ABSTRACT

WILLS, JEREMIAH B. Maternal Employment, Relative Income, and Child Well-Being: The Effects of Gendered Household Resource Allocation on Children's Cognitive Development Trajectories. (Under the direction of Theodore N. Greenstein.)

In this study, I extend the scholarship on maternal employment and the allocation of household resources by evaluating the effects of mothers' time spent in the labor force and mothers' relative income on children's cognitive development. I use a gendered resource allocation model that recognizes differences in investment preferences between men and women and how women can use increases in their relative earnings to direct greater amounts of family resources towards enrichment goods and services that promote child well-being. Support for this model comes mostly from research conducted outside of the United States. This study contributes to this research literature by using an American sample drawn from the Children of the National Longitudinal Survey of Youth 1979. In addition, I contribute to the research on maternal employment and child outcomes with a longitudinal analysis of children's cognitive development trajectories from age five to 14. I find some negative effects on children's initial levels of cognitive skills for measures of both early and current maternal employment hours. Some of these effects are moderated by race, the supportiveness of children's home environment, and mothers' cognitive skills. Contrary to predictions from a gendered resource allocation model, I find that children's cognitive development is lowest in households in which mothers' and fathers' incomes approximate parity, likely because of a lack of clear specialization in such households. I discuss these findings in terms of theoretical, research, and policy applications.

MATERNAL EMPLOYMENT, RELATIVE INCOME, AND CHILD WELL-BEING: THE EFFECTS OF GENDERED HOUSEHOLD RESOURCE ALLOCATION ON CHILDREN'S COGNITIVE DEVELOPMENT TRAJECTORIES

by
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A dissertation submitted to the Graduate Faculty of
North Carolina State University in partial
fulfillment of the requirements for the
Degree of Doctor of Philosophy

SOCIOLOGY

Raleigh, North Carolina

2007

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BIOGRAPHY

Jeremiah Brandon Wills was born on March 15, 1977 in Winston-Salem, North Carolina. He earned a Bachelor of Arts degree in sociology from High Point University in 1999 and Master of Science and Education Specialist graduate degrees in marriage and family counseling from The University of North Carolina at Greensboro in 2001. Jeremiah began his doctoral work in sociology at North Carolina State University in the fall of 2002. While completing his Doctor of Philosophy degree, Jeremiah taught several sociology courses and worked as a graduate research assistant for the First Year Inquiry program.

ACKNOWLEDGEMENTS

The state constitution of North Carolina includes the following declaration about education: “Religion, morality, and knowledge being necessary to good government and the happiness of [human]kind, schools, libraries, and the means of education shall forever be encouraged” (Article IX, Section 1). One way the state encourages educational pursuits is by appropriating tax revenues to support graduate students like myself. Without said support, my doctoral degree likely would not have been completed. Therefore, I thank the tax payers of North Carolina for covering the expenses of my education. I realize that each semester thousands of state dollars were allocated to me, and those monies could have been directed toward someone or something else. I hope the investment proves to be a wise one.

More specific individuals also have invested in my educational and career development. My dissertation chair and academic advisor, Ted Greenstein, has devoted his time and energies to see that my training in statistics, research methods, and family sociology has been exceptional. Ted maintains a remarkable standard for scholarship, and his counsel made this study more precise and thoughtful than it would have been without his high expectations. I am grateful for Ted’s influence on my work and professional identity.

I owe a tremendous amount of credit to Maxine Atkinson, whose membership on my dissertation committee is just one of her many contributions to my sociological training. Maxine has provided me with several opportunities to develop my pedagogical and research skills under her guidance. While working with Maxine in the First Year Inquiry program, I have been able to observe what a dedicated mentor, adept administrator, and prolific teaching scholar does in her multiple roles at a university. I appreciate Maxine’s willingness to create

opportunities for graduate students to receive training in becoming experienced, versatile academics.

My other committee members, Rick Della Fave and Feinian Chen, deserve considerable thanks. They have been insightful and supportive, and I am grateful for the contributions they made to this project and my professional development. I am also grateful for Andrew Behnke's readiness to join my committee at the last minute as a graduate representative.

A few fellow graduate students deserve recognition. Zach Brewster has been a reliable coffee companion throughout graduate school. I appreciate his friendship and admire his intellect, both of which were instrumental to me completing my degree. Thanks to Jon Brauer for providing statistical consultation for this study. His readiness to challenge me about everything has been both helpful and entertaining. I also appreciate the support of Matt Shurts.

As interesting as family sociology is as an academic specialty, I find the deepest joys of life in my own family. My spouse, Rebecca, supplied me with unflinching support and continuous inspiration during graduate school. I am thankful for how she always encourages me to pursue my goals. Her determination to finish her doctoral degree in mathematics has been an example for me to follow. I am blessed to share my life with such a wonderful, caring person. In addition, I am forever indebted to my parents, Brenda and Chig Wills, and my sister, Ashley Crumpton, who provided for me an enriching, loving home environment as a child. I am thankful that my parents invested so much of their resources into the lives of their children, and they continue to do so. I am also appreciative of the support of my

brother-in-law, Jon Smith. Finally, I want to thank my nephews—Charlie, Thomas, William, and Jacob—who provided pleasant distractions from the demands of graduate school.

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CHAPTER 1

INTRODUCTION

1.1 Prologue

One of the most prominent demographic trends in contemporary social life is the rate at which American women have entered the paid labor force over the past several decades (Bianchi 2000). The consequences of this trend are the focus of many empirical and theoretical efforts. One especially well developed area of research concerns the effects of maternal employment on child well-being, with researchers typically examining the negative consequences of early maternal absence from the household (i.e., employment in the first three years of a child's life) versus the potential benefits of increased family income through mothers' participation in the workforce. In this study, I extend the scholarship on maternal employment and the allocation of household resources in terms of the use of mothers' time and earnings with theoretical and methodological approaches different from those employed in the extant child well-being research literature.

More specifically, I consider maternal employment and the income such employment brings into the household from a resource allocation perspective that recognizes the gendered nature of mothers' investment preferences. Within this framework, increases in wives' earnings relative to their husbands' earnings are predicted to give mothers control over a larger fraction of household income. This is expected to have positive consequences for child well-being by increasing mothers' opportunities to direct household resources towards goods and services that promote child development.

Before examining the role of mothers' relative income, however, I start with an analysis of the allocation of maternal time to the labor force during the first three years of children's lives, which has been the focus of several recent studies (Baum 2004; Baum 2003; Han, Huang, and Garfinkel 2003). From a household resource allocation perspective, young children might benefit from parental time investments more so than economic investments given the importance of young children's early learning experiences and the establishment of close relational bonds between children and their care givers. Conversely, older children might benefit more from parental economic resource investments given their greater consumption needs. As such, the allocation of maternal time to the labor force during early child development might have negative short-term effects but positive long-term effects if this labor force participation allows for greater accumulation of resources that become beneficial to children as they age and their needs for enrichment goods become stronger.

Addressing these issues of early maternal labor force participation and mothers' relative income requires a longitudinal analysis. Therefore, I model child well-being in terms of developmental trajectories which can vary along with changes in household and parent characteristics. This longitudinal approach improves upon previous cross-sectional studies of maternal employment and child outcomes.

Sociopolitical debates surround the issue of maternal employment (Sayer, Bianchi, and Robinson 2004). These debates are in part about gender stratification within families, where mothers are assumed to be the natural caregivers of children, and within society more generally, where men are assumed to be the appropriately fitted competitors of the marketplace. As a result, negative child well-being outcomes being linked to maternal

employment can be interpreted as confirmation of traditional gender arrangements within families (i.e., breadwinning fathers and homemaking mothers). When maternal employment is shown not to negatively influence child well-being (or even to enhance it), traditional gender arrangements are contested. It is important for social scientists to inform this political debate with scholarly investigations (Greenstein 1993), which is my attempt here.

In this introductory chapter, I describe the current context of maternal employment in the United States and its consequences for contemporary families. I then offer an overview of the theoretical and methodological approaches used to answer the research questions addressed in this study. Finally, I provide a brief description of the chapters to follow.

1.2 The Context of Maternal Employment and Contemporary Families

The majority of American women—wives and mothers—are employed. About 60% of all women over age 16 and 61% of married women were employed in the American labor force in 2002 (US Department of Labor 2004). Seventy-two percent of mothers with children under the age of 18 worked for pay in 2002, compared to just 47% in 1975. Seventy-one percent of married mothers with children under the age of 15 were in the paid labor force in 2003 (Fields 2003). In addition, wives' contributions to total family household income grew from a median of 27% in 1970 to over 34% in 2001 (US Department of Labor 2004).

There are various explanations for these changes in women's employment patterns. For example, increases in women's labor force participation are attributed to feminism, birth control developments, declines in welfare assistance, and the rise of the service economy (McLanahan 2004). What is important here is that women's market work and concomitant

economic independence over the past several decades has implications for how households are arranged, gender performances are negotiated, and children are cared for in contemporary marriage and family life. One salient observation that can be made regarding the relationship between women's high rates of employment and family life is that women's gains in the labor market have not been met with comparable gains toward parity with men in their marriages and households. Even when employed, women disproportionately carry out the parenting and labor responsibilities within families (Greenstein 2000; Hochschild 1989).

Households, especially married-couple households, therefore, continue to be stratified by gender. In this context, women perform and display their gender in family work often in spite of their market position (Atkinson and Boles 1984; Berk 1985), and men are distinguished by breadwinning and their capacity to avoid family work (Nock 1998). However, even though the dependency for household labor remains unbalanced in most families, the typical contemporary marriage has become a relationship characterized by mutual economic dependency (Nock 2001; Raley, Mattingly, and Bianchi 2006). In other words, most married men and women share the role of breadwinning with their spouse. Although researchers have studied the consequences of having two, economically invested actors in marriage for a variety of outcomes (Greenstein 2000; Nock 2001; Pahl 1995; Phipps and Burton 1998; Rogers 2004; Wilcox and Nock 2006), research is scant on how the well-being of children in the United States might be affected by their parents' relative resource positions within marriage. Moreover, even though maternal employment and women's ensuing contributions to family income are normative in contemporary families, it is usually only mothers' workforce participation that is problematized in American culture.

In contrast, fathers' employment and income provisions are treated as not only normative but essential for family functioning (Amato 1998; Nock 1998). Although recent studies have focused on fathers' socioemotional contributions to child development (Amato 1998; Marsiglio, Day, and Lamb 2000), there is still an implication that fathers are primarily important for the financial resources they can contribute to their households. On the contrary, research in the maternal employment literature implies that women's financial contributions are beneficial *only if mothers do not compromise their care giving*. Furthermore, maternal earnings are seen as increasing the common pool of income available within the household—that is, as no different from the earnings contributed by fathers. This is not consistent, however, with theory and research on women's stronger investment preferences for family welfare when compared to men (Bem 1993; Blumberg 1988; Hays 2003).

Research on maternal employment and child outcomes, therefore, needs to move beyond simply examining the consequences of mothers' labor force participation, which—like fathers'—is (or at least is becoming) normative and consider how the relative resource positions of mothers compared to fathers might influence time and earnings investments in child well-being. Doing so is more consistent with the contemporary context of family life in which mothers and fathers share employment and breadwinning roles.

1.3 Overview of Research Project

In this study, I extend the research on maternal employment and child well-being by treating maternal employment as a means for increasing the relative earnings of mothers compared to fathers, which might have implications for household investment processes.

Furthermore, I use a longitudinal analysis that allows me to evaluate any long-term effects of maternal employment and relative resource characteristics present both early in a child's life (i.e., in the first three years) and throughout development. The two broad research questions that guide this project are:

(1) How do early and current maternal employment affect children's cognitive development, given their potential to increase family income but decrease maternal time investments in parenting?

(2) Is children's cognitive development positively influenced by increases in mothers' relative income, given the potential for mothers' household investment preferences to differ from those of fathers?

Below I provide a short description of my approach to investigating these questions.

Theoretical Framework

Theoretically, I consider maternal employment in the context of gendered household resource allocation processes. Maternal time in the labor force during the early years of children's development is the resource allocation process addressed in the first analysis because of its potential influence on subsequent allocation arrangements and child well-being. However, the central aspect of the household resource allocation that I consider concerns mothers' use of economic resources under their control. Within this framework, the additional income brought into the household by women's labor force participation is assumed to increase the amount of money in the hands of mothers relative to fathers, thus giving women control over a larger proportion of household income. This creates the

potential for mothers to act on their investment preferences, which—considering cultural standards for gender and parenting—are likely different from the investment preferences of fathers in that mothers are more likely to invest in child development (Schmeer 2005). Evidence for such an allocation process, which is presented in the next chapter, comes mainly from research in developing nations and some developed nations other than the United States. It is valuable to evaluate whether a sample of American children realize similar benefits from increases in their mothers' relative earnings.

Selecting an Indicator of Child Well-Being

Child well-being in the economic development literature, from where much of the evidence for the importance of mothers' relative resources comes, is generally investigated in terms of children's physical health, household nutrition, or clothing expenditures directed toward children, since these basic resources are limited yet essential for children's chances for optimal development. In the technologically advanced economies of developed nations like the United States, basic subsistence resources are in greater supply. Much of the focus of contemporary parenting, especially mothering, therefore, involves the investment of resources in cultivating children's potential for success (Lareau 2002). A prominent developmental pathway to such success, which is often construed in terms of economic attainment, is through cognitive and academic accomplishments (Bianchi 2000; Heckman 2000). Therefore, the indicator of child well-being I use in this study is children's cognitive development in reading and mathematics. These are two extensively researched indicators of child well-being often used in the maternal employment and child outcomes literature.

Sample Considerations

The data for this study come from two of the United States Bureau of Labor Statistics' National Longitudinal Surveys: the National Longitudinal Survey of Youth 1979 (NLSY79) and the Children of the NLSY79 (C-NLSY79). In the first analysis, I use a sample of children aged five to 14 for whom there is complete data on their mothers' early and current labor force participation, early household characteristics (e.g., marital status), and at least one child cognitive development assessment in both reading recognition and mathematics.

Since my primary focus in the second analysis is on the allocation of economic resources within married-couple households, I limit my sample to children living with their married, biological mother and father. This particular family structure (married-couple household with own children) currently represents only about 23% of all US households, a decline from 40% in 1970. However, a two-parent family group with children still comprises 68% of all family groups with children (Fields 2003). Moreover, it is within two-parent, and especially married-couple, households that children on average display the highest levels of well-being (Brown 2004). It is important, therefore, to investigate the processes that take place within married-family households in an effort to understand how favorable developmental opportunities in these arrangements are created and might be extended to children across household types.

In addition to parents' marital status, examining processes related to relative income among parents requires restricting the analytic sample to households in which both parents

report employment earnings in the previous calendar year. This restriction eliminates households in which there is one exclusive wage earner in a given year. In other words, a household is excluded from the restricted sample if the mother makes no earnings contributions to the household or if she makes all of them.

Methodological Approach

Methodologically, I use a latent growth curve modeling strategy to analyze children's cognitive development trajectories over time. This strategy allows for the examination of change in the cognitive development of children from ages five to 14 and how that development covaries with changes in household resource allocations (e.g., maternal employment hours, total family income, and mother's relative income). This longitudinal analysis improves upon conventional studies of maternal employment and child well-being that mainly examine child outcome levels at a given point in time.

This approach will provide information about how variables influence the starting points of children's cognitive development at age five (i.e., trajectory intercepts) and how variables affect the rate of change of children's developmental trajectories through age 14 (i.e., trajectory slopes). Moreover, my methodological approach accounts for not only the clustering of multiple assessments over time within the same children but also the clustering of children within families. Growth curve modeling, then, is more comprehensive methodologically and also more consistent with the substantive processes in question compared to conventional analyses.

1.4 Outline of Subsequent Chapters

I have provided in this first chapter a general introduction to the research project and an overview of the more salient issues involved in answering the research questions of interest about maternal employment, mothers' proportional contributions to family income, and children's well-being. In Chapter 2, I outline the theoretical framework of this study: the gendered household resource allocation perspective. In particular, I describe resource bargaining and allocation in light of gender differences in investment preferences and how these processes might influence child development. In addition, I review the relevant research from the economic development and maternal employment literatures that informs my analyses. In Chapter 3, I describe the data used for this study and explain the growth curve modeling strategy employed for the longitudinal study of children's cognitive development.

Data analysis begins in Chapter 4, in which I present the first set of analyses, which focuses on early and current maternal employment. I describe the measurement of variables for this analysis and the sample of children used, present results, and offer a brief discussion of findings. In Chapter 5, I present results from my second set of analyses, which focuses on the allocation of mothers' relative income within the household. I offer a discussion and conclusion in Chapter 6 that synthesizes the findings from the two analyses of this study and describe this project's contributions and limitations.

CHAPTER 2

THEORY AND RESEARCH ON RELATIVE INCOME, MATERNAL EMPLOYMENT, AND CHILD OUTCOMES

2.1 Introduction

In this project, I combine two areas of research to comprehensively address children's cognitive development as a function of the allocation and investment of household resources. One research tradition, referred to here as the economic development literature, focuses on women's likelihood of directing more household resources in favor of child development when their resource contributions relative to their husbands' contributions increase. This area of research offers appealing theoretical assertions about intrahousehold resource allocation processes, yet it is limited by the scope of its evidence, which comes mostly from small studies conducted in developing nations. The other research tradition in which this project is grounded is the maternal employment and child well-being literature. In contrast to the economic development literature on relative resources, this area of research is extensive, but there are still several opportunities in this area for further contributions.

Incorporating aspects of the economic development literature into this project allows me to address the role of women's earnings, particularly in terms of their proportional share of household income, which is largely unaddressed in investigations of maternal employment effects on child outcomes. Concomitantly, building on previous findings in the maternal employment literature allows me to construct an analysis that effectively examines mothers' early and current labor force participation, which are related to increases in American

mothers' relative share of parental income. Both of these research traditions address household resource allocation. The focus on mothers' relative income in the economic development literature is a matter of the allocation of earnings, while much of the focus on mother's labor force participation in the maternal employment and child well-being literature is a matter of the allocation of time as a household resource (England and Farkas 1986).

Given gender expectations within families, maternal employment is often treated as a concern, while men's employment is simply expected. Mothers' labor force participation, therefore, is often framed in terms of its potential to disrupt household processes. That is, when mothers' energies are directed toward the economic realm, they are directed away from the family, making mothers' time investments a decision with uncertain consequences. The assumption in the research literature is that time allows for the proper attachment to develop between mother and child and gives children access to opportunities for the transmission of social, cultural, and intellectual capital from one generation to the next. Additionally, maternal time in the labor force potentially has negative consequences for mothers' parenting effectiveness, especially when mothers' employment is extensive and stressful during children's early years of development (Cooksey, Menaghan, and Jekielek 1997).

Maternal employment, however, can also increase family income, which is positively related to child well-being (Yeung, Linver, and Brooks-Gunn 2002). Furthermore, the research using non-American samples of households that I review later in this chapter suggests that children not only benefit from increased family income but also increased relative income contributions to households made by mothers. Relative income increases from maternal employment, therefore, might provide children with even more positive

contexts for development (i.e., access to more educational and health related goods and services) compared to general income increases if American mothers' investment preferences are more child-focused than fathers. Moreover, the reported long-term negative effects for early maternal employment on child well-being documented in previous research (e.g., Han, Waldfogel, and Brooks-Gunn 2001; e.g., Waldfogel, Han, and Brooks-Gunn 2002) are questionable given their detection with mostly cross-sectional research methods. It might be that early maternal employment pays off for children later in their development, even if there are seemingly negative short-term consequences, if this employment allows households to accumulate beneficial resources.

I address these issues of maternal employment and relative income effects on children's development from a gendered household resource allocation perspective. In the next section of this chapter, I describe this framework and in the following section its supporting evidence. I then review the relevant research on maternal employment in section 2.4 that I rely on to construct the research hypotheses presented in section 2.5. In section 2.6, I provide a chapter summary.

2.2 The Gendered Nature of Households and Resource Allocation and Bargaining

In this study, I conceptually regard the household as a gendered institution (Berk 1985; Schmeer 2005). Cultural ideologies about gender expectations and processes of socialization that occur within a gender stratified society lead women to develop gender identities linked to the interests and obligations of motherhood and family (Bem 1993). Along with other consequential behaviors, these social-psychological processes shape

women's expected use of time in household labor and the investment of emotional resources into their families (DeVault 1991; Hays 1996). Similar processes also shape women's preferences for the allocation of resources within the household. Consequently, when households produce commodities (e.g., child quality or a family meal) they are also reproducing gender as women and men carry out their developed preferences and obligations and respond differently to household demands (Berk 1985; England and Farkas 1986).

This conceptualization of the household and the allocation processes within are in contrast to microeconomic theories based on the notion of a shared common preference for resource investments among all household members. Below, I briefly review the common preference model of household resource allocation before describing in more detail the gendered resource bargaining model that frames this analysis.

The Common Preference Model of Household Resource Allocation

Microeconomic theories of the household are commonly used for explaining the allocation of mothers' and fathers' time and earnings resources to optimize household utility (Baum 2004; Becker 1991). These theories are based on the new home economics' view of the family. Within such models, which are grounded primarily in the work of economist Gary Becker, the household is conceptualized as a small factory in which market goods and services are combined with family members' production capacities to produce household commodities (Foster 2002). One of the primary commodities produced by the household is child well-being in the form of outcomes such as social skills, educational attainment, and wellness. These child well-being commodities bring utility to household members.

Conventional microeconomic models are generally described as common preference, unity, or consensus models (Foster 2002). This is because households are assumed to have a single utility function that each member of the household desires to maximize through inputs of time and/or income and the substitution of household goods with market services. In other words, it is assumed that investment and allocation decisions are made cooperatively by spouses (or any adults in the household) since their end goals are the same. Parents, therefore, essentially function as a single rational actor pursuing joint interests, while children are assumed to be uninvolved in decision making within the household. Children's self-interests are kept aligned with their parents' preferences through various forms of control. (See Becker's (1991) "rotten kid theorem" for a more detailed explanation of children's investment preferences).

Traditional Beckerian economic models of the household, on one hand, view maternal employment as potentially advantageous due to the positive influence of mothers' income contributions to the household. On the other hand, maternal employment represents a constraint to utility due to employed mothers' potential decreased investments of time in household production (Aughinbaugh and Gittleman 2004; Greenstein 1995). In addition, maternal employment raises concerns about the effectiveness of substituting mother-provided child care with market-based child care of at least equal quality.

Common preference models attribute no consequence to the role of spouses' relative income contributions to the household since there is no bargaining over competing investment and allocation strategies and there are no assumed differences between mothers' and fathers' utility functions (Lundberg and Pollak 1996). In other words, monies from the

wallet and monies from the purse are all used the same within the family's income pool. Becker (1991), however, does maintain that the primary resource that women bring to the household is a comparative advantage over men in domestic skills and household production. Conversely, men maintain a comparative advantage in the market where they typically receive a higher return on their labor investments. In other words, family functioning and well-being are achieved through labor specialization that is often—but not necessarily—most efficient when in accordance to stereotypical gender roles (i.e., male breadwinning and female homemaking arrangements).

In contrast to classical economic models of resource allocation, gendered resource bargaining and allocation models acknowledge that the tastes and preferences of men and women within families differ. These models offer mechanisms for explaining how inputs of mothers' relative income might increase child well-being outputs for families.

Gendered Resource Allocation Models of Households

Economists and sociologists have extended common preference models to account for utility bargaining among household actors (Dasgupta 2001; Lundberg and Pollak 1996; Quisumbing and Maluccio 2003), with sociologists paying particular attention to the role of gender in household resource allocation processes (Berk 1985; England and Farkas 1986). These bargaining models, also referred to as collective models, are more consistent with a sociological understanding of the gendered preferences of actors and married couples' use of money to influence household negotiations (Deutsch, Roksa, and Meeske 2003; Kenney 2006; Pahl 1995; Vogler 1998).

There are two primary features of collective models that distinguish them from consensus models of household resource allocation. First, collective bargaining models do not assume a unitary welfare function shared among all household members. Instead, bargaining models recognize that husbands and wives each have their own utility functions (i.e., tastes and preferences), resulting in negotiations over decisions about allocating resources for various desired commodities. As Hoddinott and Haddad (1995) state, "[H]ouseholds are better modelled as collective entities in which bargaining occurs amongst members—rather than as unitary entities which behave as if they maximize a single welfare function" (p. 94).

Second, decisions about how to invest in a household outcome are assumed to be influenced by relative income contributions to the household (Browning, Bourguignon, Chiappori, and Lechene 1994). Some bargaining models presume this is the case because relative resources improve negotiating power in marriage (Blood and Wolfe 1960) or at least supply one spouse with a greater amount of symbolic power within the relationship (Vogler 1998). A more direct explanation for the potential influence of relative income that does not require assumptions about direct bargaining is that increases in relative contributions to household income simply give one claim over a larger percentage of the family income pool. This means that increases in mothers' relative income could actually allow mothers to bypass direct negotiations over household investment strategies and directly steer greater shares of resources in the direction of child welfare, according to their investment preferences.

Combining these two features of collective models reveals the potential significance of mothers' relative income within contemporary marriages and families. Actors not only

have their own investment preferences, but investment preferences are assumed to differ by gender. Women and men, therefore, are expected to allocate the household resources that they control in different ways. The child-centered investment preferences of women might translate into resources under mothers' control being allocated to opportunities and products that enhance child development. Furthermore, mothers might allocate their time to the labor force, even during the early years of child development, to foster resource accumulation and, as discussed below, satisfy the increasing financial demands of good mothering.

The Development of Gendered Investment Preferences

Women and men learn in a gender stratified society to develop gendered selves that are consistent with the dominant gender ideologies—that is, to become what Bem (1993) refers to as gender natives. Cultural ideologies about gender link femininity with motherhood and commitment to family (Hays 1996). Mothering in Western cultures has developed a historical significance in large part because of its symbolic correlation with a version of femininity that is honored as sacred for its opposition to the self-interested, callous masculinity associated with the marketplace (Hays 1996). However, standards of "good mothering" have actually increased since the 1960s and now even include the provision of financial capital. As a result, maternal employment has become another way in which "mothers provide what children need most," which now involves extended years of monetary backing as children delay adulthood to pursue educational training (Bianchi 2000:410).

Sayer, Bianchi, and Robinson (2004) describe the growing requirements of mothering this way:

> Mothers are expected to be experts in the needs and desires of their children, not to mention the latest child development methods, to cultivate and supervise all aspects of their children's development and well-being, and to vigilantly protect children's innocence—a time-intensive prescription. (p. 9)

Maternal employment, then, provides mothers with the financial resources they need to cultivate their children's development, an investment preference that is more child focused than that of fathers.[1]

Allocating resources according to cultural standards of gendered investment preferences can create somewhat of a paradox for mothers. Resources might be used to create child well-being—an investment strategy consistent with cultural notions of mothering and femininity—instead of fostering economic independence or for investments in personal well-being (Dasgupta 2001). Stated differently, mothers' earnings from the market might be used as capital to ensure their children's development. In comparison, it is more expected that men's earnings, while normatively used to promote the general welfare of the family, are likely to be diverted away from family welfare to personal recreational expenses (Quisumbing and Maluccio 2003; Waseem 2004).

It is important to note that men's masculinity development also has important links to family life. However, cultural gender ideologies for men are more about providing for their families and less about the emotion and care giving work that women tend to do more of within households (DeVault 1991; Nock 1998). Of course, men can (and do) develop personal gender ideologies that are consistent with doing household labor and creating

[1] Quisumbing and Maluccio (2003) speculate that women's preferences for child outcomes within families might even be related to women being more likely than men to depend on children for care as they get older.

gender equity as an element of their adult masculinity (Atkinson, Greenstein, and Lang 2005), but on average men still support more traditional gender roles within family life compared to women (Bolzendahl and Myers 2004; Brewster and Padavic 2000).

In summary, the gendered household resource allocation model assumes that when women increase their relative income contributions to the household they are increasing the total amount of family income over which they have influence (Kenney 2006). Within this framework, it is expected, then, that when women's relative financial contributions to the household increase they realize more opportunities to direct investments according to their preferences for goods and services that promote child development. This process of resource allocation should be reflected in enhanced child well-being outcomes. Support for the theoretical assertions of such a model comes mostly from anthropological research in developing nations, along with some findings from research on household expenditures in developed nations other than the US. In the following section, I provide a review of these findings.

2.3 Evidence for Gendered Investment Preferences in Household Resource Allocation

In general, as women's status in a region increases, the quality of life for its residents improves. A component of orchestrated national development strategies, therefore, has been to invest in the education and training of women. At an economic development meeting, Summers (1992), former President of the World Bank, stated, "The evidence that mothers channel much more of their income to expenditures on children than their husbands do is overwhelming." The assumption, then, is that the most efficient route for improving the well-

being of children is by placing resources in the hands of mothers, not fathers (Haddad and Hoddinott 1994).

Findings from the economic development and anthropological literature about mothers' investments of resources in their children's development provide a glimpse into household resource allocation processes that are "black boxes" in traditional common preference models. More importantly, mothers' economic investment strategies also suggest how women allocate their money, in addition to their time and emotional investments, in accordance to cultural expectations about parenting responsibilities and women's commitment to family life in general.

Research from Developing Nations

In an extensive review of research from developing nations, Blumberg (1988) showed that men and women use their earnings in significantly different ways due to conditions of gender stratification within societies. For example, Blumberg reviewed Mencher's 1987 study of parents' contributions to household needs in 20 villages of South India. Mencher found that women, despite earning only about 55% of the income that men earned, devoted an average of no less than 90% of their incomes to food and household needs in any of the village samples. Men, however, contributed only an average of about 70% of their incomes to such needs. Fathers, in many of the studies reviewed, held back more of their income for personal leisure expenses. Haddad and Hoddinott (1994) used 1986-1987 data from the Ivory Coast Living Standards Survey to investigate if the sex of the income earner in rural households influenced child welfare outcomes. They found that as mothers' proportion of

family income increased, children's anthropometric status (height-for-age, in this case) improved. Mothers' income proportion also interacted with children's gender in that boys benefited more from their mothers' resources than girls did.

Thomas (1990) used 1974-1975 Brazilian survey data to test for outcomes associated with women's and men's use of income. He found that mothers, relative to fathers, devoted more of their income to the nutritional demands of the household and that the magnitude of mothers' income effect on the probability of child survival was almost 20 times greater than fathers'. Using the same Brazilian data, Thomas (1997) found that mothers' control of income was more likely to be spent on household services, health, and education needs. Moreover, mothers' earnings, compared to fathers' earnings, were more strongly related to children's health outcomes, as indicated by height-and weight-for-age measures. Attanasio and Lechene (2002) analyzed household expenditures using a sample of 25,846 households in Mexico. They found that increases in mothers' incomes increased expenditures on boys' and girls' clothing.

These studies provide evidence—albeit limited—for the importance of wives' income for the well-being of families, especially children. Furthermore, wives' income seems to provide families, at least in developing countries, benefits beyond mere increased income effects. Rather, mothers' relative income is consequential because this gives women power to allocate their resources and portions of the pooled resources of the household in different ways than do fathers.

Research from Developed Nations

Although the research is more limited, there is also evidence that households allocate resources according to gendered investment preferences within developed nations. Pahl (1990) studied 102 married couples in Britain and found that wives were more likely to spend money on children's clothing and school expenses than husbands. Lundberg, Pollak, and Wales (1997) used data from the United Kingdom to evaluate household spending changes after a policy modification in the 1970s that shifted the control of child allowances specifically to mothers. Following this change, households increased their expenditures on women's and children's clothing, relative to men's clothing, which Lundberg et al. interpreted as evidence for the notion that "children do better when their mothers control a larger fraction of family resources" (p. 479). Bradbury (2004), however, was unable to replicate these findings in a later analysis of a different sample from the same data set.

Phipps and Burton (1998), using 1992 Canadian data, found that child care expenditures increased only along with increases in mothers' income. In households where both spouses were employed full-time, increases in fathers' income did not result in increased child care expenditures. Palameta (2003) found that increases in wives' share of household income increased the chances that households would purchase domestic maid services in a sample from the Survey of Household Spending in Canada. Additionally, Woolley (2004) evaluated the practice of paying government child care benefits to mothers in a sample of 300 Canadian couples. The data suggested that women were more likely to control these benefits and deposit them into an account separate from their husbands. Moreover, the mothers in the sample reported spending more of the money under their

control, either from child benefits or employment earnings, on child-related expenses (e.g., food, clothing, and household supplies).

Han, Huang, and Garfinkel (2003) provided further evidence of mothers' resource allocation preferences in an analysis of data from the 1991-1998 Survey of Family Income and Expenditure in Taiwan. They compared expenditures in single-mother and single-father families. Single-mother families spent a higher proportion of their incomes on children's education, compared to single-father families, leading to higher rates of college attendance in single-mother families. Single-father families were also less likely to invest in extracurricular activities for children, such as dance and piano lessons.

For resource allocation and investments, therefore, it appears to matter whether money comes from the wallet or the purse (Lundberg, Pollak, and Wales 1997). As Pahl (1995) stated, women have a more "family-focused" preference for their spending than do men, and children seem to be the beneficiaries of these gendered resource allocation goals. Although the consequences of mothers' investment preferences for child well-being have not been examined directly in research on a US sample, there is a sizeable body of research on maternal employment and child outcomes that is instructive about the allocation of mothers' time and the positive effects of maternal employment when it is shown to increase total family income. This is the focus of the next section.

2.4 Notable Research Findings from the Maternal Employment Literature

Bianchi (2000) commented as follows on the consequences of the increased labor force participation of mothers: "The puzzling thing about the reallocation of mothers' time to

market work outside the home is that it appears to have been accomplished with little effect on children's well-being" (p. 401). Contemporary mothers, regardless of their employment status, actually spend more time with their children than mothers did in the 1960s when they were less likely to be employed (Sayer, Bianchi, and Robinson 2004). In general, families have adapted to the allocation of mothers' time to market work; however, there is evidence that extensive early maternal employment (i.e., employment in the first three years of a child's life) has negative consequences for child well-being outcomes. Therefore, in considering the potential consequences of the allocation of increases in mothers' relative incomes, it is important to take into account maternal labor force supply arrangements for households, especially when children are young.

Much of the research on maternal employment and child well-being is from quantitative analyses of samples of children born to NLSY79 mothers, and child well-being is typically conceptualized in terms of children's cognitive or behavioral development. Rather than review all of the extensive maternal employment and child outcomes literature, in this section I primarily focus on studies using C-NLSY79 data and those that inform the discussion of the allocation of mothers' time to market work, which allows for increases in family income and, more specifically, mothers' relative income.

Early Investigations of the Effects of Maternal Employment on Child Well-Being

One of the earliest studies using C-NLSY79 data was conducted by Desai, Chase-Lansdale, and Michael (1989), who found negative effects of early maternal employment on cognitive development for four year-old boys in high income families. Desai et al. suggested

that sons in high income families had lower cognitive scores because maternal resources (e.g., cognitive abilities) in these types of families was unsubstitutable at the same level in alternative child care arrangements. However, Greenstein (1995) found that families with higher incomes actually appeared better able to substitute mother's parenting investments with similarly effective child care arrangements, thus avoiding negative effects on cognitive test scores. Belsky and Eggebeen (1991) found negative effects for maternal employment in the first two years of a child's life for behavioral adjustment, but, using a larger sample of four and five year-old children, Greenstein (1993) found that early maternal employment did not have any consistent negative effects on behavioral outcomes.

Vandell and Ramanan (1992) found that second-grade children in low-income families benefited from their mother's employment in terms of math and reading achievement scores. In addition, Parcel and Meneghan (1994) found a positive relationship between the cognitive complexity of mothers' jobs and children's verbal ability, suggesting that mothers who used their cognitive skills at work reinforced similar skills with their children at home. Blau and Grossberg (1992) showed that mothers' employment in the first year of life negatively affected children's cognitive abilities, but these negative effects were offset by subsequent maternal employment during childhood, presumably from the positive effects of increased family income through maternal employment.

Although all of the studies mentioned above relied on C-NLSY79 data, each analytic sample was different, mainly in terms of the age of the children under investigation and the survey years used in the analyses. To improve upon these earlier C-NLSY79 studies, Harvey (1999) conducted a comprehensive analysis of maternal employment effects for a number of

child well-being outcomes, including cognitive test scores, behavioral problems, and academic achievement, using all available waves of assessments at the time (1986, 1988, 1990, 1992, and 1994). Harvey averaged children's assessment scores when results for multiple years were available. In general, few negative effects for mothers' participation in the labor force were found. Negative effects were found mainly when maternal employment was extensive during children's first three years of life. Children seemed to benefit from maternal (and paternal) employment, however, through increased family income.

The accumulation of knowledge from studies in the 1990's suggested to most researchers that families with employed mothers were able to effectively substitute the allocation of maternal time with other child care arrangements of similar quality, probably because of an income effect (e.g., Greenstein 1993, 1995). Harvey (1999) concluded that by the late 1990s researchers were studying this issue better by controlling for selection effects—indicated, for example, by maternal education and economic background characteristics—and that previous findings of negative effects were likely artifacts of the methods and samples being used at the time. It is likely, however, that observations of fewer negative maternal employment effects by the end of the twentieth century were also related to families making successful adaptations to increased maternal employment and the use of non-maternal child care arrangements (Gottfried and Gottfried 2006).

Recent Investigations of the Effects of Maternal Employment on Child Well-Being

Despite advancements in scholarship and family adaptations to the demographic trends of maternal employment, concern continues among researchers over the potential

negative effects of mothers' labor force participation (Berger, Hill, and Waldfogel 2005; Gregg, Washbrook, Propper, and Burgess 2005). Due to earlier findings, current research continues to focus especially on consequences associated with mothers' early labor force participation in the first three years of a child's life. Attention to children's experiences in the early years of development is also related to the popularization of research findings from neuroscience suggesting that the first three years of life are critical biological periods in brain development that can be influenced by social experiences (Bruer 1999; Carnegie Task Force 1994).

Han et al. (2001) found that maternal employment in the first year after birth lowered the cognitive test scores of children aged three and four in the 1986 wave of the C-NLSY79, and these effects held for the same sample of children at ages five to eight in 1990. Children's outcomes were not affected when mothers delayed their employment until year two, however. Additionally, lower-income families appeared to be unable to substitute quality child care for mothers' care and as a consequence experienced the strongest negative effects of maternal employment.

These findings were replicated by Waldfogel, Han, and Brooks-Gunn (2002) using a larger sample with child assessment data from the 1992, 1994, and 1996 C-NLSY79 waves. The estimated negative effects for three- and four-year-olds' vocabulary scores and five- and six-year-olds' math scores, however, were smaller in family fixed-effects models compared to standard regression models, suggesting that there are likely unobserved differences between employed mothers and non-employed mothers that are related to child outcomes. Furthermore, the negative effects of maternal employment for children's cognitive

development found by Han et al. and Waldfogel et al. were only for non-Hispanic, non-Black children. African-American children were found to be immune from such consequences, presumably because of the historically higher rates of labor force participation of African American women. Hispanic children were excluded from these samples due to concerns about the reliability of cognitive tests for this population.

Baum (2003) also found consistent, negative effects of mothers' early labor force participation on children's cognitive performance. Baum averaged children's multiple cognitive test scores for a sample of C-NLSY79 children born between 1988 and 1993 and found that cognitive achievement was lowered by about 2.5 points when mothers switched from being non-employed to being employed full-time in the first year of their children's lives. Moreover, Ruhm (2004) found early maternal employment during the first year to be negatively associated with math and reading at ages five and six.

Other research on the effects of early maternal employment leads to less alarming conclusions. Using fixed-effects models, James-Burdumy (2005) showed that early maternal employment lowered math and reading scores, but children's math scores were higher when their mothers were employed during year three of children's development compared to children whose mothers were not employed at this time. Children's vocabulary performance, however, was not even related to maternal employment in either of the first three years of children's lives. Outside of cognitive test scores, Baum (2004) found that maternal employment during the adolescent years negatively affected adolescents' high school grades but that maternal employment started early in childhood did not have a significant effect on children's later school performance. In addition, Aughinbaugh and Gittleman (2004) found

that neither early maternal employment nor employment during adolescence were related to adolescents' likelihood of engaging in risky behaviors, such as alcohol use, smoking, or sexual intercourse.

Extending the Literature on Maternal Employment and Child Well-Being

The extant research suggests that there is a potential for negative effects of maternal employment for cognitive development when that employment is early in children's lives. However, such early effects can be offset by additional maternal employment as children age. Maternal employment can create positive role modeling opportunities by demonstrating good work ethics and expectations for success (Baum 2004). The compensating effect of later employment also suggests that as children develop they benefit from increased economic contributions to the household (Baum 2003, 2004). In other words, increases in family income promote child well-being when children have access to such financial capital. This conclusion from the maternal employment literature is consistent with more general findings on the positive relationship between economic resources and child well-being (Carlson and Corcoran 2001; Yeung, Linver, and Brooks-Gunn 2002). Taylor, Dearing, and McCartney (2004) even found that family income effects on children's cognitive well-being were greater than the effects of maternal intelligence.

The effect of family income appears to be mediated by the family's home environment, which higher incomes can make more developmentally constructive when stocked with educational resources (Baum 2004). Since there appear to be only small differences in the time spent with children between employed and non-employed mothers

(Bianchi 2000), the allocation of mothers' income becomes an important factor in explaining how maternal employment might be involved in the creation of positive child development through the creation of constructive home environments. Furthermore, since maternal employment has become almost a certainty for American families, mothers' income contributions to the family are likely involved in decisions about the intrahousehold allocation of resources, especially if common preference models fail to capture individual preferences that differ from fathers to mothers. An important question to consider, therefore, is whether some of the positive effects of maternal employment observed in the literature that are related to increases in family income are the result of a general income effect or a relative income effect.

A general income effect implies that the income is invested in child development within the household allocation system without regard to who earns the money—the common preference assumption. In other words, additional income earned by fathers is as beneficial to children as additional income earned by mothers. A relative income effect implies that when mothers contribute additional financial resources to the household they gain chances to allocate the household income pool to child development more efficiently than is the case when fathers are the primary allocators of intrahousehold resources.

In addition to previous research not giving attention to the potential role of relative income, the maternal employment and child well-being literature suffers from a major methodological limitation: a dearth of longitudinal analyses. Most researchers examine children's cognitive performance at one point in time or as an average created from multiple assessment occasions (e.g., Aughinbaugh and Gittleman 2004; Baum 2003; Harvey 1999).

These researchers have taken advantage of the longitudinal data available in the NLSY79 and C-NLSY79 datasets by examining the effects of early measures of child and family experiences on children's outcomes later in their development. For example, Baum (2004) assembled a detailed history of mothers' work life to examine how maternal employment hours for each week of a child's life influenced adolescents' grades in high school in ordinary least-squares regression models.

Although informative, such approaches are limited in that they do not capture how variations in maternal employment during children's development affect children's grades, or some other outcome, over a given time frame. Addressing this type of scenario requires a longitudinal analysis in which change over time in the outcome variable is captured. The closest example of such an analysis in the maternal employment literature is Waldfogel, Han, and Brooks-Gunn (2002). They constructed hierarchical linear models with children's cognitive test scores measured at two points in time; thus, their models were capturing the change in test scores from time one to time two. They found that early maternal employment hours expressed negative effects on the level, or intercept, of the trajectory of change in test scores, but there were no effects on the slope of the trajectory. This attempt at a longitudinal analysis, however, was severely hampered by the use of only two measurement occasions. A true longitudinal analysis of change in an outcome measure needs at least three observations of the dependent variable (Singer and Willett 2003).

Children's reading, writing, and mathematic abilities are processes that develop over time given nurturing experiences and relationships (Thompson 2001). This project adds to the existing literature, therefore, by longitudinally examining the effects of early and current

maternal employment on children's cognitive development trajectories. With this approach, I can model children's development in terms of having a trajectory starting point (at age five, in this case) and a rate at which it changes, or a slope which indicates how children's cognitive performance develops over time. This conceptualization is more consistent with the developmental processes under investigation and will extend our knowledge of the long-term effects of maternal employment and resource allocation strategies on child well-being.

2.5 Predictions for the Effects of Resource Allocation Arrangements on Children's Cognitive Development

Recall from the introductory chapter the two broad research questions that this project addresses: (1) How do early and current maternal employment affect child well-being? and (2) How does mothers' relative income, which is primarily influenced by maternal labor supply, affect child well-being? The first question builds from the extensive maternal employment and child well-being literature. Addressing this question, therefore, is necessary before extending the issue of maternal employment into the realm of mothers' allocation of resources according to investment preferences as is addressed in the economic development literature.

In this project, I conceptualize child well-being in terms of children's cognitive development as indicated by performance measures on reading and mathematics standardized tests. As mentioned before, contemporary parenting, especially mothering, requires that children be given all the resources necessary to achieve success (Bianchi 2000). Success in the United States and other developed nations is often linked to occupational and general

economic attainment (Heckman 2000). The development of human capital in the form of cognitive abilities and formal educational training is the dominant pathway to this form of success, making cognitive development measures an appropriate outcome for considering the effects of mothers' resource investment strategies. In addition, cognitive development is known to be considerably influenced by children's early experiences and environments, hence the interest in previous research in the consequences of early maternal employment and children's cognitive development.

Model Expectations

Given the nature of the outcome variables in this study, I have certain expectations about the functional form of children's cognitive development trajectories (explained in more detail in Chapter 3). These expectations concern the model building process and not the effects of predictor variables. I mention them, however, because it is best when important decisions about model construction are driven by theoretical logic or previous research, rather than trial and error (Singer and Willett 2003).

In particular, I expect that children's trajectories of cognitive growth will be non-linear, because the acquisition of knowledge and the development of cognitive skills is a dynamic process (Munakata and McClelland 2003). Moreover, since the early years of children's lives are crucial for establishing the groundwork for future cognitive, emotional, and physical development (Thompson 2001), I expect that children's trajectory starting points will affect the ensuing rate of change of their trajectories. In other words, those who start their trajectories with high cognitive test scores will have developmental trajectories

with steeper slopes compared to those with lower starting points. This suggests a cumulative advantage for children who show higher levels of cognitive skills by age five. Conversely, I am postulating that children with lower levels of cognitive skills by age five will be at a cumulative disadvantage in that their subsequent rate of growth will be constrained by their initial skill levels.

Predicted Influences on Child Well-Being

In growth curve models, covariates can affect the outcome variable by influencing the average trajectory starting point (i.e., the intercept), by influencing the growth rate of the trajectory (i.e., the slope), or by affecting both the intercept and the slope of the growth curve. Even though I expect that certain variables will either positively or negatively affect children's cognitive development, I have no basis on which to form expectations about whether an independent variable will influence the average trajectory's intercept, slope, or both. Therefore, all possible effects of covariates will be explored in the process of fitting the most parsimonious models possible; here predictions are stated generally in terms of the expected direction of the influence on children's cognitive development.

Even though I use two measures of cognitive development as indicators of child well-being to provide a comprehensive analysis that includes mathematical and reading abilities, previous research has not revealed any patterns in the differential effects of variables across these two outcomes (Han, Waldfogel, and Brooks-Gunn 2001). Therefore, my general expectations apply to both measures of cognitive development.

Expectations for Maternal Employment Effects. The first research question addressed in this study concerns the allocation of mothers' time to market work during the early years of a child's life (i.e., years one to three) and subsequent maternal employment throughout children's development. I expect that early maternal employment will negatively affect children's cognitive development. I expect that maternal employment after the crucial years of early development will positively affect child well-being by increasing family income. In the process of evaluating these general expectations, I will also examine how maternal employment effects might be moderated by race, mother's cognitive abilities, and the supportiveness of children's home environment (Han, Waldfogel, and Brooks-Gunn 2001; Waldfogel, Han, and Brooks-Gunn 2002).

Expectations for Relative Income Effects. The second research question of this study addresses the allocation of mothers' financial resources within families. Children obviously benefit from their family's overall economic resources. Thus, I expect a general income effect in the form of a positive relationship between total family income and children's cognitive development. The gendered household resource allocation perspective also predicts a relative income effect in that mothers will allocate household income to creating a constructive home environment for child development more so than fathers due their different investment preferences. This suggests that children will benefit, in the form of higher cognitive test scores, from increases in their mother's relative income contributions to the household, net of total family income. Moreover, I predict that the positive relationship between mothers' relative income and child well-being will be mediated by the educational resources and interpersonal support found within the family.

Expectations for Control Variables. The above stated predictions will be explored while controlling for the effects of other variables shown in previous research to influence cognitive development (Baum 2004; Ruhm 2004). In terms of child characteristics, boys compared to girls are expected to have lower cognitive test scores, and Non-Whites are expected to have lower cognitive test scores than Whites (Farkas and Beron 2004).

In terms of parental and household characteristics, I expect a positive relationship between children's cognitive development and mothers' Armed Forces Qualification Test scores (a proxy for cognitive ability), mothers' age at the focal child's birth, and mothers' and fathers' educational attainment. I predict family size to be negatively related to children's cognitive test scores due to resource dilution effects. Furthermore, I control for the primary child care type used in the first year of the child's life, expecting that children's cognitive development trajectories will be higher in parental care arrangements compared to non-parental care arrangements.

I also include in models a control for the year of assessment to account for potential cohort effects and potential measurement discrepancies across survey waves (Farkas and Beron 2004). Note that children's age will be in all models not as a control variable but as the indicator of time capturing the growth of cognitive development as children mature. In other words, children's cognitive performance should improve, or grow, with time.

2.6 Chapter Summary

When combined, the economic development literature and the maternal employment and child outcomes literature suggest important directions for extending research on the role

of maternal employment and mothers' relative income in the allocation and investment of family resources. Evidence from these literatures also highlights the efficacy of conceptualizing household investment processes from a gendered resource allocation perspective.

My research predictions about the influence of maternal employment on child well-being reflect the potentially negative effects of early and extensive maternal labor force participation, along with the potential positive effects of increased family income that subsequent maternal employment provides. The research predictions that I have set forth about the allocation of mothers' economic resources can best be described as tests of what Lundberg and Pollak (1996) called the "kids do better hypothesis," which asserts that children benefit when their mothers control a larger fraction of family resources. Lundberg and Pollak went as far to say, "Though the evidence on this point is not conclusive, we think that the burden of proof has shifted to those who doubt that children benefit when their mothers control a larger fraction of family resources" (1996, p.155). It is a bit careless to shift the burden of proof based on inconclusive data, especially given the lack of evidence for the "kids do better hypothesis" in samples of American families. With this project, therefore, I intend to provide additional evidence for forming conclusions about how household resource allocation processes affect child well-being.

CHAPTER 3

DATA AND METHOD

3.1 Introduction

As the literature review in the previous chapter reveals, several researchers have used the National Longitudinal Surveys (NLS) to study child well-being. Few of their studies, however, are truly longitudinal, which is the type of methodology necessary to answer the research questions asked in this project, and few extant studies make use of the entire series of survey waves available to researchers using NLS data. To improve upon earlier studies, therefore, I utilize over nine waves of the high-quality panel data from the NLS and conduct longitudinal growth curve analyses of children's cognitive well-being. Results from these data and this method will allow interesting conclusions to be drawn about the influence of household resource allocation strategies on child well-being *over time*.

In the following sections of this chapter, I describe the data used in this study and briefly explain the analytic samples drawn for my analyses. I then provide a description of the measures I use as dependent variables to indicate children's cognitive development. Next, I discuss the statistical features of three-level growth curve modeling and conclude with a chapter summary.

3.2 The National Longitudinal Surveys

Data for this study are from two National Longitudinal Surveys: the National Longitudinal Survey of Youth 1979 (NLSY79) and the Children of the NLSY79 (C-

NLSY79). Both surveys are sponsored and directed by the US Bureau of Labor Statistics and managed by the Center for Human Resource Research at The Ohio State University. The C-NLSY79 is also sponsored by the National Institute for Child Health and Human Development. Interviews for both surveys are conducted by the National Opinion Research Center at the University of Chicago.

The NLSY79 is a nationally representative sample of 12,686 young men and women who were between the ages of 14 and 21 at the end of 1978 (Bureau of Labor Statistics 2004b). The central focus of this survey is employment issues over the life course. In-home interviews with this sample began in 1979 and were conducted annually until 1994. Since then, respondents have been interviewed biennially. In 2002, the 20th round of data collection and latest round for which data are publicly available, the NLSY79 had a 77.5% retention rate.

The C-NLSY79, which started in 1986 and continues on a biennial schedule, is comprised of all children born to the 6,283 NLSY79 women. As of the 2002 wave, the subjects of the C-NLSY79 are estimated to represent about 90% of all children ever to be born to these women (Bureau of Labor Statistics 2004a). Central to this survey are issues related to child well-being, including cognitive, emotional, behavioral, and physical development. Data are primarily collected with in-home interviews, involving mother reports, interviewer administered assessments, child self-reports, and interviewer observations. Starting in 1994, children aged 15 and older formed the Young Adult sample of the C-NLSY79, and those under 15 years of age became known as the Younger Children of the C-NLSY79.

Most variables used in this project are available in the child and mother supplements of the C-NLSY79; however, some information about the children's family of origin, especially their fathers, is only available in the NLSY79 files. Therefore, I merged variables from both surveys to create a single data set with all variables attached to each child's record. There are nine years of potential observation occasions for each child in the C-NLSY79 (i.e., years 1986-2002 at two-year intervals); therefore, I pooled together each child's data across all survey waves to create a child-period data set in which each child contributes one record for each measurement occasion available across all years. This method of data construction increases the potential sample size for longitudinal analyses and provides trajectories of child development over time when time is modeled according to children's age in months at the time of their assessments (Farkas and Beron 2004).

3.3 The Analytic Samples

The two central research questions of this study require using two separate analytic samples drawn from the data described above. The first sample, used to analyze maternal employment effects, includes children aged five to 14 for whom all relevant data are complete for the reading and mathematics child assessments, early maternal employment variables, and household characteristic measures taken in the year of the focal child's birth, along with a few time-varying covariates (e.g., current maternal employment status). These restrictions are necessary given my focus in this analysis on early resource allocation arrangements and their potential long-term effects on child well-being. After restrictions, the analytic sample for this first analysis includes a total of 15,239 repeated observations from

5,089 children nested within 2,954 families. Further details on this sample, along with a discussion of the variables used in the maternal employment analysis, are provided in Chapter 4.

The research question addressed in the second analysis concerns the intrahousehold allocation of mothers' proportional share of total parental income measured in each calendar year prior to children's assessments. Therefore, the analytic sample for this analysis is limited to children aged five to 14 with continuously married parents and whose fathers and mothers report employment and earnings in the year prior to the focal child's measurement occasion(s). These sample specifications yield a total of 3,221 children nested within 1,724 families, resulting in a child-period dataset with 7,221 repeated observations. This restricted sample and the variables used for this analysis are further described in Chapter 5.

3.4 Measures of Children's Cognitive Development

I use two outcome variables that measure children's cognitive development as indicators of child well-being in this study. These measures are subtests of the Peabody Individual Achievement Test (PIAT), a test of academic achievement commonly used in child well-being research for its strong reliability and validity (Bureau of Labor Statistics 2004a; Dunn and Markwardt 1970). The PIAT is designed for children ages five years and older. Since standardized, or normed, scores are adjusted for age and given as an individual's percentile rank when compared to other similarly-aged children, I use children's raw scores for each subtest. Raw scores are appropriate for modeling children's individual trajectories against their own age in months.

Children's raw scores on the Peabody Individual Achievement Test-Reading Recognition (PIAT-RR) are used as one outcome variable to measure children's cognitive development. The PIAT-RR measures children's word recognition and pronunciation ability and is described by Dunn and Markwardt (1970:18) as an "oral reading test." This subtest consists of 84 items of increasing difficulty, resulting in non-normed scores ranging from zero to 84.

Raw scores on the Peabody Individual Achievement Test-Mathematics (PIAT-M) are also used as an outcome variable to measure children's cognitive development. This test measures ability in mathematics as it is generally covered in mainstream education with 84 items presented in multiple-choice format and in increasing difficulty. The non-normed scores on the PIAT-M range from zero to 84. The mathematics items range from "testing such early skills as matching, discriminating, and recognizing mumerals; to measuring advanced concepts in geometry and trigonometry" (Dunn and Markwardt 1970:18).

The PIAT has sound test-retest reliability and has been shown to be highly correlated with other achievement and intelligence tests, such as the Wechsler Intelligence Scale for Children, the Peabody Picture Vocabulary Test, and the Woodcock Reading Mastery Tests (Simpson and Eaves 1983). Dunn and Markwardt (1970) report that the median test-retest reliability coefficient for the total test is 0.89 and 0.74 and 0.89 for the math and reading subtests, respectively. The raw scores on the math and reading subscales have intercorrelations that range from 0.39 to 0.59 across grade levels.

3.5 Growth Curve Modeling: Multi-Level, Mixed Models of Change

I use a growth curve modeling strategy to evaluate the predictions presented in the previous chapter about children's cognitive development as a function of the allocation of mothers' time and earnings within the household. This technique offers several advantages. It allows for the investigation of development in cognitive skills over time as children age and experience changes in their lives and the lives of their parents. In other words, the most obvious advantage is that the strategy used provides detailed, longitudinal results. With this approach, I am also able to use time-varying and time-invariant predictors. For example, I am able to control for the effects of a time-invariant variable such as child's gender, while also estimating the effect of current maternal employment as it covaries with children's cognitive test scores as they age.

Growth curve models, or latent trajectory models, are mixed models of change with random effects variance and covariance estimates and fixed effects coefficient estimates (Singer and Willett 2003). Mixed models are multi-level models. In this case, there are several observations of cognitive development over time (Level-1) nested within individual children (Level-2), who are nested within families (Level-3). Mixed models are robust enough to permit the use of unbalanced data, which in this study means that the analytic samples can consist of children with as few as one measurement contribution to the data set.

The following presentation of the features of growth curve models generally follows Singer and Willett (2003). I start by separately explaining the Level-1, Level-2, and Level-3 submodels of the multi-level, mixed model. Then, I outline a composite model that combines

the submodels into one equation. In each of these sections, I provide examples of variables used in this study to give substantive relevance to the methodological details.

Level-1 Submodel

The Level-1 submodel of the growth curve addresses individual change over time. With cognitive development as an outcome, it is reasonable to assume a non-linear, quadratic change process. In other words, the acquisition of cognitive skills should occur at a high rate while children are young, and this process should level-off as they become older (Munakata and McClelland 2003). In this study, change over time is captured by measures of children's age in months, since the focus is on developmental time rather than historical time. To capture the non-linear quadratic effect, the square of age in months is also included in the models.

In my analyses, children's earliest possible assessments occur when they are 60 months old. This is the starting point of their cognitive development trajectories; therefore, I deviate the age variables by 60 so that the intercept terms will represent children's cognitive scores at 60 months.[1]

Equation 1 is the basic Level-1 specification for children's growth trajectories. It depicts a quadratic Level-1 trajectory with age and age-squared in their deviated forms as the time predictors:

[1] To further enhance the interpretability of models, along with their convergence, all continuously measured predictor variables are centered at their mean values in the models estimated in the analyses presented in the following chapters.

Equation 1

$$Y_{tij} = p_{0ij} + p_{1ij}(Age - 60) + p_{2ij}(Age - 60)^2 + e_{tij},$$

where:

Y_{tij} = the true cognitive score (in reading or mathematics) at time *t* for child *i* in the *j*th family,

p_{0ij} = the focal child's true intercept, or trajectory starting point (i.e., cognitive score at 60 months),

p_{1ij} = the focal child's true, first-order slope, or trajectory instantaneous rate of change,

p_{2ij} = the focal child's true, second-order slope, or trajectory curvature, and

e_{tij} = Level-1 residual, or random error, around the focal child's own average growth trajectory.

The linear time predictor (p_{1ij}) describes the instantaneous rate of change when time equals zero, or in this case when children are 60 months old, while the second-order time predictor (p_{2ij}) captures the trajectory's curvature. All time-varying variables included in the mixed model are considered Level-1 predictors. This is because the values of time-varying predictors are allowed to change across measurement occasions. Examples of time-varying predictors addressed in this study are mothers' current hours worked per week and households' family income—all measures that can covary with children's cognitive assessment results.

Level-2 Submodel

While Level-1 of the mixed model captures ***within*** individual change over time, the Level-2 portion represents change ***between*** individuals over time. Since there is an additional level of clustering beyond the individual child-level in the three-level model, the Level-2 equation estimates change between children within families:

Equation 2

$$p_{0ij} = b_{00j} + b_{01j}(X) + z_{0ij}$$

$$p_{1ij} = b_{10j} + b_{11j}(X) + z_{1ij}$$

$$p_{2ij} = b_{20j} + b_{21j}(X) + z_{2ij}.$$

The intercept and slope-related terms of the Level-1 trajectories in Equation 1 are now outcome variables at Level-2. In addition, X represents a time-invariant variable, and there are six fixed effects (b_{00j}, b_{01j}, b_{10j}, b_{11j}, b_{20j}, and b_{21j}) and three residuals (z_{0ij}, z_{1ij}, and z_{2ij}). More specifically, in Equation 2:

b_{00j} = population average of Level-1 intercepts where X = 0,

b_{01j} = population average difference in Level-1 intercept for a one-unit difference in X,

b_{10j} = population average of Level-1 first-order slopes where X = 0,

b_{11j} = population average difference in Level-1 first-order slopes for a one-unit difference in X,

b_{20j} = population average of Level-1 second-order slopes where X = 0, and

b_{21j} = population average difference in Level-1 second-order slopes for a one-unit

difference in X.

The Level-2 residuals indicate the share of the growth model's parameters that are unexplained by Level-2 predictors; thus, they capture random variation around the trajectory intercept (z_{0ij}), linear slope (z_{1ij}), and curvature (z_{2ij}) for children within families.[2] Time-invariant predictors, as represented by X in Equation 2, in the Level-2 model measure stable characteristics that are specific to each focal child but that can vary among children within families. Examples of such variables in this study are the focal child's gender, family income at the focal child's birth, and the focal child's primary child care arrangement for the first year after birth.

Level-3 Submodel

Level-3 of the growth model addresses differences between families. This level's dependent variables are the parameters of the Level-2 model as follows:

Equation 3

$$b_{00j} = g_{000} + g_{001}(F) + m_{00j}$$

$$b_{01j} = g_{010}$$

$$b_{10j} = g_{100} + m_{10j}$$

$$b_{11j} = g_{110}$$

$$b_{20j} = g_{200} + m_{20j}$$

[2] In my analysis models, I do not estimate a residual term for random variation around the second-order slope. Such an estimation would not converge, likely because of severe multicollinearity. The term is included here for illustrative purposes.

$b_{21j} = g_{210}$

In Equation 3, the fixed effects (i.e., the g 's) are accounting for the influence of predictors on the population trajectory intercept, slope, and curvature between families. The residuals capture random variation not explained by Level-3 variables in intercept (m_{00j}), linear slope (m_{10j}), and curvature (m_{20j}) between families.[3] In Equation 3, F represents a family-level, time-invariant predictor. Unlike X in the Level-2 equation, F is included in the model only in its main effect form. In other words, it is being allowed to influence the trajectory intercepts across families but not the slope or curvature. This is to illustrate that predictors, regardless of their level, can affect growth trajectories in a variety of ways but do not have to be included in the model as both main effects and conditional effects. Family-level variables in this study include measures for race and mothers' intelligence.

Composite Model

The three submodels can be combined into a single equation, referred to as a composite model, by substituting the equations for the outcome variables and simplifying. Equation 4 provides the composite model. The first set of brackets contains the fixed effects of the model, and the model's random effects are found in the second set of brackets. I have written out the time variables to make the slope- and curvature-related parameters clearer.

[3] As with the Level-2 residual, in analyses I do not allow for random variation around the second-order slope term between families.

Equation 4

$$Y_{tij} = [g_{000} + g_{001}(F) + g_{010}(X) + g_{100}(Age-60) + g_{110}(X(Age-60)) + g_{200}(Age-60)^2 + g_{210}(X(Age-60)^2)] + [z_{0ij} + z_{1ij} + z_{2ij} + m_{00j} + m_{10j} + m_{20j} + e_{tij}]$$

Although not depicted in the composite model but estimated by the PROC MIXED command in SAS®, which I use for estimating all models, a fundamental element of growth curves is a parameter for the covariance between the true intercept and true slope. This covariance is informative because it suggests whether or not an individual's starting point in the trajectory influences his or her trajectory growth. This is substantively important in this study for considering whether children with higher cognitive skill levels at age five experience a cumulative advantage over children with lower scores at age five in the form of steeper rates of change in their subsequent cognitive development.

3.6 Chapter Summary

In this study, I rely on a growth curve modeling strategy that offers a detailed, longitudinal look at children's cognitive development trajectories in reading and mathematics as they are influenced in their starting points and rates of change by various predictor variables—most importantly, maternal employment hours and mothers' relative income. I maximize the number of children in the analytic samples by using unbalanced data sets created by pooling children's assessments across all survey waves and modeling children's cognitive scores against their age in months.

This approach allows me to extend the research on maternal employment beyond findings generated primarily from cross-sectional studies. For example, if the effects of early

maternal employment are negative and long-term, as indicated in some recent studies (e.g., Baum 2003; Han, Waldfogel, and Brooks-Gunn 2001), I might find that early maternal employment variables have negative effects on both the intercepts and slopes of children's trajectories. What is undeterminable from most previous studies, since the developmental time frame is usually short, is whether mothers' time in the labor force has negative effects during the early years of children's development but later positive effects, which might be detected in growth curves by negative main effects and positive conditional effects for maternal employment variables.

The children analyzed for this study are panel members of the C-NLSY79, whose mothers are from the NLSY79. This is a high-quality data set with variables for several child and household characteristics that are known to influence children's performance in reading and mathematics. How these variables are used and measured in the first analysis (i.e., the maternal employment analysis), details about the analytic sample, and results from the growth curve models estimating the effects of the early and current allocation of maternal time to the labor force are presented in Chapter 4. In Chapter 5, I carry out the second analysis (i.e., the relative income analysis), which focuses on the allocation of mothers' relative income within married-couple households. For both analyses, I use the dependent variables and growth curve strategy discussed in this chapter.

CHAPTER 4

EARLY & CURRENT MATERNAL EMPLOYMENT INFLUENCES ON CHILDREN'S COGNITIVE DEVELOPMENT TRAJECTORIES

4.1 Introduction

In this analysis, I address the first research question of this study: How do early and current maternal employment affect child well-being? The focus here is on the allocation of maternal time to the labor force during the early years of child development (i.e., years one through three) and mothers' current time in the labor force as it covaries with the child assessments. As described in the previous chapter, the data for this analysis are drawn from the C-NLSY79 panel study. In addition, the method used to evaluate the effects of mothers' labor force participation is a series of growth curve models.

In the following section, I describe the measurement of all variables used in this analysis and in section 4.3 provide the descriptive statistics for the analytic sample. In section 4.4, I present the results of fitting growth curve models to the sample data, and I end with a chapter summary and brief discussion in section 4.5.

4.2 Measurement of Variables

As described in the previous chapter, I use two dependent variables that measure children's cognitive development as indicators of child well-being. The first is children's raw scores on a reading recognition test, the PIAT-RR (Dunn and Markwardt 1970). Children's raw mathematics scores on the PIAT-M serve as the second dependent variable. In the

analysis models, continuously measured predictor variables are centered at their mean values to facilitate interpretation and convergence and to reduce multicollinearity between variables.

Maternal Employment Variables. I examine the effects of early maternal employment with a continuous, time-invariant variable constructed by taking a three-year average of mothers' average hours worked per week during each year of the focal child's first three years of life. Models that included separate measures for maternal employment at each year of the first three years of the surveyed child's life evidenced high collinearity problems. Furthermore, preliminary analyses suggested a non-linear effect for mothers' early labor force participation in that effects were salient at the lower end of the distribution of early maternal employment hours. In other words, it seems to matter most when mothers move from working zero hours to working some hours or when working mothers increase their hours but still maintain a relatively low average overall. Therefore, I use the natural logarithm of this variable in the analyses to capture this non-linear effect.

Current maternal employment is indicated by a continuous, time-varying variable for the average number of hours worked per week in the calendar year prior to the child's assessment occasion. Preliminary analyses revealed similar non-linear effects for current maternal employment as was detected for early maternal employment. Therefore, I transformed this variable into its natural logarithm to model non-linear effects.

Income Variables. Family income at the child's birth is a time-invariant measure of the total family income reported in the year previous to when the child was born. Current family income is a time-varying measure of total family income in the year prior to each child assessment occasion. I use the natural logarithm of both income variables to model the

non-linear effects of income and to correct for skewness in the distribution of these variables (Strohschein 2005).

Home Observation for Measurement of the Environment (HOME). Current HOME score is a time-varying measure of the quality of children's household environment. The HOME inventory consists of a varying number of items about the emotional and cognitive support present in the household depending on the child's age (Bureau of Labor Statistics 2004a). Data are collected from mother reports and interviewer observations. The HOME is constructed from two subscales: cognitive stimulation and emotional support. Cognitive stimulation indicators include questions about the number of books children have and how often the mother reads to the child. Emotional support indicators include questions about discipline in the home and time spent as a family. Early measures of the HOME have established predictive validity in relation to children's later behavioral adjustment and cognitive development (Bradley and Caldwell 1976; Bradley and Caldwell 1980; Bradley and Caldwell 1984; Linver, Brooks-Gunn, and Cabrera 2004; Mott 2004).

Additional Child Characteristic Variables. Child's race is dummy coded as White (i.e., non-Black, non-Hispanic) and Non-White (i.e., Black or non-White Hispanic) with Non-White used as the reference category. Gender is dummy coded as male and female with male as the reference category. I use children's age in months as reported at the time of each child assessment as the time variable for the longitudinal models. This age variable is deviated by 60, since five years is the initial age used in the study, to create interpretable intercept terms in the analyses.

Additional Parent and Household Characteristic Variables. Many of the controls I use for parent and household characteristics are measures taken at or before the focal child's birth to account for potential selection factors associated with early maternal labor force participation. Mother's age at child's birth represents how old the mother was in years when the surveyed child was born. I also use a measure indicating the number of children within the household at the time of the focal child's birth.

I account for mothers' cognitive achievement with a score from the Armed Forces Qualification Test (AFQT), an aptitude test given to all NLSY79 subjects in 1980. The AFQT is a sub-component of the larger Armed Services Vocational Aptitude Battery (Bureau of Labor Statistics 2004b). The test consists of questions about word knowledge, arithmetic reasoning, paragraph comprehension, and mathematics knowledge. The test was originally designed to assist the Army in selecting military recruits. The AFQT is not an "intelligence" test; performance is influenced strongly by environmental factors and school experience (Fischer, Hout, Jankowski, Lucas, Swidler, and Voss 1996). It does, however, have high reliability and predictive validity for outcomes such as high school and job performance (Fairbank 1990).

I also include a measure of mothers' years of educational attainment at the year of the child's birth. Marital status at the year of the child's birth is indicated by a dummy variable where one equals married and zero equals not married. I also use dummy variables to indicate children's primary child care arrangement in the first year of the focal child's life. The categories are parental care, relative care, non-relative care, and center or other care with parental care as the reference category. Finally, I include a continuous, time varying survey

wave variable that indexes the year of assessment to control for cohort effects and potential measurement discrepancies across waves. This variable ranges from one to nine, with one indicating that the focal child was surveyed in 1986 (i.e., wave one) and nine indicating an observation from 2002 (i.e., wave nine).

4.3 Summary Statistics

Table 4.1 provides summary statistics for the analytic sample used for the maternal employment analysis. As described in Chapter 3, this sample consists of children ages five to 14 for whom complete data are available on all measures in this analysis and who contribute at least one reading and mathematics score from the same year to the child-period data set. The analytic sample is comprised of 5,089 children whose data yield a child-period sample of 15,239 observations. These children are nested within 2,954 different families.

In general, children's reading scores are higher than their scores in mathematics with respective mean values of 38.578 and 35.718. The average age of children across repeated observations is about nine years old. The sample is 49% female and 51% White. On average, mothers are almost 25 years old with 12 years of education at children's birth, and 66% are married. The majority of children are primarily cared for by a parent during their first year of infancy. Mothers average just over 22 hours per week of early employment during years one through three of children's lives, and they average 24 hours of work per week during children's assessment years. The average total family income for households is at a mean of just over $29,000 at the focal child's birth and a mean of almost $46,000 over children's developmental years.

4.4 Growth Curve Modeling Results

I conduct a longitudinal analysis on the sample data to address how both early and current maternal employment affect children's cognitive development over time. I start by fitting three-level growth curve baseline models specifying children's average, unconditional trajectories in reading and mathematics from ages five to 14. These results provide basic information about the general growth in children's cognitive skills, including children's average initial skill levels at age five and their average rates of change. Furthermore, the random effects portion of these basic models contains findings about the amount of variation in cognitive growth that is attributable to differences within families and between families.

Next I present results from a series of models that further specify the nature of children's cognitive development by estimating the effects of control variables on the process. Results from these models offer a descriptive picture of children's reading and mathematics development as influenced by important child, mother, and household characteristics. Finally, I estimate the influence of mothers' early employment hours and current employment hours with models containing indicators for these constructs and the essential control variables identified in previously fit models. Interaction effects are also estimated to evaluate the moderating roles of race, mother's cognitive ability, and the home environment in explaining the effects of maternal employment on child well-being.

Baseline Models

In Table 4.2, I specify the basic three-level growth curve models for PIAT-RR and PIAT-M outcomes. These basic models are non-linear and unconditional at Level-2 and -3 in that they only include Level-1 time predictors. Although not shown, a model with only linear time effects does not fit the data as well as the non-linear form presented here. In addition, I do not estimate random effects for variation around the second-order slope terms. Such an estimation would not converge, likely because of severe multicollinearity (see Farkas and Beron (2004) for similar results).

PIAT-RR. The average child's trajectory in reading development starts at a level of 9.473 at 60 months and increases positively but at a decreasing rate as children age. The average trajectory begins to level-off when children are around 127 months, or almost 11 years old (i.e., -0.763/2(-0.003) = 127.167). The average variation in initial status is statistically significant between families but not within families. There is, however, statistically significant variation in children's linear growth rates both within and between families, about 57% of which is between families (i.e., 0.008/(0.008+0.006) = 0.57). Furthermore, there is statistically significant, positive covariance between family-level initial status and rate of change.

PIAT-M. The picture is similar for children's development in mathematical cognitive skills, although the average trajectory starts about two points lower compared to the reading outcome. With an average mathematics test score of 7.576 at 60 months, children's trajectories are predicted to instantaneously grow at a rate of 0.772 and with a curvature of

-0.003, resulting in a leveling off around 129 months. As with children's reading development, the model suggests no initial status variation between children within families but a statistically significant variation in intercepts across families. There is also statistically significant variation in linear growth at Level-2 and -3, which appear to share this variation equally. The model also predicts a statistically significant, positive covariance between initial status and growth between families.

Based on the results of these specifications, in subsequent models I do not estimate random effects for variation in initial status at Level-2 (i.e., for children within families), which also eliminates the estimate of covariance at this level. The zero estimates for this random parameter in the PIAT-RR and PIAT-M models are likely due to boundary constraints created by the use of an unbalanced data set. The simplest way to solve this problem is to remove an offending random effect from the model (Singer and Willett 2003). I allow for random variation in first-order rate of change for children within families and random variation in both initial status and first-order rate of change between families. Subsequent models also retain the quadratic fixed effects specifications for trajectory growth.

Conditional, Descriptive Growth Curve Models

In Table 4.3, I present three models for each outcome variable. Model A includes the effects of basic child characteristics. In Model B, I add variables for important characteristics of the focal child's mother, and Model C presents the influence of child, mother, and additional household characteristics. These models are best thought of as descriptive models for children's cognitive development and are fit to estimate effects for the control variables

used in subsequent models that focus on maternal employment. In fitting these and all subsequent models, variables were at first allowed to influence trajectory intercepts and growth.[1] Conditional effects were only retained when statistically significant; however, the main effects for control variables were retained regardless of their statistical significance given the substantive logic for including them as important predictors of cognitive development.

Results from Model A, which only includes predictors for child characteristics and a control for the survey wave, suggest that females have PIAT-RR scores that are 1.204 points higher than males and PIAT-M scores that are 0.591 points higher than males at their trajectory starting points. Moreover, females' reading scores grow at a faster rate than males', but females' math scores are predicted to grow at a slower rate than males. Whites are predicted to have higher starting points at 60 months compared to Non-Whites, and this difference is most pronounced for mathematics scores where Whites have a predicted initial status advantage of 2.772 points. The models also suggest that Whites' growth occurs at a steeper rate than Non-Whites for both outcomes. The estimated main effect for the survey wave variable is positive and statistically significant, which is expected since, overall, children age as the waves progress.

The effects of race change after maternal and household characteristics are added to the analyses in Models B and C. With mothers' AFQT scores and education and age at the focal child's birth in the model, Whites are predicted to have statistically significant lower

[1] In the interest of parsimony, conditional effects on the growth of trajectories are considered only for first-order rate of change. Few variables showed effects on second-order growth (e.g., mothers' AFQT scores). These effects were small, and their exclusion from the models reported here does not change any conclusions.

starting points than Non-Whites in reading, and the magnitude of Whites' initial advantage in mathematics skills lessens to less than one by Model C. However, Whites' development in both reading and mathematics is predicted to grow at a faster rate than Non-Whites, net of the effects of maternal and household characteristics.

Mother's AFQT scores have positive influences on children's initial status and growth rates. Children's initial status is also influenced positively by family income at birth and mother's educational attainment. Children's cognitive development is predicted to be negatively affected by the addition of siblings to the household in terms of initial status for both outcomes and for growth rates for reading development. There appears to be no statistically significant difference in cognitive levels at 60 months for children in married households compared to non-married households, but those children whose mother was married at their birth experience faster growth rates over time.

In terms of random effects, the addition of maternal characteristics in Model B reduces the between-family (i.e., Level-3) variation in children's growth in mathematics development to zero.[2] The results of Model C suggest that with predictors for child, maternal, and household characteristics, for both outcomes there is still statistically significant variation in rate of change for children within families, children's initial status between families, and growth rate and covariance across families for children's reading development.

In Figures 4.1 and 4.2, I provide a graphical representation of these descriptive growth curves for reading and mathematics, respectively, by plotting children's average

[2] Despite a zero estimate of this parameter, I continue estimating this random effect in subsequent models to allow for comparisons of Level-3 random variation in initial status across models. Leaving out the Level-3 random effect for Age inflates the initial status estimate at this level.

trajectories by race and gender when all other variables from Model C in Table 4.3 are at their mean and reference category values. Figure 4.1 shows the initial status advantage at 60 months for Non-White females in reading levels. Around the age of nine, White females have caught-up with their Non-White counterparts, and by about age 11 White females have surpassed Non-White females in their level of reading skills. The process is similar for Non-White males compared to White males. However, females in general maintain higher levels of reading skills throughout development compared to males, and the gap between females and males begins to widen early in children's development.

For cognitive development in mathematics, Figure 4.2 shows that White females have the highest mathematics scores at age 60 months. By about eight years of age, White males appear to catch-up to White females, and they pass them by the age of nine. Non-White males pass Non-White females in mathematics development even earlier—by the age seven—after these two groups experience similar initial status levels. Non-White males, however, do not catch-up to White females.

Early Maternal Employment & Children's Cognitive Development

In the next series of models presented in Table 4.4, I estimate the influence of early maternal employment hours, measured as the natural logarithm of mothers' average hours worked per week over the first three years of the focal child's life. These models include the control variables from the analyses described above.

Results from Model A in Table 4.4 suggest that the main effect for early maternal employment has a statistically significant, negative influence on the initial status of the

average child's reading skills trajectory but not the trajectory for mathematics. Specifically, the model predicts that increasing the natural logarithm of early maternal employment hours by one unit lowers the average level of reading skills at 60 months by 0.049 points. Early maternal employment, however, is predicted to positively influence the average trajectory's rate of growth for both cognitive outcomes. The models suggest that a one unit increase in the natural logarithm of early employment hours per week increases the instantaneous rate of change of reading development by a factor of 0.002 and by a factor of 0.001 for mathematics development.

Model B of Table 4.4 includes the effects of a set of dummy variables for children's primary child care arrangement in the first year of infancy. For PIAT-M scores, the model estimates a negative effect for non-relative care compared to parental care that approaches statistical significance (-0.456, $p < .10$). In addition, including the child care variables reduces the main effect influence of early maternal employment on children's reading development. Although not shown, additional analyses revealed that there were not statistically significant interaction effects between the child care variables and early maternal employment, which suggests that primary child care arrangements potentially mediate the relationship between early maternal employment and children's cognitive development (at least in reading).

The results from Model C also indicate that there is not a statistically significant interaction effect for race and early maternal employment hours, suggesting that any main effects for early maternal employment do not vary by race. This is also true for the estimated

positive effects for early maternal employment on children's trajectory growth, which remain throughout this series of models.

In Model D, I allow early maternal employment to interact with mother's AFQT score to test the hypothesis that negative effects of early maternal employment are the most salient for children whose mothers have high levels of cognitive skills. This model suggests a statistically significant, negative interaction effect for early maternal employment and mother's AFQT score on the growth rate of children's reading development. Even though the parameter estimate here is quite small (-0.00004), Figure 4.3 shows clearly how the conditional effect of early maternal employment and mother's cognitive performance influence children's reading development over time. High levels of early maternal employment appear to benefit children when their mothers have low AFQT scores. These children start with reading levels that are slightly below those children whose mothers have low levels of early maternal employment and low AFQT scores. However, by seven years of age there is evidence that above average levels of early maternal employment pay off for children with mothers who have low AFQT scores. Differences in slope are not evident for children with mothers who performed at a high level on the AFQT and have differential levels of early maternal employment; however, the model does depict that the highest level of reading development occurs for children whose mothers have below average levels of early employment and above average levels of cognitive skills.

Current Maternal Employment & Children's Cognitive Development

The final taxonomy of models I estimate for this analysis includes several models examining the effects of current maternal employment, measured as a time-varying covariate with children's assessment occasions, on children's cognitive development. Results from Model A of Table 4.5 suggest that a one unit increase in the natural logarithm of mothers' current employment hours per week is predicted to lower the trajectory level for reading by 0.052 points, net of the effects of child, mother, and household characteristics. Current maternal employment hours do not appear to influence children's growth rates in reading development. Moreover, current maternal employment is estimated to have no statistically significant effects on children's mathematics trajectories.

In Model B, I estimate the influence of current maternal employment with the measure for early maternal employment returned to the model. The predicted negative influence of current maternal employment on children's initial status in reading is still present, although the parameter estimate is reduced. In addition, the estimate for the influence of the main effect of current maternal employment on children's mathematics development now approaches statistical significance and is positive (0.03, $p < .10$). As estimated in previous models, early maternal employment is predicted to positively influence children's rate of growth for both cognitive development outcomes.

Model C shows the statistically significant positive effects of HOME scores on children's initial status in reading and mathematics. These effects do not appear to suppress the influence of current maternal employment. Adding a measure for current family income

in Model D, however, renders the effect of current maternal employment on children's initial reading scores to non-statistical significance at traditional levels.

In Table 4.6, I test whether the effects of current maternal employment are moderated by race, mother's AFQT scores, and HOME scores. Model A predicts a statistically significant negative effect for the interaction between indictors of current maternal employment and race for the reading outcome only. This suggests that increases in current maternal employment hours lower the reading scores for Whites but not for Non-Whites. A graph of this relationship is provided in Figure 4.4, where I present a focused view of trajectorory starting points, rather than depict the entire growth curves, so that the differences in intercept values are easy to see. The initial status in reading development for White males is higher when their mothers' current employment hours are one standard deviation below the mean compared to one standard deviation above the mean. For Non-White males, however, there is no detectable difference in initial status based on levels of current maternal employment hours; these curves are stacked exactly on top of each other. Although not visible in the focused view depicted in Figure 4.4, it is worth noting that White males, regardless of the values for their mothers' current employment, eventually pass Non-White males in their reading development because of the predicted steeper growth rate for Whites compared to Non-Whites.

In Model B, I interact current maternal employment with mother's AFQT score. The relationship of this statistically significant, negative interaction effect for children's reading development is depicted in Figure 4.5. Here again, I provide a focused view on the trajectory intercepts, since the effect of interest is on the initial status of the average growth curves.

Children's reading levels are predicted to be at their highest when current maternal employment is below average and mother's AFQT is above average. Negative effects of high current maternal employment, however, can be offset by high maternal AFQT scores. In fact, for children with mothers who have current employment levels that are one standard deviation above the mean, children's reading scores at age five are predicted to be at a value of about 10.72 when their mothers have above average AFQT scores and at a value of about 8.76 when their mothers have below average AFQT scores. Moreover, children's reading scores appear to be only ever-so-slightly higher when mothers with below average AFQT scores have high compared to low levels of current employment.

The interaction effect between HOME scores and current maternal employment is presented in Model C of Table 4.6 and displayed in Figure 4.6. This interaction effect is similar to the one described above. The model predicts a statistically significant negative interaction term for children's initial status in reading but not math. As seen in Figure 4.6, children's level of reading at age 60 months is highest in households with below average levels of current maternal employment and above average HOME scores. However, children do not benefit from lower levels of current maternal employment when HOME scores are below average. The growth curves displayed in Figure 4.6 show the overall value of a positive home environment for children's reading development, regardless of mothers' time spent in the labor force.

4.5 Chapter Summary

In this chapter, I presented results from evaluations of the effects of early and current maternal employment on children's cognitive development. I used a sample of 5,089 children from 2,954 families with 15,239 repeated observations drawn from the C-NLSY79 data set to estimate three-level growth curve models that provide a longitudinal analysis of children's reading and mathematics development from ages five to 14.

Basic models suggested that children's cognitive development is non-linear and varies in important ways within and between families. Children within families appeared not to differ in their initial reading and mathematics levels but did show variation in growth rates over time. In addition, there was evidence of variation in initial status and growth between families, along with positive covariance between initial status and growth across families. This supports the general prediction that children with high levels of cognitive skill at age five experience a cumulative advantage in that their growth over time occurs faster than children with lower initial skill levels.

This analysis revealed limited negative effects associated with early maternal employment during the first three years of children's lives. Such negative effects were only detected for children's reading development, and these effects were reduced to modest statistical significance after adding variables for children's primary child care arrangements in their first year to the models. There was no evidence that the effects of early maternal employment are moderated by race as suggested by other research (Han, Waldfogel, and Brooks-Gunn 2001; Waldfogel, Han, and Brooks-Gunn 2002). However, I did find that the influence of early maternal employment on the growth of children's reading scores was

conditional upon mothers' own cognitive abilities. This finding suggests that children's reading development is maximized when mothers with high cognitive abilities spend less time in the labor force during the first three years after their child's birth. However, children with mothers who show low levels of cognitive skills do better over time when their mothers have above average levels of early employment. This is consistent with previous research showing that a portion of the negative effects associated with early maternal employment are attributable to the absence of a cognitively stimulating mother (Desai, Chase-Lansdale, and Michael 1989; Han, Waldfogel, and Brooks-Gunn 2001).

Perhaps the most novel finding in this analysis was that early maternal employment showed consistent, positive effects on the *growth* of children's cognitive development in both reading and mathematics. This suggests that early maternal employment benefits children as they age, even if there are some negative consequences associated with this employment in the short-run. Early maternal employment might allow for an accumulation of household resources over time from which children realize the benefits as they age and need more goods and services to assist in their cognitive development.

Like early maternal employment, current maternal employment—measured as a covariate with children's assessments—exerted negative effects on the *initial status* of children's reading development. These negative effects were only partially reduced after including the effects of early maternal employment in the models, and they became non-statistically significant at traditional probability levels only after including a measure of current family income, which itself was not statistically significant.

I found support for the moderating influences of race, mothers' cognitive abilities, and HOME scores for the relationship between current maternal employment and children's reading scores. Current maternal employment effects were only present for White children, whose reading scores at age five were lower when their mothers worked more than average compared to when they worked less than average. I found that children's reading skills are negatively affected by increases in current maternal employment when mothers' AFQT scores are above average. The moderating effects of HOME scores were similar in that negative effects for current maternal employment were only detectable in homes that were highly supportive and caring.

Although influences of current maternal employment on mathematics scores were not statistically significant at traditional levels (i.e., only at $p < .10$), it is worth noting that these modest effects were positive throughout the series of models estimated. This suggests that there are potentially some benefits associated with current maternal employment for children's development in mathematics skills (James-Burdumy 2005), and further studying this effect might be a fruitful avenue of future research.

The results of this maternal employment analysis overall suggest some negative influences associated with both early and current maternal employment for children's reading levels. These effects, however, were only detectable when variables measuring hours per week in the labor force were transformed into their natural logarithms. This means that much of these effects essentially result from comparing mothers who work none to those who work some. Moreover, I found a positive effect of early maternal employment on the growth rates

of children's trajectories in both reading and mathematics, which suggests that there are some benefits associated with early maternal employment.

Unfortunately, the models in this analysis did not include variables for paternal characteristics, since doing so would have considerably limited the sample size given that father characteristics are difficult to obtain for single-mother households. In the relative income analysis to follow, however, I am more easily able to examine the effects of some father-related variables since I restrict the sample to continuously married households. I also further restrict the sample in the next analysis to households in which both parents work to investigate how economic resource allocation arrangements might affect child well-being.

CHAPTER 5

THE EFFECT OF MOTHERS' RELATIVE INCOME ON CHILDREN'S COGNITIVE DEVELOPMENT TRAJECTORIES

5.1 Introduction

In this analysis, the focus turns from the allocation of mothers' time to the labor force to the allocation of mothers' earnings within the household. Here I address the second research question of this study: How does mothers' relative income affect child well-being? This analysis goes beyond examining the consequences of maternal employment to exploring how economic resources generated from mothers' labor force participation are used within families to produce a commodity like children's cognitive development. The sample for this analysis is drawn from the C-NLSY79 panel study as described in Chapter 3. I also use the same growth curve analytic strategy described in Chapter 3 and executed in Analysis I to answer my research question.

A relative income analysis requires the use of a restricted sample compared to the one used in the first analysis. In order to examine processes within households related to mothers' proportional share of parental income, I limit my sample to include only married-couple households in which both parents are employed and report earnings in the year prior to each child measurement occasion. This eliminates exclusively dependent wives and husbands.

In section 5.2, I describe how I measure the variables used in this analysis. Section 5.3 provides the summary statistics for the analytic sample. I present the growth curve modeling results in section 5.4 and offer a chapter summary and discussion in section 5.5.

5.2 Measurement of Variables

The two dependent variables I use as indicators of child well-being are children's raw scores on the reading recognition and mathematics subscales of the Peabody Individual Achievement Test as presented in Chapter 3. All continuously measured covariates described below are centered at their mean values to facilitate interpretation and convergence and to reduce multicollinearity between variables. Moreover, I deviate the age indicator by 60 to create intercept values that can be interpreted as children's cognitive level at their age five trajectory starting points (i.e., at 60 months).

Relative Income Variable. The central covariate in this analysis is a time-varying measure of mother's relative income contributions to total parental income. This variable is created by dividing mother's earnings in the previous calendar year by parents' total earnings (i.e., the sum of father's earnings and mother's earnings) and constructing five dummy categories which represent mothers' proportional contributions to parental income (Raley, Mattingly, and Bianchi 2006). I use a dummy variable for each of the following proportional categories of relative income: (a) less than 0.20, (b) greater than or equal to 0.20 and less than 0.40, (c) between and including the values 0.40 and 0.60, (d) greater than 0.60 and less than or equal to 0.80, and (e) greater than 0.80. The category approximating parity (i.e., between and including the values 0.40 and 0.60) is used as the reference group.

Parental Employment Variables. I measure current maternal and paternal employment hours with continuous, time-varying variables for the average number of hours

worked per week in the calendar year prior to the child's assessment occasion for the focal child's mother and father.

Home Observation for Measurement of the Environment (HOME). Current HOME score is a time-varying measure of the quality of children's household environment. The HOME inventory consists of a varying number of items about the emotional and cognitive support present in the household depending on the child's age (Bureau of Labor Statistics 2004a). Data are collected from mother reports and interviewer observations. The HOME is constructed from two subscales: cognitive stimulation and emotional support. Cognitive stimulation indicators include questions about the number of books children have and how often the mother reads to the child. Emotional support indicators include questions about discipline in the home and time spent as a family. Early measures of the HOME have established predictive validity in relation to children's later behavioral adjustment and cognitive development (Bradley and Caldwell 1976; Bradley and Caldwell 1980; Bradley and Caldwell 1984; Linver, Brooks-Gunn, and Cabrera 2004; Mott 2004).

Additional Child Characteristic Variables. Child's race is dummy coded as White (i.e., non-Black, non-Hispanic) and Non-White (i.e., Black or non-White Hispanic) with Non-White used as the reference category. Gender is dummy coded as male and female with male as the reference category. I use children's age in months as reported at the time of each child assessment as the time variable for the longitudinal models.

Additional Parent and Household Characteristic Variables. Mother's age at child's birth represents how old the mother was in years when the focal child was born. I account for mother's cognitive ability and achievement with a score from the Armed Forces

Qualification Test (AFQT), an intelligence test given to all NLSY79 subjects in 1980. I also include continuous, time-varying measures of mother's and father's years of educational attainment.

Current family income is a time-varying measure of total family income in the year prior to each child assessment occasion. This variable is transformed into its natural logarithm to model the non-linear effects of income and to correct for skewness in the distribution (Strohschein 2005). I measure the number of children within the household with a time-varying variable indicating the number of children present at each assessment. Finally, I include a continuous, time-varying survey wave variable that indexes the year of assessment to control for cohort effects and potential measurement discrepancies across waves. This variable ranges from one to nine, with one indicating that the focal child was surveyed in 1986 (i.e., wave one) and nine indicating an observation from 2002 (i.e., wave nine).

5.3 Summary Statistics

In Table 5.1, I present the descriptive statistics for the restricted sample, which consists of children ages five to 14 with married parents and whose fathers and mothers report employment and earnings in the year prior to each child assessment. These restrictions result in a sample comprised of 7,221 repeated observations from 3,221 children who are nested within 1,724 families.

As with the maternal employment analysis sample, children's reading scores are generally higher than their math scores. The children in the restricted sample have an average

age of about 110 months across repeated observations. The sample is 48% male and 63% White. The focal children's mothers were on average about 25 years old at their child's birth. The mothers have an average of 13 years of education and work an average of 31.406 hours per week across repeated observations. The children's fathers have 13 years of education and work almost 45 hours per week on average. The average number of children in the household is 2.512, and total current family income averages just over $62,000.

Most mothers' either approximate parity in earnings with their husbands (i.e., 32.7%) or have relative incomes greater than or equal to 0.20 but less than 0.40 (i.e., 31.9%). Less than 8% of mothers earn more than 60% of total parental income. Despite the small percentages of mothers in the two above parity relative income categories, I retain these classification groups to better model non-linear effects of relative income.

In comparison to the full sample used in the first analysis, the restricted sample has a higher average family income. In addition, the mothers in the restricted sample have higher AFQT scores, work more hours per week, and have higher levels of education than those in the full sample. HOME scores in the restricted sample also are higher than in the full sample, and a repeated observation in the restricted sample is more likely to be White than in the full sample.

5.4 Growth Curve Modeling Results

A series of growth curve models are estimated to evaluate the effects of relative income on children's cognitive development trajectories over time. The first two models in this series are unconditional, baseline models which specify the basic nature of children's

reading and mathematics growth trajectories from ages five to 14. These models provide informative results about variation in cognitive development between and within families and the general shape of the average trajectory in terms of starting points and slopes.

The next model I produce estimates the effects of important control variables, which involve predictors for characteristics about the children in the sample, their fathers, mothers, and households, on both cognitive outcomes. Using information from these preliminary and descriptive models, I proceed by constructing a taxonomy of models in which I investigate the influence of mothers' relative income on child well-being.

Baseline Models

Table 5.2 provides results from the unconditional three-level growth curve models for children's PIAT-RR and PIAT-M outcomes. The models are unconditional in that they include no predictor variables other than the first- and second-order age-related slope terms. Notice that, as in Analysis I, I do not include the second-order slope term as a random effect due to issues of non-convergence with such a specification probably due to severe multicollinearity (see Farkas and Beron (2004) for similar results).

PIAT-RR. Children's average reading trajectory begins at a level of 9.645 at age five, has an instantaneous rate of change of 0.801, and grows at a decreasing rate of -0.003 over time. The average reading trajectory begins to level-off around 11 years of age (i.e., -0.801/2(-0.003) = 133.5). The model suggests statistically significant variation in initial status between families but not within families, and children's growth rates are predicted to vary both between and within families. About 58% of the variation in growth rates is

attributable to variation between families (i.e., 0.007/(0.007+0.005) = 0.58). In addition, the model predicts a statistically significant, positive covariance between initial status and rate of change between families, suggesting that children with higher starting points will have steeper rates of growth compared to those with lower starting points.

PIAT-M. The average mathematics test score at age five is 8.221. Children's trajectories grow at an instantaneous rate of 0.797 and with a curvature of -0.003, thus leveling off around 133 months. The model predicts statistically significant variation in growth at Level-2 and in growth and initial status at Level-3. There is also statistically significant, positive covariance at Level-3 between initial status and rate of change. Between family differences account for about 67% of the variation in children's growth rates (i.e., 0.002/(0.002+0.001) = 0.67).

In the models to follow, I do not allow for random variation in initial status at Level-2, given the findings from these baseline models. The zero estimates for this random parameter in the PIAT-RR and PIAT-M models are likely due to boundary constraints created by the use of an unbalanced data set. The simplest way to solve this problem is to remove the offending random effect from the model (Singer and Willett 2003).

Conditional, Descriptive Growth Curve Model

When fitting models with predictor variables, I allow the predictors to influence both the trajectory intercepts and slopes as main effects and conditional effects, respectively.[1]

[1] Conditional effects on the growth of trajectories are considered for first-order rate of change only. Few variables appear to influence second-order growth rates, so I do not include these estimations in the models reported here to maintain parsimony.

Conditional effects were only retained when statistically significant; however, the main effects for control variables were retained regardless of their statistical significance given the substantive logic for including them as influential factors in the process of cognitive development. The effects of control variables on the restricted sample used here are generally similar to those found in the descriptive models estimated in the maternal employment analysis. Therefore, I present only one descriptive model (i.e., Model A of Table 5.3) of control variables, instead of several nested models in which I separately add variables for child, parent, and household characteristics.

Results from Model A in Table 5.3 suggest that females at age five have statistically significant higher PIAT-RR scores than males, but there is no predicted difference between males and females in mathematics scores. Whites are predicted to start their reading trajectories with statistically significant lower reading scores compared to Non-Whites, but Whites' trajectories are estimated to grow at a faster rate than Non-Whites. For mathematics, Whites compared to Non-Whites benefit from both higher initial status levels and steeper growth rates. There is a positive relationship between children's own cognitive development in reading and math and their mothers' cognitive abilities as indicated by AFQT scores, which exert statistically significant main and conditional effects. In addition, the number of children in the household is predicted to lower children's initial status in reading by 0.686 points and by 0.361 points for mathematics.

Unlike in the first analysis, here I am able to include a variable to estimate the effects of fathers' educational attainment. The results suggest that fathers' education has a statistically significant, positive effect on children's reading and math scores at age five,

while mothers' education shows positive effects on children's growth rates. Note that the main effect for the survey wave indicator is estimated to be positive and statistically significant. This is consistent with expectations given that children age as the waves of the panel study progress. According to results from the conditional model, there are no predicted statistically significant effects for mother's age at the child's birth and current family income.

In Figure 5.1, I provide a graphical representation of the conditional growth curves for children's reading and mathematics development based on the results of Model A in Table 5.3. These growth curves are plotted by race and with all other control variables are at their mean and reference category values. Notice the sizeable racial gap in cognitive develop by age 14, especially for skills in mathematics.

The Effects of Relative Income on Children's Cognitive Development

In Model B of Table 5.3, I add the relative income dummy variables to the model, using parity as the reference category. The first two relative income dummy categories are predicted to have positive, statistically significant effects on children's reading and mathematics development. In other words, children whose mothers earn less than 40% of the parental income are estimated to have higher skill levels in reading and math compared to those whose mothers' earnings approximate parity with their husbands.

Furthermore, even though the percentage of children with mothers in the relative income categories that are above parity is small, the parameter estimate for the effect of having relative income that is greater than 0.60 and less than or equal to 0.80 is positive for both outcomes and approaching statistical significance for the PIAT-M outcome. It is worth

mentioning this because it suggests—although rudimentarily—that mothers earning more than fathers is likely not a problem for child well-being; rather, there is something about parity households that translates into negative child development outcomes.

Findings from Model C show that the effects of relative income described above are still present after including a measure for the emotional and cognitive support found in the household. The HOME score variable itself is predicted to have positive effects on children's reading and math trajectory starting points, but including the HOME scores in the models does not alter the influence of relative income.

In Model D, I add predictors for the average current hours worked per week by children's mothers and fathers. There is no predicted effect for mothers' time in the labor force, but fathers' employment hours are predicted to have a statistically significant negative main effect on children's reading development. It might be that mothers' time in the labor force does not change the amount of time they spend with their children, while an increase in fathers' hours worked decreases their time spent with children.

In addition to this finding about mothers' and fathers' hours worked, results from Model D suggest that the problems at parity are present net of the effects of parents' time in the labor force. Moreover, the findings suggested by results from Model B are better supported in Model D: Children's PIAT-M scores are predicted to be higher when mothers' earnings are above parity (i.e., $0.60 < RI \leq 0.80$) than when they approximate parity. This relationship is shown graphically in Figure 5.1, in which I provide a focused view on the trajectory intercepts to better depict the initial status effect of relative income. The trajectory with the lowest initial status at 60 months, a PIAT-M level of less than 9.00, represents the

children of the parity reference group. Children whose mothers earn less than 20% of parental income have the highest levels of math development with an initial status just under 10.00. Children with mothers whose relative income lies in the categories just below and just above parity are predicted to have initial statuses of about 9.58 and 9.68, respectively.

In the final model reported in Table 5.3, I examine whether the effects of relative income are moderated by family income. Results from Model E show that there is a statistically significant, positive interaction effect with the dummy category $0.20 \leq RI < 0.40$ and current family income. The moderating effect of family income is shown in Figure 5.2, which focuses in on the differences in initial status given particular values of relative income and family income. Children with mothers whose relative income is less than 40% but greater than or equal to 20% and with above average family income have the highest initial status levels in reading. Relative to the parity group, children still do better when relative income is just below parity even if family income is below average by one standard deviation.

5.5 Chapter Summary

The purpose of this analysis was to evaluate the effects of mothers' relative income on children's cognitive development over time. Using a restricted sample of married-couple households in which both parents were employed and reported earnings in the year before the focal child's cognitive assessment, I estimated several three-level growth curve models on a sample of 3,221 children from 1,724 families with 7,221 repeated observations from the C-NLSY79 panel study. Based on predictions derived from a gendered resource household

allocation model, I expected that children's cognitive development would be enhanced by increases in mothers' proportional share of parental income. Results from Analysis II did not confirm this expectation. Instead, the analysis revealed that child well-being is lowest in households in which mothers and fathers approximate parity in earnings.

Results from the descriptive models were similar to those from the first analysis. White children and females were shown to have a cognitive development advantage over Non-Whites and males. Children also were shown to benefit from having mothers with high levels of cognitive skill and high levels of education. Additionally, this analysis revealed that there is a positive relationship between fathers' educational attainment and children's cognitive development.

I found a non-linear relationship between mothers' relative income and child well-being. Children with mothers in one of the relative income categories that indicated mothers' earnings were below parity (i.e., less than 40% of parental income) showed higher levels of cognitive development compared to children in parity households. There was also evidence from models predicting mathematics development that children have higher levels of cognitive skill when their mothers' earnings are above parity (i.e., greater than 60% and less than or equal to 80%) compared to children in parity households. These findings together suggest that children's cognitive development drops as mothers' earnings approach parity and then rises after mothers' proportional earnings exceed 60% of parental income. Unfortunately, there are not enough households in which mothers' relative income is beyond 80% to generate reliable estimates about how this economic arrangement affects child well-being.

There are at least two important features of the relationship found between relative income and children's cognitive development. First, this non-linear effect implies that child well-being is not harmed when mothers are the primary breadwinners. In essence, the effect of relative income observed here is gender neutral. Compared to parity households, child well-being is higher when mothers earn more than fathers and when fathers earn more than mothers. In both cases, breadwinning is shared, but there is still one principle earner. Although it is more common that this primary earner be the father (Raley, Mattingly, and Bianchi 2006), according to this study it is not necessary in terms of child development. It might be that as mothers' specialization in economic activities becomes greater than fathers', fathers increase their specialization in parenting activities (Yeung, Sandberg, Davis-Kean, and Hofferth 2001).

The second important element of the observed relative income effect is it implies that there are household conditions at parity that lower child well-being outcomes. It appears, at least from this analysis, that the negative effects associated with parity are not mediated or moderated by parents' time in the labor force, nor are they altered by total family income.[2] This suggests that at least part of the effect of relative income is likely due to unique aspects in parents' relationships when there is economic parity that have negative consequences for child well-being. For example, Nock (2001) and Rogers (2004) found that spouses at parity in earnings were at a greater risk of divorce than those without similar economic resources. Nock (2001) also found that achieving economic parity lowered women's commitment to

[2] In a post-hoc analysis not reported here, I examined whether the effects of relative income are mediated or moderated by a measure indicating the total number of hours spent in the labor force by both parents to see if the negative effects associated with parity are related to high levels of total employment hours. This measure did not alter the relationship between relative income and children's cognitive development.

their marriages, and Wilcox and Nock (2006) showed that wives with high levels of relative income had lower levels of marital happiness. According to Wilcox and Nock, women's gender role ideology moderates the relationship between relative income and their marital happiness such that women with traditional gender ideologies do not perceive the situation to be negative when their increased economic activities do not come with increased assistance in the household by their husbands.

The findings mentioned above suggest that parental relationships are more likely to be volatile at economic parity, and parents' marital discord has been shown to negatively influence children's developmental outcomes (Amato 2006; Gerard, Krishnakumar, and Buehler 2006; Jenkins, Simpson, Dunn, and Rasbash 2005; Sturge-Apple, Davies, and Cummings 2006). Wilcox and Nock (2006) suggest that this volatility is related to a blurring of gender roles that occurs when both spouses are relatively equal breadwinners. For instance, they state, "[W]omen who live in marriages characterized by less gendered patterns of earning and housework are less happy in their marriages" (p. 1332). My findings, suggest, however, that the arrangements in non-parity households do not need to be traditionally gendered in order to be effective at producing child well-being; rather, the arrangements are best when breadwinning is specialized, and parity households lack specialization (Rogers 2004).

The finding that specialization appears to be beneficial for households in producing child well-being is more consistent with a common preference model of household resource allocation than a gender resource allocation model (Becker 1991). Resource allocations might be more efficient in non-parity households because there is less need for bargaining

over investment decisions. Similar levels of economic resources between spouses might increase the number of negotiations within marriages, creating more strain and, thus, negatively affecting child well-being.

Results from the relative income analysis also indicate negative consequences related to fathers' labor force participation for child well-being. Increases in fathers' investments in the workforce might decrease their involvement with children. This conclusion is consistent with findings from Yeung, Sandberg, Davis-Kean, and Hofferth's (2001) study in which they observed that working more hours reduced fathers' time spent with children during weekdays. Mothers' overall time spent with children is less influenced by their time in the labor force (Bianchi 2000), and mothers' responsibilities for parenting remain fairly constant despite increased demands from work that they might experience (Craig 2006). Fathers' time in the labor force is an important factor to consider in future research examining how parents'—not just mothers'—work demands affect child outcomes.

The effects of relative income found in this analysis do not support the predictions of a resource bargaining model based on assumptions about gendered investment preferences. It might be that increases in mothers' relative incomes do not give women more control over a greater proportion of the total pool of family income (Kenney 2006). It is also possible that in families in which both parents are employed and earning money there is not a significant difference between mothers and fathers in terms of their preferences for goods and services that promote child development. More information about the allocation systems used in these households and the investment preferences of parents could be gained from data on direct household expenditures and how incomes in dual-earner households are physically managed

in terms of who has control over and access to the family income pool and whether earnings are managed jointly or separately.

CHAPTER 6

CONCLUSIONS ABOUT MATERNAL EMPLOYMENT, RELATIVE INCOME, AND CHILD WELL-BEING

6.1 Introduction

The labor force participation patterns of men and women over the life course are becoming increasingly similar (Bureau of Labor Statistics 2006). A consequence of these patterns that has been especially popular to study over the past several decades has been changes in child well-being outcomes as a function of mothers' employment activities. The purpose of this study was to continue in this tradition of examining effects associated with maternal employment but to do so without using a deprivation perspective which characterizes much of the scholarship searching for negative outcomes linked to women's involvement in the labor force (Gottfried and Gottfried 2006). Instead, I started this project with a recognition of the normative nature of maternal employment and attempted to explore how mothers' labor force participation might even benefit children by giving mothers the opportunity to use their economic resources to create enrichment opportunities for children.

Two research questions guided this investigation of resource allocation within households: (1) How do early and current maternal employment affect child well-being? and (2) How does mothers' relative income influence child well-being? I relied on two research literatures to guide my inquiries: the maternal employment and child outcomes literature and the economic development literature. The first literature, which focuses on the allocation of maternal time to the labor force, contains a large number of research studies with mixed

conclusions about how mothers' employment generally affects children. One consistent finding from multiple studies, however, is that mothers' labor force participation during the early years of children's lives has negative effects on children's cognitive development during childhood (Han, Waldfogel, and Brooks-Gunn 2001; Harvey 1999; Waldfogel, Han, and Brooks-Gunn 2002). An overall limitation of this literature is a lack of truly longitudinal studies examining changes in child outcomes over time. My project extends this research area by longitudinally studying the influence of maternal employment on children's cognitive development trajectories, rather than just looking at their outcomes at single points in time.

The economic development literature, which focuses on the allocation of mothers' resources within households, consists of smaller projects from developing nations and developed ones other than the United States that support a general conclusion: Money earned by mothers is allocated within households differently than money earned by fathers. More specifically, mothers' earnings are more likely than fathers' earnings to be directed toward enrichment goods to promote child welfare (Haddad and Hoddinott 1994; Lundberg and Pollak 1996; Thomas 1990). This finding is consistent with a gendered resource allocation framework, which recognizes the gendered investment preferences of household actors and that relative income contributions influence household decisions about resource allocations. My project contributes to this literature by investigating the predictions from a gendered resource allocation model about the positive effects of mothers' relative incomes on child well-being using a sample of American households.

Children's cognitive development skills in reading and mathematics were selected as outcomes for the analyses. Cognitive development is a form of human capital accumulation

linked to success and mobility in modern, advanced economies (Heckman 2000). As such, contemporary parenting entails the cultivation of children's intellectual capacities to foster achievement (Lareau 2002), and a new element of mothering behavior is supplying children with the economic backing—in addition to the emotional support—they need to be successful, especially in terms of financing educational endeavors (Bianchi 2000; Sayer, Bianchi, and Robinson 2004).

6.2 Summary of Findings

I conducted two separate analyses to answer the research questions of this project; however, I used the same longitudinal analytic technique for the maternal employment and the relative income analyses. I estimated three-level growth curves to model children's cognitive development from ages five to 14. This approach extended the mostly cross-sectional studies in the extant maternal employment and child well-being literature. I was able to model change in cognitive development as a function of child, parent, and household characteristics, some of which are stable over time (e.g., children's race and mothers' age at the focal child's birth) and some that vary over time (e.g., current maternal employment hours and family income). Moreover, using the multi-level component to this approach allowed me to properly account for the clustered nature of the data points in my sample (i.e., repeated observations nested within children who are nested within families).

The two analytic samples were drawn from the Children of the National Longitudinal Survey of Youth 1979 (C-NLSY79). This panel study is comprised of the offspring of the original 6,283 women from the National Longitudinal Survey of Youth 1979 (NLSY79). I

pooled each child's data across all survey waves from 1986 to 2002 at two-year intervals and modeled changes in cognitive skills over time against children's age in months at the time of their assessments. In the following paragraphs, I present the findings of each of the two analyses.

Maternal Employment Analysis Results

In my first analysis, I examined the allocation of maternal time to the labor force during the early years of children's lives and as they developed throughout childhood and into early adolescence. I expected to find negative effects for mothers' early employment hours (i.e., during years one to three of the focal child's life) on children's cognitive development. There was limited support for this prediction.

I found a negative relationship between early maternal employment hours and children's initial status levels in reading. This negative relationship was mediated by children's primary child care arrangements during their first year of infancy. I also found that the influence of early maternal employment on children's growth in reading development was moderated by mothers' cognitive skills. Children's growth rates were maximized when their mothers had above average cognitive abilities and below average early employment. Children whose mothers had below average cognitive skills experienced steeper growth in reading development over time when their mothers had above average levels of early employment compared to those whose mothers had below average levels of both cognitive skill and early labor force participation.

These findings suggest that children benefit from time spent with a cognitively stimulating mother during their early development (Desai, Chase-Lansdale, and Michael 1989). The findings also imply that children whose mothers have below average cognitive skills benefit from early maternal employment. This might be because early maternal employment exposes these children to child care situations that are more enriching than the home environments of mothers with low levels of cognitive skills. Mothers can apparently compensate for low levels of personal intellectual capital with market experience.

Although certain aspects of early maternal employment were shown to negatively affect children's reading development, I also found that early maternal employment positively affected the growth rates of children's cognitive development in reading and mathematics. This finding suggests that early maternal employment allows mothers to establish a pattern of economic activity and consequent resource accumulation that benefits children over time, even if there might be some negative short-term effects associated with this employment (i.e., lower initial status levels at age five for children).

Contrary to what I expected, there were not positive effects associated with current maternal employment due to subsequent increases in family income. Instead, current maternal employment hours—that is, the average number of hours worked per week in the year prior to each child assessment—were shown to negatively affect children's levels of reading development. This effect was moderated by race, mothers' cognitive abilities, and the positiveness of the home environment as indicated by HOME scores. Negative effects of current maternal employment were only found for White children, which is consistent with other research studies (Han, Waldfogel, and Brooks-Gunn 2001; Waldfogel, Han, and

Brooks-Gunn 2002). In general, racial and ethnic minority families have historically experienced higher levels of women's labor force participation compared to White families. Therefore, Non-White families might have better adapted to increased maternal employment patterns than have White families. Negative effects of high current maternal employment levels were also pronounced when mothers' cognitive skills and HOME scores were at high levels. These findings are consistent with the notion that advantaged children have the most to lose from maternal employment (Desai, Chase-Lansdale, and Michael 1989), but see Greenstein (1995) for alternative findings.

As I stressed in Chapter 4, the effects associated with the allocation of maternal time to the labor force were observed only after transforming variables measuring hours worked per week into their natural logarithms. This suggests that much of the effects result from comparing changes in maternal employment hours at the low end of the distribution. In other words, variation in child outcomes is most detectable when comparing mothers who work very little or none to mothers who work some.

Relative Income Analysis Results

In this analysis, I focused on the allocation of mothers' earnings to investigate how their relative resource position might influence household investment processes. I used a restricted sample consisting of only married-couple households in which both parents were employed and reported earnings in the year before each child assessment. Based on predictions derived from a gendered household resource allocation model, I expected that child well-being would be enhanced by increases in mothers' relative income. This was not

supported by evidence. Results were more consistent with a common preference model of resource allocation in which the specialization of labor contributes to household efficiency in producing outcomes.

I found that children's cognitive development was lowest in households in which mothers' and fathers' incomes approximated parity, where there is presumably a lack of specialization between spouses (Rogers 2004). Results did show, however, that it was not necessary that specialization be in accordance with traditional gender patterns—that is, with fathers as the primary breadwinners. Child well-being, at least in terms of cognitive development in mathematics, was shown to be higher when mothers' relative income was either above or below parity compared to being within the parity range. This provides some evidence that the effects of relative income on child development are gender neutral. However, the most consistent finding across both of the cognitive outcomes was that children in general had higher levels of reading and mathematics skills when their mothers' relative earnings were below 40% of parental earnings when compared to parity.

I also found some negative effects related to fathers' labor force participation in predicting children's cognitive outcomes in married-couple households. This implies that fathers' contributions to child development—likely in terms of time spent with children—are susceptible to changes in their labor force participation rates. I did not find any effects for mothers' labor force participation in married-couple households. These mothers' time spent with children is likely more stable and less influenced by work demands compared to fathers (Bianchi 2000).

6.3 Study Limitations

There are several limitations to this study that must be considered when evaluating the results discussed above. One limitation is that the children used in the analytic samples are not a random sample of American children. The C-NLSY79 panel study members are the offspring of women who were themselves selected as survey participants for the NLSY79 based on a national probability sample of young women and men ages 14 to 21 in 1978. As a result, the children of the C-NLSY79 are disproportionately born to young mothers. This has been more of a limitation of previous studies that relied on only the earliest survey waves of the C-NLSY79 (Greenstein 1995; Han, Waldfogel, and Brooks-Gunn 2001; Harvey 1999; James-Burdumy 2005) than is the case with this study.

The maternal employment analysis particularly suffered from lacking a measure of child care quality, a major limitation of the C-NLSY79 in general. I had to rely instead on measures of child care type. Recall that the child care type variables were shown to mediate the negative relationship between early maternal employment and children's reading development. More detail about how maternal care is substituted in terms of quality of care tradeoffs would provide valuable information that is simply unobtainable from the data used here.

The relative income analysis sample suffered from having a small number of households in which mothers earned over 60% of total parental income. Having more of these types of households would increase my confidence in the non-linear effect of relative income observed in the final models predicting children's mathematics scores (i.e., that when relative income is just above and below parity child well-being is higher than when relative

income is at parity). There were especially too few mothers who earned over 80% of parental income, making the estimates related to this group especially unreliable.

Both analyses would also have been strengthened by having more father-specific variables to use as controls. I was able to include measures for fathers' education levels and work hours in the second analysis, but information on fathers' cognitive skills, like available for mothers, would enhance the analyses. Moreover, having specific data on time spent with children and the quality of that time for both mothers and fathers would be beneficial, instead of relying on the more global HOME score which involves some time spent with children questions but only in reference to mothers.

A more general methodological shortcoming relates to using unbalanced data sets for both analyses. This means that not all children contributed the same number of assessment occasions to the longitudinal models. In other words, even though the mean number of PIAT-RR repeated observations for each child was 3.9, some children contributed five repeated observations and some only contributed one. Although the use of unbalanced data sets is permitted in multi-level models of change, there are drawbacks to this approach. The primary caveat associated with an unbalanced data set is that the within-person variance estimates are only informed by those who contribute multiple measurement occasions (Singer and Willett 2003). Fixed-effect estimates, however, are not appreciably altered by such imbalance.[1]

The research questions addressed in this project are mainly concerned with the effects of observed variables (i.e., fixed effects) on child outcomes; therefore, the use of unbalanced data sets is not of much concern. At most, the use of unbalanced data resulted in

[1] I estimated the final model of Analysis II with only children who contributed three or more data points, and this did not substantively change the inferences from either the fixed or random effects.

underestimated variance parameters in the random portions of the mixed models, but these parameters were used only to provide general information about variation at the different levels of the models and not to test hypotheses.

6.4 Study Implications

The findings of this study have several implications. These implications are especially important to consider given that the central prediction about the influence of mothers' relative income on child well-being was not confirmed. In the following paragraphs, I separately discuss the relevance of my results in terms of theoretical implications, future research directions, and public policy applications.

Theoretical Implications

According to a gendered resource model, each household actor is assumed to have a unique utility function in terms of how welfare is maximized through the allocation of resources within the household. More specifically, this welfare function is expected to differ by gender, with women having stronger preferences than men for investing in child enrichment goods and services (Haddad and Hoddinott 1994; Lundberg, Pollak, and Wales 1997). Decisions about how resources are allocated within married-couple households, therefore, are assumed to be influenced by mothers' and fathers' relative contributions to the family income pool (Browning, Bourguignon, Chiappori, and Lechene 1994; Vogler 1998). This led me to predict for this study that children's well-being, in terms of cognitive development, would be especially enhanced by increases in mothers' relative earnings since

such increases would give mothers greater control over a larger portion of family income that could be steered in ways to promote child welfare.

This prediction, however, is unsupported in my analyses. Instead, my results are consistent with predictions of common preference models of household allocation in which outcomes such as child well-being are most efficiently produced with labor specialization—that is, one spouse being primarily responsible for breadwinning and one for child rearing (Becker 1991). As described in Chapter 2, however, common preference models repeatedly have been shown inadequate in capturing the bargaining features of household decision making and mothers' use of increases in relative resources to shift household investments towards child welfare, especially in developing countries (Schmeer 2005; Thomas 1997).

There are several possible reasons why the expected effect of relative income was not observed in the American sample used here. First, mothers in the United States might *directly* use their earnings resources in accordance to their child-centered preferences. In other words, American mothers might bypass the pooling of family income and subsequent negotiations over its use and simply direct their own money to child development. If this is the case, child well-being outcomes would be responsive to changes in direct measures of mothers' earnings more so than fathers' earnings, and relative income measures would be inconsequential.

This reasoning is similar to that suggested by research findings showing that American women use their own earnings, rather than their combined couple earnings or increases in relative income, to purchase better quality child care and to buy market services to reduce their amount of housework (Brandon 1999; Gupta 2006). The value of American women's absolute purchasing power, compared to that of women in developing nations,

might be high enough to make combining their earnings with that of their husbands simply unnecessary, especially if there are increased relational costs associated with income pooling (Pahl 1995; Treas 1993). In addition to there being potentially costly negotiations associated with income pooling, mothers might also have an incentive to directly use their own earnings according to their tastes if their market resources are not symbolically valued within the household as highly as their husbands' are—that is, if there is an asymmetrical economy of gratitude (Hochschild 1989; Vogler 1998). It might be that men's earnings are regarded as the family wage that covers major expenses, while women's earnings are perceived as additional resources that can only be used to buy extra commodities for the household.

The possibility that women use their absolute earnings to invest in child well-being and sidestep the transaction costs of pooling their income with their husbands' leaves the notion of gendered investment preferences within the resource allocation model used to frame this analysis intact but challenges the role of relative income. A second explanation for my failure to find support for an effect of relative income on children's cognitive development, however, questions the existence of markedly different preferences for the allocation of resources within households between mothers and fathers in contemporary American marriages. Even though men's gender ideologies compared to women's are generally less egalitarian, men's and women's attitudes about gender have become closer and less traditional over recent decades, as women's economic activities have concomitantly become more like men's (Bolzendahl and Myers 2004; Rogers and Amato 2000). In addition, men and women both have increased their time spent in parenting activities (Sayer, Bianchi, and Robinson 2004), and active fathering is a central component of family life and adult

identity for many men, especially married ones (Amato 1998; Eggebeen and Knoester 2001; Marsiglio and Cohan 2000; Nock 1998).

A result of these trends and characteristics of American married couples is that contemporary husbands and wives likely have developed investment preferences that are not as distinct from each other as they might have been in earlier decades or are even currently in developing nations where gender roles are more inflexible. This, however, does not explain the apparent gender differences observed in expenditure preferences in developed nations such as Great Britain and Canada (Pahl 1990; Phipps and Burton 1998), but such expenditure preferences might ultimately have little or no effect on overall child development in industrialized countries where the majority of children and adolescents have relatively high access to nutritional, health, economic, and educational resources.

A distributive justice perspective on households is also informative in explaining the lack of support for a positive relationship between relative income and child outcomes. In general, the distributive justice framework focuses on how outcomes are valued, allocated, and perceived, usually in terms of being fair or unfair (Major 1993). An important element of this perspective is that men's and women's outcome values, or relationship goals, are assumed to differ. Women, more so than men, place greater importance on relationship quality and maintaining family harmony (Gager 1998). If this is the case, then mothers would be unlikely to use increases in their resource positions relative to their husbands to change the distribution of resources within the household. Doing so could create friction and challenge their husbands' sense of authority.

Not only might mothers' outcome values influence their decisions about the use of their relative resources, but mothers might also simply not interpret their relative economic contributions to the household as entitling them to more influence in determining how household resources are invested. In other words, as scholarship employing elements of a distributive justice framework would support (Gager 1998; Greenstein 1996; Hochschild 1989; Thompson 1991), employed, married mothers might not perceive that their increases in relative income gives them a sense of entitlement to increased access to the family income pool or to more influence in household bargaining. As a consequence, it is likely that such mothers (and their husbands) construct justifications for why their labor force participation and economic contributions to the household are not used to create equality norms within the household. I speculate that the content of such justifications would involve family myths about how men's income pays for different, more important expenses than women's; whose career has more meaning to their identity and more importance to the family's economic well-being; and whose human capital and time is more valuable when invested in the labor force than in the household (Hochschild 1989; Major 1993).

As the above discussion reveals, there are unique features of marriages and households—and mothers' and fathers' perceptions of their roles within them—that a simplistic gendered resource allocation model does not address. As such, my relative income findings appear to support a common preference model of household resource allocation that proposes labor specialization as the route to household efficiency in the production of commodities such as child welfare. The value of specialization might be reflecting how efficiency is maintained when women and men adopt outcome values and senses of

entitlement, as discussed above, that reflect traditional gender ideologies. Neotraditional arrangements of shared breadwinning still allow for specialization and do not significantly challenge traditional gender arrangements. Instead, maternal employment has been accommodated within men's and women's attitudes about family life. The observed problems at parity might be reflections, then, of what happens when a traditional model of specialization is challenged and families find themselves adjusting to new, less familiar arrangements (Nock 2001).

I did find that gendered patterns of specialization are not necessary. It is having a *primary* breadwinner, regardless of her or his gender, that appears to be better for child development. A 50/50 split in the division of household labor is not the standard of comparison used by most couples (Gager 1998), nor is parity likely the comparison standard for economic arrangements. Working parents in this situation, therefore, might experience strain when they compare their situations to other parents, in addition to the strain they experience from their employment in institutions that offer minimal support to working parents (Jacobs and Gerson 2004). The availability of family-supporting policies in the workplace and living in communities with more dual-career households are variables that might moderate the effects of relative income on child and family well-being outcomes. Theoretical models that address these contextual factors, along with the social-psychological processes related to how mothers' income is perceived within households, will improve upon simplistic models of gendered resource allocations and be able to further specify how households in which there is economic parity can efficiently produce child welfare and parents' careers.

Future Research Directions

The findings of this study suggest several directions researchers could take in subsequent projects to further develop insight into how child well-being is influenced by the allocation of time and earnings resources within households. Results reveal that the effects of early maternal employment change as children age. In fact, early maternal employment was shown to positively affect children's growth rates in both reading and mathematics. More research needs to be conducted to uncover how it is that mothers' labor force participation while their children are young has long-term payoffs for child development, even if there are small, short-term disadvantages associated with it. For example, does early maternal employment better allow mothers to establish a more rewarding career from which children benefit in terms of factors such as financial gains, work stability, benefits, and mothers' job satisfaction? Future research could utilize more of the work variables available in the NLSY79 to better model the covariation of mothers' and fathers' career trajectories and children's cognitive development. Given my finding of negative effects associated with fathers' time spent in the labor force, future research should also more closely examine how fathers' work demands influence child outcomes.

Based on the results of the relative income analysis, it would be useful to evaluate how mothers' and fathers' gender role ideologies and marital relationship characteristics moderate the effects of relative income on child outcomes. The investment preferences of women and men might be conditional upon their gender ideologies, but women's likelihood to negotiate over household investment processes might also be moderated by their gender ideology. It could be that traditional women are less likely to use their relative resource

positions to alter current allocation systems present in the household. Moreover, it might be that the observed problems at parity are mediated or moderated by parents' level of marital discord. Parity might not be negatively related to child well-being when relatively equal economic resources are shared by husbands and wives with comparable gender ideologies and/or positive relationships.

Much of the research in the economic development literature uses expenditure data to assess how changes in mothers' resource positions alter household investment processes. I attempted to extend this causal chain to capture the actual child outcomes that these investment processes might affect. However, it is clear that more research needs to be done on how American households actually allocate earnings in terms of the purchasing of goods and services and if these allocations ultimately benefit child development. Qualitative interviews with parents would be helpful in this regard. In addition, this research method could be used to study employed mothers' outcome values and sense of entitlement in the household, along with any potential justifications they and their husbands use to explain how women's relative earnings seem to have little influence on resource allocations within families.

Moreover, future data collection and research projects should assemble and use measures of the money management strategies used within families (Pahl 1990; Pahl 1995). The way family income is pooled within households might be influenced by spouses' relative income positions (Kenney 2006). This might have consequences for how these resources are distributed to children within households. In addition, the effects of measures of women's resource position within marriages other than relative income are worth exploring. For

example, having higher levels of education relative to their husbands or a higher relative age might give women a greater level of influence over household allocation processes and prove beneficial for child well-being (Schmeer 2005).

Like other researchers using cognitive development as an indicator of child well-being within families, I found predictor variables' effects to be different across children's outcomes in mathematics and reading (Han, Waldfogel, and Brooks-Gunn 2001; James-Burdumy 2005; Ruhm 2004; Waldfogel, Han, and Brooks-Gunn 2002). In general, fewer effects for maternal employment variables were found for the mathematics outcome compared to the reading outcome. Future research could better investigate how skills in these domains are differentially affected by household and parental characteristics. For example, are reading skills more influenced by family context and parenting behaviors than math skills? In addition to further studying aspects of children's cognitive outcomes, it would be beneficial to re-examine the research questions addressed in this project with children's behavioral measures as dependent variables. Do the parental and household resources that promote cognitive growth also promote behavioral adjustment during children's development?

The growth curve models estimated for this study also revealed some findings with implications beyond research focused specifically on household allocation processes. I consistently found a statistically significant covariance estimate between children's initial status levels and their rates of growth. This means that children with high cognitive skills at their starting points maintain a cumulative advantage over time by experiencing steeper growth rates compared to those children with lower starting points. This suggests that

researchers concerned with the reproduction of social inequality should pay more attention to how children's early experiences and family contexts might become obstacles in their development and lead to later consequences for job-related outcomes (Farkas 2003). Furthermore, this points to the importance of identifying the value of early intervention programs such as Head Start that are designed to strengthen the competency levels of disadvantaged children so that they enter school with cognitive skills similar to their cohort members (Garces, Thomas, and Currie 2002).

Public Policy Applications

Even though this project did not focus empirically on public policy, there are some implications for policy that can be gleaned from my findings. In general, there are two broad aspects of public policy that are often linked to maternal employment and child development. These are work leave policies and policies related to the availability of affordable, high-quality child care (Waldfogel 2001).

The most prominent policy addressing family leave is the Family Medical Leave Act (FMLA), which was adopted by the US federal government in 1993. This policy offers workers up to 12 weeks of protected, unpaid leave from their jobs to attend to family and personal affairs, if their work histories and employers meet certain requirements (see Ruhm 1997). Although states and some employers provide additional protections and some measures for paid leave, overall America offers some of the lowest levels of family-supporting work policies of all industrialized countries (Heymann, Earle, and Hayes 2007; Jacobs and Gerson 2004). Moreover, there is wide variation in the degree to which parents,

especially fathers, take advantage of leave policies after their children's births (Han and Waldfogel 2003).

The negative effects on children's cognitive development associated with early maternal employment found in this study are consistent with other studies showing that children's first years of development are important and can be enhanced by mothers taking time out of the labor force following their children's birth (Waldfogel 2001). However, I also found negative effects for fathers' time spent in the labor force while their children are between five and 14 years of age. My findings imply, therefore, that children could stand to benefit from their parents generally having more policy options for balancing work and family demands, particularly policies that offer paid leave and encourage men and women to take time off (Jacobs and Gerson 2004).

In terms of child care, I did find that child care arrangements mediated the negative effects of early maternal employment hours on children's cognitive development. Furthermore, I found that early and current maternal employment especially benefited children whose mothers have low levels of cognitive skills, suggesting that the child care arrangements used by these families are especially important and potentially offset deficiencies within disadvantaged households.

Quality child care is important but expensive. Average annual costs for full-time child care range from about $4,000 in Alabama to over $10,000 in Massachusetts (National Association of Child Care Resource and Referral Agencies 2007). In North Carolina, child care subsidies are available to low income families, but children with families receiving subsidies are less likely than those not receiving subsidies to be enrolled in high-quality child

care centers as determined by the state's rating system for child care providers (Bryant, Maxwell, and Taylor 2004). Given the importance I find for infant and preschool year experiences and children's initial skill levels at age five in shaping their subsequent cognitive trajectories, it is worth making public investments in child care and preschool programs that give children opportunities to develop and strengthen their cognitive skills and give working parents, regardless of earnings, choices about child care.

The policy applications from this study are necessarily generic, and I have intentionally avoided making any specific policy recommendations based on my findings. I simply do not have evidence from this project upon which to base any such specific proposals. As stated earlier, the C-NLSY79 unfortunately does not include measures of child care quality, which would be helpful for in an investigation of policy options about child care. However, there are measures in the C-NLSY79 related to children's participation in preschool programs, such as Head Start, and mothers' use of maternity leave that would be useful in future research projects focusing on the effectiveness of family leave policies and early developmental programs in promoting child well-being.

6.5 Overall Conclusions

Despite the normative nature of mothers' labor force participation, "mommy war" debates continue in popular culture, which were recently fueled by reports of women opting out of the workforce to stay home with their children (Good Morning America 2006; Hirshman 2006). In fact, the labor force participation rates of mothers did decline some in recent years—but so did the employment rates of non-mothers and men (Boushey 2006).

Child outcomes are typically at the center of such debates over motherhood and employment. The findings of this study inform these debates by suggesting that any negative effects associated with maternal employment are overall quite small and dependent on other factors such as child care arrangements and the supportiveness of children's home environments. I also found that early maternal employment has positive effects on children's growth in cognitive skills over time. This finding suggests that mothers who establish early patterns of employment are able to provide their children with beneficial opportunities for child development as they age.

Furthermore, my findings suggest that there is cause to problematize fathers' time spent in the labor force in married-couple households much like mothers' time away from home has historically been treated. Rather than concentrate on mothers' versus fathers' employment effects, however, scholarship needs to continue focusing on how employed parents can manage work and family life such that child (and parental) well-being is optimized (Gottfried and Gottfried 2006; Jacobs and Gerson 2004). There are also clear needs for research studies investigating the family processes within parity households that are not advantageous for child development. Families apparently have been successful adapting to neotraditional arrangements in breadwinning (Raley, Mattingly, and Bianchi 2006), but there are still adjustments to be made when shared breadwinning results in economic parity.

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TABLES AND FIGURES

Table 4.1. Summary Statistics for Maternal Employment Analysis Variables (*N*= 15,239 observations from 5,089 children of 2,954 mothers)

Variable	Mean or %	SD
PIAT-RR	38.578	19.067
PIAT-M	35.718	17.196
Age of Child (in months)	110.542	32.291
Mother's AFQT Score	37.047	27.193
Mother's Age at Child's Birth	24.548	4.292
Family Income at Child's Birth[a]	29,037.96	71,886.54
Number of Children at Child's Birth	1.184	1.128
Mother's Education at Child's Birth (in years)	12.331	2.198
Early Maternal Employment Hours (per week)[a]	22.347	16.832
Current Maternal Employment Hours (per week)[a]	23.877	18.904
HOME Score	97.509	15.803
Current Family Income[a]	45,661.96	70,124.81
Survey Wave	5.359	2.231
Female	0.493	
White	0.513	
Married at Child's Birth (1= Yes)	0.66	
Year 1 Primary Child Care Source[b]		
Relative Care	0.188	
Non-Relative Care	0.153	
Center or Other Care	0.053	

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In analyses, continuous variables are centered at their mean value except Age of Child, which is deviated by 60. [a] These variables are transformed into their natural logarithms for all analyses. [b] Reference category is parental child care arrangement.

Table 4.2. Specifications of Three-Level Growth Curves for Children's Cognitive Development: Maternal Employment Analysis (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	PIAT-RR	PIAT-M
-2 Log Likelihood	105082.8	103849.4
Fixed Effects		
Intercept	9.473*** (0.138)	7.576*** (0.142)
Age	0.763*** (0.006)	0.772*** (0.006)
Age^2	-0.003*** (0.0001)	-0.003*** (0.0001)
Random Effects		
Level-1, Residual	29.329*** (0.451)	32.700*** (0.491)
Level-2 (Children within Families)		
Initial Status	0	0
Age	0.006*** (0.001)	0.002*** (0.0004)
Covariance	0.203*** (0.016)	0.143*** (0.013)
Level-3 (Between Families)		
Initial Status	11.077*** (0.866)	11.478*** (0.884)
Age	0.008*** (0.001)	0.002*** (0.0003)
Covariance	0.132*** (0.017)	0.124*** (0.013)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60. Standard errors are in parentheses. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 4.3. Conditional Growth Curve Models for Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B		Model C	
	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M
-2 Log Likelihood	104950.8	103496.2	104378.1	102866.1	104281.0	102811.8
Fixed Effects						
Intercept	8.668***	6.244***	9.394***	7.074***	9.518***	7.016***
	(0.211)	(0.213)	(0.277)	(0.271)	(0.300)	(0.296)
Age	0.722***	0.752***	0.746***	0.767***	0.734***	0.758***
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects						
Female	1.204***	0.591**	1.210***	0.594**	1.194***	0.588**
	(0.185)	(0.188)	(0.182)	(0.186)	(0.182)	(0.185)
White	1.027***	2.772***	-0.515*	1.128***	-0.699**	0.930***
	(0.213)	(0.213)	(0.240)	(0.239)	(0.245)	(0.245)
Survey Wave	0.263***	0.327***	0.190***	0.272**	0.226*	0.297***
	(0.039)	(0.037)	(0.092)	(0.086)	(0.091)	(0.086)
Mother's AFQT Score			0.049***	0.053***	0.046***	0.051***
			(0.005)	(0.005)	(0.005)	(0.005)
Mother's Age at Child's Birth			-0.078†	-0.086*	0.020	-0.034
			(0.046)	(0.044)	(0.047)	(0.045)
Mother's Education at Child's Birth			0.381***	0.362***	0.253***	0.273***
			(0.057)	(0.054)	(0.059)	(0.056)
Log of Family Income at Child's Birth					0.105*	0.080†
					(0.047)	(0.044)
Number of Children at Child's Birth					-0.632***	-0.439***
					(0.092)	(0.092)
Married at Child's Birth					-0.037	0.275
					(0.233)	(0.234)

Table 4.3 (continued). Conditional Growth Curve Models for Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B		Model C	
	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M
Conditional Effects on Growth						
Female	0.010*	-0.017***	0.011*	-0.016***	0.011*	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
White	0.062***	0.044***	0.017**	0.014**	0.012†	0.011*
	(0.005)	(0.004)	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score			0.002***	0.001***	0.002***	0.001***
			(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of Children at Child's Birth					-0.006**	-0.001
					(0.002)	(0.002)
Married at Child's Birth					0.020***	0.013**
					(0.006)	(0.005)
Random Effects						
Level-1 Residual	29.379***	32.836***	29.414***	32.804***	29.363***	32.824***
	(0.452)	(0.493)	(0.452)	(0.488)	(0.451)	(0.488)
Level-2 (Children within Families)						
Age	0.012***	0.006***	0.012***	0.006***	0.012***	0.006***
	(0.001)	(0.0003)	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)						
Initial Status	10.012***	9.014***	7.151***	5.799***	6.856***	5.500***
	(0.827)	(0.802)	(0.750)	(0.729)	(0.737)	(0.723)
Age	0.004***	0.000	0.003***	0	0.003***	0
	(0.001)	(0.0003)	(0.001)		(0.0005)	
Covariance	0.206***	0.150***	0.150***	0.108***	0.142***	0.106***
	(0.014)	(0.010)	(0.013)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4.4. The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	104272.8	102803.8	104271.5	102798.7
Fixed Effects				
Intercept	9.508***	6.993***	9.607***	7.136***
	(0.299)	(0.297)	(0.315)	(0.310)
Age	0.734***	0.759***	0.734***	0.758***
	(0.008)	(0.008)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects				
Log of Early Maternal Employment Hours (per week)	-0.049*	-0.020	-0.041†	-0.009
	(0.023)	(0.023)	(0.024)	(0.024)
Log of Early Maternal Employment Hours (per week) × White				
Log of Early Maternal Employment Hours (per week) × Mother's AFQT Score				
Relative Care			-0.152	-0.066
			(0.242)	(0.228)
Non-Relative Care			-0.277	-0.456†
			(0.262)	(0.247)
Center or Other Care			-0.204	-0.574
			(0.383)	(0.360)
Female	1.201***	0.594**	1.200***	0.591**
	(0.182)	(0.185)	(0.182)	(0.185)
White	-0.727**	0.914***	-0.740**	0.904***
	(0.245)	(0.245)	(0.246)	(0.246)
Survey Wave	0.231*	0.295***	0.236*	0.305***
	(0.091)	(0.086)	(0.091)	(0.086)
Mother's AFQT Score	0.047***	0.051***	0.043***	0.052***
	(0.005)	(0.005)	(0.005)	(0.005)

Table 4.4 (continued). The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Mother's Age at Child's Birth	0.018	-0.032	0.018	-0.032
	(0.047)	(0.045)	(0.047)	(0.045)
Mother's Education at Child's Birth	0.258***	0.269***	0.262***	0.276***
	(0.059)	(0.056)	(0.059)	(0.056)
Log of Family Income at Child's Birth	0.111*	0.079†	0.115*	0.083†
	(0.047)	(0.045)	(0.047)	(0.045)
Number of Children at Child's Birth	-0.659***	-0.457***	-0.669***	-0.473***
	(0.092)	(0.093)	(0.093)	(0.093)
Married at Child's Birth	0.009	0.308	0.006	0.303
	(0.233)	(0.234)	(0.233)	(0.234)
Conditional Effects on Growth				
Log of Early Maternal Employment Hours (per week)	0.002**	0.001**	0.002**	0.001**
	(0.001)	(0.0005)	(0.001)	(0.0005)
Log of Early Maternal Employment Hours (per week) × Mother's AFQT Score				
Female	0.011**	-0.016***	0.011*	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)
White	0.013*	0.012*	0.013*	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score	0.001***	0.001***	0.001***	0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of Children at Child's Birth	-0.005*	0.000	-0.005*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Married at Child's Birth	0.019**	0.012*	0.018**	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)

Table 4.4 (continued). The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Random Effects				
Level-1 Residual	29.377***	32.816***	29.379***	32.822***
	(0.451)	(0.488)	(0.451)	(0.488)
Level-2 (Children within Families)				
Age	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)				
Initial Status	6.796***	5.524***	6.772***	5.457***
	(0.734)	(0.724)	(0.735)	(0.723)
Age	0.003***	0	0.003***	0
	(0.0005)		(0.0005)	
Covariance	0.144***	0.106***	0.144***	0.107***
	(0.012)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4.4 (continued). The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model C		Model D	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	104269.8	102798.6	104264.2	102795.9
Fixed Effects				
Intercept	9.622***	7.139***	9.618***	7.109***
	(0.315)	(0.311)	(0.316)	(0.311)
Age	0.734***	0.758***	0.736***	0.760***
	(0.008)	(0.008)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects				
Log of Early Maternal Employment Hours (per week)	-0.014	-0.003	-0.044†	-0.006
	(0.032)	(0.031)	(0.025)	(0.025)
Log of Early Maternal Employment Hours (per week) × White	-0.054	-0.011		
	(0.042)	(0.039)		
Log of Early Maternal Employment Hours (per week) × Mother's AFQT Score			-0.001	0.001
			(0.001)	(0.001)
Relative Care	-0.152	-0.07	-0.143	-0.069
	(0.242)	(0.228)	(0.242)	(0.228)
Non-Relative Care	-0.256	-0.452†	-0.239	-0.456†
	(0.262)	(0.247)	(0.263)	(0.247)
Center or Other Care	-0.196	-0.572	-0.173	-0.575
	(0.382)	(0.360)	(0.383)	(0.361)
Female	1.192***	0.590**	1.194***	0.596**
	(0.182)	(0.185)	(0.182)	(0.185)
White	-0.731**	0.905***	-0.745**	0.904***
	(0.246)	(0.246)	(0.246)	(0.246)
Survey Wave	0.239**	0.306***	0.236**	0.304***
	(0.091)	(0.086)	(0.091)	(0.086)
Mother's AFQT Score	0.047***	0.052***	0.048***	0.052***
	(0.005)	(0.005)	(0.005)	(0.005)

Table 4.4 (continued). The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model C		Model D	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Mother's Age at Child's Birth	0.017	-0.032	0.018	-0.031
	(0.047)	(0.045)	(0.047)	(0.045)
Mother's Education at Child's Birth	0.259***	0.275***	0.256***	0.276***
	(0.059)	(0.056)	(0.059)	(0.056)
Log of Family Income at Child's Birth	0.113*	0.083†	0.113*	0.084†
	(0.048)	(0.045)	(0.048)	(0.045)
Number of Children at Child's Birth	-0.668***	-0.473***	-0.674***	-0.475***
	(0.093)	(0.093)	(0.093)	(0.093)
Married at Child's Birth	-0.006	0.300	0.006	0.323
	(0.233)	(.0234)	(0.233)	(0.235)
Conditional Effects on Growth				
Log of Early Maternal Employment Hours (per week)	0.002*	0.001**	0.001*	0.001*
	(0.001)	(0.0005)	(0.001)	(0.0005)
Log of Early Maternal Employment Hours (per week) × Mother's AFQT Score			-0.00004*	-0.00003
			(0.00002)	(0.00002)
Female	0.011*	-0.016***	0.011*	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)
White	0.013*	0.012*	0.013*	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score	0.001***	0.001***	0.002***	0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of Children at Child's Birth	-0.005*	0.000	-0.005*	0.0002
	(0.002)	(0.002)	(0.002)	(0.002)
Married at Child's Birth	0.019**	0.012*	0.018**	0.011*
	(0.006)	(0.005)	(0.006)	(0.005)

Table 4.4 (continued). The Effects of Early Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model C		Model D	
	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M
Random Effects				
Level-1 Residual	29.382***	32.823***	29.377***	32.819***
	(0.451)	(0.488)	(0.451)	(0.488)
Level-2 (Children within Families)				
Age	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)				
Initial Status	6.754***	5.456***	6.761***	5.457***
	(0.734)	(0.723)	(0.734)	(0.723)
Age	0.003***	0	0.003***	0
	(0.0005)		(0.0005)	
Covariance	0.143***	0.107***	0.143***	0.107***
	(0.012)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4.5. The Effects of Current Maternal Employment on Children's Cognitive Development
(*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	104271.7	102803.1	104267.2	102795.2
Fixed Effects				
Intercept	9.561***	7.149***	9.566***	7.154***
	(0.316)	(0.311)	(0.316)	(0.310)
Age	0.735***	0.758***	0.735***	0.758***
	(0.008)	(0.008)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects				
Log of Current Maternal Employment	-0.052*	0.008	-0.033*	0.030†
Hours (per week)	(0.022)	(0.022)	(0.016)	(0.016)
Log of Early Maternal Employment			-0.026	-0.022
Hours (per week)			(0.025)	(0.025)
HOME Score				
Log of Current Family Income				
Relative Care	-0.101	-0.039	-0.112	-0.101
	(0.236)	(0.221)	(0.243)	(0.228)
Non-Relative Care	-0.235	-0.435†	-0.241	-0.488*
	(0.257)	(0.241)	(0.262)	(0.247)
Center or Other Care	-0.152	-0.556	-0.160	-0.611†
	(0.379)	(0.357)	(0.383)	(0.361)
Female	1.199***	0.583**	1.204***	0.587**
	(0.182)	(0.185)	(0.182)	(0.185)
White	-0.746**	0.929***	-0.754**	0.917***
	(0.247)	(0.246)	(0.247)	(0.246)
Survey Wave	0.233**	0.306***	0.234**	0.305***
	(0.091)	(0.086)	(0.091)	(0.862)

Table 4.5 (continued). The Effects of Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Mother's AFQT Score	0.047***	0.051***	0.048***	0.051***
	(0.005)	(0.005)	(0.005)	(0.005)
Mother's Age at Child's Birth	0.020	-0.034	0.020	-0.033
	(0.047)	(0.045)	(0.047)	(0.045)
Mother's Education at Child's Birth	0.268***	0.276***	0.266***	0.272***
	(0.059)	(0.056)	(0.059)	(0.056)
Log of Family Income at Child's Birth	0.116*	0.084†	0.116*	0.082†
	(0.047)	(0.045)	(0.048)	(0.045)
Number of Children at Child's Birth	-0.653***	-0.461	-0.665***	-0.477***
	(0.093)	(0.093)	(0.093)	(0.093)
Married at Child's Birth	-0.005	0.274	0.014	0.296
	(0.233)	(0.234)	(0.233)	(0.234)
Conditional Effects on Growth				
Log of Current Maternal Employment Hours (per week)	0.000	0.000		
	(0.000)	(0.000)		
Log of Early Maternal Employment Hours (per week)			0.001*	0.001**
			(0.001)	(0.0005)
Female	0.011*	-0.016***	0.011*	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)
White	0.012*	0.011*	0.013*	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score	0.002***	0.001***	0.001***	0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of Children at Child's Birth	-0.006*	-0.001	-0.005*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Married at Child's Birth	0.020***	0.013**	0.018**	0.012**
	(0.006)	(0.005)	(0.006)	(0.005)

Table 4.5 (continued). The Effects of Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model A		Model B	
	PIAT-RR	PIAT-M	PIAT-RR	PIAT-M
Random Effects				
Level-1 Residual	29.348***	32.830***	29.352***	32.827***
	(0.451)	(0.488)	(0.451)	(0.488)
Level-2 (Children within Families)	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)
Age	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)				
Initial Status	6.826***	5.416***	6.808***	5.407***
	(0.737)	(.722)	(0.736)	(0.722)
Age	0.003***	0	0.003***	0
	(0.0005)		(0.0005)	
Covariance	0.142***	0.107***	0.143***	0.107***
	(0.012)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4.5 (continued). The Effects of Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model C		Model D	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	104211.7	102721.7	104209.4	102721.7
Fixed Effects				
Intercept	9.882***	7.540***	9.865***	7.523***
	(0.317)	(0.311)	(0.317)	(0.311)
Age	0.731***	0.753***	0.731***	0.753***
	(0.008)	(0.008)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects				
Log of Current Maternal Employment Hours (per week)	-0.035*	0.028†	-0.032†	0.028†
	(0.016)	(0.016)	(0.016)	(0.016)
Log of Early Maternal Employment Hours (per week)	-0.031	-0.027	-0.030	-0.027
	(0.025)	(0.025)	(0.025)	(0.025)
HOME Score	0.035***	0.040***	0.035***	0.040***
	(0.005)	(0.005)	(0.005)	(0.005)
Log of Current Family Income			-0.047	-0.002
			(0.031)	(0.031)
Relative Care	-0.122	-0.116	-0.121	-0.116
	(0.242)	(0.227)	(0.242)	(0.227)
Non-Relative Care	-0.254	-0.508*	-0.252	-0.508*
	(.0261)	(0.245)	(0.261)	(0.245)
Center or Other Care	-0.137	-0.508†	-0.134	-0.593†
	(0.381)	(0.245)	(0.381)	(0.358)
Female	1.161***	0.536**	1.164***	0.537**
	(0.181)	(0.185)	(0.181)	(0.185)
White	-0.922***	0.724**	-0.925***	0.724**
	(0.246)	(0.244)	(0.246)	(0.244)
Survey Wave	0.269**	0.339***	0.270**	0.339***
	(0.091)	(0.085)	(0.091)	(0.085)

Table 4.5 (continued). The Effects of Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model C		Model D	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Mother's AFQT Score	0.043***	0.047***	0.044***	0.047***
	(0.005)	(0.005)	(0.005)	(0.005)
Mother's Age at Child's Birth	0.013	-0.037	0.014	-0.037
	(0.047)	(0.044)	(0.047)	(0.044)
Mother's Education at Child's Birth	0.232***	0.233***	0.234***	0.233***
	(0.059)	(0.055)	(0.059)	(0.055)
Log of Family Income at Child's Birth	0.103*	0.069	0.107*	0.069
	(0.047)	(0.044)	(0.047)	(0.044)
Number of Children at Child's Birth	-0.606***	-0.409***	-0.606***	-0.409***
	(0.093)	(0.093)	(0.009)	(0.093)
Married at Child's Birth	-0.128	0.117	-0.110	0.118
	(0.233)	(0.234)	(0.233)	(0.234)
Conditional Effects on Growth				
Log of Current Maternal Employment Hours (per week)	0.001*	0.001**	0.001*	0.001**
	(0.001)	(0.0005)	(0.001)	(0.0005)
Log of Early Maternal Employment Hours (per week)				
Female	0.011*	-0.016***	0.011***	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)
White	0.013*	0.012*	0.013***	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score	0.002***	0.001***	0.002***	0.001***
	(0.0001)	(0.0001)	(0.005)	(0.0001)
Number of Children at Child's Birth	-0.005*	0.000	-0.005*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)
Married at Child's Birth	0.019**	0.012**	0.019**	0.012**
	(0.006)	(0.005)	(0.006)	(0.005)

Table 4.5 (continued). The Effects of Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

Variable	Model C		Model D	
	PIAT-RR	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Random Effects				
Level-1 Residual	29.360***	32.870***	29.357***	32.870***
	(0.452)	(0.489)	(0.452)	(0.489)
Level-2 (Children within Families)				
Age	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)				
Initial Status	6.413***	4.840***	6.412***	4.841***
	(0.727)	(0.704)	(0.727)	(0.704)
Age	0.003***	0	0.003***	0
	(0.0005)		(0.0005)	
Covariance	0.138***	0.106***	0.138***	0.106***
	(0.012)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 4.6. The Effects of Interacting Race, Mother's AFQT Scores, and HOME Scores with Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	104204.7	102721.6	104201.6	102720.9	104201.1	102721.6
Fixed Effects						
Intercept	9.892***	7.536***	9.900***	7.550***	9.897***	7.536***
	(0.317)	(0.311)	(0.317)	(0.311)	(0.317)	(0.311)
Age	0.731***	0.754***	0.730***	0.753***	0.731***	0.754***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects						
Log of Current Maternal Employment Hours (per week)	0.001	0.025	-0.040*	0.026	-0.035*	0.029†
	(0.022)	(0.022)	(0.017)	(0.017)	(0.016)	(0.016)
Log of Early Maternal Employment Hours (per week)	-0.029	-0.027	-0.029	-0.027	-0.033	-0.027
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
HOME Score	0.035***	0.040***	0.035***	0.040***	0.033***	0.040***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Log of Current Family Income	-0.049	-0.002	-0.051	-0.004	-0.049	-0.002
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Log of Current Maternal Employment Hours (per week) × White	-0.065*	0.007				
	(0.030)	(0.030)				
Log of Current Maternal Employment Hours (per week) × Mother's AFQT Score			-0.002**	-0.001		
			(0.001)	(0.001)		
Log of Current Maternal Employment Hours (per week) × HOME Score					-0.002**	0.0002
					(0.001)	(0.001)
Relative Care	-0.121	-0.116	-0.106	-0.111	-0.113	-0.117
	(0.242)	(0.227)	(0.242)	(0.227)	(0.242)	(0.227)
Non-Relative Care	-0.236	-0.509*	-0.214	-0.496*	-0.230	-0.510*
	(0.261)	(0.245)	(0.261)	(0.245)	(0.261)	(0.245)

Table 4.6 (continued). The Effects of Interacting Race, Mother's AFQT Scores, and HOME Scores with Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Center or Other Care	-0.125	-0.595†	-0.010	-0.583	-0.120	-0.595†
	(0.381)	(0.358)	(0.381)	(0.358)	(0.381)	(0.358)
Female	1.161***	0.537**	1.164***	0.536**	1.162***	0.537**
	(0.181)	(0.185)	(0.181)	(0.185)	(0.181)	(0.185)
White	-0.948***	0.727**	-0.931***	0.723**	-0.938***	0.725**
	(0.246)	(0.244)	(0.246)	(0.244)	(0.246)	(0.244)
Survey Wave	0.273**	0.339***	0.271**	0.339***	0.268**	0.339***
	(0.091)	(0.085)	(0.090)	(0.085)	(0.091)	(0.085)
Mother's AFQT Score	0.044***	0.047***	0.043***	0.047***	0.044***	0.047***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mother's Age at Child's Birth	0.013	-0.037	0.014	-0.037	0.014	-0.037
	(0.047)	(0.044)	(0.047)	(0.044)	(0.047)	(0.044)
Mother's Education at Child's Birth	0.232***	0.234***	0.230***	0.232***	0.231***	0.234***
	(0.059)	(0.055)	(0.059)	(0.055)	(0.059)	(0.055)
Log of Family Income at Child's Birth	0.106*	0.069	0.103*	0.068	0.102*	0.069
	(0.047)	(0.044)	(0.047)	(0.044)	(0.047)	(0.045)
Number of Children at Child's Birth	-0.604***	-0.410***	-0.604***	-0.409***	-0.600***	-0.410***
	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)	(0.093)
Married at Child's Birth	-0.126	0.119	-0.139	0.108	-0.129	0.120
	(0.233)	(0.234)	(0.233)	(0.234)	(0.233)	(0.234)
Conditional Effects on Growth						
Log of Early Maternal Employment Hours (per week)	0.001*	0.001**	0.001*	0.001**	0.001*	0.001**
	(0.001)	(0.0005)	(0.001)	(0.0005)	(0.001)	(0.0005)
Female	0.011*	-0.016***	0.011*	-0.016***	0.011*	-0.016***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
White	0.014*	0.012*	0.014*	0.012*	0.014*	0.012*
	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
Mother's AFQT Score	0.002***	0.001***	0.002***	0.001***	0.002***	0.001***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Table 4.6 (continued). The Effects of Interacting Race, Mother's AFQT Scores, and HOME Scores with Current Maternal Employment on Children's Cognitive Development (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Number of Children at Child's Birth	-0.005*	0.000	-0.005*	0.000	-0.005*	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Married at Child's Birth	0.019**	0.012**	0.019**	0.012**	0.019**	0.012**
	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
Random Effects						
Level-1 Residual	29.359***	32.869***	29.364***	32.871***	29.341***	32.870***
	(0.452)	(0.489)	(0.452)	(0.489)	(0.451)	(0.489)
Level-2 (Children within Families)						
Age	0.012***	0.005***	0.012***	0.005***	0.012***	0.005***
	(0.001)	(0.0003)	(0.001)	(0.0003)	(0.001)	(0.0003)
Level-3 (Between Families)						
Initial Status	6.382***	4.841***	6.364***	4.850***	6.400***	4.839***
	(0.725)	(0.704)	(0.725)	(0.705)	(0.725)	(0.704)
Age	0.003***	0	0.003***	0	0.003***	0
	(0.0005)		(0.001)		(0.0005)	
Covariance	0.138***	0.106***	0.138***	0.106***	0.138***	0.106***
	(0.012)	(0.009)	(0.012)	(0.009)	(0.012)	(0.009)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 5.1. Summary Statistics for Relative Income Analysis Variables (*N*= 7,221 observations from 3,221 children of 1,724 mothers)

Variable	Mean or %	SD
PIAT-RR	39.903	19.253
PIAT-M	36.984	17.282
Age of Child (in months)	109.664	32.09
Mother's AFQT Score	45.321	26.987
Mother's Age at Child's Birth	25.167	4.42
Current Family Income[a]	62,277.16	75,940.15
Number of Children in Home	2.512	0.953
Mother's Education (in years)	13.187	2.314
Father's Education (in years)	13.015	2.539
Current Maternal Employment Hours (per week)	31.406	14.892
Current Paternal Employment Hours (per week)	44.705	10.125
HOME Score	103.582	12.529
Survey Wave	5.504	2.321
Female	0.484	
White	0.633	
Relative Income Dummies[b]		
Below 0.20	0.278	
$0.20 \leq RI < 0.40$	0.319	
$0.60 < RI \leq 0.80$	0.064	
Above 0.80	0.012	

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In analyses, continuous variables are centered at their mean value except Age of Child, which is deviated by 60. [a] This variable is transformed into its natural logarithm for all analyses. [b] Reference category is parity.

Table 5.2. Specifications of Three-Level Growth Curves for Children's Cognitive Development: Relative Income Analysis
(*N*= 7,221 observations from 3,221 children of 1,724 mothers)

Variable	PIAT-RR	PIAT-M
-2 Log Likelihood	49941.5	49219.1
Fixed Effects		
Intercept	9.645*** (0.195)	8.221*** (0.200)
Age	0.801*** (0.009)	0.797*** (0.008)
Age^2	-0.003*** (0.0001)	-0.003*** (0.0001)
Random Effects		
Level-1, Residual	28.977*** (0.688)	31.083*** (0.718)
Level-2 (Children within Families)		
Initial Status	0	0
Age	0.005*** (0.001)	0.001*** (0.001)
Covariance	0.191*** (0.023)	0.163*** (0.018)
Level-3 (Between Families)		
Initial Status	9.723*** (1.228)	11.100*** (1.298)
Age	0.007*** (0.001)	0.002*** (0.0005)
Covariance	0.130*** (0.023)	0.111*** (0.018)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60. Standard errors are in parentheses. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 5.3. The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores
(*N*= 7,221 observations from 3,221 children of 1,724 mothers)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	49494.5	48616.4	49478.0	48590.7	49469.4	48562.7
Fixed Effects						
Intercept	9.670***	7.655***	9.284***	7.208***	9.481***	7.551***
	(0.384)	(0.376)	(0.401)	(0.393)	(0.406)	(0.396)
Age	0.790***	0.788***	0.789***	0.787***	0.785***	0.780***
	(0.011)	(0.010)	(0.011)	(0.010)	(0.011)	(0.010)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects						
Female	1.494***	0.027	1.495***	0.030	1.467***	-0.029
	(0.214)	(0.200)	(0.214)	(0.200)	(0.214)	(0.199)
White	-0.840*	1.319***	-0.955**	1.136***	-1.047**	0.970**
	(0.333)	(0.333)	(0.334)	(0.334)	(0.335)	(0.334)
Survey Wave	0.266*	0.250*	0.281*	0.273*	0.318**	0.331***
	(0.122)	(0.115)	(0.122)	(0.114)	(0.122)	(0.114)
Mother's AFQT Score	0.050***	0.052***	0.050***	0.053***	0.049***	0.050***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Mother's Age at Child's	-0.065	-0.006	-0.068	-0.009	-0.074	-0.016
Birth	(0.064)	(0.060)	(0.063)	(0.060)	(0.063)	(0.059)
Mother's Education (in years)	0.114	0.021	0.129	0.045	0.117	0.024
	(0.082)	(0.081)	(0.082)	(0.081)	(0.082)	(0.081)
Father's Education (in years)	0.271***	0.366***	0.259***	0.344***	0.245***	0.319***
	(0.060)	(0.057)	(0.061)	(0.057)	(0.061)	(0.057)
Number of Children in Household	-0.686***	-0.361**	-0.704***	-0.415***	-0.670***	-0.358**
	(0.131)	(0.124)	(0.132)	(0.125)	(0.132)	(0.124)
Log of Current Family Income	0.044	0.023	0.041	0.040	-0.013	-0.055
	(0.185)	(0.180)	(0.185)	(0.0180)	(0.186)	(0.180)

Table 5.3 (continued). The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Relative Income Dummies [a]						
Below 0.20			0.633*	1.146***	0.613*	1.109***
			(0.259)	(0.252)	(0.259)	(0.252)
$0.20 \leq RI < 0.40$			0.824***	0.701**	0.807***	0.674**
			(0.224)	(0.221)	(0.224)	(0.221)
$0.60 < RI \leq 0.80$			0.573	0.662†	0.611	0.735†
			(0.388)	(0.381)	(0.389)	(0.381)
Above 0.80			-0.748	-0.971	-0.701	-0.887
			(0.812)	(0.789)	(0.812)	(0.788)
Below 0.20 × Log of Current Family Income						
$0.20 \leq RI < 0.40$ × Log of Current Family Income						
$0.60 < RI \leq 0.80$ × Log of Current Family Income						
Above 0.80 × Log of Current Family Income						
HOME Score					0.023**	0.042***
					(0.008)	(0.008)
Current Maternal Employment Hours (per week)						
Current Paternal Employment Hours (per week)						

Table 5.3 (continued). The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model A		Model B		Model C	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Conditional Effects on Growth						
White	0.024**	0.015*	0.025**	0.014*	0.025**	0.015*
	(0.009)	(0.007)	(0.009)	(0.007)	(0.009)	(0.007)
Mother's AFQT Score	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Mother's Education (in years)	0.005*	0.003†	0.004*	0.003†	0.005*	0.003†
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Random Effects						
Level-1 Residual	29.131***	31.428***	29.092***	31.393***	29.135***	31.448***
	(0.694)	(0.722)	(0.693)	(0.722)	(0.695)	(0.723)
Level-2 (Children within Families)						
Age	0.011***	0.005***	0.011***	0.005***	0.010***	0.005***
	(0.001)	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.0004)
Level-3 (Between Families)						
Initial Status	4.926***	4.486***	4.816***	4.293***	4.734***	4.049***
	(1.022)	(1.026)	(1.022)	(1.022)	(1.021)	(1.013)
Age	0.003***	0	0.003***	0	0.003***	0
	(0.001)		(0.001)		(0.001)	
Covariance	0.143***	0.103***	0.144***	0.102***	0.143***	0.101***
	(0.018)	(0.013)	(0.018)	(0.013)	(0.018)	(0.013)

Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses.

[a] Reference category is parity. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Table 5.3 (continued). The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores (*N*= 7,221 observations from 3,221 children of 1,724 mothers)

	Model D		Model E	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
-2 Log Likelihood	49464.1	48562.0	49456.8	48558.3
Fixed Effects				
Intercept	9.480***	7.593***	9.490***	7.598***
	(0.409)	(0.399)	(0.409)	(0.399)
Age	0.786***	0.780***	0.785***	0.781***
	(0.011)	(0.010)	(0.011)	(0.010)
Age^2	-0.003***	-0.003***	-0.003***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Main Effects				
Female	1.463***	-0.029	1.455***	-0.031
	(0.214)	(0.199)	(0.214)	(0.199)
White	-1.018**	0.959**	-1.029**	0.933**
	(0.335)	(0.334)	(0.335)	(0.334)
Survey Wave	0.319**	0.332**	0.327**	0.329**
	(0.122)	(0.114)	(0.122)	(0.114)
Mother's AFQT Score	0.049***	0.050***	0.049***	0.050***
	(0.007)	(0.007)	(0.007)	(0.007)
Mother's Age at Child's Birth	-0.075	-0.016	-0.074	-0.011
	(0.063)	(0.059)	(0.063)	(0.059)
Mother's Education (in years)	0.120	0.025	0.117	0.023
	(0.082)	(0.081)	(0.082)	(0.081)
Father's Education (in years)	0.242***	0.318***	0.243***	0.321***
	(0.061)	(0.057)	(0.061)	(0.057)
Number of Children in Household	-0.668***	-0.364**	-0.672***	-0.362**
	(0.132)	(0.125)	(0.132)	(0.125)
Log of Current Family Income	0.059	-0.034	-0.358	-0.138
	(0.190)	(0.184)	(0.290)	(0.285)

Table 5.3 (continued). The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

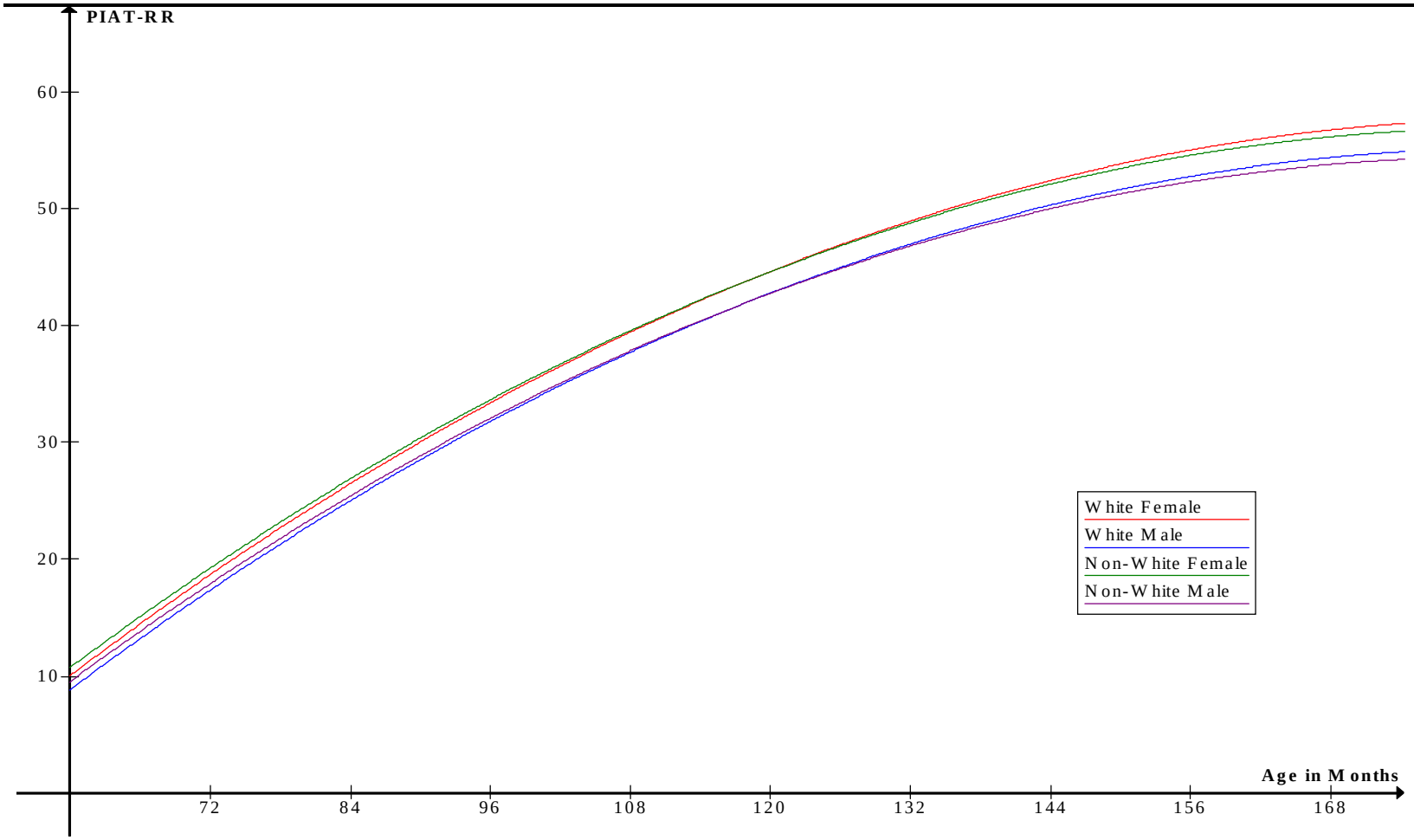
	Model D		Model E	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Relative Income Dummies[a]				
Below 0.20	0.539†	0.994***	0.533†	0.985***
	(0.297)	(0.291)	(0.300)	(0.293)
0.20 ≤ RI < 0.40	0.803***	0.642**	0.843***	0.638**
	(0.227)	(0.224)	(0.228)	(0.225)
0.60 < RI ≤ 0.80	0.563	0.749*	0.509	0.682†
	(0.389)	(0.382)	(0.391)	(0.383)
Above 0.80	-0.786	-0.876	-0.695	-0.688
	(0.812)	(0.789)	(0.845)	(0.821)
Below 0.20 × Log of Current Family Income			0.199	-0.016
			(0.358)	(0.349)
0.20 ≤ RI < 0.40 × Log of Current Family Income			0.747*	-0.006
			(0.339)	(0.335)
0.60 < RI ≤ 0.80 × Log of Current Family Income			0.855†	0.749
			(0.489)	(0.479)
Above 0.80 × Log of Current Family Income			0.996	1.082
			(1.140)	(1.083)
HOME Score	0.023**	0.041***	0.023**	0.042***
	(0.008)	(0.008)	(0.008)	(0.008)
Current Maternal Employment Hours (per week)	-0.007	-0.006	-0.007	-0.005
	(0.008)	(0.008)	(0.008)	(0.008)
Current Paternal Employment Hours (per week)	-0.019*	0.002	-0.019*	0.002
	(0.009)	(0.009)	(0.009)	(0.009)

Table 5.3 (continued). The Effects of Relative Income on Children's PIAT-RR and PIAT-M Scores (*N*= 15,239 observations from 5,089 children from 2,954 families)

	Model D		Model E	
Variable	**PIAT-RR**	**PIAT-M**	**PIAT-RR**	**PIAT-M**
Conditional Effects on Growth				
White	0.025**	0.015*	0.025**	0.015**
	(0.009)	(0.007)	(0.009)	(0.007)
Mother's AFQT Score	0.001***	0.001***	0.001***	0.001***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Mother's Education (in years)	0.004*	0.003†	0.004*	0.003†
	(0.002)	(0.002)	(0.002)	(0.002)
Random Effects				
Level-1 Residual	29.135***	31.452***	29.084***	31.422***
	(0.696)	(0.723)	(0.695)	(0.723)
Level-2 (Children within Families)				
Age	0.003***	0.005***	0.011***	0.005***
	(0.001)	(0.0004)	(0.001)	(0.0004)
Level-3 (Between Families)				
Initial Status	4.632***	4.031***	4.624***	4.027***
	(1.021)	(1.013)	(1.019)	(1.013)
Age	0.003***	0	0.003***	0
	(0.001)		(0.001)	
Covariance	0.141***	0.101***	0.142***	0.101***
	(0.018)	(0.013)	(0.018)	(0.013)

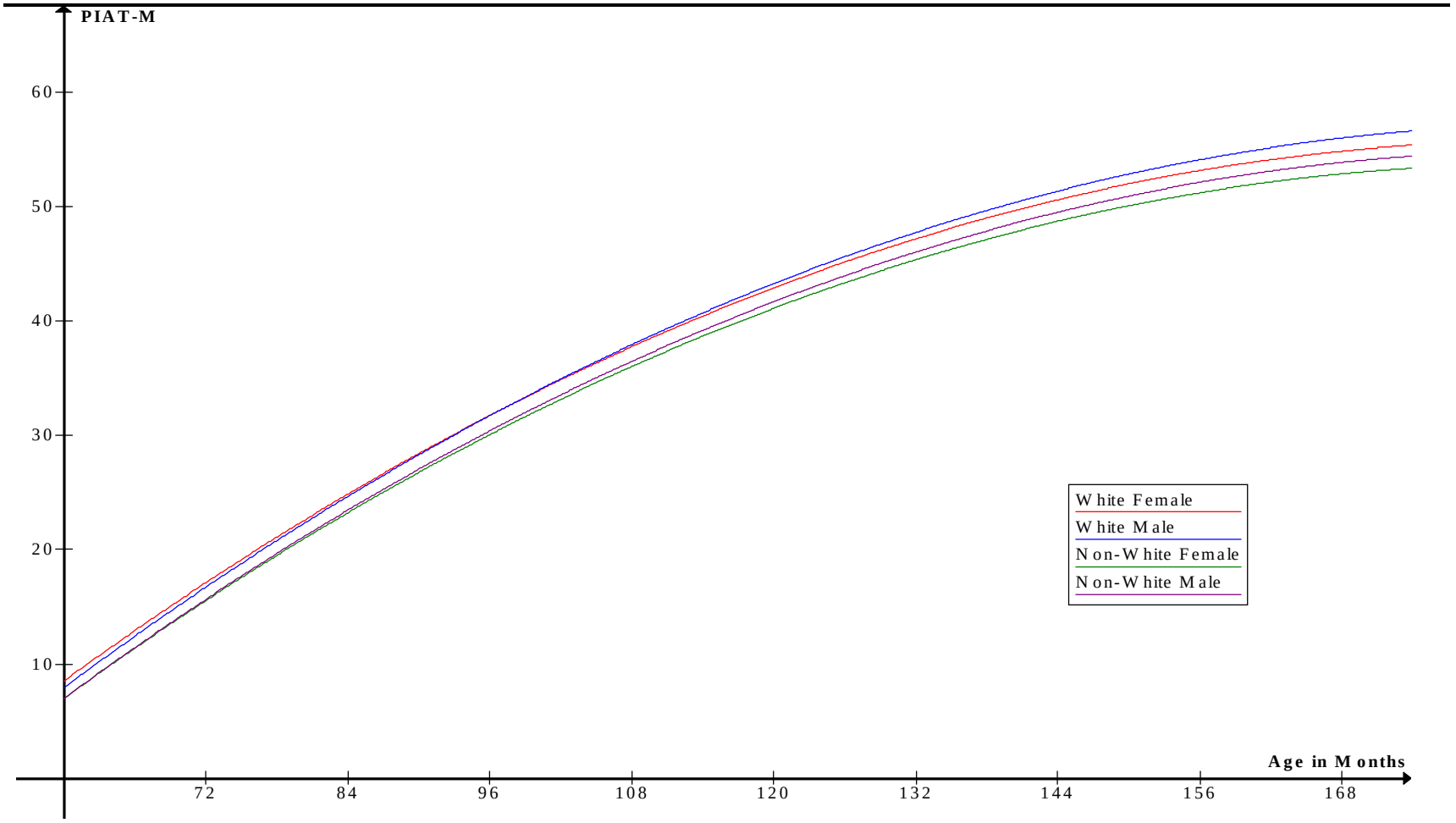
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: In all analyses, Age values are deviated by 60, and continuous variables are centered at their mean value. Standard errors are in parentheses. [a] Reference category is parity. $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$.

Figure 4.1. Descriptive Conditional Growth Curves for Children's PIAT-RR Scores



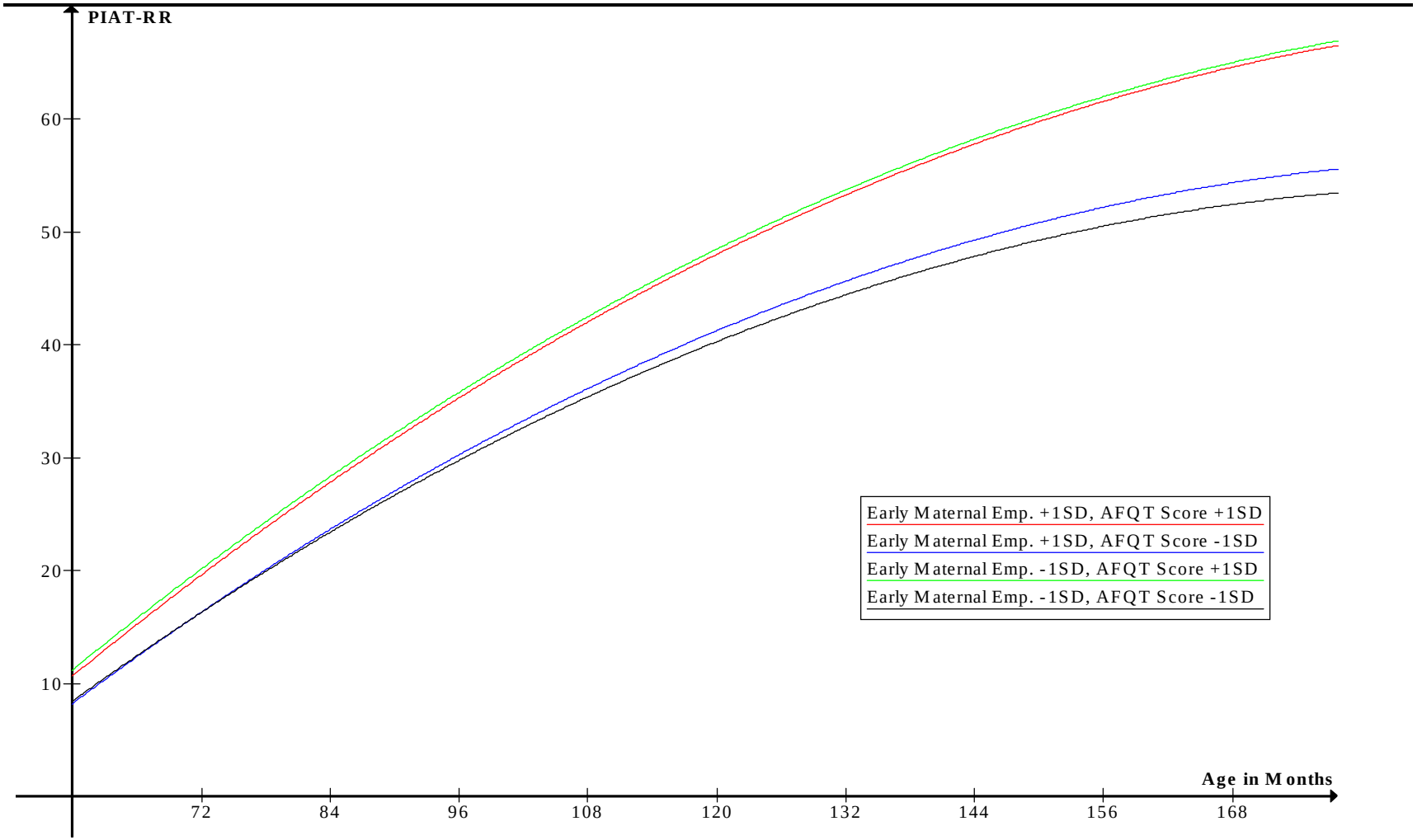
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model C in Table 4.3. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 0, and the y-axis crosses at x= 60.

Figure 4.2. Descriptive Conditional Growth Curves for Children's PIAT-M Scores



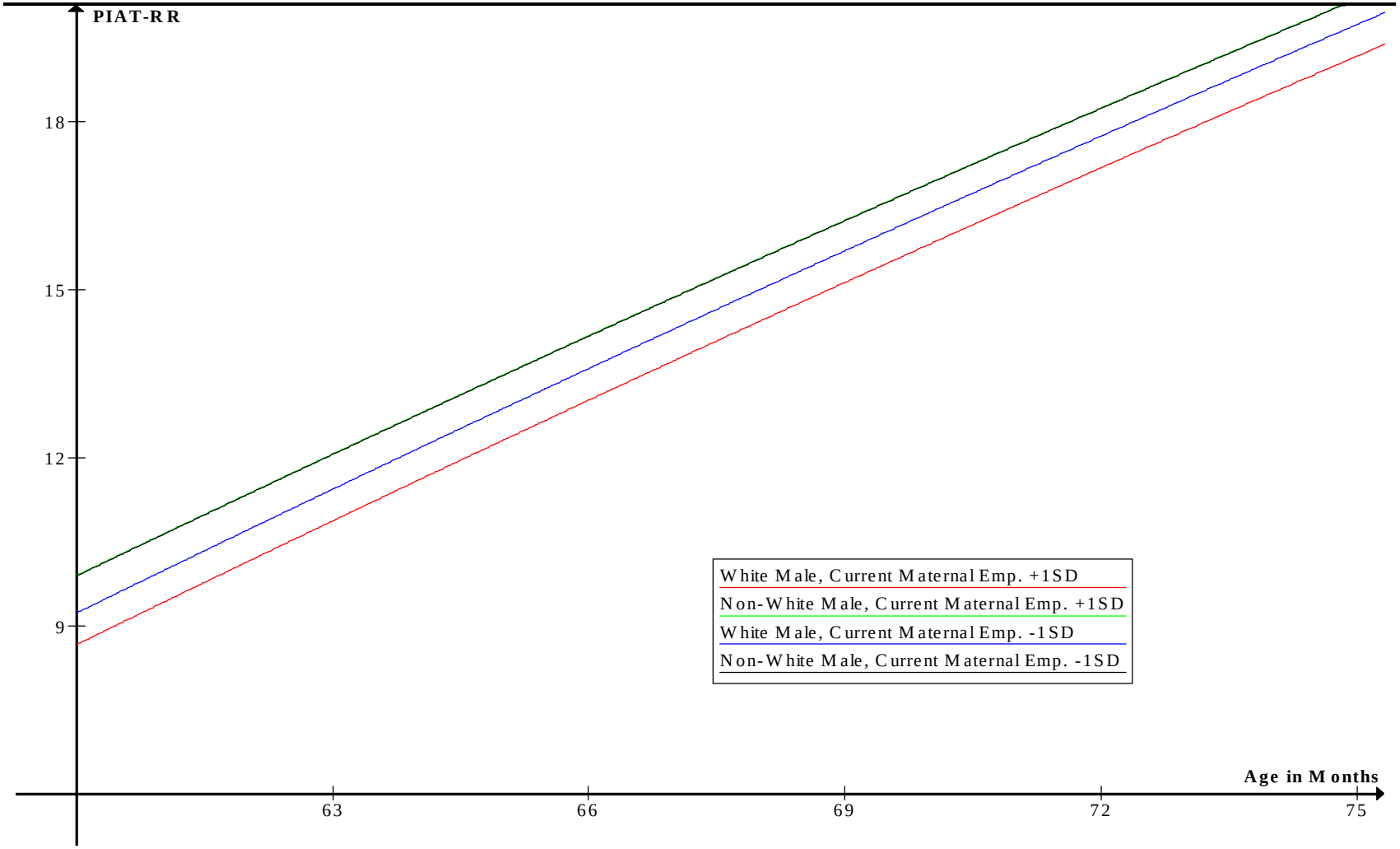
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model C in Table 4.3. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 0, and the y-axis crosses at x= 60.

Figure 4.3. The Effects of Early Maternal Employment on Children's PIAT-RR Scores Moderated by Mother's AFQT Scores



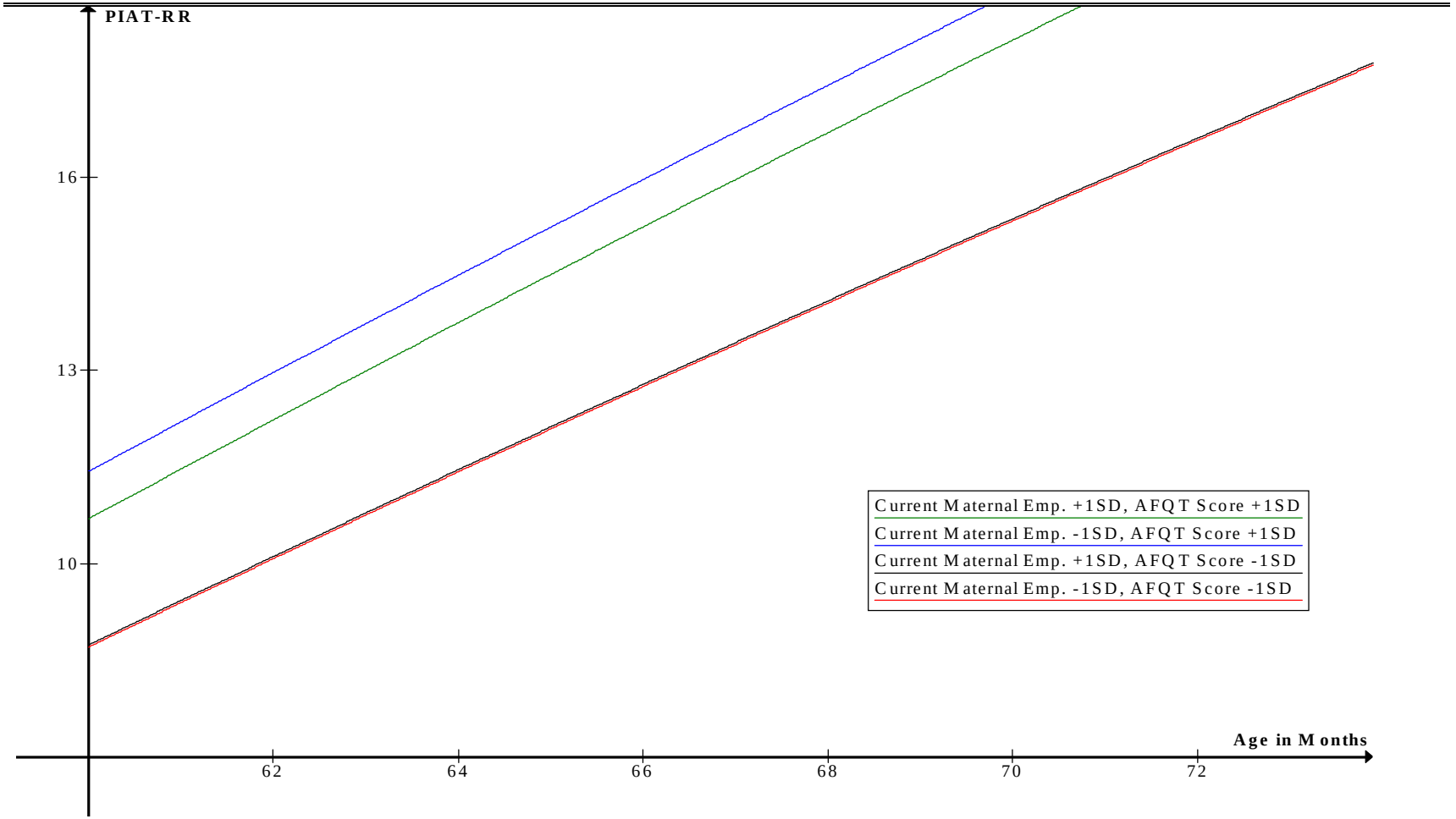
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model D in Table 4.4. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 0, and the y-axis crosses at x= 60.

Figure 4.4. The Effects of Current Maternal Employment on Children's PIAT-RR Scores Moderated by Race



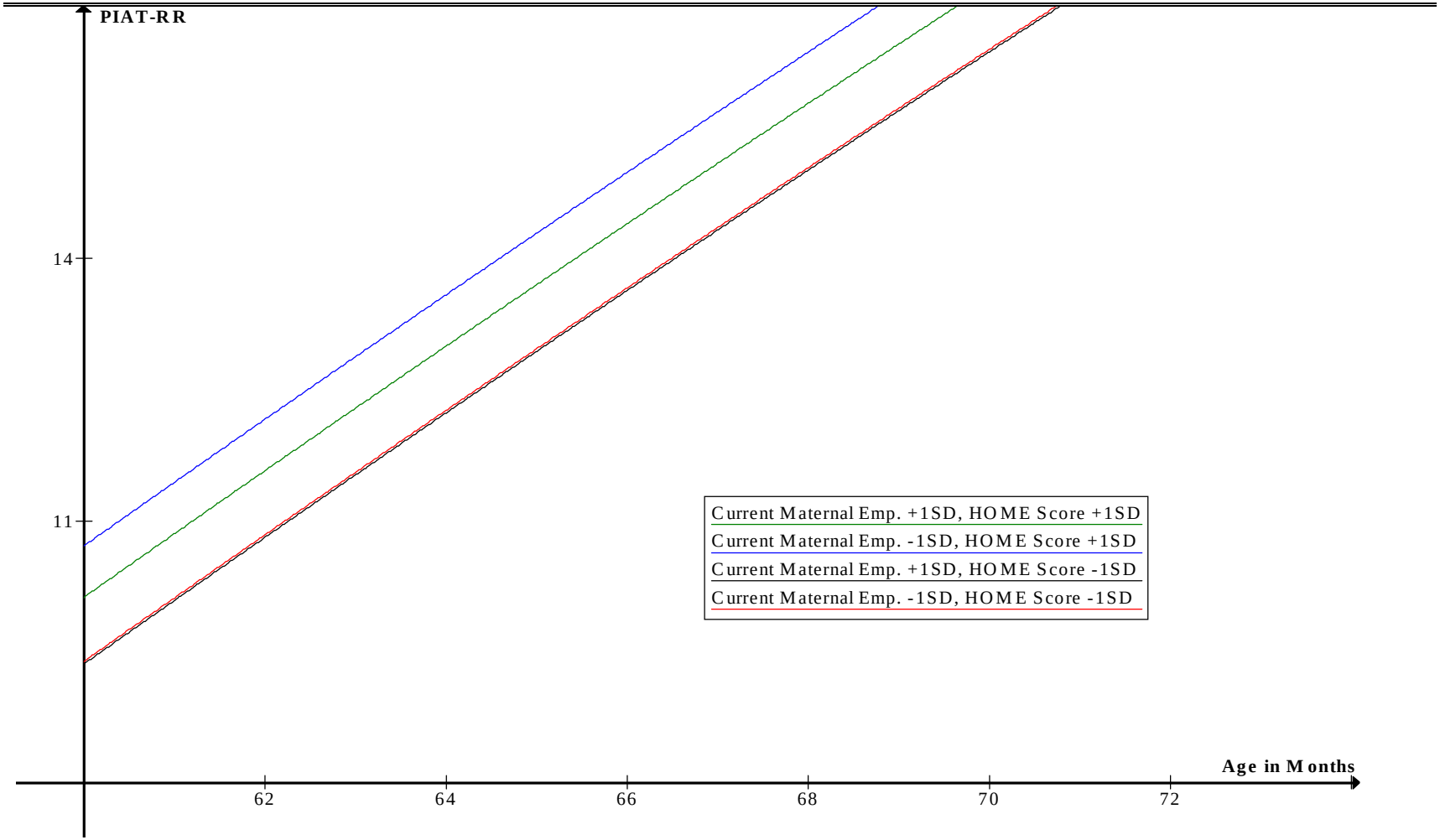
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model A in Table 4.6. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 6, and the y-axis crosses at x= 60.

Figure 4.5. The Effects of Current Maternal Employment on Children's PIAT-RR Scores Moderated by Mother's AFQT Score



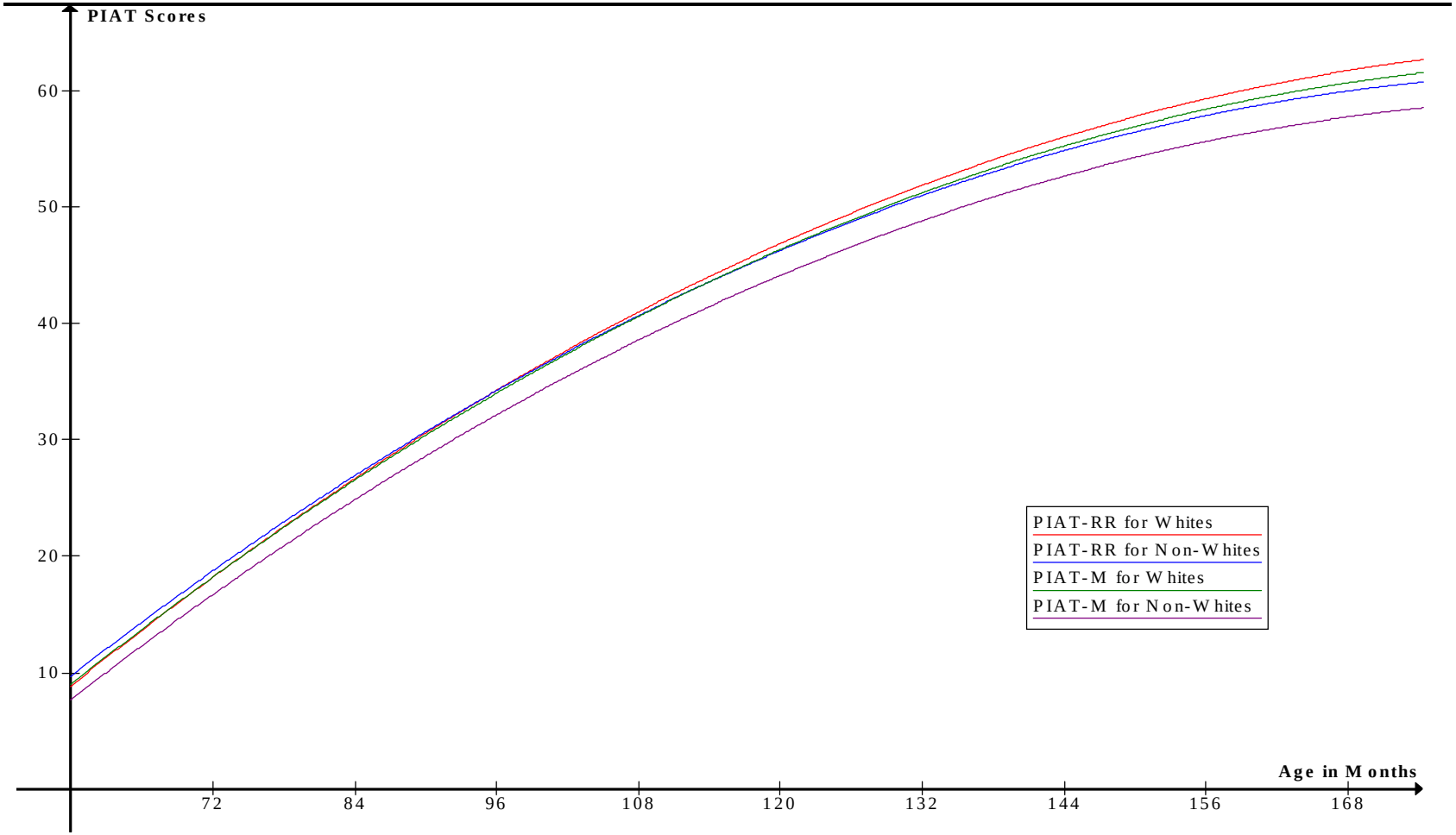
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model B in Table 4.6. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 7, and the y-axis crosses at x= 60.

Figure 4.6. The Effects of Current Maternal Employment on Children's PIAT-RR Scores Moderated by HOME Scores



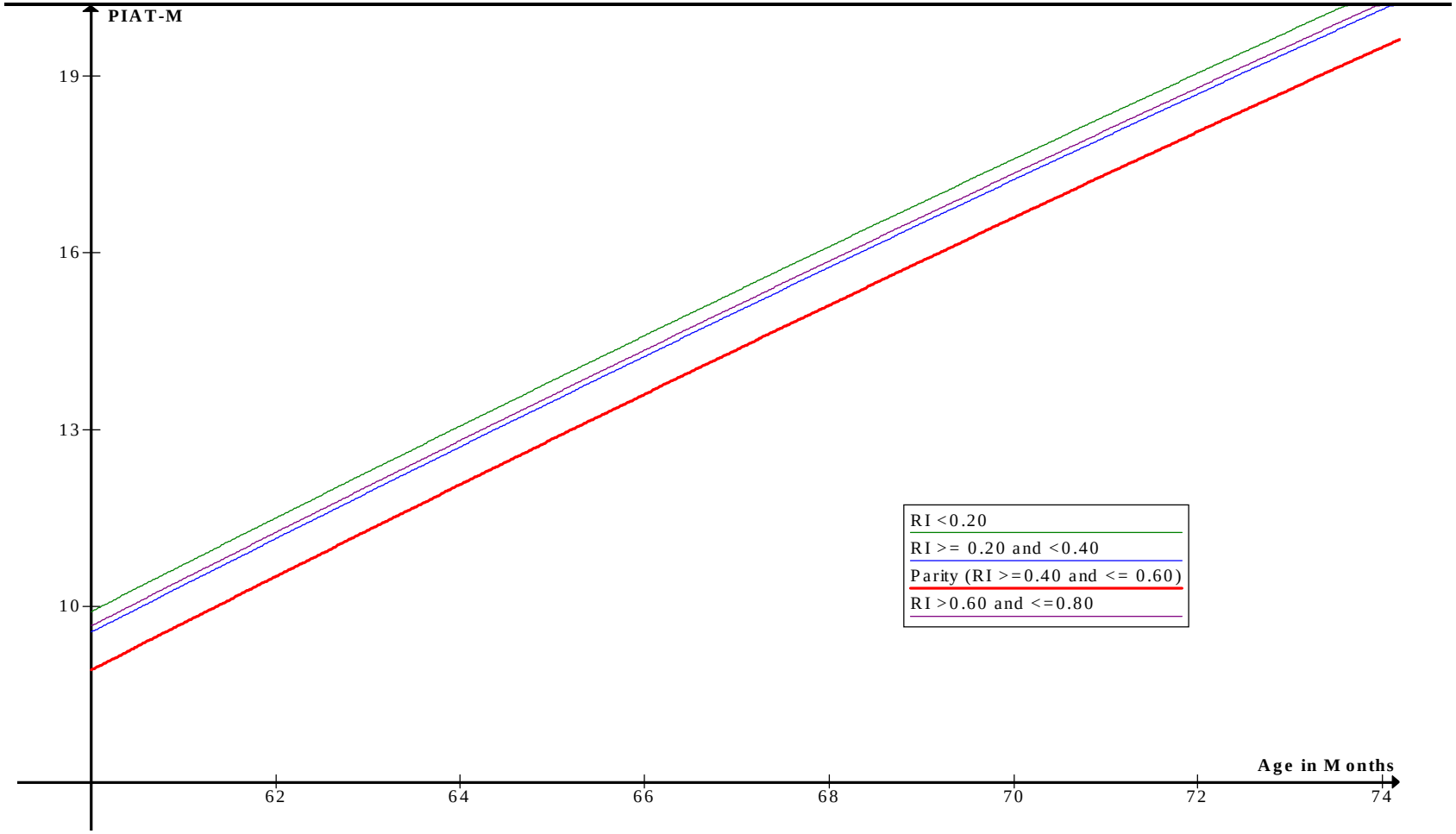
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model C in Table 4.6. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 8, and the y-axis crosses at x= 60.

Figure 5.1. Desciptive Conditional Growth Curves for Children's PIAT-RR and PIAT-M Scores



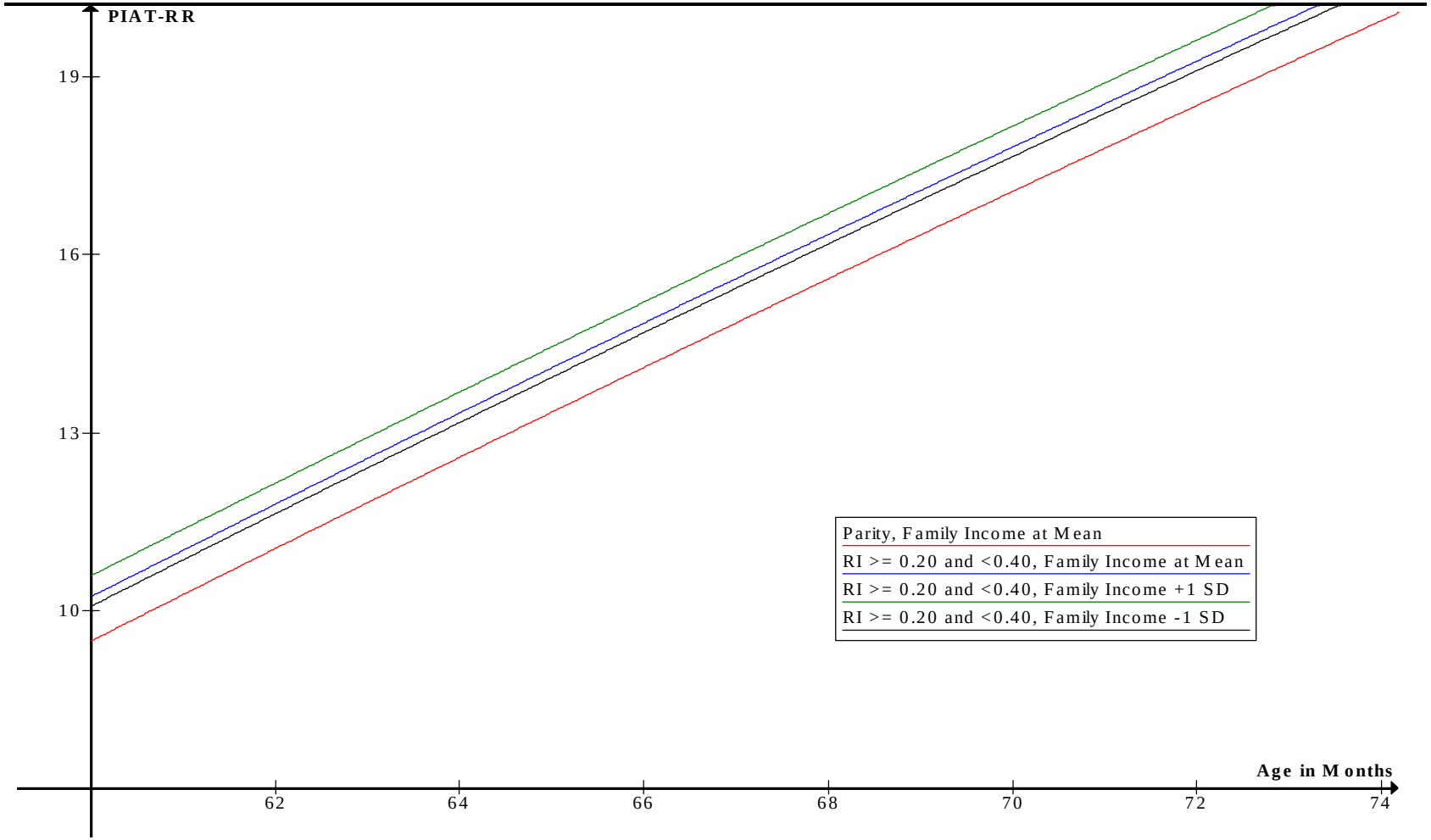
Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model A in Table 5.3. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 0, and the y-axis crosses at x= 60.

Figure 5.2. The Effects of Relative Income on Children's PIAT-M Scores



Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model D in Table 5.3. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 7, and the y-axis crosses at x= 60.

Figure 5.3. The Effects of Relative Income on Children's PIAT-RR Scores Moderated by Family Income



Source: 1986-2002 waves of the Children of the National Longitudinal Survey of Youth 1979 panel study. *Notes*: Displayed curves are based on results from Model E in Table 5.3. Unless noted, effects are presented at mean and reference category values. In this figure, the x-axis crosses at y= 7, and the y-axis crosses at x= 60.