-sample instrumental variables design enables us to recover the structural estimate of the impact of mothers' earnings on birth weight.

In addition, I estimate input demand functions for smoking, drinking, and prenatal medical care using data provided by birth certificates. Together, these results reveal insights into not only the impact of income on birth weight, but also on the pathways through which the impact of income operates. For example, I find that in case of low-skill pregnant women (those with education levels of high school or less) the increase in income produces an increase in prenatal care. On the other hand, the same increase in income prompts these mothers to smoke and drink more. The net result is an improvement in birth weight as the detrimental impact of incremental smoking and drinking are outweighed by the benefit of additional prenatal care consumption. A different result is obtained for high-skill married mothers. They too increase their demand for smoking and drinking as well as prenatal care consumption (both in terms of the number of visit and early initiation). The net effect of these changes on birth weight, however, is negative in case of high-skill married mothers (those with at least some college education). Such heterogeneity has not been detected before in the literature.

The rest of the chapter is organized as follows. In the next section I describe the empirical framework and introduce the instrument. Section 3.4 describes the data, and Section 3.5 presents the results. Section 3.6 is the conclusion.

3.2 Theoretical Framework and Empirical Strategy

Following the standard framework of a birth weight production function as outlined in Grossman and Joyce (1990), Corman et al. (1987), and Corman and Grossman (1985), I assume that parents' utility function depends on consumption, the number of births, and the birth outcome. Maximization of this function subject to production and budget constraints generates the demand for birth outcome; and the production function of birth outcome determines the demand for inputs such as medical care. The birth weight production function can be depicted as

$$b = f(m, a, z) \tag{3.1}$$

where m is the use of prenatal care, a is the use of contraceptive and abortion services, and z represents maternal risk factors and productive efficiency of the mother (Altindag et al., 2011; Grossman, 2006, 2000). Input demand functions are given by Equations (3.2) and (3.3).

$$m = g_1(p, y, z) \tag{3.2}$$

$$a = g_2(p, y, z) \tag{3.3}$$

where p is the vector of prices and availability and y represents income. Substitution of 3.2 into 3.1 yields

$$b = h(p, y, z) \tag{3.4}$$

Equation 3.2 is the reduced form demand function for the birth outcome, where birth outcome b depends on prices, income and maternal risk factors. I estimate 3.2 to identify the impact of income on infant health at the mother level. I also estimate 3.2 to identify the role played by income in inputs demand functions. The input demand functions are also reduced form equations because they are obtained by maximizing a utility function subject to production and resource constraints (Corman and Grossman, 1985).

Although 3.2 is a reduced form, its estimation is complicated using micro data (birth certificates) for two reasons. First, the birth certificate data do not contain information on mother's income (y). Second, even if income information were available on birth certificates, mother's income (or family income) in equation 3.2 is likely endogenous if more productive mothers with higher incomes have better health outcomes due to unobservable productivity. Therefore I develop an instrument for y to employ in equations 3.2 and 3.2. The details of the instrument are described below.

Since a data set that includes both income and indicators of infant health are not available, I employ data from two different sources and use a two-sample instrumental variables strategy. I use income data for women of child bearing age from the Current Population Survey (CPS) for the years 1978-2004 to estimate the following first stage regression.

$$\ln \text{Earnings}_{is}^{t} = \beta_1 (\text{Skill biased tech change})_{s}^{t} + \beta_2 X_{is}^{t} + \epsilon_{is}^{t} \tag{3.5}$$

whereEarnings_{is}^{t} represents real weekly earnings of woman i in state s in year t, and X_{is}^{t} stands for a vector of individual level characteristics. It also includes state fixed effects, year fixed- effects and state-specific time trends. Note that equation 3.5 does not represent a panel data structure. Instead, it depicts the models to be estimated based on repeated cross sections using the CPS data, and the superscript t indicates the year of the CPS survey.

As will be detailed below, skill-biased technological change in year t and state s negatively affects earnings of unskilled women (women with high school education or less). On the other hand, earnings increase in response to skill-biased technological change for skilled women (women with at least some college education). This means that in the sample of unskilled (skilled) mothers, β_1 is expected to be negative (positive).

I estimate Equation 3.5 separately by skill (high and low) and marital status (married and unmarried) by dividing the sample of CPS women into four mutually exclusive groups. X includes race indicators and the age of the woman. The first two sub-samples contain low-skill married and low-skill unmarried women. These women have at most a high school education. Therefore in these samples I include a dummy variable to control for whether the woman has a high school degree. The remaining two sub-samples contain married high-skill women and unmarried high-skill women. In these samples I add an indicator to control for the receipt of a college diploma.

The second data set pertains to nearly 85 million of birth certificates in the United States for the years 1978-2004. These data are employed to estimate the reduced form equation 3.6

$$\ln \text{Outcome}_{is}^{t} = \alpha_1 (\text{Skill biased tech change})_s^t + \alpha_2 X_{is}^t + \eta_{is}^t \tag{3.6}$$

where Outcome_{is}^{t} stands for the birth weight of the child, the extent of prenatal care consumption during pregnancy, or smoking/drinking behavior of mother who gave birth in state s during year t. Note that the explanatory variables X are identical in both the reduced form and first stage equations 3.5 and 3.6 for the two-sample instrumental variable strategy to be viable (Inoue and Solon, 2010).

Taking the ratio of the coefficient of the instrument from the reduced form estimates using birth certificate data (α_1 in Equation (3.6), and the coefficient of the instrument from the first stage estimation using CPS data (β_2 in Equation (3.5)) provides the two-sample instrumental variables estimate of the impact of earnings on birth outcomes. That is, I calculate $\gamma = \frac{\alpha_1}{\beta_1}$. I use the delta method to calculate the standard error of the estimate of γ (Inoue and Solon, 2010; Dee and Evans, 2003). Specifically, the variance of the estimated two-sample IV coefficient is

$$\begin{aligned} \text{var}(\gamma) &= \left(\frac{\partial\gamma}{\partial\beta_1}\right)^2 \text{var}(\beta_1) + \left(\frac{\partial\gamma}{\partial\alpha_1}\right)^2 \text{var}(\alpha_1) \\ &= \left(\frac{1}{\alpha_1}\right)^2 \text{var}(\beta_1) + \left(-\frac{\beta_1}{\alpha_1^2}\right)^2 \text{var}(\alpha_1) \\ &= \left(\frac{1}{\alpha_1}\right)^2 \left[\text{var}(\beta_1) + \frac{\beta_1^2}{\alpha_1^2}\text{var}(\alpha_1)\right] \end{aligned} \tag{3.7}$$

and because I use the actual population of birth certificates (nearly 85 million records), rather than a sample in estimation β_1 from the first-stage regession (3.5), I take $\text{var}(\beta_1) = 0$ and the variance of γ reduces to

$$\text{var}\,\gamma = \frac{\beta_1^2}{\alpha_1^4}\text{var}(\alpha_1) \tag{3.8}$$

The two-sample instrumental variables approach was pioneered by Angrist and Krueger (1992), who used the two stage instrumental variables estimator to estimate the effect of age at school entry on educational attainment. Other applications of this estimator can be found in Lindo and Stoecker (2010) who investigated the criminal propensity of Vietnam veterans, Dee and Evans (2003) who examined the impact of drinking on the educational attainment of teenagers, as well as Currie and Yelowitz (2000) who analyzed the impact of housing project on the welfare of children. For a succinct technical discussion of the estimator see Inoue and Solon (2010).

3.3 The Instrument

I use a measure of state- and year-specific skill-biased technological change as an instrument for mothers' earnings. Let aggregate output, Y_{st}, produced in state s during year t be

described by the following CES production function where H and L stand for efficiency-adjusted high-skill and low-skill labor inputs, respectively.

$$Y_{st} = \left[(A_{Hst}H_{st})^{((\sigma-1)/\sigma)} + (A_{Lst}L_{st})^{(\sigma-1/\sigma)}\right]^{(\sigma/(\sigma-1))} \tag{3.9}$$

A_H and A_L are factor-augmenting technology terms. The parameter σ is the elasticity of substitution between low-skilled and high-skilled labor and based on previous work, it is assumed to be greater than one. Following Autor et al. (2008) we set $\sigma = 1.6$. Assuming competitive factor markets, the first order conditions result in the following relationship between the relative wage of skilled and unskilled worked, W_{Hst}/W_{Lst}, and the relative supply of skills, H_{st}/L_{st}:

$$\frac{W_{Hst}}{W_{Lst}} = \left(\frac{A_{Hst}}{A_{Lst}}\right)^{\frac{\sigma-1}{\sigma}} \left(\frac{H_{st}}{L_{st}}\right)^{-\frac{1}{\sigma}}. \tag{3.10}$$

where W_H and W_L represent efficient-adjusted wages of skilled and unskilled labor, respectively. Using data on wages and labor supply of both low-skilled and high-skilled labor for the CPS, I back out the value of A_{Hst}/A_{Lst}. Following Autor et al. (1998), Autor et al. (2008), and Goldin and Katz (2007), I use $\ln(A_{Hst}/A_{Lst})$ as an index for skill-biased technological change. I use this index of skill-biased technological change as an instrument for mothers' earnings. Although a change in $\ln(A_{Hst}/A_{Lst})$ can arise for a number of reasons, ranging from variations in the relative prices of non-labor inputs to the evolution of labor market institutions, the consensus in the literature is that the primary driver of $\ln(A_H/A_L)$ is skill-biased technological change (Autor et al., 2008; Goldin and Katz, 2007).

A related point is whether skill-biased technological change and the resultant change in the relative demand for skilled workers would induce a policy reaction, which would render our instrument invalid. For example, if state governments increase minimum wages in reaction to a change in technology favoring skilled workers, the instrument would be invalid to the extent that the minimum wage has a direct impact on infant health. However, the scenario that states increase the level of minimum wages in response to technology shocks does not seem realistic because minimum wages are not adjusted frequently. Mocan and Unel (2011) provide detailed evidence on the validity of this instrument. The construction of the instrument using the CPS data is explained in the Appendix to this chapter.

3.4 Data

I use individual-level data from two sources. First, I use birth certificates of the universe of births in the United States for the years 1978-2004, obtained from the Natality Detail Files of the National Center for Health Statistics. The birth certificate data contain a record for each child born in the United States, and each record includes information regarding the child's birth weight, as well as demographic characteristics of the mother, such as age, education, race, and marital status.[2] In addition, information regarding the mother's use of

[2] I make use of the frequency weights supplied with the data for the years 1978-1984 because some states did not report 100 percent of births during that time period. Using the frequency weights allows us to expand the data set in order to accurately account for all births in the US. Hawaii, Mississippi, New Jersey,

prenatal care and the mother's smoking and drinking behavior are available. I use only birth certificates for singleton births to mothers who are at least 18 years old, and I use data only until 2004 because geographic identifiers are not available in the public use data starting in 2005. Geographic identifiers -in particular the state of residence of mothers– are essential in order to be able to match our measure of state-level skill-biased technology shocks described above with individual mothers in the data set.

Demographic information for the mother, such as her age, race, education, and marital status, is generally available on the birth certificates, with a few exceptions. Some states did not report education in all years. Specifically, New Mexico did not report education in the years 1978 and 1979; California and Texas did not report mothers' education in the years 1979-1988, and Washington did not start reporting education until 1992. Furthermore, not all states reported the marital status of mothers in all years. California, Connecticut, Georgia, Maryland, Montana, Nevada, New Mexico, New York, Ohio, and Texas did not report the marital status of mothers in 1978 and 1979.

I use the birth weight of the infants (recorded in grams) from the birth certificates as a measure of infant health. Since one potential mechanism for how income can affect infant health is prenatal care, I make use of several measures of prenatal care consumption contained in the birth certificates. There are two particular variables of interest: The number of prenatal care visits attended by the mother, and the month of the pregnancy during which prenatal care was initiated. The number of prenatal care visits is the actual number of times that the mother visited a physician for prenatal consultations. The month of the pregnancy when the first prenatal care visit took place is an indication for how early the mother sought prenatal care. [3] Since it is important that prenatal care starts early in the pregnancy I also create a dummy variable that indicates whether prenatal care was initiated late. I consider prenatal care to have commenced late if the first prenatal care visits occurred after the first trimester of the pregnancy, i.e. if prenatal care was initiated in the fourth month of the pregnancy or thereafter.

Regarding smoking and drinking, data are generally available starting in 1989. Smoking behavior is recorded using a dummy variable indicating whether the mother smoked during the pregnancy, and drinking behavior is similarly captured using a dummy variable indicating whether the mother consumed alcohol during the pregnancy. While most states started reporting smoking and drinking information in 1989, some states started reporting this information later. Louisiana and Nebraska started reporting smoking and drinking behavior information in1990, Oklahoma started in 1991, New York in 1995, and Indiana in 1999. California and South Dakota never reported data on smoking or drinking.[4]

After restricting the birth certificate data to records of only singleton births to mothers age 18-49 where demographic information of the mother is available, I end up with a data

Pennsylvania, and Wyoming started reporting 100 percent of births in 1979; Arkansas and South Dakota in 1980; New Mexico in 1982; North Dakota in 1983; Arizona, California, Delaware, Washington DC, and Georgia in 1985. All states were reporting 100 percent of births starting in 1985.

[3]If no prenatal care took place, then the month of the first prenatal care visit is coded to be equal to 10.

[4]Beginning in 2003, some states adopted a revised version of the standard birth certificate that changed the way in which smoking behavior of the mother are recorded. Specifically, the revised version contains smoking participation information separately for each trimester of the pregnancy. In those cases I recode data on the different trimesters to be consistent with the measure of smoking used during the other years.

set of 84,967,027 birth certificates. I merge these birth certificates with the measure of skill-biased technological change described in Section 3.3 using the year of conception and the state of residence of the mother.

In our two-sample design, I combine information from the birth certificates regarding the circumstances of each birth with information regarding mothers' earnings. I obtain individual-level earnings data from the Current Population Survey's Annual Demographic File. Since the birth certificate data are for mothers of age 18-49, I only use the earnings for females who are between 18 and 49 years old in the CPS data. The CPS contains an income measure indicating annual personal income from wages and salaries for the calendar year prior to the survey. I construct the measure of real weekly earnings by dividing the real value (in 2005 Dollars) of annual personal income from wages and salaries in the previous calendar year by the number of weeks worked in the previous calendar year.[5] For women in the CPS sample, the year during which the reported income was earned is therefore the year prior to the CPS survey year.

After restricting the CPS sample to women between the ages of 18 and 49, and dropping observations with missing demographic information, the resulting data set contains 537,274 observations. I merge these observations with the measure of skill-biased technological change described in Section 3 using the year during which income was earned and the state of residence of the woman.

In order to match the time of conception of infants with the time when personal income was earned by the mother, we subtract nine months from the date of birth of infants from the birth certificates and match the resulting year with the year during which income was earned by women in the CPS sample. [6] For example, if a child was born in November of 2000, then conception occurred in February of 2000. Real weekly earnings during February of 2000 are then obtained from the 2001 survey year of the CPS sample.

As described earlier, I use the state of residence of the mother to match skill-biased technology shocks with births. Therefore, there are some births in the data that occurred in a state other than the state of residence of the mother. For example, while a mother may be a resident of California, she may have given birth in Illinois. In this case, the birth certificate would be reported by the state of Illinois and will include all items reported by the state of Illinois. Some items reported by Illinois may, however, not be reported by the state of California. For example, smoking information is never reported by California, but is included in the Illinois birth certificate data starting in 1989. In order to check whether women who give birth in states other than their state of residence significantly influence the results, I also estimated specifications that include only mothers who gave birth in the state where they reside. The results did not change.

Table 3.1 presents descriptive statistics of the birth weight data and the CPS income data. The instrument (the measure of skill biased technology change described above) is available in both the birth weight data from birth certificates and the income data from the CPS. Summary statistics of the instrument are very similar between the two data sets. Average real weekly earnings for women in the CPS sample are \$592.43. Infants have an

[5] I exclude women who were employed less than full time in the previous calendar year, and also exclude women who are self-employed.

[6] In our main results I assume that a pregnancy lasts nine months because gestational length is often missing on the birth certificates, and it is measured with error.

average birth weight of about 3,362 grams and mothers attend on average 11 prenatal care visits during the course of their pregnancies. Since the mean of the month of pregnancy when prenatal care began is about 2.7, women do on average initiate prenatal care in the first trimester. In fact only 18 percent of women initiate prenatal care late, i.e. in the fourth month of their pregnancy or later. There are some important differences in the average characteristics of women in the CPS Samples compared to the characteristics of mothers obtained from the birth certificates. In terms of age, women in the CPS sample tend to be older on average, though the minimum age is 18 and the maximum age is 49 in both samples. In terms of education, the characteristics of women in the CPS sample are very similar to the characteristics of mothers from the birth certificates. In both samples, about 38 percent of women have a high school diploma. However, the proportion of women with less than a high school education is larger in the birth certificate data (18.9 percent) compared to the CPS sample (9.7 percent). At the same time, women in the CPS sample are more likely to have some college education, or a college degree compared to the mothers in the birth certificate data. Racial characteristics are very similar between the two data sources, although the proportion of black mothers from birth certificates (15.2 percent) is slightly higher than the proportion of black women in the CPS sample (11.8 percent). Regarding marital status, 74 percent of mothers in the birth certificate data are married, while only 56 percent of women in the CPS sample are married.

Since our empirical strategy described above relies on estimating the impact of earnings on mothers' behavior and the impact of earnings on health outcomes of newborns separately for low-skill mothers and high-skill mothers, I present summary statistics separately for low-skill mothers (Table 2) and for high-skill mothers (Table 3). I assign the skill level of women by using information about their educational attainment. I classify women as being low-skilled if they have at most a high school diploma. Women are considered high-skilled if they have at least some college education.

Tables 3.2 and 3.3 show that the average birth weight for children of low-skill mothers (3,318 grams) is less than the average birth weight of children of high-skill mothers (3,421 grams). This is a difference of 103 grams, or about 3.6 ounces. The tables also show that the number of prenatal care visits of low-skill mothers is significantly lower than the average number of prenatal care visits for high-skill mothers. Moreover, low-skill mothers initiate prenatal care later than high-skill mothers and the percentage of low-skill mothers who smoked during their pregnancy (20.7 percent) is much higher compared to the percentage of high-skill mothers who smoked during their pregnancy (6.4 percent).

3.5 Results

Table 3.4 presents the results pertaining to low-skilled married women. I report the results for the birth weight equation, for smoking and drinking as well as three measures of prenatal care. Smoking and drinking are dummy variables to indicate if the mother smoked cigarettes or consumed alcohol during pregnancy. Prenatal Care Late is another dummy variable that takes the value of one if the prenatal care was initiated after the first trimester during pregnancy. Prenatal Care Visits is the number of visits to a prenatal care provider during the pregnancy. Prenatal Care Delay represents the delay in the receipt of prenatal care

Table 3.1: Summary Statistics of Current Population Survey (CPS) and Birth Certificate Data

Variable	CPS Sample			Birth Certificates		
	Mean	Standard Deviation	Observations	Mean	Standard Deviation	Observations
Ln(As/Au)	0.8020	0.8022	537,274	0.7974	0.8178	84,967,027
Real Weekly Earnings (2005 Dollars)	592.43	424.03	537,274	-	-	
Birth Weight (grams)	-	-		3362.1	576.89	84,967,027
Number of Prenatal Care Visits	-	-		11.22	3.937	82,589,996
Prenatal Care Delay†	-	-		2.693	1.682	83,217,094
Late Initiation of Prenatal Care (after 1st Trimester)‡	-	-		0.1822	0.3861	82,148,495
Smoking (=1 if smoked during pregnancy)	-	-		0.1403	0.3473	46,341,011
Drinking (=1 if drank alcohol during pregnancy)	-	-		0.0167	0.1281	47,019,239
Age	33.83	8.563	537,274	26.94	5.554	84,967,027
Less than High School Education	0.0967	0.2955	537,274	0.1892	0.3917	84,967,027
High School Diploma	0.3812	0.4857	537,274	0.3821	0.4859	84,967,027
Some College Education	0.2708	0.4444	537,274	0.2185	0.4132	84,967,027
College Graduate	0.2512	0.4337	537,274	0.2102	0.4074	84,967,027
White	0.8318	0.3741	537,274	0.8015	0.3989	84,967,027
Black	0.1184	0.3231	537,274	0.1523	0.3593	84,967,027
Other Race	0.0498	0.2176	537,274	0.0462	0.2099	84,967,027
Married	0.5566	0.4968	537,274	0.7384	0.4395	84,028,062

Note: Borth the CPS Sample and Birth Certificates are for the years 1978-2004. Smoking is available starting in 1989

† If no prenatal care took place, prenatal care delay is coded = 10

‡ Late initiation of prenatal care is conditional on having any prenatal care.

Table 3.2: Summary Statistics for Low-Skill Women of Current Population Survey (CPS) and Birth Certificate Data

Variable	CPS Sample			Birth Certificates		
	Mean	Standard	Observations Deviation	Mean	Standard Deviation	Observations
Ln(As/Au)	0.6502	0.8146	256,778	0.7249	0.8342	48,542,162
Real Weekly Earnings (2005 Dollars)	458.41	286.33	256,778	-	-	
Birth Weight (grams)	-	-		3317.74	586.02	48,542,162
Number of Prenatal Care Visits	-	-		10.67	4.126	46,983,504
Prenatal Care Delay†	-	-		2.995	1.870	47,385,277
Late Initiation of Prenatal Care (after 1st Trimester)‡	-	-		0.2454	0.4303	46,478,298
Smoking (=1 if smoked during pregnancy)	-	-		0.2069	0.4051	24,735,925
Drinking (=1 if drank alcohol during pregnancy)	-	-		0.0182	0.1335	25,146,296
Age	33.52	8.929	256,778	25.25	5.368	48,542,162
Less than High School Education	0.2024	0.4017	256,778	0.3312	0.4706	48,542,162
High School Diploma	0.7977	0.4017	256,778	0.6688	0.4706	48,542,162
White	0.8286	0.3768	256,778	0.7801	0.4142	48,542,162
Black	0.1292	0.3354	256,778	0.1811	0.3851	48,542,162
Other Race	0.0422	0.2009	256,778	0.0388	0.1931	48,542,162
Married	0.5609	0.4963	256,778	0.6379	0.4806	47,907,785

Note: Borth the CPS Sample and Birth Certificates are for the years 1978-2004. Smoking is available starting in 1989
Low-skill means that the mother has a high school diploma or less education
† If no prenatal care took place, prenatal care delay is coded = 10
‡ Late initiation of prenatal care is conditional on having any prenatal care.

Table 3.3: Summary Statistics for High-Skill Women of Current Population Survey (CPS) and Birth Certificate Data

Variable	CPS Sample			Birth Certificates		
	Mean	Standard Deviation	Observations	Mean	Standard Deviation	Observations
Ln(As/Au)	0.9409	0.7647	280,496	0.8941	0.7851	36,424,865
Real Weekly Earnings (2005 Dollars)	715.11	487.70	280,496	-	-	
Birth Weight (grams)	-	-		3421.28	559.04	36,424,865
Number of Prenatal Care Visits	-	-		11.94	3.54	35,606,492
Prenatal Care Delay†	-	-		2.2959	1.2903	35,831,817
Late Initiation of Prenatal Care (after 1st Trimester)‡	-	-		0.1000	0.3001	35,670,197
Smoking (=1 if smoked during pregnancy)	-	-		0.0641	0.2450	21,605,086
Drinking (=1 if drank alcohol during pregnancy)	-	-		0.0150	0.1215	21,872,943
Age	34.11	8.20	280,496	29.19	4.971	36,424,865
Some College Education	0.5188	0.4997	280,496	0.5097	0.4999	36,424,865
College Graduate	0.4812	0.4997	280,496	0.4903	0.4999	36,424,865
White	0.8346	0.3715	280,496	0.8301	0.3756	36,424,865
Black	0.1085	0.3110	280,496	0.1139	0.3177	36,424,865
Other Race	0.0569	0.2316	280,496	0.0560	0.2299	36,424,865
Married	0.5526	0.4972	280,496	0.8718	0.3343	36,120,277

Note: Borth the CPS Sample and Birth Certificates are for the years 1978-2004. Smoking is available starting in 1989
High-skill means that the mother has at least some college education

† If no prenatal care took place, prenatal care delay is coded = 10

‡ Late initiation of prenatal care is conditional on having any prenatal care.

Table 3.4: Results for Low-Skill, Married Women

	Low-Skill, Married Women		
	First Stage	Reduced Form	IV
Birth Weight (grams)	-0.0312***	-0.2330	7.4796***
	(0.0069)		(1.6481)
Prenatal Care Visits	-0.0312***	-0.0708	2.2716***
	(0.0069)		(-0.5005)
Prenatal Care Delay	-0.0312***	0.0365	-1.1697***
	(0.0069)		(0.2577)
Prenatal Care Late	-0.0312***	0.0066	-0.2110***
	(0.0069)		(0.0465)
Smoking	-0.0375***	-0.0004	0.0098***
	(0.0101)		(0.0026)
Drinking	-0.0393***	-0.0001	0.0015***
	(0.0101)		(0.0004)

Notes: Sample sizes in the first stage are about 144,000 for the birth weight equation and the prenatal care equations, and about 80,000 for the smoking and drinking equations. The reduced form uses about 30,000,000 observations for birth weight and prenatal care equations, and about 14,000,000 observations for smoking and drinking equations. First stage results were obtained using data from the Annual Demographic File of the Current population survey for the years 1978-2004 (birth weight and prenatal care equations) and for the years 1989-2004 (smoking and drinking equations). Regressions also include a quadratic term in age, controls for having a high school diploma, race, state dummies, year dummies, and state-specific year trends. The F-Statistic of the first stage is 150.98 for birth weight and prenatal care equations, 98.79 for the smoking equation, and 99.86 for the drinking equation. The reduced form results were obtained using the birth certificate data for the years 1978-2004 and regressions include identical control variables as the first stage regressions. I do not report standard errors for the reduced form because I use the population of births to low-skill married women. The IV estimate is the ratio of the reduced form coefficient over the first stage coefficient. Prenatal Care Visits are the number of times the mother visited a health care provider for prenatal consultations during the pregnancy. Prenatal Care Delay is the number of months that the mother waited before seeking prenatal care. Prenatal Care Late is a dummy variable indicating whether the mother initiated prenatal care after the first trimester of the pregnancy. Smoking is a dummy variable for whether the mother smoked in during the pregnancy. Drinking is a dummy variable for whether the mother drank during the pregnancy.

in months. For example, if the mother started receiving prenatal care in the fifth month of her pregnancy, this variable takes the value of five. If she never received prenatal care, the variable is assigned the value of 10.

The first row of Table 3.4 shows that the first-stage, the reduced form and the IV estimates. The instrument is very strong with F-values obtained from the first stage are in the range of 99-150. The birth weight is in levels, and the real weekly earnings are in logarithms. Thus, the IV estimate indicates that a 10 percent increase in mother's real weekly earnings increases the birth weight of children of unskilled married women by only 0.7 grams, which is a very small impact. The table shows that an increase in income has a positive effect on prenatal care consumption. Specifically, an increase in real weekly earnings has a small impact on the number or prenatal care visits during pregnancy, and the same increase in income generates a shortening in the delay of the initiation of prenatal care (i.e. women start consuming prenatal care sooner after getting pregnant). Consistent with these results, I also observe that an increase in income of low-skilled married women reduces their propensity to initiate late prenatal care (after the first trimester).

Table 3.4 also shows that cigarettes and alcohol are normal goods for low-skilled married women. The propensity to drink and smoke during pregnancy goes up for these women as their weekly earnings go up.[7] The upshot of Table 3.4 is that in case of low-skilled married mothers, an increase in income, triggered by a state-level shock to the relative demand for skilled labor, increases the propensity to consume of alcohol and cigarettes, and it increases the consumption of prenatal care. The net result is a negligible positive impact on birth weight.

Table 3.5 displays a different picture in case of high-skilled married women. In this case, an increase in real weekly earnings prompts an increase the propensity to consume alcohol and cigarettes. Put differently, alcohol and cigarettes are normal goods for high-skill married women as was the case with low-skilled married women. However, the increase in income produces a decrease in prenatal care consumption for high-skilled married women: the number of prenatal visits goes down, and the propensity to delay the initiation of prenatal care goes up. This decline in prenatal medical care use is consistent with that reported by Dehejia and Lleras-Muney (2004) and it could be because of increased opportunity cost of

[7]While there exist an extensive literature on the effect of cigarette prices on smoking (Tekin et al., 2009; Cawley et al., 2004; Colman et al., 2003; Becker et al., 1994), the evidence on the income elasticity of smoking is scant. Maternal smoking behavior has also received attention (Fingerhut et al., 1990). However, the focus of the research has again been the effect of price changes on smoking behavior of women, not on income (Evans and Ringel, 1999; Evans et al., 1999; Ringel and Evans, 2001). For example Ringel and Evans (2001) investigate how women's smoking behavior during pregnancy is affected by cigarette taxes and find that higher cigarette taxes reduce smoking rates among pregnant women. They find that the quit behavior of pregnant women is more sensitive to changes in the prices of cigarettes than the quit behavior of non-pregnant women. The authors acknowledge that income is an essential control variable, but they are unable to control for it using only data from the Natality Detail Files. Limited evidence on the income elasticity of smoking suggests that whether income elasticity is positive or negative varies systematically across time periods, countries, and demographic groups. For high-income countries like the U.S. the sign appears to have reversed over time, so that cigarettes appear to have switched from being a normal good to an inferior good (Cheng and Kenkel, 2010; Wasserman et al., 1991). Kenkel et al. (2011) use data on 7 waves of the Current Population Survey's Tobacco Use Supplement matched with income data from the Annual Social and Economic Supplement from 1993 to 2007. The authors find that while the income elasticity of smoking in a cross sectional OLS specification is positive, that income elasticity is negative in the IV specification.

time for these high-educated mothers. The end result is a small decline in birth weight. Specifically, a 10 percent increase in income generates about 0.4 grams decline in birth weight.

Although the magnitude of the impact of income is negligible for both low-skilled and high-skilled married women, one interesting implication of the results is that prenatal care consumption counterbalances the harmful effect of cigarette and alcohol consumption during pregnancy. Both low-skilled and high-skilled married mothers' propensity to smoke and consume alcohol goes up in reaction to a change in their income. High-skilled married mothers decrease their prenatal care consumption when their income rises, which further jeopardizes their birth outcomes. The end result is a decrease, albeit small, in birth weight. Low-skilled married mothers, on the other hand, increase their prenatal care consumption and the beneficial effect of prenatal care outweighs the detrimental effect of cigarettes and alcohols, producing a small increase in birth weight.

Tables 3.6 and 3.7 present the results pertaining to low-skilled and high-skilled unmarried women, respectively. In these samples the impact of income on birth weight is still small, although it is larger than those obtained from the sample of married women. As before, the direction of the impact is different between low-skilled and high-skilled women. For example, Table 3.6 shows that a 10 percent increase in real weekly earnings reduces birth weight of newborns of low-skilled unmarried women by 3 grams. Table 3.7 demonstrates that the same increase in earnings increases the birth weight of babies of high-skilled unmarried mothers by about 5 grams.

The small and negative impact on birth weight of an increase in income in the sample of low-skilled unmarried women emerges because the detrimental impact of the rise in the propensity to drink and smoke as a result of an increase in income is evidently greater than the beneficial effect of increased prenatal care. This is in contrast to the case of low-skilled married women, for whom the birth outcomes improve despite the changes in prenatal care and alcohol and cigarette consumption in the same direction.

Unmarried, high-skilled mothers present a different picture. For this group, alcohol and cigarettes are inferior goods, thus the propensity to drink and smoke goes down as income goes up. However, so does the consumption of prenatal care, presumably because the opportunity cost of time is higher. The net result is a positive but small effect on birth weight.

Grossman and Joyce (1990) find a small impact of prenatal care on birth weight. Specifically, they report that a month of prenatal care delay causes a reduction of in birth weight by 37 grams for black mothers, and it has not statistically significant effect in case of white mothers. This finding collaborates with results. I find that mother's income has a small impact on the use of prenatal medical care. Given that prenatal care has a small impact on birth weight reported by Grossman and Joyce (1990), the impact of income on birth weight through the channel of prenatal care is expected to be low.

Previous research has shown a detrimental impact of smoking while pregnant on birth weight. Much of this research is based on the intensity of maternal smoking; i.e. the number of cigarettes smoked during pregnancy (e.g. Grossman and Joyce (1990); Rosenzweig and Schultz (1983)), although the inference obtained from Evans and Ringel (1999) is based on smoking participation during pregnancy as I do in this paper. Researchers either considered cigarette consumption as an exogenous variable, or investigated the impact of cigarettes on birth weight driven by changes in cigarette prices. Information on the response of maternal

Table 3.5: Results for High-Skill, Married Women

	Low-Skill, Married Women		
	First Stage	Reduced Form	IV
Birth Weight (grams)	0.0239***	-0.0915	-3.8359***
	(0.0068)		(1.0967)
Prenatal Care Visits	0.0239***	-0.0360	-1.5099***
	(0.0068)		(0.4317)
Prenatal Care Delay	0.0239***	0.0181	0.7582***
	(0.0068)		(0.2168)
Prenatal Care Late	0.0239***	0.0031	0.1313***
	(0.0068)		(0.0375)
Smoking	0.0179**	0.0017	0.0927**
	(0.0087)		(0.0448)
Drinking	0.0172**	0.0008	0.0474**
	(0.0087)		(0.0239)

Notes: Sample sizes in the first stage are about 155,000 for the birth weight equation and the prenatal care equations, and about 111,000 for the smoking and drinking equations. The reduced form uses about 31,000,000 observations for birth weight and prenatal care equations, and about 19,000,000 observations for smoking and drinking equations. First stage results were obtained using data from the Annual Demographic File of the Current population survey for the years 1978- 2004 (birth weight and prenatal care equations) and for the years 1989-2004 (smoking and drinking equations). Regressions also include a quadratic term in age, controls for having a high school diploma, race, state dummies, year dummies, and state-specific year trends. The F-Statistic of the first stage is 332.64 for birth weight and prenatal care equations, 257.72 for the smoking equation, and 260.5 for the drinking equation. The reduced form results were obtained using the birth certificate data for the years 1978-2004 and regressions include identical control variables as the first stage regressions. I do not report standard errors for the reduced form because I use the population of births to skilled married women. The IV estimate is the ratio of the reduced form coefficient over the first stage coefficient. Prenatal Care Visits are the number of times the mother visited a health care provider for prenatal consultations during the pregnancy. Prenatal Care Delay is the number of months that the mother waited before seeking prenatal care. Prenatal Care Late is a dummy variable indicating whether the mother initiated prenatal care after the first trimester of the pregnancy. Smoking is a dummy variable for whether the mother smoked in during the pregnancy. Drinking is a dummy variable for whether the mother drank during the pregnancy.

Table 3.6: Results for Low-Skill, Unmarried Women

	Low-Skill, Married Women		
	First Stage	Reduced Form	IV
Birth Weight (grams)	-0.0320***	0.9968	-31.1758***
	(0.0080)		(7.8073)
Prenatal Care Visits	-0.0320***	-0.1463	4.5738***
	(0.0080)		(1.1454)
Prenatal Care Delay	-0.0320***	0.0678	-2.1207***
	(0.0080)		0.5311
Prenatal Care Late	-0.0320***	0.0106	-0.3316***
	(0.0080)		0.0830
Smoking	-0.0207**	-0.0008	0.0391**
	(0.0116)		(0.0219)
Drinking	-0.0228**	-0.0007	0.0289***
	(0.0116)		(0.0146)

Notes: Sample sizes in the first stage are about 112,000 for the birth weight equation and the prenatal care equations, and about 65,000 for the smoking and drinking equations. The reduced form uses about 17,000,000 observations for birth weight and prenatal care equations, and about 10,000,000 observations for smoking and drinking equations. First stage results were obtained using data from the Annual Demographic File of the Current population survey for the years 1978- 2004 (birth weight and prenatal care equations) and for the years 1989-2004 (smoking and drinking equations). Regressions also include a quadratic term in age, controls for having a high school diploma, race, state dummies, year dummies, and state-specific year trends. The F-Statistic of the first stage is 186.45 for birth weight and prenatal care equations, 111.6 for the smoking equation, and 112.27 for the drinking equation. The reduced form results were obtained using the birth certificate data for the years 1978-2004 and regressions include identical control variables as the first stage regressions. I do not report standard errors for the reduced form because I use the population of births to low-skill unmarried women. The IV estimate is the ratio of the reduced form coefficient over the first stage coefficient. Prenatal Care Visits are the number of times the mother visited a health care provider for prenatal consultations during the pregnancy. Prenatal Care Delay is the number of months that the mother waited before seeking prenatal care. Prenatal Care Late is a dummy variable indicating whether the mother initiated prenatal care after the first trimester of the pregnancy. Smoking is a dummy variable for whether the mother smoked in during the pregnancy. Drinking is a dummy variable for whether the mother drank during the pregnancy.

Table 3.7: Results for High-Skill, Unmarried Women

	Low-Skill, Married Women		
	First Stage	Reduced Form	IV
Birth Weight (grams)	0.0310***	1.5158	48.9763***
	(0.0077)		(12.2424)
Prenatal Care Visits	0.0310***	-0.1226	-3.9609***
	(0.0077)		(0.9901)
Prenatal Care Delay	0.0310***	0.0477	1.5424***
	(0.0077)		(0.3855)
Prenatal Care Late	0.0310***	0.0092	0.2975***
	(0.0077)		(0.0744)
Smoking	0.0445***	-0.0007	-0.0166***
	(0.0101)		(0.0038)
Drinking	0.0445***	-0.0006	-0.0138***
	(0.0101)		(0.0031)

Notes: Sample sizes in the first stage are about 125,000 for the birth weight equation and the prenatal care equations, and about 87,000 for the smoking and drinking equations. The reduced form uses about 45,000,000 observations for birth weight and prenatal care equations, and about 31,000,000 observations for smoking and drinking equations. First stage results were obtained using data from the Annual Demographic File of the Current population survey for the years 1978-2004 (birth weight and prenatal care equations) and for the years 1989-2004 (smoking and drinking equations). Regressions also include a quadratic term in age, controls for having a high school diploma, race, state dummies, year dummies, and state-specific year trends. The F- Statistic of the first stage is 397.70 for birth weight and prenatal care equations, 302.10 for the smoking equation, and 305.28 for the drinking equation. The reduced form results were obtained using the birth certificate data for the years 1978-2004 and regressions include identical control variables as the first stage regressions. I do not report standard errors for the reduced form because I use the population of births to high-skill unmarried women. The IV estimate is the ratio of the reduced form coefficient over the first stage coefficient. Prenatal Care Visits are the number of times the mother visited a health care provider for prenatal consultations during the pregnancy. Prenatal Care Delay is the number of months that the mother waited before seeking prenatal care. Prenatal Care Late is a dummy variable indicating whether the mother initiated prenatal care after the first trimester of the pregnancy. Smoking is a dummy variable for whether the mother smoked in during the pregnancy. Drinking is a dummy variable for whether the mother drank during the pregnancy.

smoking to income is limited. Rosenzweig and Schultz (1983) found that the elasticity of maternal smoking to husband income is small, with an elasticity of 0.07. Our results also show that smoking participation during pregnancy is small in absolute value, and therefore a change in smoking participation (initiation or cessation of smoking during pregnancy) due to a change in income is not an important avenue through which birth weight is impacted.

3.6 Conclusions

Although the impact of income on infant health is important to identify both from a scientific and public policy perspective, the analysis is complicated because of the endogeneity of income. For example, maternal income or household income is likely to be correlated with mother attributes and household characteristics that may directly impact the birth weight of the infant. In this paper I use a two-sample instrumental variables strategy to identify the causal impact of mother income on the birth weight of the newborns. I use birth record data obtained from nearly 85 million births between 1978 and 2004, which contains information about mother characteristics, the birth weight of the newborn and the location of the birth.

Following the literature on skill-biased technological change and wage inequality, I create a state- and year-specific measure of skill-biased technological change as an instrument in the first-stage earnings regressions. Because earnings information is not available on birth certificates, I use micro data from the Current Population Survey (CPS) to estimate first-stage earnings equations for women who are observationally similar to the mothers of the 85 million newborns. Specifically, the CPS women and the mothers on the birth certificates are similar in such dimensions as state of residence, age, race, marital status and education. The reduced form equations are based on birth certificates where the birth weight of the newborn depends on exogenous mother characteristics and the state-level skill-biased technology parameter. This two-sample instrumental variables design allows us recover the structural estimate of the impact of mothers' earnings on birth weight.

I also estimate input demand functions for smoking, drinking, and prenatal medical care consumption of mothers using data provided by birth certificates. Together, these results reveal insights into not only the impact of income on birth weight, but also on the pathways through which the impact of income operates.

The results reveal significant heterogeneity between the four categories of mothers divided by marital status (married vs. unmarried) and skill level: high-skilled (those who have at least some college education) and low-skilled (those with an education of high school or less).

For example, an increase in real weekly earnings increases the number of prenatal medical care visits and shortens the delay in the initiation of prenatal care for unskilled mothers, whereas an increase in earnings has the opposite effect on prenatal care consumption of high-skill mothers. Smoking participation and the propensity to consume alcohol go up with income for low-skilled mothers regardless of their marital status. The consumption of prenatal care also goes up for both of these groups. The impact on birth weight, however, is different between low-skilled married and low-skilled unmarried mothers. The net effect of improved medical care along with increased propensity to consume alcohol and cigarettes among low-skilled mothers produces an improvement in birth weight for married low-skilled mothers. On the other hand, the net effect of improved medical care and increased propensity

to consume alcohol and cigarettes generates a decline in birth weight among unmarried low-skilled mothers.

Although the prenatal care consumption declines as income rises for all high-skilled mothers, the birth weight of infants of unmarried high-skilled mothers goes up because these mothers' propensity to smoke and drink goes down as their income goes up. On the other hand, the birth weight of the newborns of unmarried low-skilled mothers goes down because these mothers initiate drinking and smoking when income rises.

The direction of the change in birth weight as a response to a change in income is not uniform among the groups of mothers analyzed. The impact of income on birth weight depends on how the demand for health inputs react to a change in income, but the net effect of income on birth weight is small.

3.7 Chapter Appendix: Construction of the Efficiency-adjusted Labor Inputs to create the index of Skill-biased Technological Change

I use the March Current Population Survey (CPS) files from 1978 to 2010 (covering earnings from 1977 to 2009) for full-time workers (those who work 35 or more hours a week) ages 16 to 64. Self-employed people are dropped from the sample, as are allocated earnings observations (using individual earnings allocation flags). In constructing the key variables, I closely follow the previous labor literature on wage inequality (Katz and Murphy, 1992; Krusell et al., 2000; Card and DiNardo, 2002; Autor et al., 2008).

Each individual's average weekly earnings are formed by dividing annual income from wages and salaries by the number of weeks worked during the previous year. Earnings are deflated using the Personal Consumption Expenditure Index with a base year of 2005. I make two adjustments for topcoded earnings. First, following Autor et al. (2008) income of workers with top coded earnings is imputed by multiplying the annual topcode amount by 1.5. Second, starting in 1996, topcoded earnings values are assigned the mean of all topcoded earners. In these cases, I simply reassign the topcoded values to all such observations and again multiply by 1.5. Workers whose weekly earnings below $70 in 2005 dollars are dropped, as are those non-full-year workers (i.e., those who work less than 40 weeks) whose weekly earnings exceed 1/40th the top-coded value of weekly earnings.

I construct the series for high-skill and low-skill labor input and wages as follows. The data in each year in each state are divided into 24 distinct groups characterized by 2 sexes, 4 education categories (Education <= 11 years, Education = 12 years, 13 <= Education <= 15 years, and Education >= 16 years) and three potential experience categories (0-9 years, 10-19 years, 20+ years). Potential experience are calculated as Min{age-years of schooling–6, age–16} following Autor et al. (2008). In calculating each groupąŕs average weekly earnings, earnings are weighted by the product of the corresponding CPS sampling weight and weeks worked.

I assume that the high-skill labor class consists of college or college-plus workers and the workers with some college; and the low-skill labor class consists of those who have no college education. Groups within a class are assumed to be perfect substitutes and I use group

relative weekly earnings of full-time workers as weights for the aggregation of labor inputs into skilled and unskilled classes. Standard in this literature is the assumption that relative wages equal relative efficiencies of labor. More specifically, following Autor et al. (2008), I choose the group that contains male workers with less than 12 years of education and with less than 10 years of potential experience as the base group. A relative wage measure is then constructed by dividing each groupąŕs average weekly earnings by the average weekly earnings of the base group. The relative efficiency index measure for each group, q_g , is computed as the arithmetic mean of the relative wage measures in that group over 1977 to 2009. Then the total efficiency-adjusted labor input in each class is given by

$$H_t = \sum_{g \in G_H} q_g H_{gt} \tag{3.11}$$

$$L_t = \sum_{g \in G_L} q_g N_{gt} \tag{3.12}$$

where N_{gt} respresents the total labor weeks used in production by group g in year t. Since H and L are efficiency-adjusted labor inputs, the corresponding earnings W_h and W_L are also efficiency-adjusted. Following Krusell et al. (2000), they are calculated as

$$W_{Ht} = \sum_{g \in G_H} \omega_{gt} N_{gt} / H_t \tag{3.13}$$

$$W_{Lt} = \sum_{g \in G_L} \omega_{gt} N_{gt} / L_t \tag{3.14}$$

where ω_{gt} represents the average weekly earnings of group g in year t.

Chapter 4. Food Stamps and the Time Cost of Food Preparation*

4.1 Introduction

The objective of this paper is to investigate the cost of individuals' time that is incurred due to preparing food at home, with special attention paid to low income households who receive food stamp benefits. When deciding whether or not to cook a meal at home, one must consider not only the cost of the ingredients used to prepare the meal, but also the time it takes to prepare the meal, serve it, as well as clean up afterwards. Since time is scarce and costly, it is important to account for the time cost of food preparation in addition to the direct cost of ingredients in the context of nutritional assistance program policy.

During the fiscal year 2010, over 40 million people in the United States received benefits from the Supplemental Nutrition Assistance Program each month (United States Department of Agriculture, 2010). The Supplemental Nutrition Assistance Program (SNAP) provides assistance to low-income families so they can purchase sufficient food which they might otherwise not be able to afford. Benefits received from the program are commonly referred to as "food stamps"; they allow the recipient to purchase food at grocery stores, produce markets, and other stores using a debit card system that electronically deducts money spent on groceries from the recipient's monthly allotment. Food stamps may not be used to purchase prepared meals in the market or non-food items also available at grocery stores[1]. Therefore, when using food stamps, the recipient must necessarily incur a time cost of preparing the food at home. If a one dollar benefit is used to buy a one dollar cheeseburger at a fast food restaurant, then (excluding transportation costs, tipping, etc) the total benefit will be one dollar. If, however, one dollar's worth of ingredients to be prepared at home are purchased at a grocery store, then the total benefit is one dollar minus the time cost of transforming the ingredients into a meal and cleaning up afterwards.

The method of how the monthly food stamp allotments are determined as well as the general design of the SNAP have been criticized. Recently, the failure of the program to account for the time cost of food preparation has drawn much research interest. Specifically, the Thrifty Food Plan (TFP), which is the basis for determining food stamp allotments,

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[1] The Nutritional Assistance Program of the Commonwealth of Puerto Rico is also administered by the United States Department of Agriculture. This program requires 75% of a household's benefit to be used directly for food purchases, while up to 25% of the benefit may be withdrawn as cash. See Fraker et al. (1986) for a discussion of the economic effects of 'cashing out' on food stamps. The data and discussion in this paper relate to the United States only, excluding the Commonwealth of Puerto Rico.
We also assume that food stamps are used for ingredients for everyday meals. While it may be possible to purchase food items such as wedding cakes with SNAP benefits, due to the nature of the data we cannot make distinctions between the different types of food items that SNAP participant purchase.

has been criticized for being outdated. For example, Rose (2007) finds that the assumption that meals are prepared using only raw ingredients purchased using food stamps contradicts current U.S. welfare policy. The excessive cooking time required by recipes of the TFP to prepare all meals from scratch discourages labor force participation of low income individuals, which is a disincentive not previously discussed in critiques of the US Welfare system (Moffitt, 1992). Davis and You (2010) determined that the Thrifty Food Plan is unrealistic and 'not so thrifty' after all when labor costs are considered. They find that it is extremely difficult to adhere to the nutritional guidelines for preparing healthful meals, given the framework that the design of the food stamp program provides.[2] Davis and You (2009) estimated the time cost of food preparation for "typical" food stamp recipients and found that they incur a much larger share of time costs than typical non-recipients. However, these papers do not investigate the issue using data on actual food stamp recipiency status or actual food expenditures, instead conclusions about the food stamp program are drawn by examining "typical" participants as determined by individuals' demographic characteristics and by computing food expenditures from national averages.[3] Yet, generalizing results obtained from all lower income household to the narrow question of nutritional assistance program efficacy might be dangerous. For example, the details of individual SNAP eligibility are not observed in their data, and non-participation due to the effect of stigma associated with receiving welfare (Moffitt, 1983) cannot be captured in the models used.

The critique of the Thrifty Food Plan in this literature is based on the idea that an individual who receives food stamps is not able to take advantage of the full benefit of the program because time costs are not considered. For example, in terms of direct cost of buying a can of pinto beans is more expensive than purchasing dehydrated beans. Due to the nature of the TFP, however, individuals receiving food stamps are required to purchase the cheaper dehydrated beans in order to meet the budget constraints imposed on them by the program. After considering the time that it takes to sort, rinse, soak, and boil the dehydrated beans, the total cost of the beans (i.e. ingredient costs plus time costs) exceeds the total cost of the pinto beans to a person who was able to simply purchase the can of precooked beans.

Since Vickery (1977) it has been clear that the time dimension is very important in poverty issues. More recent research suggests that this is still true. For example, Aguiar and Hurst (2007) have found that home production has decreased in the United States in the last five decades, while leisure time has increased. However, they also note that inequality in terms of leisure has increased substantially over the same time period and suggest that wages and consumption by themselves do not adequately represent the welfare of individuals. Meyer and Sullivan (2008) studied, among other things, changes in time use of single mother headed families following the welfare reform of the 1990s. They found that time spent doing housework and food production fell sharply to accommodate for more time spent working in the market. While these results pertain to the general lower income population, these

[2] Of course, food does not only have to be prepared, but also eaten. For example, Hamermesh (2010) has studied the frequency and duration of actual food consumption and their relationship to heath outcomes. He found that eating occurs often as a secondary activity; that is, people eat while actually being engaged in another activity. Since many foods can be taken 'to go' once they have been prepared, the focus of this research is the time cost associated with preparing the food, not actually eating it.

[3] Davis and You (2009) used single non-white, non-professional females, with some high school education from metropolitan areas as the typical Food Stamp participant demographic profile.

findings still underscore the importance of taking a closer look at the time cost of food preparation in the context of nutrition assistance programs.

I contribute to the literature by estimating the time cost and total cost of food-at-home for food stamp recipients as well as non-recipients using a structural model of individuals' time allocation decisions. By making use of a new data set, I am able to estimate the time cost of food preparation as well as the total cost of food that is prepared at home as the sum of ingredient costs and time costs for *actual* food stamp recipients. Using data on actual grocery expenditures of the individuals in my sample, I calculate the proportion of time cost in relation to total cost of food at home for food stamp recipients and non-recipients. This allows an insight into the extent of the difference in time cost of food preparation between the two subgroups.

The following section develops the model used to estimate the shadow wage of household work. Section 4.3 provides an overview of the data used in this study. Section 4.4 presents the estimation and Section 4.5 discusses the results. Section 4.6 concludes.

4.2 The Model

The model is based on the theory of allocation of time developed by Becker (1965), and it follows closely the model developed by Kiker and Oliveira (1990) and the work of Davis and You (2009).

Individuals derive their utility from consumption and leisure such that

$$U = U(Y, L) \tag{4.1}$$

where Y denotes total consumption and L stands for leisure. Total consumptions includes home consumption (Y_H) and market consumption (Y_M) such that

$$Y = Y_H + Y_M \tag{4.2}$$

Home production occurs according to the production function

$$Y_H = f(T_H, \mathbf{Z}), \tag{4.3}$$

where T_H denotes the time devoted to home production and $\mathbf{Z}$ denotes some determinants of productivity in home production. Market consumption satisfies the budget constraint

$$Y_M = wT_M + I, \tag{4.4}$$

where w is the market wage rate of the individual and T_M denotes the time devoted to market work. I is non-market income. An individual is time constrained such that

$$T = T_H + T_M + L. \tag{4.5}$$

where T stands for total available time during the period of analysis.

The first order conditions of this straightforward setup require that time be allocated up to the point where the marginal products are all equal and for an interior solution

$$\frac{\partial Y_H}{\partial T_H} = s = \frac{\partial Y_M}{\partial T_M} = w = MRS_{LY}, \tag{4.6}$$

where s is the shadow wage and MRS_{LY} is the marginal rate of substitution of leisure with respect to goods.

Heckman (1974) describes how the well-known sample selection bias arises by ignoring the corner solutions that occur due to people not working, and how it is important to incorporate information from those individuals who do not work into estimation procedures. As early as Gronau (1977) it became apparent that in the context of home production it is important to consider yet another corner solution: those who do not participate in household production. Some individuals choose to work exclusively in the market, some work exclusively at home, and then again others choose to allocate positive time to both market work and home production. That is, in the data we observe no wages, $T_M \equiv 0$ and $T_H > 0$ for those working exclusively at home, while those exclusively working in the market report $T_H \equiv 0$ and $T_M > 0$. Those working both in the market and at home report $T_M > 0$ and $T_H > 0$. Since the observed time allocations are outcomes of an individual's utility maximization and are bounded from below by zero, a model must account for both types of censoring.

The following describes the empirical counterparts to the relevant elements in equation (4.6). Let the market wage rate be determined according to the familiar Mincerian wage equation

$$\ln w_i = \mathbf{X}_i \beta + \epsilon_i, \tag{4.7}$$

where $\mathbf{X}_i$ are market wage determinants of individual i, β is a vector of coefficients to be estimated, and ϵ_i is a stochastic component with mean zero and variance σ_ϵ^2. The marginal product for household work is described similarly by

$$\ln s_i = \mathbf{Z}_i \delta + \gamma T_{Hi} + \nu_i, \tag{4.8}$$

where $\mathbf{Z}_i$ contains determinants of the individual's productivity at household work, δ is a vector of coefficients to be estimated, and the parameter γ indicates the return to time spent in household work. ν_i is a stochastic component with mean zero and variance σ_ν^2, which captures unobserved determinants of the marginal productivity in household work such as preferences and abilities.

The first order conditions of the model imply that (4.7)=(4.8). Setting the two equations equal to each other and rearranging yields

$$\tilde{T}_{Hi} = \gamma^{-1} \left(\mathbf{X}_i \beta - \mathbf{Z}_i \delta + \epsilon_i - \nu_i \right) \tag{4.9}$$

where $\tilde{T}_{Hi}$ is a latent variable that indicates the time in household production required to meet the first order condition in (4.6).

Only in an interior solution do we observe $\tilde{T}_{Hi} = T_{Hi}$. In this case the marginal product of market work equals the marginal product of home production for some $T_{Hi} > 0$ and $T_{Mi} > 0$ and we have $\ln w_i = \ln s_i$. In this scenario the individual chooses to allocate some $T_{Hi} > 0$ to home production and some $T_{Mi} > 0$ to market work. I label this group of individuals B-type, indicating that both market work and home production are performed. However, if the market wage exceeds the marginal product of work at home (that is $\ln w_i > \ln s_i$), then the individuals will be observed only working in the market and not at home. I label this group of individuals M-type to indicate that they work in the market only. In this case we

have $T_{Hi} = 0$ and $T_{Mi} > 0$, and it follows that the latent variable $\tilde{T}_{Hi} < 0$. Group H-type is characterized by those individuals for whom the marginal product of household work exceeds the market wage. Those are the individuals who perform household work only and do not participate in market work. In these cases we observe $T_{Mi} = 0$ and $0 < T_{Hi} \leq T - L$. The latent variable is $\tilde{T}_{Hi} > T_{Hi}$.

The quantity of interest for this paper is the marginal product of household work. Define $(\epsilon_i - \nu_i) = \eta_i$. Assuming that ν and η are jointly Gaussian with variance σ_ν^2 and σ_η^2, as well as correlation coefficient ρ, it is possible to jointly estimate the parameters of (4.7) and (4.8) by maximum likelihood to obtain an estimate of the marginal product of household work. In order to specify the likelihood, the three different groups (M, B, and H) must be considered separately. For those working only in the market (Group M) we have $\tilde{T}_{Hi} \leq 0$ and using (4.9) we have

$$\mathbb{P}(\tilde{T}_{Hi} \leq 0) = \mathbb{P}(\eta \geq Z\delta - X\beta) = \Phi\left(\frac{X\beta - Z\delta}{\sigma_\eta}\right) \tag{4.10}$$

where $\Phi(\cdot)$ is the standard Gaussian cumulative distribution function and the term γT_{Hi} drops out since, by definition, $T_{Hi} = 0$ for all individuals in Group M.

On the other hand, for individuals who are observed only working at home but not in the market (Group H) we get

$$\mathbb{P}(\tilde{T}_H \geq T - L) = \mathbb{P}(\eta \leq Z\delta + \gamma T_H - X\beta) = \Phi\left(\frac{Z\delta + \gamma T_H - X\beta}{\sigma_\eta}\right). \tag{4.11}$$

For the group of individuals engaged in both home production and market production, the probability density function of $\left(\ln w, \tilde{T}_{Hi}\right)$ is transformed in terms of the residuals such that

$$pdf\left(\ln w, \tilde{T}_H\right) = \Psi\left(\ln w - Z\delta - \gamma T_H,\ Z\delta + \gamma T_H - X\beta\right) \cdot |J| \tag{4.12}$$

where $\Psi(\cdot)$ is the bivariate Gaussian probability density function and the Jacobian of the transformation is $-\gamma$.

Combining the components from equations 4.10, 4.11 and 4.12, the joint likelihood of the data given a set of parameters is described by

$$\begin{aligned} L(\theta|y) &= \prod_M \Phi\left(\frac{X_i\beta - Z\delta}{\sigma_\eta}\right) \\ &\times \prod_B |\gamma| \Psi\left(Z_i\delta + \gamma T_{Hi} - X_i\beta, \ln w_i - Z_i\delta - X_i\beta\right) \\ &\times \prod_H \Phi\left(\frac{Z_i\delta + \gamma T_{Hi} - X_i\beta}{\sigma_\eta}\right) \end{aligned} \tag{4.13}$$

This likelihood function forms the basis for the estimation of the unknown parameters $\theta = (\beta', \delta', \gamma, \sigma_\nu, \sigma_\eta, \rho)'$, which in return will allow a recovery of the expected shadow wage s, by using the estimated coefficients in equation (4.8).

4.3 Data

In order to estimate the model above, I require data on the actual time spent by individuals doing household work, their market wage (if any), as well as data on various determinants of individuals' market wages and marginal products of household work. Moreover, data regarding food expenditures and particularly expenditures for ingredients used for in-home meal preparation are needed, as well as information regarding whether a respondent's household receives food stamp benefits. I obtain these data from the American Time Use Survey (ATUS), as well as the Current Population Survey (CPS) and its Food Security Supplement (December Supplement).

The American Time Use Survey is administered by the Bureau of Labor Statistics and has been collecting data since 2003. The outgoing Current Population Survey panel is surveyed and one person from the CPS household age 15 and up is selected as a "designated person". This designated person keeps a diary of one predetermined day's activities. During a later telephone interview all activities that occurred on the designated day are captured, the activity type for each item is recorded and the duration of the activity is noted. Activity types are coded according to a six digit multi-tier activity code. This provides a great deal of detail regarding different activities and there are a total of 424 distinct activities that are coded. The main item of interest here are the activities associated with the "household work" tier. By adding the different activities in this tier I am able to obtain how many total minutes each individual spent in household work as well as specifically household work that is related to food preparation and clean-up on the interview day.

In addition to the time use variables, the ATUS also collects other basic information on its respondents. Various household characteristics such as the household size, number of children, marital status of the respondent, etc are available. Most importantly, the wage rate of the individual is contained in the ATUS data. As mentioned before, all ATUS respondents are members of the outgoing CPS panel. Therefore, it is possible to link the ATUS data set to the CPS data in order to obtain other information that is not included in the ATUS data directly. This includes, for instance, a respondent's race as well as geographic variables. Via the CPS data, it is also possible to link a subset of the ATUS respondents back to the Food Security Supplement of the CPS, which contains data regarding the usual food expenditures of the household.

The subset of data used for this study consists of the 2003-2009 sample years. Some observations had to be excluded due to data inconsistencies. For example, some individuals reported working a positive amount of time in the market but did not report a valid wage or salary. Others reported not working in the market, but not working in the household either. Since leisure takes up all available time for those individuals they cannot be included in my model. I restrict my attention to individuals aged 18-65 since very few of those individuals who are older than 65 report positive labor market hours. While the choice to retire is itself the outcome of a utility optimization process, it is a different problem from the one investigated here, and the model developed here is not suitable to account for retirement decisions. The final sample contains a total of 57,590 individuals. Table 4.1 summarizes the data.

Table 4.1: Summary Statistics by Group

Variable	Means			
	(1)	(2)	(3)	(4)
Group	Overall	*M*	*B*	*H*
Female	0.607	0.313	0.603	0.708
Education: Less then HS	0.098	0.087	0.063	0.123
Education: High School	0.264	0.261	0.238	0.280
Education: Some College	0.292	0.291	0.288	0.294
Education: Bachelors Degree	0.225	0.229	0.252	0.208
Education: Masters Degree +	0.121	0.132	0.160	0.095
Age	41.839	39.908	42.194	42.283
Race: White	0.822	0.815	0.836	0.816
Race: Black	0.122	0.127	0.109	0.127
Race: Other	0.056	0.058	0.055	0.056
Ethnicity: Hispanic	0.137	0.147	0.115	0.146
Region: Northeast	0.183	0.172	0.192	0.180
Region: Midwest	0.253	0.255	0.263	0.246
Region: South	0.346	0.362	0.331	0.349
Region: West	0.219	0.211	0.213	0.225
Lives in Metropolitan Area	0.825	0.833	0.831	0.819
Union Member	0.105	0.127	0.141	0.077
Marital Status: Never Married	0.212	0.280	0.201	0.196
Marital Status: Married	0.593	0.568	0.590	0.602
Marital Status: Widowed	0.025	0.013	0.022	0.031
Marital Status: Separated	0.170	0.139	0.187	0.171
Observed on a Weekday	0.516	0.721	0.733	0.320
Professional Occupation	0.333	0.398	0.457	0.238
Enrolled in School	0.072	0.080	0.061	0.075
Has Employed Spouse	0.495	0.414	0.510	0.513
Number of Children in HH	1.063	0.915	1.020	1.137
Number of Adults in HH	1.954	2.032	1.907	1.956
Nominal Hourly Wage	20.921	21.041	20.851	-
Minutes in Home Production	107.600	0.000	80.745	159.536
Minutes in home Food Production	54.941	0.000	47.753	77.659
Observations	57,590	10,120	17,470	30,000

Note: Individuals who belong to Group M (column 2) work exclusively in the market. Individuals in Group B (column 3) work in the household as well as at home. Individuals in Group H (column 4) work exclusively in the household.

Most variables are self explanatory.[4] Professional is a dummy variable that indicates whether the respondent reported working in management, professional, or related occupations. The dummy variable Union Member indicates whether an individual is either a member of a union (or other collective bargaining group), or, if she is not an actual member, her work contract is subject to provisions negotiated by a collective bargaining group.

The means for the different Groups presented in Table 4.1 shed some light on the typical individual working only at home, only in the market, or both. There are a total of 57,590 observations, out of which 30,000 work exclusively at home. 17,470 individuals reported working both in the market and at home, while 10,120 respondents work only in the market. The large proportion of individuals that were observed doing only household work is likely due to the fact that weekends are oversampled in the Time Use Survey. Group H is predominantly female, while Group M is predominantly male. Not surprisingly professionals are very likely to be employed in the market.

Because the subject of interest for this paper is the time cost component of food preparation, some additional data are required in order to investigate how large the proportion of the cost of time is with respect to the overall cost of food. I link the data used in the previous section with the December Supplement of the Current Population Survey to obtain information on the food expenditures incurred by the respondent households. The CPS follows a 4-8-4 sampling scheme, meaning that households will be in the sample for four consecutive months, then be out of the sample for 8 consecutive months before returning to the sample for another 4 months. Since the American Time Use Survey samples households from all outgoing CPS panels, not all the ATUS data will have corresponding entries in the December CPS data. Due to the sampling scheme, four out of the twelve monthly panels of the CPS answered the December Supplement. Therefore it is expected that about one third of the respondent households from the ATUS should find a corresponding match in the CPS Food Security Supplement. Indeed, out of the 57,590 households in the ATUS sample I am able to match 18,740 households (32.5% of the original sample) with the December CPS data.

Weekly food expenditure data are reported at the household level, while the time use information (the time spent in food related household work) and estimated shadow wage are available for only one individual in the household. This is due to the fact that only one designated person from the CPS household is asked to complete the time diary collected by the ATUS. However, while technically food stamps are received by an individual person, the benefit is clearly received at the household level.

Table 4.2 presents summary statistics broken down by SNAP participation status. SNAP participants are predominantly female, less educated, and more likely to be black than non-participants. Participants are also more likely to be unmarried and on average have more children. The household size is on average larger for SNAP participants despite the fact that there are generally fewer adults present in those households. While SNAP participants' market wage is significantly lower than that of non-participants, they spend more time in home production and food production.

[4] I aggregated Race into three groups because the original data provide more detail than is useful. The Race category 'Other' contains all 15 possible races other than white-only or black-only, which are indicated by themselves accordingly. Note that Race and Ethnicity are treated as two separate variables in the data, meaning that it is possible to be white-hispanic, black-hispanic, etc.

Table 4.2: Summary Statistics by SNAP Participation Status

Variable	SNAP non-participants	SNAP participants
Female	0.599	0.771
Education: Less then HS	0.087	0.292
Education: High School	0.256	0.262
Education: Some College	0.295	0.292
Education: Bachelors Degree	0.235	0.044
Education: Masters Degree +	0.126	0.009
Age	42.15	37.72
Race: White	0.831	0.666
Race: Black	0.113	0.276
Race: Other	0.056	0.058
Ethnicity: Hispanic	0.130	0.199
Region: Northeast	0.186	0.145
Region: Midwest	0.255	0.279
Region: South	0.341	0.386
Region: West	0.219	0.189
Lives in Metropolitan Area	0.829	0.744
Union Member	0.112	0.026
Marital Status: Never Married	0.202	0.355
Marital Status: Married	0.614	0.281
Marital Status: Widowed	0.026	0.032
Marital Status: Separated	0.158	0.332
Observed on a Weekday	0.523	0.505
Professional Occupation	0.349	0.058
Enrolled in School	0.069	0.099
Has Employed Spouse	0.514	0.171
Number of Children in HH	1.033	1.73
Number of Adults in HH	1.973	1.66
Hourly Wage	21.01	10.9
Minutes in Home Production	103.9	132.5
Minutes in home Food Production	53.52	66.95
Observations	17,805	935

4.4 Estimating the Model

The likelihood function used in the estimations is provided in equation (4.13). For the wage equation estimation the regressors (i.e. the $\mathbf{X}_i$) include an individual's sex, education, race, ethnicity, geographic region in the country, age, and the square of age. Indicator variables for whether the individual lives in a metropolitan area, is a union member, is employed in

a professional occupation, or is currently enrolled in school are included. Data regarding experience or tenure on the job are not available, but the inclusion of age should help mitigate this shortcoming. All things equal, union membership is usually associated with higher wages; therefore the coefficient is expected to be positive, as is the coefficient on the indicator for professional occupation categories. The indicator for current school enrollment is included in order to control for individuals potentially accepting lower wages in the short run in exchange for more education and higher wages in the future. The geographic indicators (four very broadly defined regions: North, South, East, and West) are included to account for potential differences of individuals across the country.

The determinants of the marginal product of household work equation (i.e. the $\mathbf{Z}_i$) include some of the same variables that are used in the wage equation. Sex, Education, Age, squared Age, Metropolitan Status, Race, and Ethnicity are contained in both $\mathbf{X}_i$ and $\mathbf{Z}_i$. In addition there are some regressors that are expected to be correlated with the marginal product of household work, but not with the individual's wage. These include the number of children present in the household, the number of adults present in the household, whether an individual's spouse is employed in the market, as well as the marital status of the individual.

Table 4.3 presents the results from the pseudo maximum likelihood estimation of the model described above[5] using the large sample with 57,590 observations. Both the market wage equation, as well as the marginal product of household work equation include dummies for the year during which the individual was observed, although those coefficients are not reported in the interest of space.

The estimated coefficients have the expected signs and are mostly highly significant. For instance, as expected, females earn less than males; the return to education is positive and increasing with increasing educational attainments. We also observe the familiar increasing (with a decreasing rate) returns to age.

Regarding the marginal product of household work equation, we see that females have a higher marginal product than males. There are also positive returns to education that are increasing with the level of educational attainment. However, the magnitude of the coefficients is much smaller compared to the log wage equation. The number of children in the household increases the marginal product of household work, while the number of adults has a negative impact, though the absolute value of this negative impact is less than the positive impact of another child. The indicator for whether the respondent's spouse is employed is positive and statistically significant as well. γ, the parameter on time spent in household production, is negative and significant, which is expected due to diminishing marginal returns to time spent in household work. The marginal product curves of household work are downward sloping in the model and the data indicate that for every additional hour spent in household work, the marginal product diminishes by about 17%.

It is interesting to note that the estimate of the correlation coefficient of ν and $\eta = (\epsilon - \nu)$, $\hat{\rho}$ is significantly negative. This means that the unobservables picked up in the

[5]The maximization was carried out using the BHHH algorithm for numerical optimization. Other (Quasi-Newton) methods all provided very similar results. Analytic gradients used in the optimization were tested for accuracy against their numerical counterparts. Starting values were chosen based on the Heckman Selection model where the marginal product equation from the present model served as the selection equation in the Heckman procedure. Results are highly robust to different choices of starting values (e.g. random starting values).

Table 4.3: Estimation Results

	log wage		log marginal product of household work	
Variable	Coefficient	(SE)	Coefficient	(SE)
Intercept	1.312**	(0.052)	2.080**	(0.076)
Female	−0.242**	(0.009)	0.253**	(0.021)
Education: High School	0.178**	(0.017)	0.042*	(0.021)
Education: Some College	0.290**	(0.017)	0.140**	(0.022)
Education: Bachelor's Degree	0.478**	(0.018)	0.340**	(0.023)
Education: Master's Degree	0.607**	(0.019)	0.470**	(0.026)
Age	0.046**	(0.002)	0.038**	(0.003)
Age Squared	−0.001**	(0.000)	−0.000**	(0.000)
Metro	0.157**	(0.010)	0.159**	(0.012)
Race: Black	−0.094**	(0.012)	−0.118**	(0.015)
Race: Other	−0.010	(0.016)	−0.018	(0.020)
Ethnicity: Hispanic	−0.138**	(0.012)	−0.122**	(0.015)
Weekday	0.052**	(0.011)	−0.053**	(0.025)
Region: Midwest	−0.074**	(0.011)	−0.124**	(0.014)
Region: South	−0.081**	(0.010)	−0.130**	(0.013)
Region: West	−0.005	(0.011)	0.002	(0.013)
Union	0.116**	(0.008)		
Professional Occupation	0.272**	(0.009)		
Currently in School	−0.055**	(0.010)		
Widowed			0.019	(0.023)
Divorced			0.018	(0.011)
Never married			−0.024*	(0.011)
Spouse Employed			0.121**	(0.010)
Number of Children in HH			0.074**	(0.004)
Number of Adults in HH			−0.040**	(0.005)
γ			−0.174**	(0.007)
σ_ν			0.729**	(0.018)
σ_η			0.604**	(0.025)
ρ			−0.773**	(0.013)
Log Likelihood			-81379.2	
Number of Observations			57,590	

Note: Standard errors are in parentheses. Significance levels: *: 5%, **:1%

residual of the marginal product equation are not strongly positively correlated with the stochastic component of the wage equation. The two may even be negatively correlated. This result is intuitive, and given that the stochastic components include unobservables such

Table 4.4: Mean Shadow Wages in US Dollars per Hour

	SNAP Non-participants	SNAP Participants
All	29.90	23.82
Marketwork Only	31.34	26.20
Both Household Work and Market Work	29.18	24.72
Household Work Only	29.82	23.29

as personal preferences and abilities, the result is somewhat expected as well: all things equal those individuals with, say, unobserved talents in aluminum welding may command a high market wage, but will find it difficult to apply this particular talent in home production. An appropriate test of overall significance involves the hypothesis that all slope coefficients other than γ are equal to zero.[6] A likelihood ratio test rejects this hypothesis at all conventional levels of significance.

From the estimation results it is easy to back out the expected shadow wage of home production. Since the expectation of a log-normally distributed variable is $\mathbb{E}[X] = \exp(\mu + \sigma^2/2)$ we can use equation (4.8), substitute the coefficients obtained during the estimation procedure[7], and obtain $\mathbb{E}[s_i] = e^{\mathbf{Z}_i\hat{\delta}+\hat{\gamma}T+\hat{\sigma}^2_\eta/2}$.

4.5 Discussion

I compare several outcomes between SNAP participants and non-participants: time spent in food preparation, the time cost of food preparation, the total cost of food preparation, and the share of time cost in food preparation. Holding home production Y_H constant, the substitution of time for ingredients will cause the time spent doing household work, T_{Hi}, to increase as the marginal product of household work, s_i, decreases. This is already confirmed in Table 4.2: SNAP participants spend on average a significant 13.43 minutes more each day in food preparation at home.

Table 4.4 presents the means of shadow wages for individuals in the sample, broken down by SNAP participation. Food stamp recipients have an average shadow wage of household work of$23.82, while the average shadow wage for non-recipients is $29.90. This difference is statistically significant with a p-value of < 0.000.[8]

[6] When attempting to test for the overall significance of the model there are two things to consider: First, the hypothesis that all the regression coefficients except the intercepts (and variances) are zero is meaningless here when they include γ; in fact, I require $\gamma < 0$ for identification. A technical problem is that the Jacobian of the transformation term in the log-likelihood is infinite whenever $\gamma = 0$, but this is merely a symptom of the fact that the first order condition of the model only has a unique solution when $\gamma \neq 0$.

[7] A Smearing Estimate along the lines of Duan (1983) is often the preferred method of computing the expected response after fitting linear regression models with transformed scales. However, since the left hand side of the specification is not directly observed (though the shadow wage follows a linear specification in the parameters, the model is not a linear regression per se), these methods do not apply here.

[8] All differences in this paper are tested using a Welch's t-test in order to account for the possibility of unequal variances of the two samples.

The time cost of food preparation is obtained by multiplying the hourly shadow wage with the actual time spent by each individual in food preparation, presentation, and clean up.[9] Whether the incurred time cost increases, decreases, or remains constant as the marginal product of household work varies will depend on the elasticity of demand for time in production with respect to the shadow wage. Columns (1)-(3) in Table 4.5a and 4.5b present the results of combining the hourly shadow wage with the actual time spent in food production at home. Panel (a) presents the results for those respondents not receiving food stamps and panel (b) displays results for households that receive food stamps.

The mean of the time cost of food preparation when considering the entire household is \$28.27 per day for SNAP non-participants and \$24.56 per day for SNAP participants (see column (1) in Table 4.5). The difference is statistically and economically significant. The p-value of the difference of these means is < 0.000. SNAP participants have a lower shadow wage of household work compared to non-participants (see Table 4.4) and they also incur a lower time cost of food preparation and cleanup. This pattern is consistent when considering separately those individuals who work both in the market and at home (Column (2) in Table 4.5), as well as those who work exclusively in the household (Column (3) in Table 4.5).

In order to obtain the total cost of food preparation at home, I add the cost of ingredients to the time cost of each individual. Ingredient costs are reported as a weekly amount and therefore I divide by seven to achieve daily estimates. Ingredients used in food preparation are spread across all individuals in the household. However, the time cost of food preparation is only incurred by the one individual preparing the meal as identified in the data. Therefore, I also calculate the total cost and its components per household member by dividing the individual estimates by the total household size.

The difference in the ingredient costs are insignificant. Note that the ingredient cost for food stamp recipients include any groceries purchased using food stamp benefits. Those households who do not receive food stamps spend on average \$15.37 per day on ingredients, while households who do receive food stamps spend an average of \$15.13. The difference of only 24 cents is very small and the p-value of this difference is 0.580. However, after adjusting for household size, food stamp recipients spend a statistically significant \$0.62 less per person per day on food ingredients (the p-value is < 0.000). Note that SNAP participants families are larger (see Table 4.2) and therefore their per capita spending is lower.

By adding the time cost and ingredient cost components I obtain a total daily cost of food at home for a household in general population of about \$44.15, whereas the daily total cost of food at home is \$40.08 for food stamp recipients. Note that the total cost was computed at the individual level and the reported mean in table 4.5 is the mean of the individual sums.

[9] One potentially strong assumption has to be made here: The marginal productivites of different types of household work is assumed to be identical. Ideally, each activity such as vacuuming, taking out the garbage, or cooking would be modeled separately and have different marginal productivities associated with them. Due to the multitude of different possible activities and the design of the model used in this study this is not possible.

Table 4.5: Cost components of Food at Home

(a) SNAP Non-Participants

	Time Cost (US$)			**Ingredient Cost (US$)**			**Total Cost of FAH (US$)**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Group	All	*B*	*H*	All	*B*	*H*	All	*B*	*H*
Entire Household	28.27	21.62	32.19	15.37	15.21	15.47	44.15	36.90	48.85
Per HH Member	11.51	9.20	12.88	5.64	5.78	5.55	17.14	14.96	18.56

(b) SNAP Participants

	Time Cost (US$)			**Ingredient Cost (US$)**			**Total Cost of FAH (US$)**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Group	All	*B*	*H*	All	*B*	*H*	All	*B*	*H*
TOTAL									
Entire Household	24.56	20.43	25.52	15.13	15.64	15.00	40.08	36.66	40.90
Per HH Member	9.40	6.64	10.04	5.02	4.55	5.13	14.45	11.35	15.19
Net of FS									
Entire Household	24.56	21.62	32.19	8.36	8.51	8.32	33.31	29.52	34.21
Per HH Member	9.40	9.20	12.88	2.87	2.49	2.95	12.30	9.29	13.01

"Net of FS" means that the total food stamp benefit was subtracted from total ingredient expenditures. Individuals in Group *B* work in the household as well as at home. Individuals in Group *H* work exclusively in the household. The column heading "All" includes individuals from Group B and Group H. Those individuals who work exclusively in the market (Group *M*) do not perform any houshold work and therefore all values in this table are zero for that group.

This implies a difference of $4.07 in the means of total cost between food stamp recipients and non-recipients. The p-value of the difference of the means is < 0.000.

So far the ingredient costs have included all items purchased with food stamps. Food stamps (partially) subsidize the ingredient costs and therefore not the entire total cost of food preparation is actually borne by the individual or household. In order to obtain an estimate of the total out-of-pocket cost of food preparation I use the total food ingredient expenditure reported by the household and subtract the amount of food stamp support received.[10] When subtracting the food stamp benefit received to obtain the total cost of

[10]The dollar amount of food stamps received by the household is available for the month of November preceding the December CPS interview. Since that amount is reported as a monthly total, I divide by 30 in order to obtain a per diem value.

food as an out-of-pocket expense of the individual food stamp recipient, the estimated total cost is reduced to $33.31 (See Table 4.5b).

Finally, it is useful to also compare the time cost shares in food preparation at home between SNAP participants and non-participants. The time cost shares are calculated by respectively dividing columns (1), (2), and (3) in Table 4.5 into columns (7), (8), and (9) of the same Table. Time cost accounts for 64.0% of total costs for SNAP non-participants, while SNAP participants incur 61.3% of their total costs as time costs. This includes ingredients purchased with SNAP benefits in the denominator. Therefore we can conclude that using ingredients purchased with food stamps does not increase the time cost share for meals prepared at home for SNAP participants over non-participants. Not only do SNAP participants incur a lower time cost of food preparation at home, but also the time cost share of preparing food at home is smaller for SNAP participants. Comparing time cost shares over food expenditures *net of SNAP benefits* is not informative since, all other things equal, any positive food stamp benefit will increase that share compared to non-recipients.

Note that recent research has indicated that SNAP participants significantly underreport their own participation in SNAP programs (Bollinger and David, 2001; Meyer and Goerge, 2010). On the other hand it is rare that a SNAP non-participant would identify herself as a participant (Bollinger and David, 1997). Misreporting of SNAP benefits seems to occur almost exclusively at the extensive margin, not at the intensive margin, and so it is likely that some of the individuals that I have identified themselves as non-participants actually do receive food stamps (Meyer and Sullivan, 2007). Since SNAP participants have a lower shadow wage of household production, it is likely that the shadow wage rates are actually higher, and the difference of the shadow wage as well as the difference of the total cost of food preparation between SNAP participants and non-participants represents a lower bound.[11]

4.6 Conclusions

This study confirms that the time cost of preparing food at home is a significant proportion of the total cost incurred by an individual preparing food at home. A structural model of time allocation between market work and household production is estimated using data from the American Time Use Survey as well as data from the Current Population Survey's Food Security Supplement concerning individuals' food expenditures and food stamp program participation.

The average household not participating in the Supplemental Nutritional Assistance program incurs about $28.27 in time cost per day by preparing meals at home. In terms of individuals, the average time cost is $11.51 per person per day across households. Food stamp recipients incur a significantly smaller time cost of $24.56 per day per household or $9.40 per day per individual. Time costs account for 64% of the total cost of food at home for SNAP non-participants, whereas time costs account for about 61% of the total cost of food at home for SNAP participants.

Previous literature has questioned whether the total cost of food preparation is higher for food stamps recipients compared to non recipients due to the increased amount of time that

[11] I thank a referee for this insight.

is spent preparing food when following the Thrifty Food Plan. My results show that food stamp recipients have an estimated shadow wage of home production that is significantly lower than non-recipients. My results also show that the shadow wage of home production of food stamp recipients is low enough so as to offset the increased amount of time spent in the kitchen. As a result, the total cost of food preparation at home is still significantly lower for food stamp recipients compared to non-recipients, even after accounting for extra time inputs.

Future research should address how the time cost of food preparation at home impacts the nutritional quality of the food being prepared. The details of what is prepared at home are not observed in the data used for this paper, and therefore all meals are considered equal. However, if nutritional quality and the time spent preparing meals are substitutes, then it is important to consider an individual's shadow wage of household production in policies designed to target important outcomes, such as obesity. Results from this paper may be used to develop a model that is able to account for both *how much* is cooked at home, as well as *what* is cooked at home.

Chapter 5. Summary and Conclusion

In this dissertation I presented three essays that investigated the impact of income on the well-being of families and children.

The first paper investigated how exogenous changes in the amount of child benefit received by families in Germany impacted the circumstances related to well-being of their children. The German child benefit is paid as an unconditional cash transfer to all families with children, but it is the stated intention of the policy maker that the child benefit be used to ensure that children's needs in terms of nutrition and housing (among other things) are met. Due to the unconditional nature of the benefit and the fact that the benefit is paid in cash, any money paid to the families is fully fungible. I investigate whether parents really do use the child benefit for its intended purpose, or whether they may use the benefit for expenditures on other commodities that are unrelated to the well-being of children.

I find that households primarily increase their per capita food expenditures in response to exogenous increases in child benefit. Households spend on average between 49 and 74 cents out of every additional Euro of child benefit on food, which should improve nutrition. Households also use child benefit to improve their housing conditions: they are more likely to own their home instead of renting, and are more likely to live in a larger home if they are renters. I find no evidence that child benefit increases smoking of parents I also do not find any evidence that child benefit income causes parents to increases drinking of alcohol.

These improvements in the circumstances related to child well-being are only observed when the children in the household are young. Families may be eligible for child benefit until the children are up to 25 years old; however, I find that once children in the household are older than 18 years of age, parents no longer use additional child benefit income to improve nutrition or housing conditions. Instead, parents of older children are more likely to use child benefit income for their own personal entertainment activities such as going to the movies or pop music concerts. Parents of older children are also more likely than parents of younger children to use child benefit income to attend cultural events such as classical music concerts, the opera, public lectures, or theater performances. These activities are unrelated to the well-being of children. On the other hand, parents are more likely to use child benefit to go on day trips or short vacations when children are young. This includes trips to the zoo or other excursions, and therefore those activities may be related to the well-being of children.

The effect of child benefit income on families with young children is larger for low-income households compared to high-income households. Households that are considered to be at-risk of poverty spend about 4 more cents of every additional Euro of child benefit on food, compared to households not at-risk of poverty. However, households at-risk of poverty do not differ in their behavior.

I also find that there is a significant labeling effect for the child benefit, indicating that households treat child benefit income differently compared to income from other sources. An increase in child benefit income leads to larger improvements in nutrition and housing conditions compared to an identical increase in general household income.

My results indicate that the child benefit does have the desired effect of improving nutrition and housing for families with non-adult children. Indeed, parents of young children are more likely to spend an additional Euro of child benefit towards those commodities copared to an additional Euro out of other sources. Parents are also not using child benefit income for increases in cigarette smoking or drinking of alcohol. However, once children are older, parents no longer improve nutrition and housing conditions when child benefit increases. Rather they use the child benefit for their own social activities and entertainment.

The second paper investigated the impact of income on infant health. Since maternal income or household income are likely correlated with mother attributes and household characteristics that may directly impact the health of an infant, I employ an instrumental variables approach in order to account for this endogeneity issue. I used birth records from nearly 85 million births between 1978 and 2004 combined with micro data on income from the Current Population Survey's Annual Demographic File for this study.

I constructed a state-year-level measure of skill biased technology change that is based on the literature on wage inequality. Using a two-sample instrumental variables strategy allowed me identify the causal impact of mothers earnings on the birth weight of the newborns. I also estimated health input demands for negative health inputs such as smoking and drinking, and positive health inputs such as prenatal medical care consumption of the mothers. Together with the results regarding birth weight production, the results from input demand estimations provide insights into the channels through which the impact of income on infant health operates.

The results show that the impact of mothers' earning on infant health varies significantly depending on mothers' marital status and education level. For low-skill mothers (those with at most a high school education) an increase in real weekly earnings increases the number of prenatal medical care visits and shortens the delay in the initiation of prenatal care. The opposite is true for high-skill mothers (those mothers with at least some college education). Smoking participation and the propensity to consume alcohol go up with income for low-skilled mothers regardless of their marital status. On the other hand, high-skill unmarried mothers reduce their smoking and drinking while high-skill married mothers increase smoking and drinking. The impact of income on the consumption of prenatal care does not depend on marital status.

The impact of mothers' earnings on birth weight is different between low-skilled married and low-skilled unmarried mothers. For married low-skilled mothers the net effect of improved prenatal medical care together with the increased propensity to consume of alcohol and cigarettes results in an improvement in birth weight for their children. This net effect generates a decline in birth weight among unmarried low-skilled mothers. Although the prenatal care consumption declines as income rises for all high-skilled mothers, the birth weight of infants of unmarried high-skilled mothers goes up because these mothers' propensity to smoke and drink goes down as their income goes up. On the other hand, the birth weight of the newborns of unmarried low-skilled mothers goes down because these mothers initiate drinking and smoking when income rises. The direction of the change in birth weight as a response to a change in income is not uniform among the groups of mothers analyzed. In each of the mentioned groups of women, the net effect of income on birth weight is small.

The third paper investigated the time cost of preparing meals at home. The study confirmed that the time cost of preparing food at home is a significant proportion of the total

cost incurred by an individual preparing food at home. I used data from the American Time Use Survey as well as data from the Current Population Survey's Food Security Supplement on individuals' food expenditures and food stamp program participation. I estimated a structural model of time allocation between market work and household production in order to determine individuals' shadow wage of home production.

I estimated the total cost of food production at home and I found that the total cost of food preparation at home is still significantly lower for food stamp recipients compared to non-recipients, even after accounting for extra time inputs. This is due to a significantly lower shadow wage of home production for individuals receiving food stamps. Concentrating on time cost, I find that the average household not participating in the Supplemental Nutritional Assistance program incurs about \$28.27 in time cost per day by preparing meals at home. Food stamp recipients incur a significantly smaller time cost of \$24.56 per day per household. As a proportion of total cost of food at home, time costs account for 64% of the total cost of food at home for SNAP non-participants, whereas time costs account for about 61% of the total cost of food at home for SNAP participants.

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Vita

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