1-1-2011

Family Policy, Family Resources, and Children's Educational Achievement: A Comparative Study of 18 Rich Countries

Yung Soo Lee
Washington University in St. Louis

WASHINGTON UNIVERSITY

George Warren Brown School of Social Work

Dissertation Examination Committee:
Nancy Morrow-Howell, Co-Chair
Shanta Pandey, Co-Chair
Garrett Duncan
Melissa Jonson-Reid
Michael Sherraden
Edward Spitznagel

FAMILY POLICY, FAMILY RESOURCES, AND CHILDREN'S EDUCATIONAL ACHIEVEMENT: A COMPARATIVE STUDY OF 18 RICH COUNTRIES

by

Yung Soo Lee

A dissertation presented to the
Graduate School of Arts and Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

August 2011
Saint Louis, Missouri

Abstract

Educational achievement among children is one of the most important concerns for most contemporary societies. While numerous studies have explored factors associated with children's educational achievement, little research fully incorporated multi-level, multi-faceted contexts of child education. More specifically, less attention has been paid to the role of macro-level, policy contexts and their interactions with various aspects of family-level resources. To help fill the gap in the literature, this study investigates (1) the role of various aspects of family-level resources, that is family financial, human, and social capital, in children's educational achievement, (2) mediating pathways among those family-level resources, and (3) the moderating role played by family policy contexts in the relationships between family-level resources and child achievement.

This study utilized data from the Program for International Student Assessment (PISA), large scale survey data containing information on students' academic achievement as well as other contextual information on students, families, and schools for 18 affluent countries. Data on family policy, derived from various other sources, were merged into the PISA. The dependent variable was standardized test scores of reading literacy. To measure various aspects of family-level resources, this study included a series of independent variables such as family financial capital (e.g., family income and wealth), human capital (parents' education), and social capital (e.g., maternal work, single-parent family, sibling size, parent-child interaction). Two alternative family policy measures were included as country-level, independent variables: (1) a series of single

family policy indicators, and (2) family policy regimes grouped based on characteristics of family policy settings using the hierarchical cluster analysis. Missing data were imputed using the Markov Chain Monte Carlo (MCMC) multiple imputation. Random-effect multilevel modeling was mainly employed, and, to address potential endogeneity in random-effect modeling, a series of alternative econometric procedures were used including fixed-effect multilevel modeling, the Hausman-Taylor estimator, and the Bartel's approach. Mediating pathways among family-level resources were tested using the Baron and Kenny's approach reformulated for multilevel modeling.

Study findings supported a significant role of family financial, human, and social capital in children's educational achievement. Further, family social capital (e.g., parent-child interactions) partially mediated relationships between other family-level resources and children's educational achievement. Findings also supported a positive role of family policy contexts; children in countries with generous family policy perform better in terms of reading achievement, compared to those in countries with weak family policy. Family policy contexts were also found to moderate the relationships between family-level resources and child achievement. For example, the negative impact of maternal full-time work on child achievement was mitigated by availability of generous family policies.

Findings from this study provide additional empirical evidence to understand multilevel, multifaceted contexts of child education. This study also provides policy implications for the United States; that is, study findings calls for introducing and expanding family policies building on the current policy measures to enhance children's educational achievement.

Acknowledgement

This dissertation is a profound reflection of the support, encouragement, and inspiration that I have received from so many over the years.

I thank the George Warren Brown School of Social Work and Washington University for allowing me access to the finest educational opportunity. I would like to express my special thanks to my co-chairs, Dr. Nancy Morrow-Howell and Dr. Shanta Pandey without whose guidance, extreme patience and support this work would never have been completed. Nancy has been the most generous and brilliant mentor, and an exemplary model of not just a scholar, mentor, and teacher but caring and engaging relationships with students and colleagues. Shanta has always provided thoughtful, constructive insights and guidance for this work, and encouraged me to keep on the track. I am also indebted to my committee members: Dr. Melissa Jonson-Reid, Dr. Michael Sherraden, Dr. Edward Spitznagel, and Dr. Garrett Duncan. They were willing to take time out of their busy schedules to read my work, to share their knowledge, and to offer constructive support and guidance. Their expertise truly enhanced the quality of this dissertation.

I would also like to thank other faculty and staff at the Brown School and Washington University: Dr. Martha Ozawa, Dr. Amanda Moore McBride, Dr. Carol Woods, Dr. Yunju Nam, and Ms. Lucinda Cobb. They have been very influential in my research, teaching, and overall education at this school. Many of my friends, fellow graduate students, and colleagues also deserve my sincere gratitude. They have listened to me and offered the advice, moral support, and encouragement that I needed to accomplish this work.

Of most importance, I am deeply grateful for my wife, Narae, our son, Jaein, and our entire family. Narae has been always accompanying and supporting me all along this journey not just as a wife but as a great colleague. Jaein has been such a joy that always makes us smile. He is and will be our greatest achievement. They are the reason that propels me to keep pursuing my career and goals. I dedicate this work to my parents, Jongtae Lee, Kyeongsok Kim, and my in-laws, Dr. Bokryong Shin, Myeonghwa Choi. They always provide me with love, great inspiration, and steadfast support throughout this process and over the years.

Table of Contents

Abstract ..... **ii**
Acknowledgement ..... **iv**
Table of Contents ..... **v**

I. Introduction **1**

II. Theory and Empirical Evidence **6**

2.1. The Effect of Family Financial and Human Capital 6
2.1.1 Investment Theory 7
2.1.2. "Good Parent" Theory 8
2.1.3. The Assets Perspective 10
2.1.4. Empirical Evidence 11
2.2. The Effect of Social Capital 16
2.2.1. Definition of Social Capital 17
2.2.2. The Role of Social Capital 18
2.2.3. Empirical Evidence 23
2.3. Family Policy and Children's education 26
2.3.1. Definition and Scope of Family Policy 27
2.3.2. Typologies of Welfare States: Models of Family Policy and Institutions 29
2.3.3. The Impact of Family Policy on Children's Educational Outcomes 35
2.3.4. Empirical Evidence 40

III. Conceptual Model **48**

3.1. Limitations of Current Literature and Contributions of This Study 48
3.1.1. Brief Summary of Literature review 48
3.1.2. Limitations Inherent in Current literature and Contributions of This Study 49
3.2. Proposed Conceptual Model 51
3.3. Research Questions and Hypotheses 54

IV. Method **56**

4.1. Data and Sample 56
4.2. Measurement 58
4.2.1. Dependent Variable 58

4.2.2. Independent Variable....60
4.2.3. Control Variable....65
4.3. Missing Data....67
4.4. Analytic Model and Statistical Procedures....68
4.4.1. Main Analytic Models and Statistical Procedures....69
4.4.2. Mediating Role of the Parent-Child Interaction....72
4.4.3. Consideration of Endogeneity in Random Effect Multilevel Modeling....72

V. Findings....76

5.1. Descriptive Statistics....76
5.2. The Impact of Family-Level Financial, Human, and Social Capital....81
5.3. The Mediating Role of the Quality of Family Social Capital....84
5.4. Correcting for Endogeneity....88
5.5. The Role of Family Policy Contexts....90
5.5.1. Hierarchical Cluster Analysis of Family Policy Regimes....90
5.5.2. The Direct Impact of Family Policy Indicators....96
5.5.3. Moderating Role of Family Policy Context....97

VI. Discussion....102

6.1. Discussion....102
6.1.1. The Effect of Family Financial, Human, and Social Capital....102
6.1.2. Mediating Role of Parent-Child Interaction....105
6.1.3. The Role of Family Policy Context....106
6.2. Limitations....111

VII. Implications and Conclusion....115

Reference....120

Appendix A. Descriptive Statistics for the Sample with Multiple Imputation....136
Appendix B. The Effect of Family Policy Contexts on Child Achievement....137
Appendix C. Regression Diagnostics for Multilevel Modeling....139

List of Figures

Figure 2-1. Investment Theory....8
Figure 2-2. "Good Parents" Theory....10
Figure 2-3. Dimensions and Models of Family Policy....34
Figure 2-4. The Relationship between Parental Income and Educational Outcome....37
Figure 3-1. Conceptual Model....53
Figure 5-1. Hierarchical Cluster Analysis of Family Policy Regimes....92
Figure C-1. Overall Level-1 Residual and Level-1 Residual for Each Level-2 Unit....136
Figure C-2. Variance of Level-1 Residuals for All Observations....139
Figure C-3. Plot of Level-1 Residuals versus Predicted Values....140
Figure C-4. Homogeneity of Variance Plot of Level-2 Errors....141
Figure C-5. Distribution of Level-2 Residuals....142
Figure C-6. Distribution of Mahalanobis Distances for Multivariate Outlier Analysis 143

List of Tables

Table 2-1. Leitner's Combination of Familialization and Defamilialization....32
Table 2-2. Policy Supports by Welfare State Regime Type....33
Table 4-1. Sample Size and Participation Rates across Countries....58
Table 4-2. Interpretation of Reading Literacy Score....60
Table 4-3. Definition and Source of Family Policy Indicators....63
Table 4-4. Variance Component Analysis and Intra-Class Correlations (ICC)....69
Table 5-1. Descriptive Statistics of Student and School-level Variables....79
Table 5-2. Family Policies across Industrialized Countries....80
Table 5-3. The Impact of Family Financial, Human, and Social Capital on Children's Educational Achievement....81
Table 5-4. The Impact of Family Financial, Human, and Social Capital on Parent-Child Interaction....84
Table 5-5. Sobel's Tests for the Significance of Mediating Effects....86
Table 5-6. The Impact of Family Financial, Human, and Social Capital on Children's Educational Achievement: Correcting for Endogeneity....88
Table 5-7. Characteristics of Family Policy Regimes....93
Table 5-8. Descriptive Statistics of Student and School-level Measures by Regimes....95
Table 5-9. The Role of Family Policy Contexts with Single Policy Indicator....96
Table 5-10. The Role of Family Policy Contexts with Family Policy Regime....100
Table A-1. Descriptive Statistics (after Multiple Imputation)....133
Table B-1. The Role of Family Policy Contexts: Standardized Coefficients....134

I. Introduction

Educational achievement during the school years is one of the most important concerns for most contemporary societies. Education is crucial for individuals as well as for the whole society. Numerous studies have reported that educational achievement during the school years is strongly linked to success in a later life (Alexander, Antwisle, & Horsey, 1997; Garnier, Stein, & Jacobs, 1997; Haveman & Wolfe, 1995; Lloyd, 1978). Education also benefits the whole society. First, education increases civic engagement and thereby contributes to a stable and democratic society (Friedman, 1962; Hall, 2006). A stable and democratic society is not possible without a minimum degree of literacy and knowledge on a common set of values, and education can contribute to both. Children are also human capital, one of the most important resources for a society's future; that is, highly educated workforce is vital for the nation's economic competitiveness and sustainability (Hanushek, 2002). Therefore, any efforts to enhance children's educational achievement are today's investment yielding future returns by producing a healthy, productive workforce and pool of citizens.

Children in the United States, however, do not fare well in terms of educational achievement. The nation-wide assessment of reading achievement indicates that over 30 percent of fourth-grade children are reading below the basic-level, and this is more so for low income, minority children (Lee, Grigg, & Donahue, 2007). International comparisons of child well-being also reveal that the United States ranked 21th of 25 rich countries in educational achievement at age 15 measured by average scores of reading, mathematical

and scientific literacy scores (UNICEF, 2007). The United States has substantial inequities in educational achievement; that is, the performance gap between the most- and least-proficient students is among the highest of all rich countries (Kirsch et al., 2007).

A long tradition of research has examined factors associated with children's educational outcomes, and much of this research concentrates on the role played by family-level background and resources. Parental income, wealth, and education, for example, has been found to be strong predictors of educational outcomes through increased investment in children's education or better parenting practices (Becker, 1991; Becker & Tomes, 1979, 1986; Conger, 2005; Conger et al., 1992; Conger, Conger & Martin, 2010; Duncan & Magnusson, 2003; Haveman & Wolfe, 1995; Leibowitz, 1977, 2003; Mayer, 2002; Shanks, 2007; Sherraden, 1991; Yeung & Conley, 2008; Yeung, Linver & Brooks-Gunn, 2002).

Recently, social capital theorists asserted that another type of family resources, social capital, plays a significant role in determining child well-being, especially human capital accumulation of children (Coleman, 1988). According to the social capital theory, social capital not only directly influences children's development and education, but plays an important role in transmitting positive impacts of parents' economic and human capital to the child. After Coleman's introduction of social capital, empirical research confirmed that social capital within the family (e.g., family structure, sibling size, mother's employment and parent-child bonds) and social capital outside the family (e.g., residential stability, bonds between parents and communities) were linked to various

educational outcomes of children (Coleman, 1988; Dika & Singh, 2002; McLanahan & Sandefur, 1994; Schlee, Mullis & Shriner, 2009). Studies further found that social capital mediates or moderates the relationship between family financial or human capital and educational outcomes of children (Coleman, 1988; Huang, 2008; Meier,1999; Teachman, Passch, & Carver, 1996; Sandefur, Meier, & Hernandez, 1999).

While these theories and empirical evidence have attained a high level of conceptual and technical sophistication, they are not without limitations. Theories and empirical research focusing on individual or family-level characteristics lack of other important consideration such as public policy contexts (Haveman & Wolfe, 1995; Phipps, 1999a).

The purpose of this study is to help fill this gap in our understanding of children's educational achievement among industrialized countries.[1] Account is still taken of family-level characteristics and resources, but the emphasis is on public policy contexts across countries, that is, cross-national variations in *family policies and institutions*. Welfare state policies and institutions are often assumed to be important for the shaping of individual well-being by affecting the living condition, actions, orientations, and, in a wide sense, the capabilities of individuals (Ferrarini, 2006). In relation to child well-being, family policies and institutions have been identified as being of central importance for affecting child outcomes in both direct and indirect ways.

[1] This study focuses on cross-national variations across industrialized countries such as Western European countries and the United States which have similar-levels of social, economic, and political development. In this dissertation, terms such as "industrialized", "rich", "affluent", or "OECD" countries are inter-changeably used.

While studies have examined how various types of family policies (e.g., income support for families and children, maternity/parental leave or early childhood education and care policy) influence children's educational outcomes, extant studies usually focus on a single policy intervention based on experiences of only one or, at most, a few countries. Further, few studies explicitly explored a possible moderating role of family policies in the relationship between family-level factors and educational outcomes of children.

Evidence indicates significant variation in the direction and magnitude of the effect of family background and family-level resources across countries. For instance, several studies examined the impact of family financial, human, and social capital on child education using survey data from multiple countries (Bassani, 2006; Park, 2005; Robert, 2003; Xu, 2008), and their findings suggest that the effect substantially differs across countries. These studies, however, compared limited number of countries without explicitly addressing cross-national differences in family policy contexts. Thus, empirical research that investigates the relevance of family policy contexts for explaining the variation in the relationship between family-level characteristics and resources, and educational outcomes of children is still needed. Considering this gap in literature, a few recent studies have tried to examine how the effect of family-level characteristics and resources on child education differs by public policy contexts (Park, 2005; Pong , Dronkers, & Hampden-Thompson, 2003; Xu, 2008). These studies, however, focus on only one or two family-level characteristics (e.g., single-parent family or number of

siblings); in addition, measures of public policy contexts and statistical approaches adopted in these studies still suffer from limitations.[2]

Based on the gap in the literature, the aims of this study are as follows: (1) to examine the direct, independent impact of different aspects of family-level resources, that is family financial, human, and social capital, on children's educational achievement, (2) to examine the mediating pathways among these family-level resources, and (3) to explore how family policy contexts directly affect children's educational achievement and how they interact with family financial, human, and social capital to influence children's educational achievement.

[2] These limitations are discussed in the method section (Chapter III) in more detail.

II. Theory and Empirical Evidence

This chapter reviews relevant theories and empirical evidence for this study. Theories relating family-level resources such as family income, wealth, parental education, and social capital to children's educational achievement are presented; empirical evidence related to these theoretical approaches is followed. As argued by Haveman and Wolfe (1995) and Phipps (1999a), theories and empirical studies emphasizing "families" lack one of important considerations, the public policy context. Addressing this missing link, this review discusses the role of family policy contexts in children's educational outcomes. All these theoretical approaches and empirical evidence are used to construct the extended conceptual model of this study in the next chapter.

2.1. The Effect of Family Financial and Human Capital

A considerable literature has explored the effect of family background on child's education, and family income and parental education have been reported to be strongest predictors of such an outcome. There are two competing theories on the role of parental income and education on children's educational achievement: (1) the investment theory, and (2) the "good parent" theory. While both theories predict that family income and parental education have positive impacts on child outcomes, they suggest different causal mechanisms. The former argues that family income and parental education increase the investments parents are able to make in their children's development, thus promoting educational achievement; the latter maintains that the effect of family income and

parental education on child's education is mediated through parenting practices or parental role models. Recently, a growing body of research has focused on the effect of family wealth (or assets) on children's educational outcomes, beyond those of family income or parental education. Thus, this review briefly introduces theories and empirical research with regard to the role of wealth or assets.

2.1.1 Investment Theory

The economic perspectives with respect to child outcomes are dominated by models in which individuals make utility-maximizing choices as most economic theories are. More specifically, they tend to focus on the parents' choices and behaviors in the family, and their effects on children's outcomes. The seminal work by Becker (1991) and Becker and Tomes (1979, 1986) argues that child outcome is the result of a genetic endowment transmitted by parents as well as parents' investment in children. First, children inherit genetic endowments from their parents - e.g., sex, race, educational and cultural endowments -, which translate into human capital, and into earnings when they participate in the labor market later. Second, and more importantly, parents make a decision with regard to the resource allocation in the family and other important family issues, based on an income constraint and their preferences. In this framework, child outcome is affected by the amounts of family resources allocated to children, the nature of these resources, and the timing of their distribution as well as other parents' choices. Leibowitz (1977, 2003) builds upon Becker's framework by introducing the idea that investments in children depend upon both the amount and quality of time parents spend with them as well as upon material investment. In this framework, the level of family

income and home investments in time and goods determine child's education. In sum, the investment theory emphasizes that child outcomes are a direct function of parental investment in children's human capital which is constraint by parental income or education.

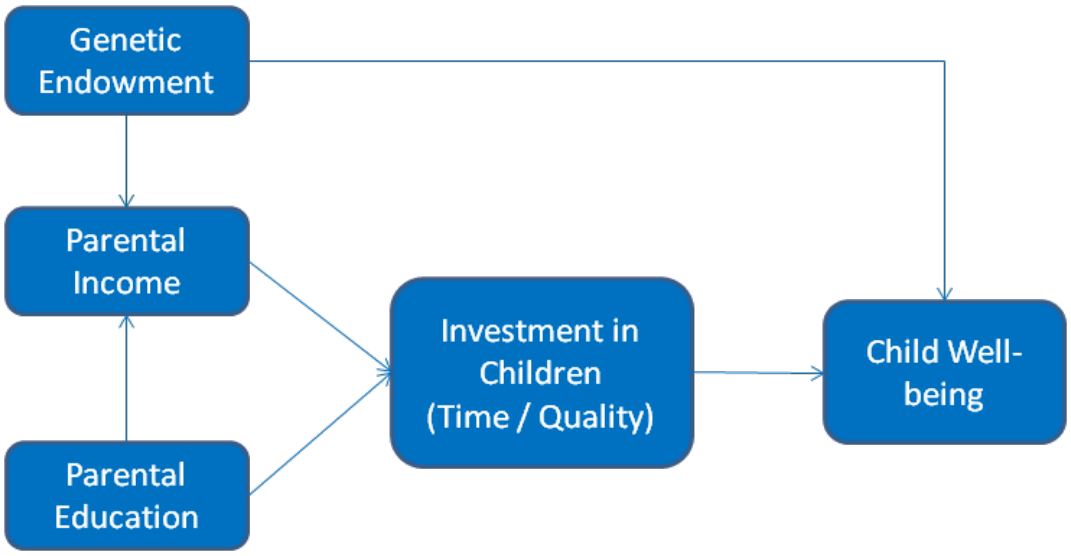


Figure 2-1. Investment Theory

2.1.2. "Good Parent" Theory

In contrast to the investment theory, the good parent theories maintain that low income and education negatively affect children because they reduce parents' ability be "good parents" (Mayer, 2002). There are at least two versions of the good parent theory: (1) the family stress theory, and (2) the socialization/role model theory. The family stress

model proposes that economic pressure caused by economic hardship has an adverse impact on parents' emotions, behaviors, and relationships, which in turn negatively affects their parenting skills or strategies (Conger, 2005; Conger & Conger, 2002; Conger, Conger, & Martin, 2010). That is, stress caused by economic hardship diminishes parents' ability to be supportive, consistent, and involved with their children, and poor parenting in turn hurts children's development (Conger, 2005; Chas-Lansdale & Pittman, 2002; Parker, Greer & Zuckerman, 1988; Mayer, 2002). The socialization/role model version of the good parent theory emphasizes the potential important effect of role models and socialization during the childhood or adolescent years on achievement (Haveman & Wolfe, 1995). As primary role models, parents' behaviors, norms, values, and aspirations are taken to directly affect child's educational outcome. However, parents with low SES often have developed values, norms and behaviors that are dysfunctional for success in the dominant culture, and, if these are transmitted to their children through socialization process, it may negatively influence their development (Mayer, 2002).

While the causal mechanisms explained by these theories are quite different from those emphasized by the investment theory, both suggest that family income or parental education can be positively linked to children's education outcomes.

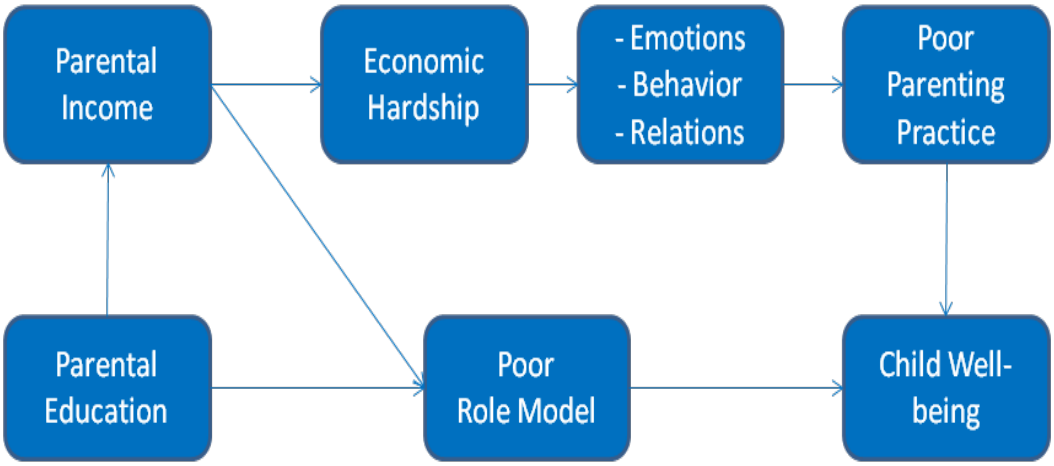


Figure 2-2. "Good Parents" Theory

2.1.3. The Assets Perspective

A growing attention has been paid to the role of family wealth or assets in children's educational outcomes, and theoretical perspectives and empirical research in this area suggest that family wealth or assets have significant, independent impacts on child outcomes, beyond those of family income or parental education.

Sherraden (1991) emphasizes that assets are more important than income for child outcomes because assets capture the long-term and dynamic process better than income or consumption. Assets have unique impacts on various domains of life chances and welfare of children as well as parents. Sherraden (1991) suggests nine potential effects of assets: (1) improving household stability, (2) creating future orientation, (3) promoting productivity and human capital, (4) enabling focus and specialization, (5) providing a foundation for risk-taking, (6) Increasing personal efficacy, (7) increasing the welfare of offspring, (8) increasing social influence, and (9) increasing political participation.

Wealth or assets can affect children's educational achievement, the main outcome of this study, in a variety of direct and indirect ways (Conley, 2001; Oliver & Shapiro, 1997; Orr, 2003; Paxton, 2001; Sherraden, 1991; Yeung & Conley, 2008). Wealth or assets allow parents to invest more in their children in a similar way income does. Assets may produce an additional flow of income (e.g., through interest or dividends from liquid assets) or minimize expenses (e.g., through homeownership), which allows parents to invest more in their children's education. Assets further offer a unique, positive impact on children's educational outcomes that income cannot provide because they can be used to finance a cost of college attendance or other high educational costs, and wealthy parents (or grand-parents) can make bequests to their children. Assets improve economic stability and financial security of households through buffering the short-term income shocks and economic hardship. To the extent that this is true, children in wealthy families may suffer less from the negative outcomes associated with frequent economic hardship. Family assets have positive psychological effects on the formation of future orientation and self-efficacy of children as well as parents that are important predictors of academic achievement. Wealth or assets also improve residential stability and enable families to live in better neighborhoods and school districts, all of which may positively influence children's educational achievement.

2.1.4. Empirical Evidence

After an extensive literature review, Mayer (2002) draws several conclusions on the role of family income: (1) a positive income effect exists and has consistently been reported, (2) permanent income has a greater effect on outcomes than current, short-term

income, (3) effects are stronger for children in low income families, and (4) the effect of income differs by children's ages; there is some evidence that income is more important during early childhood for educational outcomes.

Empirical evidence has consistently reported the positive impact of family income in the United States (Duncan, Brooks-Gunn, & Klebanov, 1994; Haveman & Wolfe, 1994; Mayer, 2002) and in other countries (e.g., Lefebvre & Merrigan, 1998 for Canadian children; Barker, & Maloney, 2000 for New Zealand children). There are, however, controversies among researchers on the channels through which the effect of family income are transmitted to children. Several studies suggest that family income affects children by influencing abilities of parents to invest in their children based on the investment theory (Bradley & Corwyn, 2002; Mayer, 1997). Others found that the effect of family income on children is mediated by a set of factors suggested by the family stress model or the role model/socialization theory such as parental stress, marital conflict parental beliefs, aspiration, parenting practices and so on (Conger, 2005; Conger et al., 1992; Davis-Kean, 2005). A limited number of studies examined two sets of mediators reflecting both the investment and the good parent perspective, and simultaneously tested those mediating effects in the same model (Guo & Harris, 2000; Klebanov, Brooks-Gunn, & Duncan, 1994; Yeung, Linver & Brooks-Gunn, 2002). For example, based on large US survey data, Panel Study of Income Dynamics (PSID), Yeung and her colleagues found that mediators drawn from the investment theory (e.g., stimulation learning environment) are more important for the children's academic development, and those drawn from the

family stress model (e.g., economic pressure, mothers' depression, parenting practices) are more related to children's behavioral outcomes.

In terms of the role of parental education, a large body of empirical research has consistently reported a significant, positive impact on various educational outcomes of children even after controlling for other family characteristics such as income (Behrman, 1997; Chevalier, 2004; Haveman & Wolfe, 1995). Highly educated mothers often have more interactions with their children, help their children's school work more (Tracey & Young, 2002), and have more knowledge about educational systems and thus provides more assistance to their children (Baker & Stevenson, 1986). All these mediators may lead to better educational outcomes of their children. The significant positive impact of parental education has also been found in other countries. For example, Ermisch and Francesconi (2001) found a significant relationship between parental education, family income, and educational attainment for British adolescent. Based on large-scale German survey data, Jenkins and Schluter (2002) found that parental education is positively linked to child's educational attainment, and effects of parental education are stronger than those of family income.

Although consistent, relatively strong effects of family income or parental education have been reported, many studies failed to control for unobserved family characteristics which may produce biased results. That is, if unobserved parental characteristics such as genetic inheritance or parents' cognitive ability affect both parental income/education and child outcomes (endogeneity problem), the estimated effect will be biased upwardly; thus it cannot be claimed as causal (Blau, 1999). To

overcome this problem, several studies estimated the effect using a series of fixed effect model, and found that the magnitude of income effects substantially declined (Blau, 1999; Brooks-Gunn, Klebanov & Duncan, 1996). Chevalier and his colleagues (2005) applied the instrumental variable approach to UK national survey data to overcome the endogeneity problem in family income and parental education. Their findings suggest that a positive, significant effect of parental education becomes non-significant when possible endogeneity of parental education is adjusted using the instrumental variable approach.

A growing number of empirical studies have explored the role of family wealth or assets in children's educational outcome, and they tend to find a significant impact, even after controlling for family income or parental education. Based on the Panel Study of Income Dynamics (PSID), Shanks (2007) found that families' net-worth was a significant correlate of children's academic achievement, when controlling for family income. Parental assets were also found to be significantly associated with other outcomes such as the years of schooling completed (Hill & Duncan, 1987; Conley, 2001), high school graduation, college enrollment and graduation (Nam & Huang, 2009). These studies further suggest that the effect of assets differ depending on the types of assets, types of outcomes, and the time period. According to the study conducted by Nam and Huang (2008) based on two different cohorts in the PSID, net-worth, controlling for income, is significantly associated with high school graduation and college enrollment for 1984 cohort; for the 1994 cohort, liquid assets are a significant predictor of high school graduation and college enrollment.

Several empirical studies explored mediating pathways in the relationship between parental assets and child educational outcomes focusing on potential mediators such as parental involvement, parental expectation and aspiration, home environment and so on. Using the sample from the National Survey of Families and Household (NSFH), Zhan and Sherraden (2003) tested the direct impact of parental assets measured by homeownership and saving with a cut-off amount of $3000 as well as the possible mediating role of parents' educational expectation. Their findings confirm a significant, positive impact of assets, after controlling for income; they also found that parents' educational expectation partially mediates the relationship between assets and the outcome. Using data from the National Longitudinal Survey of Youth (NLSY79), Orr (2003) found that the exposure to cultural opportunities such as extracurricular activities and outings mediated the effect of assets on children's academic achievement. Using the sample of school-aged and preschool children from the PSID, Yeung and Conley (2008) tested whether assets had a significant effect on children's academic achievement measured by reading and math scores. Their findings indicate that the effect of assets on child education can vary across different measures of assets, different types of outcome measures, and the child age. With regard to the mediating pathways, the evidence does not lend a strong support although potential mediators such as home environment, cognitively stimulating materials, parental warmth, and parental activities, private school attendance, and child's self-esteem were found to be associated with some of asset measures.

In sum, empirical evidence tends to support the positive role of family income, wealth (or assets), and parental education, consistent with theoretical expectations. The exact causal mechanism, however, needs to be further investigated. Empirical evidence further suggests that if the possible endogeneity in family financial and human capital is statistically considered, the magnitude of effect tends to decrease.

2.2. The Effect of Social Capital

Family financial capital (e.g., family income or wealth) and human capital (e.g., parental education) have been considered as two most important family background determining child well-being. Social capital theorists suggest a third type of capital – social capital – that may have an equally important effect on child outcomes, especially educational achievement. This section reviews the theoretical work and empirical evidence on social capital with regard to children's educational achievement. The concept of social capital is broad and several scholars have refined and developed it after the seminal work done by Coleman (1988, 1990) and Bourdieu (1985). However, this section mainly focuses on Coleman's work since it explicitly discusses the role of social capital in the context of children's human capital and most subsequent empirical studies have been based on Coleman's concept and measures of social capital.[3]

[3] Social capital is a broad concept and the initial work of Coleman (1988) or Bourdieu (1985) has been criticized and developed by other scholars. For more detailed discussion on these issues, see Dika & Singh (2002), Morrow (1999), Portes (1998, 2000), Putnam (2000), and Sandefur, Meier, & Hernandez (1999).

2.2.1. Definition of Social Capital

Although the use of the term, social capital, can be traced back to as early as 1920 (e.g., Hanifan, 1916), the initial theoretical development of the concept was done by Coleman (1988) and Bourdieu (1985). While theoretical roots and definitions of social capital differ between the two scholars, they share common features that social capital is a set of social resources inherent in the relationship between actors or among actors. For example, Bourdieu defines social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship (1985, p.248)." For Coleman, social capital can be defined by its functions. "It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether personal or corporate actors – within the structure (1988, p.98)." That is, social capital is resources people have access to and utilize in order to enhance their life chances or well-being; however, unlike financial or human capital, social capital inheres in the structure of relationships and connectedness between and among actors.

Coleman (1988) further identifies three different forms of social capital: (1) the level of trust which is evidence by obligations and expectations, (2) the information available from social networks and relations, and (3) the norms and sanctions that promotes the common good over self-interest. What each form of social capital has in common is that the investment that individuals create through involvement in social relations, and these investments generate social capital as a resource upon which

individuals may draw to enhance their well-being or opportunities (Fustenberg & Hughes, 1995).

2.2.2. The Role of Social Capital

Coleman was especially interested in the role of social capital in creating human capital of children. Coleman distinguished between social capital within the family and social capital outside the family (e.g., school or community), and suggests that both family social capital and social capital outside the family play crucial roles in enhancing children's educational outcomes (Coleman, 1988; Fustenberg & Hughes, 1995; Morrow, 1999).

Family Social Capital

Family social capital refers to the bonds and connectedness between parents and children that are useful in promoting various outcomes of child well-being. That is, family social capital reflects the time and attention that parents spend in interaction with children, in monitoring their activities, and in promoting child outcomes (Coleman, 1988; Parcel & Defur, 2001). While measures of family social capital slightly differ across studies, a common set of indicators includes parents' physical presence at home (e.g., two-parent family versus single-parent family, mothers' work outside the home), number of siblings, and other indicators measuring the quality and strength of relationships between parents and children such as parental expectation for or involvement in children's education.

Single-parent family may reflect the structural deficiency in social capital since a two-parent family have more time and resources; thus can provide more social support,

more information, and greater access to individuals and institutions outside the family than a single-parent family does (Astone et al., 1999; Coleman, 1988; Morrow, 1999; Winter, 2000). In the same vein, even though children are living in two-parent families, parental time and efforts transmitted to them will be diminished if both parents are working outside the home. Mothers' work outside the home, thus, weakens social capital inherent in the parent-child bond (Coleman, 1988) and, in addition, decreases social capital inherent in the relations among parents, neighbors and schools (Parcel & Menaghan, 1994).[4] The number of siblings represents a dilution of resources to the child. A large number of siblings dilutes the amount of parental time, attention, and other resources per child (Blake, 1981), thus making it more difficult for parents to develop tools to acquire greater social capital.

While measures such as parents' physical presence at home and the number of siblings reflect the "structural" deficiency of social capital, other indicators measuring the relationships and bonds between parents and children may represent the "quality" of social capital (Meier, 1999; Sandefur, Meier, & Hernandez, 1999). Even though parents are physically present or a sibling size is small, there is a lack of social capital in the

[4] It is worth to note that theoretical linkage between maternal employment and children's educational outcome can be explained based on the two competing theories discussed in the previous section as well (Moore & Schmidt, 2004). On the one hand, based on the investment theory, more income resulting from mother's employment makes it possible for parents to invest more resources in their children, which in turn positively affects child outcomes. However, the good parent theory suggests a possible negative relationship between maternal employment and child outcomes. That is, working mothers usually have a dual job of childrearing and work in the labor market. Under this circumstance, the allocation of maternal time to the labor market comes at the expense of time invested in childrearing, which may negatively influence child outcomes (Moore & Schmidt, 2004; Verropoulou & Joshi, 2006). Further, mother's work in the labor market may cause psychological stress, and this stress diminishes mothers' ability to be supportive, consistent, and involved with their children (Kalil & Ziol-Guest, 2005).

family if the quality or strength of relationships between parents and children are weak (Coleman, 1988). Thus, measures such as parental expectation for or involvement in children's education, frequencies of discussion on the school work, and parents' assistance in school work can be used for the indicators of family social capital.

Social Capital outside the Family

Social capital can be extended to the resources from schools or communities, and this social capital outside the family is also a key to child development (Furstenberg & Hughes, 1995). As argued by Coleman (1988), family relationships can be most effective for reinforcing group norms and sanctioning non-reciprocal behavior when the family is embedded within a network of dense community ties. If families are part of a community with dense social ties and common values, parents may rely upon the support and assistance from others (Furstenberg & Hughes, 1995).

Coleman (1988) considers residential stability as an important structural attribute of social capital outside the family. Residential instability can disrupt local relationships, thereby reducing social capital available from members outside the family. Another example of social capital outside the family with regard to children's educational achievement includes the relationships between children and adult residents in the community (Israel, Beaulieu, & Hartless, 2001). Adult-child relationships provide children with opportunities to shape their norms, values, and aspirations. Further, adults' involvement based on these relationships creates a "caring community", where a social support is provided for children to maximize their development (Lerner, 1995).

Other researchers focus on school social capital as a primary source of social capital in relation to children's educational achievement. School is another importance source of social capital since the school is the dominant extra-familial institution in the early life course, and it is a primary site for social interactions for young people (Schneider & Coleman, 1993; Crosnoe, 2004). Social capital associated with schools refers to bonds or connections between parents and school (Parcel & Dufur, 2001) and those between children and school climate and teachers (Crosnoe, 2004; Putnam, 2000). Agents in the school such as teachers, other parents, and peer students possess valuable resources for children's academic development. Since these resources are often limited, a good relationship among parents, children, and those agents become precious assets.

Mediating and Moderating Pathways

Social capital theorists further argue that family-level resources such as family income/wealth, parental education, and social capital within the family interact to influence children's educational outcomes. That is, social capital not only directly influences child outcomes, but it also affects the ability of parents to pass on the benefits of financial and human capital to their children (Coleman, 1988; Sandefur, Meier & Hernandez, 1999). If financial or human capital possessed by parents is not complemented by social capital in the family, it might be less relevant to the child's educational growth (Coleman, 1988; Teachman, Passch & Carver, 1996).

There are also possible interactions between different levels of social capital. As well pointed out by Crosnoe (2004) and Parcel & Dufur (2001), family and school social capital have been considered as independent contexts, but the interactions are crucial

parts of children's academic development. When interactions occur, one of three effects may results: boost effect, a double jeopardy effect, or a mitigating effect (Bassani. 2008). The boost effect occurs when high levels of social capital both in family and school interact to create rich network of social capital, thereby boosting children's educational achievement. In contrast, a double jeopardy effect occurs in the opposite situation. Last, a mitigating effect occurs when high levels of social capital in family positively compensate the negative effect of low social capital in school or vice versa. Even though children are from families with low levels of social capital, the negative effect can be mitigated by attending schools with high levels of social capital.

The social capital theorists also posit the mediating pathways among different aspects of family-level resources.[5] For example, measures of family social capital such as parent-child interaction, parental aspiration, parental-school connectivity and parental assistance to the school work may mediate the effect of family financial and human capital on children's educational outcomes (Astone & McLanahan, 1991; McNeal, 1999; Meier, 1999; Useem, 1992). That is, lower income, less educated, minority parents may be less involved in their child's education and less prepared to help their child academically, which in turn leads to poor academic achievement of children.

Similarly, the quality of family social capital may mediate the relationship between the structural deficiency of social capital and children's educational achievement.

[5] As reviewed in previous sections, the family stress model also suggests that the effect of parental income or education on children's educational outcomes can be mediated by parents' emotions, behaviors, and relations. Thus, the mediating role of family social capital in the relationship between family financial and human capital, and child education can be understood within the framework of the family stress model as well as the social capital theory.

As suggested by Coleman (1988), measures such as single-parent family, large sibling size, or maternal employment represent structural deficiency of family social capital, and to the extent that this is true, the quantity and quality of family social capital are lower for these families (Meier, 1999).

2.2.3. Empirical Evidence

It had been an important research topic to examine the effect of social capital measures (e.g., single-parent family, sibling size, or maternal employment) even before social capital theory was introduced by Coleman (1988) or Bourdieu (1985). Several studies have tested the relationships between these social capital measures and educational outcome without explicitly applying social capital theory. For example, children from two-parent families perform better in their school achievement than those from broken families (Blau & Duncan, 1967; McNarahan & Sandefur, 1994). Children's achievement is also negatively associated with number of siblings (Blake, 1981; Downey, 1995) and maternal work outside the home (Han, Waldfogel, & Brooks-Gunn, 2001; Joshi & Verropoulou, 2006; Ram, Abada, & Hou, 2004; Ruhm, 2004; Waldfogel, Han, & Brooks-Gunn, 2002). Although these studies did not explicitly utilize social capital theory, the results are consistent with the social capital theory.

Coleman (1988) used High School and Beyond (HSB) data to empirically test his own theory. He found that presence of two parents at home, lower number of siblings, higher educational expectation of parents, and intergeneration closure, residential stability, and attending Catholic schools were significantly related to positive school outcomes.

After Coleman's introduction of social capital theory, most empirical research in this area has been devoted to replicate the Coleman's studies using large-scale US survey data such as National Educational Longitudinal Study (NELS). Dika and Singh (2002), based on the extensive literature review, conclude that those studies tend to provide supporting evidence on the positive role of social capital in the United States. Possible interactions between family human capital, family financial capital, and social capital suggested by Coleman (1988) are also empirically supported. For example, using the NELS data, Teachman and his colleagues (1996) found that human capital and financial capital at home were more easily transmitted to children's school success when social capital was present.

Other researchers explore possible interaction effects between different levels of social capital: family, school, and community social capital (Crosnoe, 2004; Israel, Beaulieu & Hartless, 2001; Parcel & Dufur, 2001). Using a nationally representative sample of US children from the National Longitudinal Study of Adolescent Health data, Crosnoe (2004) found that both family and school social capital have a positive impact on achievement as consistent with previous research. Further, a significant interaction effect between family and school social capital suggests that children from families with high-level of social capital benefit more from school social capital. Bassani (2008) found similar results in her study of Canadian children. Multilevel analysis of Canadian data from the 2000 Programme for International Student Assessment (PISA) revealed that family social capital (e.g., number of sibling, family structure, family interaction) and school social capital (e.g., attending public schools, mean social economic status of the

student body, classroom disruption) had a significant impact on students' reading scores, consistent with previous literature. More importantly, she found that interaction effects, more specifically a boosting effect and a double jeopardy effect, between family and school social capital were partly supported.

Instead of these moderating effects of social capital, empirical studies often suggest that family social capital mediates the impact of financial and human capital in families on children's educational achievement (Astone & McLanahan, 1991; Bogenschneider, 1997; Huang, 2008; Lareau, 1989; McNeal, 1999; Yeung & Conley, 2008; Zhan, 2006; Zhan & Sherraden, 2003). Huang (2007), for example, investigated the mediating role of parent-child interactions in the relationship between family human and economic capital and children's achievement in Norway. His findings demonstrate that family human and economic capital positively influence child-parent interactions, which in turn have a strong positive effect on students' achievement. Others also found that lower income, less educated parents are less likely to be involved in and interact with their child (Lareau, 1989; McNeal, 1999). Several researchers explicitly differentiate family income and wealth, and have shown that family wealth has an independent effect on child education; further, measures of family social capital such as parental involvement mediate this significant relationship (Orr, 2003; Zhan, 2006; Zhan & Sherraden, 2003).

A few studies further refine the concept of social capital, and test more complex relationships between several dimensions of social capital (Meier, 1999; Sandefur, Meier, & Hernandez, 1999). Sandefur and his associates differentiate three aspects of social

capital: the forms of social capital (e.g., family structure, residential stability), the quality of social capital (intergeneration closure, students' perception of school/teachers), and assistance provided by forms of social capital (e.g., parent-child bonds measured by family discussion of school activities). Their findings based on NELS data suggest that these social capital measures not only directly influence children's academic achievement, but the effect of forms of social capital is mediated by the quality of social capital and assistance provided by forms of social capital.

One of the important findings from empirical evidence, especially with regard to the purpose of the current study, includes the possibility of differential relationship between social capital and educational outcomes across countries. Bassani (2006) tested the role of family and school social capital for youths' math scores in three developed countries: the United States, Canada, and Japan. While the direction of relationships was consistent across three countries, the magnitude and significance of relationships differed across countries; the impact was strongest in the United States and the opposite was true for Japan. Using the same PISA data for 27 industrialized countries, Robert (2003) shows that there is a variation in the magnitude and direction of relationships between social capital measures and students' academic achievement.

2.3. Family Policy and children's education

Although theories linking family or school-level characteristics to children's educational outcomes provide useful tools to understand children's educational achievement, one important link is still missing. As pointed out by Phipps (1999a),

family-focused approach somewhat ignore the importance of broad institutional contexts (e.g., public policies, macro-economic environments and other social, political contexts). Goldberger (1989) also argues that, while the economic perspectives on child well-being provide testable hypothesis regarding the effect of a few family-based determinants of investments in children, it does not provide an empirical guidance beyond that.

This study posits that states' family policies and institutions play a crucial role in determining such an outcome. As discussed below, family policy contexts across countries not only directly influence children's educational outcome, but interact with other family-level characteristics and resources.

2.3.1. Definition and Scope of Family Policy

Almost all industrialized countries have family policies designed to provide income support and social services to families and children. The term, family policy, has been differently defined and measured among researchers. For instance, family policy is a term used to describe what government does to and for families, in particular those public policies that are explicitly designed to affect the situation of families with children, and those that have clear consequences for children and their families even though the impacts may not have been intended (Kamerman, 2003; Kamerman and Kahn, 1997). As a sub-category of public policy, the family policy includes laws clearly directed to families, child or family allowances, tax benefits, maternity and parenting paid and job protected leaves, early childhood education benefits and services, child support or advanced maintenance policies providing financial support for children by a non-custodial parent, child protection service, subsidized goods and services, other child-

conditioned benefits linked to old age, disability, or unemployment benefits, and maternal and child health care (Kamernam, 2003).

Family policies can also be defined as "an amalgam of policies directed at families with children and aimed at increasing their level of well-being" (Gauthier, 1999, 2000). From a broad perspective, topics as varied as employment, transport, food and education policies may be included in the definition of family policies in view of their potential impact on families' well-being. In general, however, the literature tends to opt for a narrower perspective and to restrict family policies to its several core components (Gauthier, 2002).

According to Baker (1995), family policy, broadly defined, refers to a coherent set of principles about the state's role in family life which is implemented through legislation or a plan of action. For Baker, family policies encompass three areas of policy making. First, there are laws relating to family issues such as marriage, adoption, reproduction, divorce, and child custody. Second, there are policies to help support family income such as maternity leave, childcare costs and availability, family and child allowances, maternity and parental leave, and child benefits and support. The third category refers to the provision of direct services that may include childcare provision, home care, health service, and subsidized housing.

Although there is a slight difference between researchers in the definition and scope of family policy, they share common features. Accepting the narrow perspective and focusing on those common features, the scope of family policies in this study includes follows: (1) income support for families and children (e.g., child allowance, tax

expenditure for dependent children); (2) parental leave policies for working parents (e.g., duration of parental leave, duration of total leave, cash benefits during parental leave); (3) early childhood education and care (ECEC).

2.3.2. Typologies of Welfare States: Models of Family Policy and Institutions

Before exploring theoretical linkages between family policies and children's educational achievement, this section reviews how theorists and researchers characterize and differentiate the welfare states based on sets of family policies and institutions. When comparing countries, it is difficult to hold all possible explanatory factors under control, due to the relatively limited number of cases (Ferrarini, 2006). Further, countries tend to have a combination of several policy packages; thus it might not be enough to examine the effect of any single policy. One popular approach to overcome these problems is the welfare state typologies. Welfare state typologies order countries into different classes based on certain criteria such as institutional design of political and social policy institutions, labor market outcomes or structures of inequalities in the welfare state (Esping-Andersen, 1990; Ferrarini, 2006; Kamerman, 2003). The typology thus ascribes similarities to countries within the same category, as well as positing dissimilarities between groups of countries in different categories.

There have been considerable efforts to characterize and differentiate welfare states based on their institutional features (Wilensky & Lebeaux, 1958; Titmuss, 1974; Therborn, 1987; Esping-Andersen, 1990, 1999). Among others, Esping-Andersen (1990)'s groundbreaking work is worthwhile to be discussed. Esping-Andersen used the term *welfare state regimes* as an organizing concept to describe social policies of

advanced industrialized countries and governments' roles in managing and organizing the economy, employment, and wages as well as providing social protection (Kamerman, 2003). In his work on the typology of welfare states, Esping-Andersen (1990) employs the concept of decommodification which refers to "the extent to which individuals and families can maintain a normal and socially acceptable standard of living regardless of their market performance" (Esping-Andersen, 1990). The welfare state decommodifies labor because "certain services and a certain standard of living become a right of citizenship and reliance on the market for survival decreased" (Esping-Andersen, 1990). However, under market capitalism, pure decommodification is not possible; thus, the important issue is the relative degree of social protection from dependence on the labor market provided by the welfare state. Based on different welfare state institutions, social policies for social protection, and the resulting relative degree of decommodification, Esping-Andersen introduces three types of welfare state regimes: Social Democratic, Conservative, and Liberal model. More specifically, he characterizes social policies in the Nordic countries as generally organized along Social Democratic lines, with generous entitlements linked to universal social rights. Social policies in continental Europe are largely Conservative, typically tied to earnings and occupation, with public provisions replicating market-generated outcome. Social policies in the Anglo-Saxon countries are described as Liberal; that is, they are organized to reflect and preserve markets and most entitlement to welfare provisions are derived from need (Esping-Andersen, 1990; Gornick & Myers, 2004).

Esping-Andersen's influential work discussed above has been faced with broad critiques, especially from feminist welfare state theorists. The main argument of them is that his typology of welfare states marginalized women and families in its analysis (Bambra, 2005; Daly, 1994; Gornick & Myers, 2004; Orloff, 1993; Sainsbury, 1999); more specifically, decommodification is a gender-blind concept being unaware of the role of women and families in the provision of welfare. Further, social policies realizing decommodification in the real world exclude women-related ones such as family leave and child care (Bambra, 2005; Daly, 1994).

Esping-Andersen (1999) himself responded these critiques by incorporating several family policy indicators into his welfare state typologies: (1) overall servicing commitment (non-health family service expenditure as a percentage of GDP; (2) overall commitment to subsidizing child families (the combined value of family allowances and tax deductions); (3) the diffusion of public child care (daycare for children less than 3 years); (4) the supply of care to the aged (percentage of aged 65+ receiving home-help services). He concludes that incorporating this measure does not change much his original welfare state regime typology discussed in the previous section. Gauthier (2002) also proposes the typology of family policy regime with more extensive indicators of social policies for women and families with children. Her typology identifies four main family policy regimes which is not substantially different from Esping-Andersen's work.

Although typologies developed by Esping-Andersen (1999) and Gauthier (2002) explicitly incorporate family policy dimensions into their analyses, they suffer from several limitations. Among others, indicators used for typologies are limited. Esping-

Andersen, for example, did not include parental leave policy, one of the important elements of the family policy arrangement, in his typology. Secondly, they seem to assume that family policy and institutions have only one dimension. As well criticized by Leitner (2003), Korpi (2000), and Ferrarini (2006), each element of family policy and institutions could be grouped into several different categories. For example, parental leave policy and child allowance may have different consequences in terms of women's work or child well-being.

Table 2-1. Leitner's Combination of Familialization and Defamilialization

Familialization	Defamilialization	
	Strong	Weak
Strong	*Optional Familialism*: Services for caretakers Supportive care policies for workers	*Explicit Familialism*: No Services for caretakers Supportive care policies for workers
Weak	*Defamilialism*: Services for caretakers No supportive care policies for workers	*Implicit Familialism*: No services for caretakers No supportive care policies for workers

Source: Adapted by the author from Leitner (2003)

Leitner (2003) categorizes a series of family policies into two groups – familializing and defamilializing policies. Here, familializing policies, which attempt to strengthen the family in its caring role, includes parental or family leaves, cash benefits or tax reductions for caregivers, or social rights attached to care, such as pensions. On the contrary, defamilializing policies, which relieve the family of providing direct care, might include the public provision of child care or other services. According to Leitner, each

welfare state combines familialistic and defamilialistic policies, and, based on this notion, she develops the typology presented in Table 2-1. Based on this typology, Leitner (2003) analyzes how different policy arrangements suggest different forms of familialization and defamilialization. For example, different from Esping-Andersen's (1999) or Gauthier's (2002) argument, Leitner argues that Social Democratic countries appear to provide optional familialization rather than defamilialization. Furthermore, Liberal countries provide both explicit familialization and defamilialization, while Conservative countries are split between explicit and implicit familialization.

Table 2-2. Policy Supports by Welfare State Regime Type

	Support for time to care		Support for gender equality in paid and unpaid work	
	Family leave policy (frees time for mothers)	Working time policy (frees time for both parents)	Family leave policy (supports fathers caregiving)	ECEC (supports mothers' employment)
Social Democratic countries: Denmark, Finland, Norway, Sweden	High	High/Medium	High	High/Medium
Conservative countries: Belgium, France, Germany, Netherlands	Medium	High/Medium	Medium/Low	High/Medium
Liberal countries: UK, US	Low	Medium/Low	Low	Medium/Low

Source: Gornick and Meyers (2006)

More recently, Gornick and Meyers (2006) uses three areas of family policies, and analyzes how groups of countries vary in terms of these policies (See Table 2-2). According to them, Social Democratic countries, overall, do the most to support both time for care among employed parents and also gender equality in domestic and paid

work. The Conservative countries are less supportive on both dimensions – freeing up time for employed parents and encouraging egalitarian division of labor. Liberal countries do the worst on both dimensions.

Korpi (2000) also attempts to develop a family policy typology. He arranges characteristics of family policy institutions into two separate dimensions, depending on whether they support a traditional family (general family support), or whether they support a dual earner family (dual earner family support). General family support maintains a family type where the father is the main earner and the mother mainly is expected to do care work at home. On the other hand, dual earner support is more oriented towards enabling mothers to participate in both labor market and care work at home, and may provide fathers with incentives to engage in care work as well. The indicators used include aspects of parental leave policy, public services to families (e.g., publicly provided child care), and other cash transfers (e.g., child allowance).

		Dual earner support	
		Low	High
General family support	High	General family policy model	Contradictory family policy model
	Low	Market-oriented family policy model	Dual earner family policy model

Source: Revised by the author based on Korpi (2000)

Figure 2-3. Dimensions and models of family policy

Korpi's family policy typology has several advantages over others previously discussed. First, it is explicitly two-dimensional- general family support and dual earner

support-, and family policy indicators are aligned on those two dimensions (Ferrarini, 2006). Secondly, while previously discussed typologies include both family policy institutions and policy outcomes as indicators for the typology, Korpi's model is based only on institutional family policy indicators (Ferrarini, 2006).

2.3.3. The Impact of Family Policy on Children's Educational Outcomes

In this section, I will explore in depth the theoretical role of family policy contexts in shaping children's educational achievement. Family policies and institutions are expected to influence various outcomes related to families, women, and children such as women's fertility decision, women's employment and earning, and various outcomes of child well-being (Gauthier, 2000, 2002; Gornick & Meyers, 2006; Kamerman et al, 2003; Misra, Budig, & Moller, 2007). For the purpose of this study, however, focus will be on the impact on children's educational outcomes.

Public policies and programs designed to support families with children are expected to influence child education. Income support for families and children (e.g., child allowance, tax credits for dependent children) may have a positive impact on children's educational outcome through directly increasing the level of family income. Income support programs directly raise the disposable income of parents and this additional income provides more room for making investments in their children (Becker, 1981; Haveman, Wolfe, 1995; Mayer, 1997). Alternatively, this additional income may decrease parental stresses or pressures related to low income, thereby positively affecting family processes (Conger, 2005; Conger et al., 1992; Davis-Kean, 2005). Although an exact causal mechanism and the magnitude of the effect differ across scholars, there is a

consensus that additional income from such income support policies has a positive impact on child development or educational achievement.

Other policies and institutions such as generous parental leave policies and socially provided child care and early education services influence children's educational outcomes as well. First, these policies and programs make women's work and childrearing compatible, and this compatibility enables women with children to be attached more to labor market (Bambra, 2004, 2005; Gauthier, 1996; Gornick & Meyers, 2004; Orloff, 1993). As the primary caregivers for children, women with young children often pay a *child penalty* in the form of reduced labor force participation and lower wages (Gornick, Meyers & Ross, 1998; Waldfogel, 1997). Due to weaker labor market attachments and lower wages, children could be more likely to be poor. By providing a generous leave after childbirth and an alternative to full-time caregiving in the home, these penalties will be reduced, thereby enhancing families' economic well-being. The increased family income through this process can be positively linked to other child outcomes such as educational achievement as discussed above.

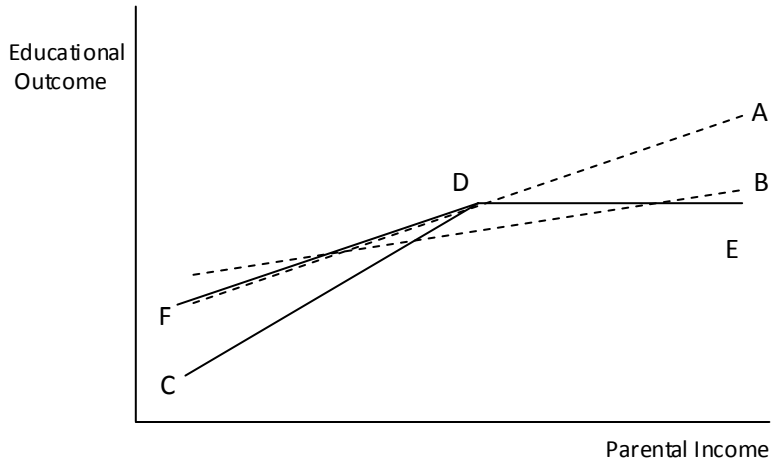
Second, but not less important, generous parental leave policies enable parents to spend more time with their children, thereby enhancing child development and achievement. Since research has shown that development and achievement during the earliest years of childhood is crucial for a later achievement, the positive effect due to generous parental leave policies may be long lasting. Early childhood education and care (ECEC) is another example of family policy which may directly influence children's educational achievement. Since ECEC directly provides children with care services and

education, ECEC with high quality can have direct consequences for children's human capital accumulation (Meyers & Gornick, 2003).

Moderating Role of Family Policies

While family policies and programs may directly influence children's educational outcome (or through mediating processes), they also moderates the relationship between family-level characteristics and children's educational outcomes.

The moderating role of income support policies in the effect of family income on child education can be explained as follows (Mayer & Lopoo, 2008). Although this explanation is originally designed to explain the role of governments' spending in moderating the relationship between parental income and generational mobility, it can be applied to the context of child education.



Source: Adapted by the author from Mayer and Lopoo (2008)

Figure 2-4. The relationship between parental income and educational outcome

In Figure 2-4, the line C-D-E indicates how children's educational outcomes increase by additional parental income without any governments' support. If parental

income increases so does educational achievement, since parents invest more in their child. However, if optimal investment occurs at point D, additional parental income might not affect child education anymore. The dotted line A represents an estimated regression line in this case. Suppose the government provides income supports for poor families, the line will be changed to F-D-B, all else equal. The regression line in this case will be represented by the dotted line B. As seen in the difference between the two regression line A and B, the government income support programs can moderate the relationship between parental income and child education.

The magnitude of difference between the line A and B may further depend on several factors such as: (1) the extent to which rich parents reduce the investment in their children by paying taxes to support the poor parents, and (2) the extent to which governments' income support crowds out investment by poor parents, and how leaky the transfer bucket is. In sum, the relationship between parental income and children's educational outcomes differ across the level of income support policies, and the direction and magnitude of differences can be more complicated by several factors discussed above.

The effect of family social capital such as living in a single-parent family or a large number of siblings can be moderated by income support policies as well. The negative effect of living in single-parent families is often associated with prevalent low income in those families. If generous income support policies lead to more investment in children in those families, the negative effect will diminish or disappear (Pong, Dronkers & Hampden-Thompson, 2003). Similarly, resource dilution in families with a large

number of siblings may, at least partly, be compensated by governments' income support (Park, 2005; Xu, 2008).

Parental leave and ECEC policy also interact with family background and family social capital to determine children's educational outcomes. A good example may include the moderating role of these policies in a negative relationship between maternal work and child outcomes. While mothers' work in the labor market enhances children's economic status, theoretical linkage between mother's work and child development and educational achievement is ambiguous. On the one hand, as discussed earlier, more income resulting from mother's employment makes it possible for parents to invest more resources in their children. However, other researchers suggest a negative relationship. Working mothers usually have a dual job of childrearing and work in the labor market. Under this circumstance, the allocation of maternal time to the labor market comes at the expense of time invested in childrearing, which may negatively influence child development or education (Verropoulou & Joshi, 2006). Further, the family stress perspective posits that mother's work in the labor market may cause psychological stress, and this stress diminishes mothers' ability to be supportive, consistent, and involved with their children (Kalil & Ziol-Guest, 2005).

Even if the negative impact of mother's work with regard to child well-being is true, this negative relationship can be diminished by parental leave and ECEC policies. Generous parental leave policy grants parents the right to take time off for caregiving or free up parents'caring time (Gornick & Meyers, 2006), and thus parents can provide quality care to their children, which in turn produce better child outcomes. Considering

the evidence that first years of life are particularly important for cognitive, physical, social, and emotional development (Shonkoff and Phillips, 2000; OECD, 2002), the moderating impact of generous parental leave may amplify. Furthermore, these policies may moderate the possible negative relationship between mother's work and child outcomes by diminishing parental stress (Phipps, 1999b). Without such family policies, parents -especially working mothers- may suffer from economic insecurity as well as parental stress to reconcile the burdens of work and childrearing. This may affect the quality of their parenting and in turn child outcomes.

2.3.4. Empirical evidence

This section aims to review empirical research on the effect of family policies on children's educational achievement. The empirical research in this domain could be divided into two: (1) the comparative cross-national study utilizing aggregate-level or household-level data; (2) studies conducted in one country utilizing household-level data. Although comparative cross-national studies are more relevant to this statement, these types of studies are sparse. Therefore, this review also includes the studies conducted in one country.

Evidence from a single country studies

The effect of income support policy. Several studies examine the effect of income support policies on children's educational outcomes based on policy experiments in one country (e.g., Dynarski, 1999, 2000, Morris, Duncan & Rodriguez, 2004 for the US evidence; Milligan & Stabile, 2007 for Canada; Chevalier & Lanot, 2001 for UK). For example, Morris and his colleagues (2004) explored whether random-assignment-

induced variation in family income from four welfare and anti-poverty programs in the United States was related to children's achievement. Their findings suggest that family income induced by governments' income support programs positively affect school achievement of young children (e.g., preschooler), but not of older children. Dynarski (1999) also provides supportive evidence of positive impacts of financial support by governments. Using natural policy experiment data in the United States, he concludes that financial support would yield a significant, positive increase in adolescents' educational attainment.

Parental leave policy. While research linking parental leave policies and women's employment and earning is considerable, only a few studies provide evidence on the direct relationship between parental leave policies and child outcomes, and much of this research utilizes child health or economic well-being as an outcome (Berger et al., 2002; Winegarden & Bracy, 1995; Ruhm, 2000; Tanaka, 2005). One exception is Dustmann and Schonberg's work (2008), where they evaluated the impact of three major expansions in parental leave coverage in Germany on children's long-term educational outcomes. They compared outcomes of children born shortly before and after the reform to identify the causal impact of the reform. While they identified a strong impact of the reform on mothers' labor supply after a child birth as consistent with previous studies, they found no evidence that the expansions improved children's outcomes. Although this one study does not support the positive role of parental leave policy on children's educational achievement, more empirical research is needed.

Early Childhood Education and Care (ECEC). There is a substantial body of research which explores the effect of ECEC, and most studies focus on child outcomes such educational, cognitive achievement or health. There has been a debate for decades on whether non-parental care outside the home benefits children or not. Recently, researchers delving into this topic seem to have a consensus that, if the quality and accessibility of ECEC are guaranteed, ECEC may positively influence child outcomes. Especially, with regard to two or three to five or six year-old children, empirical research documents that participation in good quality ECEC programs not only does no harm but has positive effects on children's cognitive development, school readiness, and school performance (Kamerman, 2003; Meyers et al, 2003).

A number of experimental studies in the United States have documented lasting cognitive gains for children experiencing high-quality interventions in the years before school (Karoly et al., 1998; Brooks-Gunn, 2000; Vandell & Wolfe, 2000; Waldfogel, 2002). These gains are particularly large for the most disadvantaged children; that is, poor children appear to benefit the most dramatically from high quality early childhood interventions and to be most adversely affected by poor quality of care (Currie, 2000).

Non-experimental studies also provide evidence on the influence of ECEC experiences on child's educational achievement or cognitive development. One of the advantages of non-experimental studies is researchers can include a range of child care arrangements that vary in structural and process quality (Meyers, Rosenbaum, Ruhm, & Waldfogel, 2002). The disadvantage of non-experimental studies includes the possibility of contamination by omitting controls for unobserved differences between families

choosing different child care settings (Meyers, Rosenbaum, Ruhm, & Waldfogel, 2002). The evidence from these studies suggests that higher-quality child care is positively associated with higher levels of cognitive skills (Peisner-Feinberg & Burchinal, 1997; NICHD-ECCRN, 1999, 2000), and better school readiness (Peisner-Feinberg et al., 2001). The effects of quality also tend to be larger for low income children than for more affluent children, and for children with less-educated mothers than for children with more-educated mothers (Peisner-Feinberg & Burchinal, 1997). Another recent U.S. study conducted by Magnusson, Ruhm, and Waldfogel (2004) provides consistent evidence. Utilizing data from the Early Childhood Longitudinal Study-Kindergarten Class of 1998-99 (ECLS-K), they found that children who attended prekindergarten programs had better math and reading performance at school entry, and these cognitive gains were more lasting for disadvantaged children.

The positive effects of ECEC on cognitive outcomes are also found in other developed countries. Andersson (1992), for example, found from Swedish longitudinal data that high quality child care programs in Sweden are one of the important factors explaining positive cognitive outcomes of children. Based on a sample of children born in 1983 from British longitudinal data, Melhuish and Moss (1991) report that pre-school childcare experience is positively associated with children's cognitive development. Evidence from France which has a highly developed universal preschool system for two to six year olds also confirms the positive effect of ECEC programs. More specifically, a 1997 study in France evaluated a cohort of about 10,000 children in the early years of elementary school in terms of their general knowledge, oral and pre-reading skills, logic

and pre-math skills and so on (Jeantheau & Murat, 1998). According to the results of this study, children who enrolled in preschool at age two outperformed those who began at age three, and the effects were larger for disadvantaged children.

Evidence from comparative cross-national studies

It has been one of the main concerns among welfare state researchers to explore the effect of welfare state policies (or regimes) cross-nationally. However, empirical studies exclusively focusing on family policies (or family policy regimes) are rather limited, and much of them use gender equalities as main outcomes (Daly, 2001; Ferrarini, 2006; Gauthier, 2002; Korpi, 2000; Sainsbury, 1994, 1996). A few studies (e.g., Backman & Ferrarini, 2010; Ferrarini, 2006) focus on the impact of family policy regimes on child outcomes; however, their outcomes only include child poverty rates.

One exception is the work conducted by Gornick and Meyers (2006), where they examine how child outcomes vary across different family policy regimes. More specifically, in order to categorize developed countries into several regimes, they applied three domains: gender equality in paid work, gender equality in un-paid work, and parental time for children with several policy indicators for each domain. Further, they included various child outcomes such as child poverty, infant mortality, educational achievement, and so on. Relating the typology of regimes to child outcomes, they suggest that, in the Social Democratic countries (e.g., Sweden, Finland, and Norway) characterized by favorable levels of gender equality both at home and labor market and moderate to good parental time for children show better performance in most child

outcomes. While this study provides informative evidence on the relationship between family policy and child outcomes, the analysis is conducted at the descriptive-level.

Harknett and his associates (2003) investigated the impact of public expenditures on child outcome in the United States. Although this study is based on one country, the United States, it utilizes variations in public spending across 50 states in a comparative manner. Through the comparative study of 50 states of the United States, they found that states that spend more on children show better child outcomes such as educational attainment (e.g., elementary-school test scores), controlling for other potential confounding effects. Phipps (1999b) explores the impact of social spending on child outcomes in Norway, Canada, and the United States. Similar to findings from Harknett and his colleagues (2003), the author found that higher average social spending is associated with better child outcomes in terms of child health and school performance even after taking into account other micro and macro-level factors.

Within my knowledge, there is one study exploring the relationship between family policies and children's educational outcomes based on the data from a large number of countries. Engster and Stensota (2009) estimate the effect of family policies on child outcomes using country-level, aggregate data from 19 industrialized countries. Family policy indicators used in their study includes: 1) family cash and tax benefits, 2) unemployment and incapacity-related insurance program, 3) paid parental leave full-time equivalency (FTE), and 4) public child care services; their outcomes include: 1) child poverty rate, 2) infant mortality rate, and 3) educational achievement measured by test scores of 15 year-old students and school enrollment. Their OLS analysis revealed that

family cash benefits were most effective in improving educational achievement; further, combinations of all these policies promoted the highest level of child well-being across all domains.

Moderating Role of Family Policy. Evidence suggests a significant variation across countries in the relationship between family-level characteristics and children's educational outcomes. For example, Robert (2003) and Bassani (2007) examined the effect of family social capital on children's educational achievement using combined survey data from 27 countries and 3 countries, respectively. Both found that the effect of family social capital variables (e.g., family structure, maternal work, number of siblings, and parent-child relationship) significantly differ across countries. Micklewright and Schnepf (2004) found similar evidence for the sample of English-speaking countries from several multi-national surveys. However, these studies did not explicitly model or address which macro-level contexts across countries might contribute to this variation.

Using the welfare-state theories and typologies, recent scholarship has begun to produce findings on the relationship between the family and education in a comparative perspective. For example, Park (2005) and Xu (2008) examined how the effect of sibship size on educational achievement varied across countries utilizing multi-national survey data, the Program for International Student Assessment (PISA). Analysis using hierarchical linear modeling (HLM) to adjust for the clustering effects suggests that the negative impact of a large sibship size on educational achievement is weak in the countries with strong public policies (e.g., Nordic countries); however, the opposite is true for countries with weak policy settings such as Anglo-Saxon countries. Another

important study relevant to this issue is the work done by Pong and her colleagues (2003). They explicitly focused on the role of family policy in moderating the effect of living in single-parent families on educational achievement. Using data of 11 industrialized countries from the Third International Math and Science Study (TIMSS), and applying HLM technique to the data, they found supportive evidence that single-parenthood was less detrimental when family policies successfully equalized the resources between single and two-parent families. [6]

[6] Since these studies are most relevant to the current study, the limitations of these studies will be discussed more in the next chapter.

III. Conceptual Model

This chapter begins with briefly summarizing theoretical approaches and empirical evidence reviewed in Chapter 2. Then, limitations in the literature are discussed both in a conceptual and methodological perspective, especially those most relevant to this study. The conceptual model of this study, research questions and hypotheses are followed.

3.1. Limitations of current literature and contributions of this study

3.1.1. Brief summary of literature review

In Chapter 2, theories and relevant empirical evidence related to children's educational achievement were reviewed. Previous literature has emphasized the role of families in determining children's educational outcomes. Although exact causal mechanisms and the magnitude of the effect are still controversial, financial (e.g., income, assets) and human capital (e.g., parental education) within the family have been reported to be positively related to child development and educational outcomes.

Social capital theory and related empirical evidence suggest that various types of social capital measures are significant predictors of children's educational achievement. Social capital within the family not only directly influence child outcomes, but the transmission of family financial and human capital largely depends on the level of social capital available in the family. Social capital theory and empirical evidence further suggest that family social capital can be classified into two different types: (1) the

structural deficiency (e.g., single-parent family, large sibling size, mothers' work) and (2) the quality of social capital (e.g., parent-child bonds and interaction). The quality of social capital may mediate the relationship between the structural deficiency of family social capital and children's educational achievement.

Although theories and empirical evidence linking the family and child education have been a central focus among scholars, they lack of other important considerations such as macro-level, public policy contexts. Based on this limitation, this study explicitly focuses on the role played by family policy contexts. Welfare state theorists and researchers have well recognized the important role of family policy contexts on child outcomes; empirical research, although still limited, has supported the positive link between various family policy indicators and child education. Recently, emerging studies start examining how family policy contexts interact with family-level resources to affect children's educational outcomes. However, empirical evidence is still limited, and those studies suffer from several limitations as discussed in the following section.

3.1.2. Limitations inherent in current literature and contributions of this study

The foremost limitation in the current literature, especially relevant to this study, is its lack of comprehensive approaches. As seen in Chapter 2, current literature tends to focus on a single aspect of determinants of child education. As argued by Haveman and Wolfe (1995), a comprehensive framework is needed to fully understand the dynamics of child outcomes and based on this notion this study develops an extended conceptual framework where multiple-levels of predictors such as different types of family resources (e.g., family human, financial, and social capital) and family policy contexts can be

considered in one model. Through the use of an extended conceptual framework, the effect of families and policy contexts can be identified controlling for each other; further, this framework permits to understand how different levels of predictors interact with each other to affect children's educational outcomes.

Emerging, but still limited, studies recognize this gap and explicitly examine the role of public policy contexts as well as their interactions utilizing multi-national survey data. Within my knowledge, there are six empirical studies related to this topic (Hampden-Thompson & Pong, 2005; Koster & Bruggeman, 2008; Park, 2005; Pong, Dronkers & Hampden-Thompson, 2003; Robert, 2003; Xu, 2008), and these studies suffer from several limitations that motivates the current study.

First, research conducted by Robert (2003) employed a wide range of social capital measures to understand their impact on educational achievement, and further explored how these effects differed across countries. This study, however, did not explicitly conceptualize or model which cross-national contexts might contribute to those variations. In a methodological perspective, this study applied ordinary least squares (OLS) to the data ignoring the hierarchical structure of the multi-national survey data.

Other five studies have an advantage in that they explicitly contextualized cross-national variations using general welfare state typologies (Koster & Bruggeman, 2008; Park, 2005; Xu, 2008), family policy regimes (Hampden-Thompson & Pong, 2005) or individual family policy indicators (Pong, Dronkers & Hampden-Thompson, 2003); there is, however, much room for development in measuring policy contexts. Likewise, since they tended to employ a limited set of family-level predictors (e.g., single-parenthood in

Pong, Dronkers & Hampden-Thompson (2003); sibship size for Park (2005) or Xu (2008); parent-child relationships for Koster & Bruggeman (2008)), they were not able to examine mediating pathways among family-level predictors. Although these studies used more advanced statistical approaches such as multilevel modeling to correct for clustering effects in the data, they failed to consider endogeniety problem inherent in the model.

Based on gaps in the extant empirical research, the current study includes a variety of measures capturing different types of family resources, and mediating pathways among them are examined. This study also utilizes alternative measures of family policy contexts, and employs a series of advanced statistical approaches that can consider both a clustered structure of data and a potential endogeniety problem. These will be discussed in more detail in the next Chapter.

3.2. Proposed Conceptual Model

Based on the discussion in the previous chapters, the conceptual model of this study is presented in Figure 3-1. Three different aspects of family-level resources, financial, human and social capital, are expected to directly affect children's educational achievement. Several mediating pathways among these resources are specified in the conceptual model as well; that is, the quality of social capital are expected to mediate the impact of family financial and human capital on children's educational achievement. The quality of family social capital also mediates the relationship between the structural deficiency of family social capital and children's educational achievement.

Country-level family policy contexts are included in the model to examine the direct impact as well as the moderating role of them. Family policy contexts are expected to directly influence children's educational achievement. Family policy contexts may moderate the relationships between family-level resources and children's educational achievement; that is, the impacts of family financial, human and social capital differ by family policy contexts.

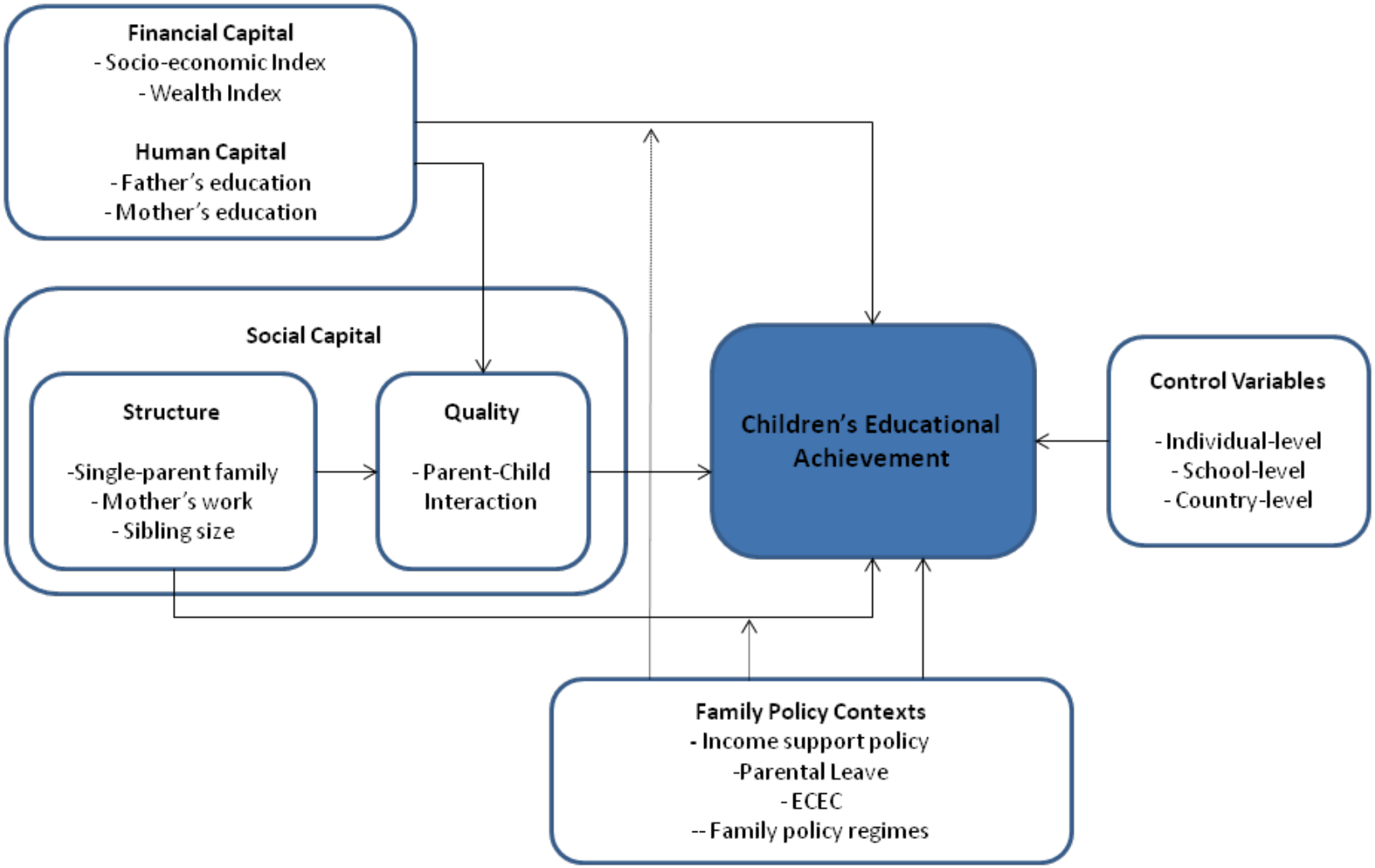


Figure 3-1. Conceptual Model

3.3. Research questions and hypotheses

Based on the conceptual model presented in Figure 3-1 and extant literature reviewed in Chapter 2, this study sets a series of research questions and hypotheses as follows:

Q 1. Do different aspects of family-level resources affect children's educational achievement?

H 1-1. Financial capital within the family – parents' socio-economic status, wealth - is positively associated with children's educational achievement.

H 1-2. Human capital within the family – parental education - is positively associated with children's educational achievement.

H 1-3. Structural deficiency of family social capital – single-parent family, large sibling size, maternal work outside the home – is negatively associated with children's educational achievement.

H 1-4. Quality of family social capital – parent-child interaction – is positively associated with children's educational achievement.

Q 2. Does the quality of family social capital mediate the impact of other family-level resources on children's educational achievement?

H 2-1. The quality of social capital – parent-child interaction – mediates the impact of family financial and human capital on children's educational achievement.

H 2-2. The quality of social capital – parent-child interaction – mediates the impact of the structural deficiency of family social capital on children's educational achievement.

Q 3. Do family policy contexts affect children's educational achievement?

H 3-1. Family policy contexts - income support, parental leave policy, and ECEC - positively affect children's educational achievement.

H 3-2. Family policy contexts moderate the impacts of family financial, human and social capital on children's educational achievement.

H 3-3-1. The positive impact of family financial and human capital is weaker in the countries with strong family policy measures.

H 3-3-2. The negative impact of structural deficiency of family social capital is weaker or disappears in the countries with strong family policy measures.

IV. Method

4.1. Data and Sample

This study utilizes the data from the 2000 Programme for International Student Assessment (PISA) study, an international survey database. The PISA contains academic assessments (standardized test scores on reading, math, and science) on a representative cross-sectional sample of 15-year-old students for the 32 participating countries. Further, the PISA includes a variety of contextual information in both families and schools.

The PISA sampling is carried out in two stages. At the first stage, a minimum of 150 schools are randomly chosen in each participating country with probability proportional to size. Then, 35 eligible students are randomly sampled from each school with equal probability. All students are selected if there are fewer than 35 students in the school; in this case, the number of students has to be at least 20 in order to ensure adequate accuracy in estimating variance components within and between schools. If fewer than 35 students are available in a large number of schools, then additional schools (replacement schools) are included in the sample to ensure adequate sample sizes.

Certain groups of schools or groups of students in each school can be excluded from the sample for various reasons and, if exclusion substantially occurs, the sample may not be representative of the entire national school system. The PISA requires that the overall exclusion rate within a country be kept below 5 percent. Regarding the response rate, a school-level response rate of 85 and a student-level response rate of 80 percent

within each school are required. In instances in which the initial response rate of schools is between 65 and 85 percent, an acceptable school response rate is achieved through the use of replacement schools.

Information on number of schools and students, response rates, and exclusion rates in each participating country is presented in Table 4-1. Although school- and student-level sample sizes differ across countries and are not proportional to the size of the entire 15-year-old population, the PISA samples are representative since countries meet the PISA sampling requirements.[7]

Thirty two countries originally participated in the PISA; however, 18 industrialized countries are selected for the sample of this study: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, United Kingdom, and the United States. I selected these countries because they show similar level of economic, social, and political development, which is often an important criterion of the sample selection for the comparative study. In addition, explicit family policies are introduced and embedded only in these developed countries as well as reliable, comparable data on family policies are available for these countries.

Family and school-level variables in this study were drawn from the PISA data. Country-level, family policy data were drawn from various sources such as OECD Family Policy database, OECD Social Expenditure Database, and Family Policy

[7] Some countries such as the United States, the United Kingdom, and the Netherlands do not meet the PISA's requirement of school response rates. In these cases, the PISA conducted in-depth analyses on the extent of bias and ensured the potential bias was minimal. For more information on the PISA sampling procedure and framework, see Adams and Wu (2002).

Database compiled by Gauthier (2003), and these data were merged into the PISA dataset. The family policy measures and data sources are discussed in more detail in the next section.

Table 4-1. Sample size of schools and students, and participation rates in each country

	Number of Participating Schools	Number of Participating Students	Weighted School Participation Rate	Weighted Student Participation Rate	Overall student exclusion rate	Total Population of 15-year-olds
Australia	228	5,154	94	84	2.3	266,878
Austria	213	4,745	100	92	0.7	95,041
Belgium	214	6,648	86	93	2.3	121,121
Denmark	223	4,212	95	92	3.1	53,693
Finland	155	4,864	100	93	1.9	66,571
France	174	4,657	95	91	3.5	788,387
Germany	213	4,983	95	86	1.7	927,473
Greece	139	4,672	100	97	0.8	128,175
Ireland	135	3,786	88	86	4.8	65,339
Italy	170	4,984	100	93	2.5	584,417
Netherlands	100	2,503	55	84	4.4	178,924
NZ	152	3,667	86	88	5.1	54,220
Norway	176	4,147	92	89	2.7	52,165
Portugal	145	4,517	95	86	2.7	132,325
Spain	185	6,214	100	92	2.7	462,082
Sweden	159	4,416	100	88	4.7	100,940
UK	349	9,250	82	81	4.9	731,743
US	145	3,700	70	85	4.1	3,876,000

Note: School and student participation rates are calculated after replacement
Source: Adam and Wu (2002)

4.2. Measurement

4.2.1. Dependent variable

The dependent variable of this study is the standardized test score of reading literacy drawn from the PISA data. Although the PISA data contains other test scores such as math or science, this study focuses on reading test scores since the 2000 PISA

puts a large emphasis on reading skills, students' ability to retrieve information from written texts by understanding, using and reflecting on them (Robert, 2000). Reading literacy is measured by 141 items. Of those, 70 items require students either to form a broad understanding or to develop an interpretation. Next 42 items are designed to evaluate students' skill at retrieving isolated pieces of information. The remaining 29 items require students to reflect on either the content or information provided in the text or on the structure and form of the text itself. According to the theoretical framework of student assessment (OECD, 1999), the reading test in the PISA does not aim to measure the extent to which students have mastered or will replicate the specific school curriculum. Instead, it aims to measure the level of students' capacity to continue learning as well as their ability to use knowledge in real life. Therefore the test scores in the PISA are more related to students' preparedness for life and for future employment (Robert, 2000).

The reading literacy items are scaled using the Item Response Theory (IRT) that is a mathematical model used for estimating the probability that a particular person will respond correctly to a given task from a specified pool of tasks. This probability is modeled along a continuum which summarizes both the proficiency of a person in terms of their ability and the complexity of an item in terms of its difficulty. Then, the reading literacy assessments are summarized on a single composite scale having a mean of 500 and a standard deviation of 100. Five levels of reading literacy based on these standardized scores and their interpretations are presented in Table 4-2. Students with level-2 or below are considered as low performers (OECD, 1999).

Table 4-2. Interpretation of Reading Literacy Score

Level	Score	Description
1	335-480	Students are capable of completing only the least complex reading tasks, such as: 1) Locating a single piece of information. 2) Identifying the main theme of a text. 3) Or making a simple connection with everyday knowledge.
2	408-480	Students are capable of solving basic reading tasks, such as: 1) Locating straightforward information. 2) Making low-level inferences of various types. 3) Working out what a well-defined part of a text means and using some outside knowledge to understand it.
3	481-552	Students are capable of solving reading tasks of moderate complexity, such as: 1) Locating multiple pieces of information. 2) Making links between different parts of a text. 3) Relating it to familiar everyday knowledge.
4	553-625	Students are capable of solving complex reading tasks, such as: 1) Locating embedded information. 2) Construing meaning from nuances of language. 3) Critically evaluating a text.
5	Above 625	Students at this level are capable of completing sophisticated reading tasks, such as: 1) Managing information that is difficult to find in unfamiliar texts. 2) Showing detailed understanding of such texts and inferring which information in the text is relevant to the task. 3) Evaluating critically and building hypotheses, drawing on specialized knowledge, and accommodating concepts that may be contrary to expectations.

4.2.2. Independent variable

Financial capital within the family

The PISA data do not provide direct measure of family income or wealth. As a proxy for family income or wealth, this study utilizes two measures: (1) Parental Socio-economic Index and (2) Family Wealth Index. The PISA data provide *the International Socio-Economic Index of Occupational Status (ISEI)* derived from students' responses on parental occupation. This index is an internationally comparable and standardized method of ranking the parent's occupation according to their socio-economic status (Ganzeboom et al., 1992). The higher value between father's or mother's occupation is used, and

values on the index range from 16 to 90 with higher values representing high socio-economic status. The *Family Wealth Index* is derived from students' reports on: (1) the availability of a dishwasher, a room of their own, educational software, and a link to the Internet; and (2) the number of cellular phones, television sets, computers, motor cars and bathrooms at home. This index was calculated using the weighted estimate method (Warm, 1985).

Human capital within the family

Students were asked to report the highest level of education of their parents on the basis of national qualifications, and this information was then recoded in accordance with the *International Standard Classification of Education (ISCED).* The ISCED index ranges from one (not going to school) to six (completing tertiary education). Both father's and mother's education are included in the model.

Structural deficiency of family social capital

Three variables were utilized to measure the structural deficiency of family social capital: (1) *living in a single-parent family*, (2) *number of siblings* and (3) *mothers' work status*. A children living in a single-parent family was coded as one; otherwise zero. Students were asked to indicate how many brothers and sisters they had older than themselves, younger than themselves, or of the same age. The numbers in each category were summed to calculate the number of sibling. Mother's work status had three categories: no work, part-time work and full-time work. Dummy-coded variable for each category was created and included in the model.

Quality of family social capital

The parent-child interaction scale was used to measure the quality of family social capital. The parent-child interaction scale is derived from students' reports on the frequency with which their parents engage with them in the following six activities: (1) discussing political or social issues, (2) discussing books, films or television programs, (3) listening to classical music, (4) discussing how well they are doing at school, (5) eating the main meal together and (6) spending time talking with them. Each item is measured by a five-level Likert-type scale, and all six items were summed to create the parent-child interaction scale.

Exploratory factor analysis (with maximum likelihood estimation and oblique quartimax rotation) showed that six items were successfully loaded on one factor and the first factor explained a majority proportion of variances. The Cronbach's alpha for the parent-child interaction scale was 0.65. Although the conventional guideline requires higher alpha values (e.g., 0.80 or higher), this value may be acceptable (Nunnally, 1967), especially considering a small numbers of items in the scale. These results indicate that the validity and reliability of this measure are empirically supported.

Family Policy Contexts

This study employs two alternative measures of family policy contexts. First sets of family policy measures are a series of individual policy indicators in three areas of family policy: (1) Income support for families with children, (2) Parental leave policy and (3) Early childhood education and care policy (ECEC). Income support for families with children was measures by *public expenditure on family cash benefits* expressed as a percentage of the GDP. Parental leave policy was measured by *the full-time equivalent*

parental leave benefits constructed by multiplying cash benefits during the leave by the duration of the paid leave. ECEC was measured by two indicators: (1) *public expenditure on pre-primary education and care* expressed as a percentage of the GDP and (2) *gross enrollment rate of children in public childcare and pre-primary education*. Through utilizing individual family policy indicators, the independent impact of each policy controlling for others can be examined. Definitions and data sources for family policy measures are presented in Table 4-3.

Table 4-3. Definition and source of family policy indicators

Variable	Definition	Source
Income support for families with children		
Public expenditure on family cash benefits	A percentage of GDP	OECD Social Expenditure (SOCX) Database
Maternity and parental leave policy		
Full-time equivalent (FTE) maternity benefits	Constructed by multiplying cash benefits during maternity leave (expressed as a percentage of women's regular wages) by duration of maternity leave	Gauthier (2003)
Early Childhood Education and Care (ECEC)		
Public expenditure on pre-primary education and care	A percentage of GDP	OECD Family Database
Children enrolled in public childcare and pre-primary education	A percentage of total children	OECD Employment Outlook (2001)

Utilizing a series of single policy indicators enables the influence of specific policies and institutional characteristics to be disentangled, and provides quantitative estimates of the extent to which those policies and institutions account for differences in the outcome variable after controlling for effects of other variables. However, it is often

difficult to operationalize or measure policies or institutional characteristics for all countries of interests. Further, this approach may suffer from the small-N problem; that is, a small number of countries in the sample makes it difficult to obtain unbiased, efficient estimates and therefore only a limited number of variables can be included in the analytic sample (Lewin-Epstein & Stier, n.d.; Ragin, 1987).

The second, alternative measures of family policy contexts include a series of dummy variables representing *family policy regimes*. As discussed earlier, welfare states scholars have made an effort to group countries into a limited number of regimes based on a series of policy indicators. The use of family policy typologies has several advantages; among others, countries often have different combinations of policy settings and the impact of these combinations can be explored by utilizing family policy regimes. Further, since typologies usually produce a limited number of regimes or clusters, the small-N problem can be partially solved. Since theoretical work on family policy typologies are slightly different across scholars, partly due to the use of different sets of family policy indicators, this study uses empirically driven family policy regimes. Countries included in the study sample were grouped into several regimes based on similarities and differences among family policy indicators using a hierarchical cluster analysis. More detailed information on hierarchical cluster analysis and resulting family policy regimes are presented in Chapter V[8].

[8] Family policy regimes are derived based on family policy indicators measured at the same time with children's educational achievement. Since the study sample from the PISA consists of 15-year-old students and several components of family policy indicators are mainly for younger children, additional analyses might be needed utilizing family policy regimes and family policy indicators measured at an earlier time point (e.g., family policy indicators and regimes in 1980s to

4.2.3. Control Variable

Student-level control variables

Students' demographics such as gender and age are included as control variables. *Gender* is a dummy variable where female is coded as one and zero otherwise. The *age* of student expressed in months was computed from the students' date of birth. Students were also asked if they speak each country's official language at home and the *language* variable was included in the model as a control variable as well (yes=1; otherwise 0). This variable may be used as a proxy for the immigration status of the family.

The PISA data provide several measures of school social capital such as teacher-student relations, teacher support, achievement pressure and disciplinary climate. Since the focus of this study is the family-level resources and their interaction with family policy contexts, these school social capital variables were included in the model as control variables. *The index of teacher-student relations* consists of five items asking how students feel about the relationship between them and teachers: (1) they get along well with most teachers, (2) most teachers are interested in students' well-being, (3) most teachers listen to what students say, (4) students would receive extra help from their teachers, if they need it and (5) most teachers treat students fairly. Each item was measured by a Likert-type scale ranging from 1 (strongly disagree) to 4 (strongly agree) and all five items were summarized to construct the index of teacher-student relations.

---

early 1990s when children in the study sample were younger). Social policy in countries, however, does not change dramatically in a short period. Further, in many affluent countries included in this study, family policies were substantially expanded during 1960s and 1970s. Gauthier (2002) also suggests that family policy regimes were difficult to distinguish during the 1970s, but regimes were much clearly discernible during the 1980s and 1990s, although there was a slight difference between the two time periods.

The index of teacher support was derived from six items: (1) how often the teacher shows an interest in student's learning, (2) gives students an opportunity to express opinions, (3) helps students with their work, (4) continues teaching until students understand, (5) does a lot to help students and (6) helps students with their learning. Each item was measured using a Likert-type scale ranging from 1 (never) to 4 (every lesson), and all six items were used to construct the index of teacher support. *The index of achievement press* was derived from students' reports on the frequency with which: (1) the teacher wants students to work hard, (2) the teacher tells students that they can do better, (3) the teacher does not like it when students deliver careless work and (4) students have to learn a lot. *The index of disciplinary climate* was derived from six questions asking the frequency with which: (1) the teacher has to wait a long time for student to quieten down, (2) students cannot work well, (3) students do not listen to what the teacher says, (4) students do not start working for a long time after the lesson begins, (5) there is noise and disorder and (6) at the start of the class, more than five minutes are spent doing nothing. This index was reverse-coded so that low values indicate a poor disciplinary climate.

School-level control variables

School-level variables were included in the model to control for differences across schools. First, the student-level school social capital variables, teacher-student relations, teacher support, achievement pressure, and disciplinary climate were aggregated to the school-level, and these *aggregated measures of school social capital* were additionally included in the model.

Several other school-level variables such as school size, student-teacher ratio, and school's educational resources were also included as control variables. *The school size* represents the total enrolment in the school. *The student-teacher ratio* was calculated by dividing the school size by the total number of teachers (part-time teachers were regarded as the half of the full-time teachers). *The index of the quality of schools' educational resources* was derived from school principals' reports on the extent to which learning in their schools was hindered by: (1) the lack of instructional material, (2) not enough computers for instruction, (3) lack of instructional materials in the library, (4) lack of multi-media resources for instruction, (5) inadequate science laboratory equipment, and (6) inadequate facilities for the fine arts. This index was reverse coded so that low values indicate a low quality of educational resources.

4.3. Missing Data

The PISA data contain missing observations across variables. The proportion of missing observations ranges from 0 to 10% across variables as presented in Table 5-1. This study imputed missing values using a multiple imputation technique. Multiple imputation replaces each missing observation with a set of predicted values using existing values from other variables, and these multiply imputed values represent the uncertainty about the right value to impute (Rubin, 1987; Schafer, 1997; Wayman, 2003). Standard statistical analyses are then performed for each imputed datasets, and the analysis results are combined to produce an overall result. Combined estimates from multiply imputed data have been proved to be unbiased (Wayman, 2003).

There are several approaches to conduct multiple imputation and, among others, this study used the Markov Chain Monte Carlo (MCMC) multiple imputation, which is one of the most widely used methods for arbitrary missing data. Assuming that data are from multivariate normal distribution, MCMC multiple imputation uses the EM algorithm and the method of generating random draws from probability distribution via Markov Chains (Schafer, 1997). Although the MCMC method requires multivariate normality of the data, simulation studies have found that it is robust to departures from this assumption (Wayman, 2003; Yucel & Zaslavsky, 2005). Five imputed datasets were created for the current study following the suggestion by Schafer and Olsen (1998). Given the moderate fraction of missing data in this study, five imputations may be efficient enough.

4.4. Analytic Model and Statistical Procedures

To explore research questions and hypotheses presented in the previous section, this study mainly utilized random effect multilevel modeling and fixed effect model where available. Mediating pathways among different aspects of family resources were examined using the Baron and Kenny's approach (1986) reformulated for multilevel modeling (Bauer, Preacher, & Gil, 2006; Kenny, Bolger, & Korchmaros, 2003; Krull & MacKinnon, 2001). To further examine whether the findings were robust to possible endogeneity between random effects and predictors in the model, alternative statistical procedures were used such as the Bartel's approach (2008) and the Hausman-Taylor estimator.

4.4.1. Main analytic models and statistical procedures

To examine the impact of different-types of family resources on children's educational achievement (research question 1), this study utilized three-level random effect multilevel modeling. The data used in this study have a clustered structure (i.e., students clustered within schools, schools clustered within countries). A failure to incorporate within-cluster correlations into the analytic model would lead to incorrect coefficients and standard errors (Ballinger, 2004; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). The main statistical procedures adopted in this study were multilevel modeling where both school and country-level random intercepts were allowed. The variance component analysis and the intra-class correlations (ICC) are presented in Table 4-4, justifying the use of multilevel modeling. The ICC for the school and country-level were .37 and .05, respectively, suggesting that between-school variance was more substantial compared to between-country variance.

Table 4-4. Variance Component Analysis and Intra-Class Correlations (ICC) across clusters

	Reading Achievement	
	Variance	ICC
School-level variance	3713.15	0.37
Country-level variance	543.29	0.05
Error variance	5660.10	

The empirical model is as follows:

Level-1 (student-level): $Y_{ijk} = \beta_{0jk} + \beta_1 W_{ijk} + \beta_2 E_{ijk} + \Sigma \beta_m S_{mijk} + \Sigma \gamma_n C_{nijk} + r_{ijk}$

Level-2 (school-level): $\beta_{0jk} = r_{00k} + \Sigma \beta_l Z_{ljk} + u_{0jk,}\ u_{0jk} \sim N(0, \tau_\pi)$

Level-3 (country-level): $r_{00k} = r_{000} + u_{00k,}\ u_{00k} \sim N(0, \tau_\beta)$

The reduced form equations can be written as follows:

$$Y_{ijk} = r_{000} + \beta_1 W_{ijk} + \beta_2 E_{ijk} + \Sigma \beta_m S_{mijk} + \Sigma \gamma_n C_{nijk} + \Sigma \eta_l Z_{ljk} + u_{0jk} + u_{00k} + r_{ijk}$$

$$u_{0jk} \sim N(0, \tau_\pi),\ u_{00k} \sim N(0, \tau_\beta)$$

where, i, j, and k denote student, school and country, respectively; Y_{ijk} = standardized reading score; W_{ijk} = financial capital within the family; E_{ijk} = human capital within the family; S_{mijk} = the m-number of social capital variables within the family; C_{nijk} = the n-number of other student-level control variables; β_{0jk} and r_{ijk} represent the mean reading score of school j in country k and is an error term, respectively. In the level-2 specification, Z_{mjk} = the l-number of school-level control variables; r_{00k} represents the mean achievement score in country k and u_{0jk} is random effects at the school-level which are assumed to be normally distributed with a mean of *0* and variance τ_π. In the level-3 specification, r_{000} is the grand mean, and u_{00k} is random effects at the country-level which are assumed to be normally distributed with a mean of *0* and variance $\tau_{\beta.}$

Although random effect model has been known to produce efficient estimates with the clustered data, it would yield biased estimates if random effects are correlated with predictors in the model (endogeneity problem). In this case, fixed effect model in which a series of dummy variables representing upper-level clusters are added to the model is preferred since it produces unbiased within-cluster estimates adjusting for unobserved cluster-level heterogeneity (Baltagi, Bresson, & Pirotte, 2003; Chaplin, 2003; Ebbes, Bockenholt & Wedel, 2004; Wooldridge, 2002). Fixed effect model was additionally run in which country-level fixed effects were included in the model instead of country-level random effects.[9]

Next, to examine the mediating role of the quality of social capital (research question 2), the Baron and Kenny's approach (1986) reformulated for the multilevel modeling (Bauer, Preacher, & Gil, 2006; Kenny, Bolger, & Korchmaros, 2003; Krull & MacKinnon, 2001) was used. This approach is discussed in the next section in more detail.

To examine the direct effect and moderating role of family policy contexts (research question 3), country-level family policy measures were added to the level-3 equations in the random effect model.[10] To explore the moderating role of family policy contexts in the relationships between different aspects of family resources and children's

[9] School-level fixed effects could not be included in the model because the model includes school-level regressors. The possible endogeneity between school-level random effects and regressors is discussed in the later section in more detail.

[10] In this case, country-level fixed effects cannot be included in the model because the model includes country-level predictors.

educational achievement, a series of interaction terms between family policy measures and family-level resources were added to the model.

4.4.2. Mediating role of the parent-child interaction

To test the mediating role of the parent-child interaction, we utilized the Baron and Kenny's approach (1986) reformulated for multilevel modeling (Bauer, Preacher, & Gil, 2006; Kenny, Bolger, & Korchmaros, 2003; Krull & MacKinnon, 2001). To establish a mediating effect, three conditions should be met: (1) the primary predictor is significantly associated with the dependent variable; (2) variations in the mediator are significantly accounted for by the primary predictor; (3) the mediator is significantly associated with the dependent variable controlling for the primary predictor. Given these three conditions are met, there is full mediation when the primary predictor is no longer significant controlling for the mediator. If the primary predictor is still significant, the findings support partial mediation. Since we used clustered data in this study, these conditions were tested in the context of a random effect multilevel modeling. To test the significance of the mediating effect, the Sobel test was conducted (MacKinnon et al., 2002).

4.4.3. Consideration of endogeneity in random effect multilevel modeling[11]

In statistics, endogeneity usually refers to the correlation between regressors and the error term (Foster & McLanahan, 1996; Fuch & Wobmann, 2004). The endogeneity problem usually results from three reasons: (1) omitted variable, (2) simultaneity, and (3)

[11] This section focuses on the possible endogeneity between school-level random effect and predictors because the variance component analysis revealed that school-level variance is much more substantial compared to country-level variance (see Table 4-3).

measurement error. If the model suffers from one of these problems, predictors can be correlated to the error term, violating the assumption of the OLS regression. All parameter estimates in the model can be affected, leading to biased estimates (Wooldridge, 2002).

With regard to the empirical model in this study, predictors in the model are possibly correlated with school-level random effects since any omitted, unobserved school-specific effects can influence both predictors and children's educational achievement. When an endogeneity problem exists, one popular, relatively simple, solution is to use fixed effect model instead of random effect model (Ebbs, Bockenholt & Wedel, 2004; Mundlak, 1978; Wooldridge, 2002). By explicitly modeling school-specific heterogeneity by adding a series of school dummy variables, possible biases in the random effect model can be solved. However, one of the critical flaws of fixed effect model is that it is not possible to include school-level predictors, since these predictors and fixed effect perfectly collinear. Thus, alternative estimation methods are needed which permit not only to include school-level predictors but also to solve the bias due to endogeneity.

Several alternative estimation procedures have been proposed. One approach is to model the correlation between random effects and the predictors explicitly. Mundlak (1978) suggests the inclusion of group means of lower-level predictors into the equation. Bafumi and Gelman (2006) and Bartel (2008) suggest similar solutions. The Bartel's approach, for example, first calculates within- and between-cluster transformation of a lower-level variable. That is, one calculates the cluster (or group) mean of lower-level

variables and subtracts the cluster mean from the lower-level variables (centering lower-level variables with regard to the cluster means); then includes in the model these centered lower-level variables instead of original variables as well as cluster means. In this way, the dependencies between random effects and lower-level predictors can be explicitly modeled, thus allowing us to estimate the impacts of upper-level predictors as well as to tackle a potential endogeneity problem. Although this approach has been proved to be effective in dealing with correlations between lower-level predictors and random effects, the correlations between upper-level predictors and random effects may still be problematic (Ebbs, Bockenholt & Wedel, 2004).

Hausman and Taylor (1981) suggests an alternative approach where both lower and upper-level endogeneity can be considered. The Hausman-Taylor estimator uses an instrumental variable approach, but one advantage of the Hausman-Taylor estimator is that it does not require external instrument variables; instead all instruments are derived from within the model (Baltagi, Bresson & Priotte, 2002; Dixit & Pal, 2010; Wooldridge, 2002). The Hausman-Taylor estimator requires prior knowledge of which of the lower and upper-level predictors are uncorrelated with the random effects. Let $X_{ij} = [X_{1ij} : X_{2ij}]$ and $Z_i = [Z_{1i} : Z_{2i}]$, where X_{ij} is sets of lower-level predictors, Z_i is sets of upper-level predictors, X_1 and Z_1 are assumed to be uncorrelated with random effects, and X_2 and Z_2 are assumed to be correlated with random effects. The Hausman-Taylor estimator utilizes a series of internal instruments as follows: (1) X_{1ij} and Z_{1i} serve as their own instruments; (2) deviations from group-mean X_{2ij} can be used as instruments for X_{2ij}, (3) group mean of X_{1ij} serves as instrument for Z_{2i}. In sum, the Hausman-Taylor estimator allows

unobserved school-specific effects to be random effects, thus permitting to include upper-level predictors in the model; at the same time, dependencies between random effects and other predictors (both lower and upper-level predictors) are solved using internal instruments.

The Bartel's approach and the Hausman-Taylor estimator were additionally used to estimate the main model to examine whether the findings are robust to potential endogeneity in the random effect multilevel modeling.[12]

[12] Recently, Plumper and Troeger (2007) suggested fixed effects vector decomposition as another alternative to tackling the dependencies between random effects and predictors while allowing group-level predictors in the model. However, this procedure is still experimental, and several statisticians have criticized this method (see Breusch, Ward, Nguyen, and Kompas, 2010; Greene, 2010). Therefore, this study did not include this method.

V. Findings

5.1. Descriptive Statistics

Descriptive statistics for the student and school-level variables from the PISA data are provided in Table 5-1. The mean reading score of the children, the dependent variable in this study, was 508.41 (standard deviation = 96.34), which was slightly higher than the mean score of children in all participating countries.

With regard to descriptive statistics for family-level characteristics, about 15.76% of children were living in the single-parent families. The average number of siblings was 1.86. About 69% of mothers were working outside the home and, of those, 46.84% were employed at full-time work and 22.47% were working part-time. The remaining 30.69% of mothers stayed at home at the time of the survey. The mean education score for mothers and fathers were 4.33 and 4.35, respectively, based on the ISCED scale (4: post-secondary non-tertiary education, 5: first-stage of tertiary education). The mean socio-economic index for parents was 49.35 with the range from 16 to 90. The mean score of the family wealth index was 0.17 with the range between -5.05 and 3.38. The mean score of parent-child interactions were 20.24 with a range of 6 to 30. This mean score suggests that children are likely to be involved in activities with their parents “once a month” or more on average.

Turning to the student demographics, the sample consists of male (49.66%) and female (50.34%), and the mean age was 188 months. The majority of students spoke

official language – test language – at home (91%), but the remaining 9% did not speak official language at home because they were from immigrants family or had other reasons.

Descriptive statistics for a series of family policy measures are provided in Table 5-2. Public expenditure on family cash benefits was 0.84% of the GDP, on average, for the countries included in the sample. The mean benefit-level of maternity leave was 69.67% of the average wage, and the mean duration of paid maternity leave was 20.22 weeks. About 0.58% of the GDP was allocated to pre-primary education and care, and the mean enrollment rate for public child care and pre-primary education was over 103% for the study countries (the sum of enrollment rates for children at age 3 or below and those for children at age 6 or below).

More importantly, descriptive statistics presented in Table 5-2 suggest that there is a substantial variation across countries. For example, countries such as Australia (2.2%), Austria (1.9%), and Belgium (1.5%) had a highest level of public expenditure on cash benefits, followed by Finland (1.0%), France (1.0%), and Denmark (0.9%). Countries such as the United States (0.1%), Spain (0.1%), and Italy (0.3%) had a lowest level of expenditure. In terms of parental leave policy, Scandinavian countries and several Continental European countries (e.g., France and Austria) had most generous policy settings, reflected by a highest level of benefit replacement rate and a longer week of benefit duration. The opposite was true for the countries such as Australia, New Zealand, and the United States; they did not have explicit schemes for publicly guaranteed, paid parental leave. For ECEC policy, the Scandinavian countries tended to experience a highest level of public expenditure as well as high enrollment rates.

Countries such as Austria, Portugal and Spain had a low level of policy measures in ECEC. The United States spent only 0.4% of the GDP in ECEC, but enrollment rates were relatively high (124%).

Descriptive statistics presented in Table 5-2 clearly show that there are variations in family policy measures across countries and countries have different combinations of family policy measures.

Table 5-1. Descriptive statistics of student and school-level variables (from the PISA data)

Variable		Mean (Standard deviation) or Percentage of Frequency	Proportion of Missing Observation
Dependent variable			
Educational achievement			
Standardized reading score		508.41 (96.34)	0.00%
Independent variable			
Family Human Capital			
Father's education		4.35 (1.45)	9.07%
Mother's education		4.33 (1.43)	6.51%
Family Financial Capital			
Parents' socio-economic index		49.35 (16.32)	4.40%
Wealth index		0.17 (0.87)	0.93%
Family Social Capital			
Single parent family	Yes	15.76%	1.73%
	No	84.24%	
Number of siblings		1.86 (1.32)	1.45%
Mothers' work	Full-time	46.84%	3.46%
	Part-time	22.47%	
	No	30.69%	
Parent-child interactions		20.24 (4.37)	1.47%
Control variable			
Student-level			
Age (months)		188.45 (3.45)	1.05%
Female	Yes	50.34%	0.87%
	No	49.66%	
Language	Yes	91.00%	3.73%
	No	9.00%	
Teacher support		0.08 (1.00)	1.56%
Achievement press		0.04 (0.98)	1.48%
Teacher-student relationship		0.04 (0.97)	1.70%
School disciplinary climate		0.10 (0.98)	1.45%
School-level			
Teacher support (school-level)		0.09 (0.43)	0.00%
Achievement press (school-level)		0.05 (0.39)	0.00%
Teacher-student relation (school-level)		0.05 (0.37)	0.00%
School disciplinary climate (school-level)		0.10 (0.40)	0.00%
School size		673.38 (465.54)	7.55%
School resources		0.006 (0.99)	4.50%
Student-teacher ratio		12.54 (4.49)	9.77%

N=87,664 (Student-level) N=3,336 (School-level)

Table 5-2. Family policies across industrialized countries included in this study

Country	Public expenditure on family cash benefits, 2000	Benefit level of maternity leave, 1999	Duration of paid maternity leave, 1999	Public expenditure on pre-primary education and care, 2000	Children enrolled in public child care and pre-primary education, 2000
Australia	2.2	0	0	0.4	75.0
Austria	1.9	100	16	0.2	72.0
Belgium	1.5	77	15	0.6	127.0
Denmark	0.9	100	30	1.5	155.0
Finland	1.0	70	52	1.0	88.0
France	1.0	100	16	0.9	128.0
Germany	0.7	100	14	0.3	88.0
Greece	0.4	50	16	0.1	49.0
Ireland	0.7	70	14	0.2	94.0
Italy	0.3	80	22	0.5	101.0
Netherlands	0.7	100	16	0.4	104.0
New Zealand	0.9	0	0	0.6	135.0
Norway	0.8	100	42	1.1	120.0
Portugal	0.3	100	17	0.3	87.0
Spain	0.1	100	16	0.3	89.0
Sweden	0.8	63	64	1.1	128.0
UK	0.9	44	18	0.6	94.0
US	0.1	0	0	0.4	124.0
Mean	0.84	69.67	20.22	0.58	103.22
(St.d.)	(0.56)	(36.92)	(17.04)	(0.39)	(26.58)

Note: See the Table 4-1 for definitions and sources of the data

5.2. The impact of family-level financial, human, and social capital

Table 5-3. The impact of family financial, human, and social capital on children's educational achievement

Variable		Random-effect model Coefficients (Standard errors)	Fixed-effect model Coefficients (Standard errors)
Family Human Capital			
Father's education		1.92 (0.30)***	1.92 (0.30)***
Mother's education		2.68 (0.30)***	2.67 (0.30)***
Family Financial Capital			
Parents' socio-economic index		0.82 (0.02)***	0.82 (0.02)***
Wealth index		1.19 (0.39)**	1.18 (0.39)**
Family Social Capital			
Single parent family		– 4.90 (0.75)***	– 4.91 (0.75)***
Number of siblings		– 4.59 (0.20)***	– 4.60 (0.20)***
Mothers' work	Full-time	– 1.82 (0.75)*	– 1.83 (0.75)*
	Part-time	7.46 (0.84)***	7.45 (0.84)***
Parent-child interactions		2.77 (0.06)***	2.77 (0.06)***
Control variable			
Student-level			
Age (months)		1.10 (0.08)***	1.10 (0.08)***
Female		24.60 (0.53)***	24.60 (0.53)***
Language		17.77 (1.20)***	17.77 (1.20)***
Teacher support		–1.01 (0.35)**	–1.01 (0.35)**
Achievement press		–2.21 (0.31)***	–2.21 (0.31)***
Teacher-student relationship		4.83 (0.34)***	4.83 (0.34)***
School disciplinary climate		–4.07 (0.28)***	–4.07 (0.28)***
School-level			
Teacher support (school-level)		–35.36 (3.23)***	–36.03 (3.25)***
Achievement press (school-level)		–6.66 (2.98)*	–6.64 (3.00)*
Teacher-student relation (school-level)		6.17 (3.31)	6.32 (3.31)
School disciplinary climate (school-level)		–34.60 (2.64)***	–34.96 (2.64)***
School size		0.02 (0.00)***	0.02 (0.00)***
School resources		–5.70 (0.89)***	–5.73 (0.89)***
Student-teacher ratio		0.58 (0.24)*	0.57 (0.24)*

Note: (1) The random-effect model allows both school and country-level random intercepts; (2) The fixed-effect model includes country-level fixed effects; (3) The estimates are combined across 5 imputed datasets.

The direct impacts of financial, human, and social capital within the family on children's educational achievement were estimated using both random and fixed effect model and results are presented in Table 5-3.

Both variables measuring family financial capital were significantly associated with children's educational achievement controlling for all other covariates in the model. The parents' socio-economic index was positively related to children's reading achievement (b=.82, p<.001); so was the family wealth index (b=1.19, p<.01).

In terms of family human capital, both mothers' and fathers' education were positively associated with children's reading achievement, and the magnitude of the impact was higher for mothers' education (b=1.92, p<.001 for father; b=2.68, p<.0001 for mother). As mothers' education increased by one level (based on the ISCED index), reading score increased by 2.68 points. For fathers' education, a one level increase was associated with a 1.92 point increase in the reading score.

Turning to the variables measuring structural deficiency of family social capital, children living in single-parent families had a lower mean reading score by 4.90 points, compared to those living with both parents, and this difference was statistically significant (b=-4.90, p<.001). The number of siblings was also negatively associated with children's reading achievement (b=-4.59, p<.001). As the number of siblings increased by one, the reading score decreased by 4.59 points. Likewise, employment status of the mother was a significant predictor of children's reading achievement. Children with full-time working mothers had a lower mean reading score than those with mothers who did not work (b=-1.82, p<.05). On the contrary, children with part-time working mothers

were found to have a higher mean reading score than those with mothers who did not work (b=7.46, p<.001).

Parent-child interactions measuring the quality of family social capital had a significant, positive impact on children's reading achievement (b=2.77, p<.001). A one point increase in the parent-child interaction scale was associated with a 2.77 point increase in the reading score.

Several student and school-level control variables included in the model were significantly associated with reading achievement. For example, female students had a higher reading achievement than male students (b=24.60, p<.001); students who spoke official language at home had a higher reading score compared to those who did not (b=17.77, p<.001). Four variables capturing school social capital were also significant predictors of reading achievement (b=-1.01, p<.01 for teacher support; b=-2.21, p<.001 for achievement pressure; b=4.83, p<.001 for teacher-student relation; b=-4.07, p<.001 for school disciplinary climate). Among school-level controls, school size and student-teacher ratio were positively related to children's reading achievement (b=.02, p<.001 for school size; b=.58, p<.05 for student-teacher ratio).

The second column of Table 5-3 presents the findings from the fixed effect model where country-level fixed effects were included in the model instead of country-level random effects. The results suggest that findings are consistent and almost identical between the two models.

5.3. The mediating role of the quality of family social capital

Table 5-4. The impact of family financial, human, and social capital on parent-child interaction

Variable		Random-effect model Coefficients (Standard errors)	Fixed-effect model Coefficients (Standard errors)
Family Human Capital			
Father's education		0.17 (0.02)***	0.17 (0.02)***
Mother's education		0.28 (0.02)***	0.27 (0.02)***
Family Financial Capital			
Parents' socio-economic index		0.03 (0.00)***	0.03 (0.00)***
Wealth index		0.35 (0.02)***	0.35 (0.02)***
Family Social Capital			
Single parent family		–0.44 (0.05)***	–0.48 (0.04)***
Number of siblings		–0.19 (0.01)***	–0.19 (0.01)***
Mothers' work	Full-time	–0.36 (0.04)***	–0.36 (0.04)***
	Part-time	–0.17 (0.07)*	–0.16 (0.07)*
Control variable			
Student-level			
Age (months)		–0.00 (0.01)	–0.00 (0.01)
Female		0.75 (0.03)***	0.75 (0.03)***
Language		0.11 (0.07)	0.11 (0.07)
Teacher support		0.30 (0.02)***	0.30 (0.02)***
Achievement press		0.34 (0.02)***	0.34 (0.02)***
Teacher-student relationship		0.69 (0.02)***	0.69 (0.02)***
School disciplinary climate		–0.16 (0.02)***	–0.16 (0.02)***
School-level			
Teacher support (school-level)		–0.32 (.10)**	–0.32 (0.10)**
Achievement press (school-level)		–0.05 (.09)	0.05 (0.09)
Teacher-student relation (school-level)		–0.15 (.10)	0.15 (0.10)
School disciplinary climate (school-level)		–0.26 (.08)**	–0.26 (0.08)***
School size		0.00 (.00)***	0.00 (0.00)***
School resources		0.00 (.02)	0.00 (0.02)
Student-teacher ratio		–0.01 (.01)	–0.00 (0.01)

Note: (1) The random-effect model allows both school and country-level random intercepts; (2) The fixed-effect model includes country-level fixed effects; (3) The estimates are combined across 5 imputed datasets.

To examine the mediating role of parent-child interactions in the relationships between other types of family resources and children's reading achievement, the Baron and Kenny's approach (1986) reformulated for multilevel modeling was used as discussed earlier.

As presented in the previous section (Table 5-3), all variables measuring family financial capital (parents' socio economic index, family wealth index), human capital (mothers' and fathers' education), and structural deficiency of family social capital (single-parent family, sibling size, mothers' working) had significant impacts on children's educational achievement, thus meeting the first condition of the Baron and Kenny's approach. A supplemental analysis was conducted to examine the second condition whether family financial, human capital and structural deficiency of family social capital were significantly associated with the possible mediator, parent-child interactions. The results are provided in Table 5-4, indicating that mother's education, father's education, parent's socio-economic index, and family wealth index were positively associated with parent-child interactions. On the contrary, single-parent family, number of siblings and mothers' work had negative impacts on parent-child interactions. All of these relationships were statistically significant. In terms of the third condition of the Baron and Kenny's approach, Table 5-3 shows that a possible mediator, parent-child interactions, was significantly associated with children's reading achievement.

These results indicate that parent-child interactions mediated the impact of family financial, human capital and structural deficiency of family social capital on children's reading achievement. The impacts of family financial, human capital, and structural

deficiency of family social capital on reading achievement were still significant and the magnitude of the impacts did not decrease much after controlling for the mediator, parent-child interactions, suggesting that these mediation effects were partial.

The significance of each mediating effect was estimated using the Sobel's test. In the multilevel models, lower-level mediation effects need to be adjusted when the relationships in each mediation chain significantly vary across the upper-level clusters (Bauer, Preacher, & Gil, 2006; Kenny, Bolger, & Korchmaros, 2003). I found no evidence of significant variability when the random slopes across school-level clusters were allowed to the mediation equations. Thus, I conducted the conventional Sobel-test to examine whether each mediating effect was significant or not (Mackinnon et al., 2002).The Sobel's tests presented in Table 5-5 show that all mediating effects were statistically significant.

Table 5-5. Sobel tests for the significance of mediating effects

Mediating Pathways	Sobel's test (standard error)
Family financial capital	
Parent's socio-economic index -> Parent-child interaction -> Reading achievement	25.15 (0.00)***
Family wealth index -> Parent-child interaction -> Reading achievement	16.36 (0.06)***
Family human capital	
Mother's education -> Parent-child interaction -> Reading achievement	13.40 (0.06)***
Father's education -> Parent-child interaction -> Reading achievement	8.36 (0.06)***
Structural deficiency of family social capital	
Single parent family -> Parent-child interaction -> Reading achievement	–8.64 (0.14)***
Number of siblings -> Parent-child interaction -> Reading achievement	–17.57 (0.03)***
Mother's work (full-time) -> Parent-child interaction -> Reading achievement	–8.83 (0.11)***
Mother's work (part-time) -> Parent-child interactions -> Reading achievement	–2.42 (0.19)*

Note: * p<.05 ** p<.01 *** p<.001

In sum, both parents' socio-economic index and the family wealth index measuring family financial capital had positive impacts on parent-child interactions, and parent-child interactions in turn positively influenced reading achievement. Likewise, the positive impact of parents' education on children's academic achievement was partly mediated by parent-child interactions. Structural deficiency in family social capital (e.g., living in single-parent families, a large sibling size, and working mothers) had negative influences on children's educational achievement partly by lowering parent-child interactions.

5.4. Correcting for endogeneity

Table 5-6. The impact of family financial, human, and social capital on children's educational achievement (Correcting for endogeneity between school-level random effect and predictors)

Variable		Bartel's approach	Hausman-Taylor estimator
		Coefficients (Standard errors)	Coefficients (Standard errors)
Family Human Capital			
Father's education		1.71 (0.28)***	1.91 (0.03)***
Mother's education		2.42 (0.29)***	2.37 (0.03)***
Family Financial Capital			
Parents' socio-economic index		0.77 (0.02)***	0.78 (0.00)***
Wealth index		0.88 (0.42)*	0.57 (0.04)***
Family Social Capital			
Single parent family		–4.36 (0.72)***	–4.31 (0.08)***
Number of siblings		–4.35 (0.27)***	–4.36 (0.02)***
Mothers' work	Full-time	–2.78 (0.74)***	–3.18 (0.07)***
	Part-time	6.61 (1.20)***	5.79 (0.08)***
Parent-child interactions		2.69 (0.08)***	2.64 (0.01)***
Control variable			
Student-level			
Age (months)		1.06 (0.09)***	1.07 (0.01)***
Female		23.84 (0.54)***	23.87 (0.06)***
Language		17.58 (1.17)***	17.04 (0.11)***
Teacher support		–0.80 (0.37)*	–1.16 (0.01)***
Achievement press		–2.16 (0.33)***	–2.18 (0.03)***
Teacher-student relationship		4.75 (0.38)***	4.87 (0.03)***
School disciplinary climate		–4.18 (0.29)***	–4.33 (0.03)***
School-level			
Teacher support (school-level)		–22.83 (2.60)***	0.10 (2.52)
Achievement press (school-level)		–1.32 (2.39)	–9.42 (1.92)***
Teacher-student relation (school-level)		–2.54 (2.64)	–0.26 (2.36)
School disciplinary climate (school-level)		–16.30 (2.13)***	–46.75 (1.63)***
School size		0.01 (0.00)***	–0.01 (0.00)**
School resources		–2.38 (0.69)***	–86.67 (3.30)***
Student-teacher ratio		–0.22 (0.19)	20.16 (1.14)***

Note: (1) Country-level fixed effects are included in all models; (2) The estimates are combined across 5 imputed datasets; (3) See Chapter 4 for more information on the Bartel's approach and the Hausman-Taylor estimator.

To correct for potential endogeneity between school-level random effects and predictors, the main model was estimated using two alternative statistical approaches: (1) the Bartel's approach and (2) the Hausman-Taylor estimator[13]. Table 5.6 provides findings from those two appraoches.

Looking at the first column of Table 5-6, findings from the Bartel's approach were consistent with those from the main model using random-effect model. Although regression coefficients slightly decreased compared to those from the main model (Table 5-3), overall interpretations remain same.

The results from the Hausman-Taylor estimator presented in the second column of Table 5-6 are also consistent with those from the main model. Although school-level control variables such as school-level teacher support, school-level disciplinary climate, school resources, and student-teacher ratio were found to produce different coefficients and standard errors, findings for family-level measures, variables of interest in this study, were almost identical to those from the main model.

[13] One of the limitations in the Hausman-Taylor estimator is that one should assume the exogenous and endogenous predictors in the analysis. Based on the literature, I assume that parent-child interaction and several school-related measures (e.g., teacher-student relations, teacher support, achievement pressure) are correlated with school-level random effects, and other variables are exogenous with regard to school-level random effects.

5.5. The role of family policy contexts

5.5.1. Hierarchical Cluster Analysis of Family Policy Regimes

Before examining the role family policy contexts, countries in the study sample were empirically grouped into a limited number of family policy regimes and these were included in the model as an alternative measure of family policy contexts.

Cluster analysis empirically classifies countries into a limited number of clusters on the basis of combination of pre-determined selection criterion (e.g., family policy indicators in this study) so that each country in a cluster is similar to others in the same cluster and different from countries in other clusters (Bambra, 2007; Gough, 2001; Rapkin & Luke, 1993; Saint-Arnaud & Bernard, 2003; Sambamoorthi, n.d.). In this way, each cluster represents different regime types.

Among different types of cluster analysis, this study used hierarchical cluster analysis which identifies a closest pair of countries and combines them until all cases are in one cluster (Bambra, 2007; Gough, 2001).[14]

Four family policy indicators presented in Table 4-1 were utilized for the hierarchical cluster analysis. These family policy indicators encompass all three areas of family policy: income support for families with children, parental leave policy, and early childhood care and education policy. As far as the specific methods used to identify clusters were concerned, several choices were made. First, each indicator was

[14] Although hierarchical clustering is popular especially for small sample sizes, it is often considered as exploratory and atheoretical. K-means clustering can be alternatively utilized which enables *a priori* specification of the number of clusters to be formed (Gough, 2001). In this study, k-means clustering are also used to empirically classify sample countries into family policy regimes, and both methods produced similar results.

standardized to prevent variables with a broad range of absolute values from dominating the analysis. Second, among several measures of distances among indicators, this analysis used a classic measure of distance known as squared Euclidean. Squared Euclidean is known to give more importance to greater distances, and thus makes it possible to identify differences between countries whose profiles still show high degrees of similarity (Saint-Arnaud & Bernard, 2003). Third, the current analysis adopted the Ward's method for grouping countries which minimizes the variance within groups and therefore maximizes their homogeneity. [15]

The results are presented in the dendrogram below (Figure 5-1). Since hierarchical cluster analysis is exploratory, I decided number of clusters in a way that they made a theoretical sense.

[15] Other measures of distance and grouping methods did not alter the results.

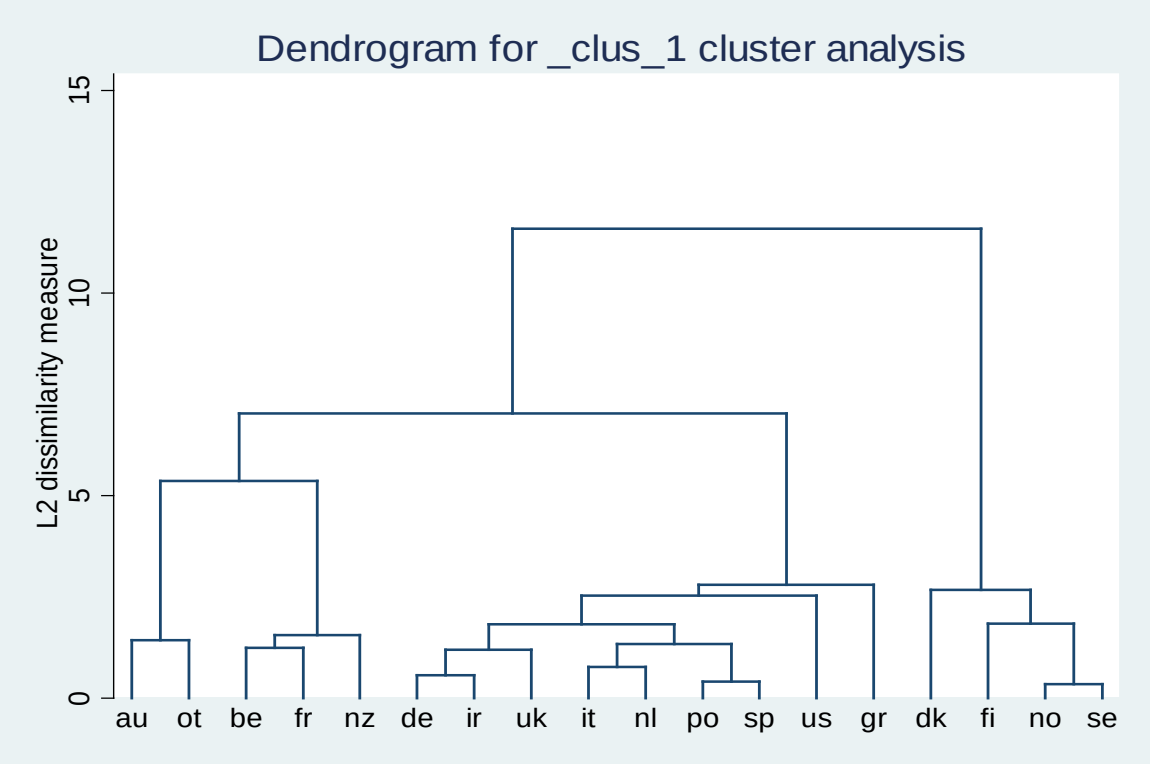


Figure 5-1. Hierarchical Cluster Analysis of Family Policy Regimes

Based on the dendrogram and theoretical discussion in Chapter 2, three different clusters (family policy regimes) were selected. The first cluster (or regime) included the United States, the United Kingdom, Spain, Italy, Greece, Portugal, Ireland, and Netherlands. The second cluster included France, Austria, Belgium, New Zealand and Australia. Scandinavian countries such as Denmark, Finland, Norway, and Sweden were included in the third cluster or regime.

The characteristics of each policy regime are presented in Table 5-7. According to Table, countries in the first cluster are characterized as low-level of family policies in all areas. Countries in the second cluster show a highest level of cash benefits for families

and a medium level of parental leave and ECEC policies. On the contrary, countries in the third cluster are characterized as highest-level of paid parental leave and ECEC policies, and a medium to high level of cash benefits. Although slight differences still exist, the result of cluster analysis is in line with the Korpi's typology of family policy regime (2000). That is, the first, second, and third cluster in this analysis correspond to the market-oriented support regime, general family support regime, and dual earner support regime, respectively. This study utilized these family policy regimes as one of the measures for family policy contexts.

Table 5-7. Characteristics of Family Policy Regimes

	Mean Score for each regime		
Family Policy Indicators	**Countries with weak family policies** *(e.g., US, UK, Spain, Ireland, Italy, Netherlands)*	**Countries with a strong general family support** *(e.g., Austria, Belgium, France, Australia)*	**Countries with a strong dual earner support** *(e.g., Denmark, Sweden, Norway, Finland)*
Public expenditure on family allowance	0.47	1.50	0.87
Full-time equivalent (FTE) maternity benefits	11.81	8.71	37.18
Total weeks of leave [16]	73.43	93.00	111.75
Public expenditure on pre-primary education and care	0.35	0.55	1.15
Children enrolled in public childcare and pre-primary education	92.22	107.40	122.75
Reading Score	502.12	513.94	516.98

[16] Total duration of leave includes both maternity/parental and childcare leave schemes (in weeks).

Table 5-8 presents descriptive statistics of student and school-level measures for each family policy regime. Mean reading test scores are highest in countries with dual-earner supports, followed by those with general family supports and market-oriented supports. Parents in dual-earner support countries have highest-level of family financial capital; the opposite is true for those in market-oriented countries. Regarding parents' education, both fathers and mothers in countries with market-oriented supports have lowest education. Notably, mothers' education-level is substantially higher in the dual-earner support regime, compared to other regimes. Other interesting findings include a difference in proportions of working mothers across regimes. That is, over 80% of mothers are engaged in work outside the home in the dual-earner regime; of those, about 65% of all mothers work full-time. Overall proportions of working mothers are lower in other two regimes, and proportions of mothers working part-time are relatively higher in those regimes.

With regard to school-related measures, countries with dual-earner supports perform better than those with other two regimes. For instance, dual-earner support countries have highest-levels of teacher support, school disciplinary climate, and school resources as well as lowest-levels of teacher-student ratio and school size. Countries in other two regimes show worse outcomes in most of these measures, although the magnitude of differences across regimes differs by measures.

Table 5-8. Descriptive statistics of student and school-level measures by regimes

Variable		Mean (Standard deviation) or percentage of frequency		
		Dual-Earner Support Regime	General Family Support Regime	Market-Oriented Support Regime
Educational achievement				
Standardized reading score		516.98 (22.02)	513.94 (13.50)	502.12 (24.08)
Family Human Capital				
Father's education		4.56 (0.35)	4.53 (0.26)	4.20 (0.50)
Mother's education		4.71 (0.34)	4.47 (0.27)	4.11 (0.53)
Family Financial Capital				
Parents' socio-economic index		51.14 (1.99)	50.20 (1.86)	48.38 (2.62)
Wealth index		0.48 (0.18)	0.12 (0.23)	0.08 (0.29)
Family Social Capital				
Single parent family	Yes	17.03%	15.53%	14.96%
	No	82.97%	84.45%	85.04%
Number of siblings		2.02 (0.11)	1.90 (0.24)	1.82 (0.47)
Mothers' work	Full-time	64.62%	44.22%	40.83%
	Part-time	18.29%	25.00%	23.23%
	No	17.09%	30.78%	35.94%
Parent-child interactions		20.13 (0.59)	19.69 (0.97)	20.62 (1.03)
Student-level Control				
Age (months)		188.39 (0.55)	188.83 (0.64)	188.27 (0.65)
Female	Yes	49.96%	49.44%	51.11%
	No	50.04%	50.56%	48.89%
Language	Yes	93.44%	88.01%	91.34%
	No	6.56%	11.99%	8.66%
Teacher support		0.10 (0.11)	0.00 (0.34)	0.09 (0.31)
Achievement press		-0.05 (0.20)	-0.08 (0.29)	0.14 (0.24)
Teacher-student relationship		0.04 (0.21)	0.05 (0.11)	0.01 (0.18)
School disciplinary climate		0.23 (0.10)	0.04 (0.15)	0.10 (0.19)
School-level Control				
Teacher support		0.09 (0.11)	0.02 (0.32)	0.10 (0.31)
Achievement press		-0.05 (0.20)	-0.08 (0.30)	0.14 (0.24)
Teacher-student relation		0.04 (0.21)	0.06 (0.09)	0.02 (0.17)
School disciplinary climate		0.23 (0.08)	0.03 (0.16)	0.11 (0.19)
School size		357.48 (112.00)	723.58 (145.92)	727.07 (235.17)
School resources		0.13 (0.34)	-0.25 (0.23)	0.08 (0.38)
Student-teacher ratio		10.99 (1.55)	12.09 (1.52)	13.41 (3.30)

Note: Mean values and frequencies for each country were calculated first, and then those are averaged across countries in each regime.

5.5.2. The direct impact of family policy indicators

Table 5-9. The role of family policy contexts (using single policy indicator)

Variable		Random-effect model Coefficients (Standard errors)
Student-level independent variables		
Family Human Capital		
Father's education		1.98 (0.27)***
Mother's education		2.79 (0.29)***
Family Financial Capital		
Parents' socio-economic index		0.82 (0.02)***
Wealth index		1.12 (0.41)*
Family Social Capital		
Single parent family		–4.63 (0.72)***
Number of siblings		–4.57 (0.27)***
Mothers' work	Full-time	–2.42 (0.74)**
	Part-time	7.15 (1.20)***
Parent-child interactions		2.78 (0.08)***
Student-level controls		
Age (months)		1.09 (0.09)***
Female		24.56 (0.53)***
Language		18.35 (1.16)***
Teacher support		–0.83 (0.37)*
Achievement press		–2.21 (0.33)***
Teacher-student relationship		4.65 (0.38)***
School disciplinary climate		–4.12 (0.29)***
School-level controls		
Teacher support (school-level)		–34.51 (3.24)***
Achievement press (school-level)		–6.20 (2.98)*
Teacher-student relation (school-level)		5.37 (3.30)
School disciplinary climate (school-level)		–35.38 (2.64)***
School size		0.02 (0.00)***
School resources		–5.77 (0.89)***
Student-teacher ratio		0.59 (0.24)*
Country-level Family policy		
Expenditure on family cash benefits		5.79 (13.05)
Maternity/Parental Leave (FTE)		–0.00 (0.01)
Expenditure on ECEC		45.47 (44.40)
Gross enrollment rate in ECEC		0.36 (0.44)

Note: (1) The random-effect model allows both school and country-level random intercepts; (2) The estimates are combined across 5 imputed datasets.

To examine the direct impact of family policy on children's reading achievement, four country-level family policy indicators were added to the random effect multilevel model.

According to the findings presented in Table 5-9, none of policy indicator variables were statistically significant after controlling for all other student and school-level covariates in the model. Next, family policy regimes drawn from hierarchical cluster analysis were used as an alternative measure of family policy contexts. The first column of Table 5-10 provides findings from the model including a dummy variable for each family policy regime. The dummy variable representing the dual-earner support regime was significantly associated with children's reading achievement, holding all other student and school-level predictors constant ($b=29.27$, $p<.05$). That is, the mean reading score in countries with the dual-earner support regime (strong parental leave and ECEC policy, moderate-to-high level of income support policy) were 29.27 points higher than countries with the market-oriented regime (low level of family policies). The difference in mean reading scores between the general support regime (strong income support policy, moderate level of parental leave and ECEC policy) and the market-oriented support regime was not statistically significant ($b=3.94$, $p=.78$).

*5.5.3. Moderating role of family policy contex*t

To examine the moderating role of family policy contexts in the effect of family financial, human and social capital on children's reading achievement, a series of interaction terms were added to the model. The findings from random effect multilevel modeling with interaction terms are presented in the second column of Table 5-10.

According to Table 5-10, five interaction terms were statistically significant and two additional interactions were marginally significant. First, the interaction term between the single parent family and dual-earner support regime was statistically significant (b= -8.17, p<.05), suggesting that the negative relationship between single parent families and children's reading achievement was stronger for the countries with dual-earner support regime (b=-4.41for the market-oriented support regime; b=-12.58 for the dual-earner support regime). Next, the interaction between mothers' education and children's reading achievement was statistically significant (b=-1.39, p<.05). The effect of mothers' education on children's reading achievement was positive in the market-oriented regime (b=3.05); this positive effect was weaker for the general family support regime (b=1.66). The interaction term between parents' socio-economic index and the dual-earner regime was statistically significant as well (b=0.33, p<.001), indicating that the positive impact of parents' socio-economic status was stronger in the dual-earner support countries (b=0.80 for the market-oriented regime; b=1.13 for the dual-earner regimes).

Next, turning to the mother's work, the interaction term between working full-time and the dual-earner regime was significant (b=8.88, p<.05); so was the interaction between working full-time and the general support regime (b=8.04, p<.05). These results suggest that the negative impact of full-time employment on children's reading achievement in the market-oriented countries (b=-4.20) disappeared and changed to positive in other family policy regimes (b=4.68 for the dual-earner regime; b=3.84 for the general support regime).

It is worthwhile to note that two interaction terms were marginally significant at a .10 of an alpha-level ($b=-3.30$, $p<.10$ for the interaction between the wealth index and the dual-earner support regime; $b=-1.09$, $p<.10$ for the interaction between fathers' education and the general support regime). These findings suggest that the positive impact of family wealth in the market-oriented regime disappeared in the dual-earner support regime; so did the positive impact of fathers' education in the general family support regime.

Table 5-10. The role of family policy contexts (using family policy regime dummies)[17]

Variable		Random-effect Coefficients (Standard errors)	Random-effect with interactions Coefficients (Standard errors)
Student-level independent variables			
Family Human Capital			
Father's education		1.98 (0.27)***	2.14 (0.32)***
Mother's education		2.79 (0.29)***	3.05 (0.35)***
Family Financial Capital			
Parents' socio-economic index		0.82 (0.02)***	0.80 (0.02)***
Wealth index		1.12 (0.41)*	1.03 (0.47)*
Family Social Capital			
Single parent family		–4.63 (0.72)***	–4.41 (0.81)***
Number of siblings		–4.57 (0.27)***	–4.70 (0.30)***
Mothers' work	Full-time	–2.43 (0.74)**	–4.20 (0.88)***
	Part-time	7.15 (0.20)***	6.93 (1.50)**
Parent-child interactions		2.78 (0.08)***	2.77 (0.08)***
Student-level controls			
Age (months)		1.09 (0.09)***	1.10 (0.09)***
Female		24.56 (0.53)***	24.53 (0.53)***
Language		18.35 (1.16)***	18.40 (1.16)***
Teacher support		–0.83 (0.37)*	–0.81 (0.37)*
Achievement press		–2.21 (0.33)***	–2.22 (0.33)***
Teacher-student relationship		4.65 (0.38)***	4.65 (0.38)***
School disciplinary climate		–4.12 (0.29)***	–4.12 (0.29)***
School-level controls			
Teacher support (school-level)		–34.42 (3.23)***	–34.52 (3.24)***
Achievement press (school-level)		–6.23 (2.98)*	–6.11 (2.98)*
Teacher-student relation (school-level)		5.36 (3.30)	5.31 (3.30)
School disciplinary climate (school-level)		–35.37 (2.63)***	–35.46 (2.63)***
School size		0.02 (0.00)***	0.02 (0.02)***
School resources		–5.76 (0.89)***	–5.72 (0.89)***
Student-teacher ratio		0.60 (0.24)*	0.58 (0.24)*
Country-level Family policy contexts			
Dual-earner support		29.27 (15.01)*	–1.80 (16.67)
General support		3.94 (13.98)	7.54 (14.50)
Interaction terms			
Dual X Single parent			–8.17 (3.62)*

[17] Standardized regression coefficients for the model are presented in the Appendix B.

General X Single parent	0.92 (1.96)
Dual X Wealth index	–3.30 (1.84)†
General X Wealth index	1.13 (0.97)
Dual X Sibling size	1.25 (1.01)
General X Sibling size	0.81 (0.57)
Dual X mother's education	0.85 (1.22)
General X mother's education	–1.39 (0.66)*
Dual X father's education	1.18 (1.20)
General X father's education	–1.09 (0.63)†
Dual X socio-economic status	0.33 (0.09)***
General X socio-economic status	0.03 (0.05)
Dual X Work full-time	8.88 (3.75)*
General X Work full-time	8.04 (1.81)***
Dual X Work part-time	–1.01 (4.68)
General X Work part-time	1.85 (2.39)

Note: (1) The random-effect model allows both school and country-level random intercepts; (2) The estimates are combined across 5 imputed datasets.

VI. Discussion

6.1. Discussion

The main objectives of this study are three folds: 1) to examine direct effects of family-level financial, human, and social capital on children's educational achievement, 2) to empirically test whether the quality of social capital within the family mediates the relationship between other family-level resources and child education, and 3) to examine a direct effect of varying family policy contexts across countries on children's educational achievement as well as a moderating role in the relationship between family-level resources and children's educational achievement.

6.1.1. The effect of family financial, human, and social capital[18]

Findings from this study indicate that family financial (e.g., parents' socio-economic status, family wealth) and human capital (e.g., parental education) positively affect children's educational achievement, and this strong, positive effect holds after controlling for a wide sets of other family, school, and country-level contextual factors. This finding is consistent with extant theories (e.g., Becker, 1981, 1991; Conger, 2005; Sherraden, 1991) and empirical evidence (e.g., Haveman & Wolfe, 1994, Mayer, 2002). Caution is needed, however, to interpret this finding. First, this study only estimates direct impacts of family financial and human capital on children's educational outcome; thus it cannot provide further insight on the exact mechanism through which these family

[18] Readers should keep in mind that the effect of family financial, human, and social capital discussed in this section is based on the full sample of this study. These effects can differ across countries and family policy regimes as discussed later.

resources exert their effects (e.g., the investment theory versus the good parent theory). Secondly, partly due to the data limitation, this study could not fully control for unobserved parental characteristics. If any unobserved parental characteristics affect both family financial and human capital predictors and the outcome, the magnitude of the effect can be diminished (Blau, 1999; Brooks-Gunn, Klebanov & Duncan, 1996).[19]

Between educational levels of mothers and fathers, mothers' education is more strongly associated with children's achievement although both show significant, positive effect. This result is consistent with literature. In most countries, mothers have primary responsibilities for caring their child; therefore, mothers' education may matter more for child outcomes.

Turning to the effect of family social capital, measures of structural deficiency of family social capital such as a single-parent family and sibling size are negatively associated with children's educational achievement. These findings support the social capital theory and related empirical evidence. Parents in two parent families tend to have more time and resources for their children and thus provide more social support, more information, and greater access to resources outside the family (Astone et al., 1999; Coleman, 1988; Winter, 2003). Therefore, children from two parent families may perform better in schools than those from single-parent families. Similarly, a large sibling size dilutes the amount of parental time, attention and other resources per child (Blake, 1981); thus children from families with large sibling sizes may fare worse in terms of educational achievement.

[19] These issues are discussed in more detail in the study limitation section.

As discussed earlier, theoretical prediction and empirical evidence on the effect of mothers' employment are rather ambiguous and inconsistent. On the one hand, additional family income from mothers' work outside the home may provide parents with more room for investing in their children as suggested by the investment theory (Becker, 1991). On the other hand, according to the social capital theorists, maternal employment can be conceived as structural deficiency of family social capital because it weakens social capital inherent in the parent-child bond as well as social capital inherent in the relations between parents, neighbors and schools (Coleman, 1988; Parcel & Menaghan, 1994). Empirical studies also provide inconsistent evidence on this issue depending on several contextual factors such as children's age, other attributes of children as well as intensity, timing, and other characteristics of mothers' work (Brooks-Gunn, Han, & Waldfogel, 2010; Waldfogel, 2007). The finding from this study supports, at least partly, the social capital theory; that is, school-aged children with full-time working mothers perform worse in terms of school achievement than those with mothers who are not working.

Interestingly, a negative effect of maternal work does not hold for part-time work. Children with part-time working mothers show highest achievement scores compared to those with mothers engaged in full-time work or no work. Part-time working may allow mothers to earn additional income that can be invested in their children; at the same time, part-time working mothers still have enough time to support their children (Waldfogel, 2007).

6.1.2. Mediating role of parent-child interaction

Consistent with previous evidence (Conger, 2005; Huang, 2008; Meier, 1999; Teachman, Passch, & Carver, 1996), findings support a significant mediating role of parent-child interactions in the relationship between other family-level resources and children's educational achievement. In line with the family stress theory and the social capital theory, family income, wealth, and parental education are positively associated with parent-child interactions, which in turn enhance children's achievement. As expected (Coleman, 1987), results also confirm that parent-child interactions mediate the relationship between structures (or forms) of social capital and children's educational achievement. That is, parents are found to interact more with their children when they live in a two parent family and when they have a small number of children. Increased interactions in turn lead to better educational achievement.

It is worthwhile to note that the magnitude of mediating effects is small although significant. Even after considering mediating effects, direct effects of family-level resources on children's educational achievement are still significant and strong. This finding suggests that more comprehensive sets of possible mediators need to be incorporated in the model in order to fully understand the mediating pathways. Previous research, for example, suggests several different measures of family social capital as potential mediators, such as parental academic aspiration, parental school connectivity, and parental assistance to school work in addition to parent-child interactions (Astone & McLanahan, 1991; McNeal, 1999; Meier, 1999; Useem, 1992).

6.1.3. The role of family policy context

Turning to the effect of family policy contexts on children's educational achievement, this study does not find evidence of a significant association between single policy indicators and children's reading achievement. This finding, however, does not necessarily suggest family policy contexts do not matter for child education. Non-significant findings can be explained in several ways: (1) a single policy may not have enough impacts because public policy often exerts its impact in combination with other relevant policies, (2) in a methodological point of view, it is possible that estimates for the country-level family policy measures are unstable due to the small sample size in the country-level equation, and (3) although I used most relevant policy measures based on the literature, better policy indicators and measures may need to be developed and used. The impact of each family policy measure on children's educational outcome needs to be explored further in the future research.

To overcome limitations in single policy indicators, this study additionally used family policy regimes as measures of family policy contexts. As discussed earlier, these measures were empirically derived using the hierarchical cluster analysis and substantiated by the theoretical work on welfare state typologies and regimes. The hierarchical cluster analysis reveals that countries in the study sample are successfully clustered into three groups (regimes), and these three groups are consistent with prior literature (Ferranini, 2006; Korpi, 2000).

Family policy regimes are found to be significantly associated with children's educational achievement. Holding other family and school-level variables constant,

reading achievement are highest in the countries with a dual-earner support (e.g., moderate to high level of income support, high level of maternity/parental leave and ECEC), followed by countries with a general support (e.g., high level of income support, moderate level of maternity/parental leave and ECEC), and those with a weak support (e.g., moderate to low level of support in all family policy indicators). This result demonstrates that combinations of family policy may be effective in enhancing children's achievement, and, among the varying configuration of family policy settings across countries, the dual-earner support model performs best.

The results of this study also lend support to the moderating role of family policy regimes. The direction and magnitude of the effect of family financial, human, and social capital on child educational outcomes vary significantly across countries, and the cross-national variation is in part explained by differences in family policy contexts. With exceptions, the impact of family-level resources tends to be less strong in the countries with generous family policy (e.g., countries with a dual-earner support), compared to those with weak supports. This fining is consistent with theories and empirical evidence (Koster & Bruggeman, 2008; Park, 2005; Pong, Dronkers, & Hampden-Thompson, 2003; Xu, 2008).

First, with regard to the moderating role of family policy in the relationship between family financial capital and children's educational achievement, two different measures of family financial capital tell the different story. As expected, the strong positive relationship between the family wealth index and children's educational achievement is attenuated to some extent in the countries with a dual-earner support, but

this moderating effect is only marginally significant at the .10 of an alpha-level. Inconsistent with literature, the positive impact of the parents' socio-economic index is found to be stronger in the countries with a dual earner support. These findings may suggest an important role of family income or wealth that is not replaced by the existing family policy arrangements across countries. However, one should be cautious about these interpretations for the following reasons. Potential unobserved heterogeneity in parental characteristics may produce biased results. If unobserved parental characteristics differ across countries and affect both family financial capital and child achievement differently, the unobserved bias can be more serious. These inconsistent findings also call for using more accurate income or wealth measures. Due to data availability, this study uses a socio-economic index of parents and a family wealth index as proxies for family income and wealth, and these rough measures may not be able to clearly differentiate between income and wealth effect, nor do they differentiate between income or wealth from the market and those from the policy intervention.

Second, the results of this study suggest that the positive impact of mothers' education is attenuated in countries with general supports. A wide availability of family policy benefits may enable children in these countries to perform well in school achievement, although they have parents with less education. Interestingly, a strong, positive relationship between parents' education and children's achievement holds for the countries with dual-earner supports. One plausible explanation is the difference in policy designs and purposes between the two regimes. Countries with general supports provide mothers with incentives to stay at home caring for their child through policy measures

such as a high-level of general income support. On the other hand, countries with dual-earner supports encourage mothers to be engaged in the labor market by attenuating the burden of child-caring through various policy measures such as socially-provided childcare and generous maternity/parental leave benefits (Bambra, 2004, 2005; Gornick & Meyers, 2004). Therefore, parents' (mostly mothers') education might be still important in enhancing children's achievement in the countries with dual-earner supports, because mothers with better education are more likely to have high income, decent jobs in the labor market.

Contrary to the theoretical and empirical prediction (Pong, Dronkers, & Hampden-Thompson, 2003), the negative impact of a single-parent family was stronger in the countries with strong family policies, compared to those with weak family policies. This finding suggests that family policy may enhance overall educational achievement among children but does not narrow the achievement gap between single and two-parent families. Countries with strong family policies tend to have universal benefits instead of targeted benefits to low-income, single-parent families, and thus these may not be effective in narrowing the achievement gap between single-parent and two-parent families.

One of the most important findings in this study is the significant moderating role of family policy contexts in the relationship between maternal work and children's educational achievement. The negative impact of mothers' full-time work disappears and the association is positive in countries with strong family policies. Countries with dual-earner supports provide mothers with generous maternity/parental leave benefits as well

as publicly-funded high quality child care and early education services, enabling them to reconcile the burden of child-caring and work at the labor market. Due to these policy supports, the negative impact related to mothers' work can be minimal and even can be changed to be positive because children with working mothers benefit from additional income that their mothers earn.

Interestingly, the relationship between mothers' part-time working and child achievement is positive and this strong, positive relationship is consistent across all three family policy regimes. Regardless of family policy settings, children with mothers who work part-time benefit most since mothers can invest more in their children with the additional income as well as they still have enough time to support their children. This finding, however, does not necessarily argue that social policies should encourage mothers to work part-time over to work full-time or to stay at home. For most mothers, it is not a matter of choice whether they work full-time or part-time; low-income or single mothers may have to work full-time to support their families. This study emphasizes that, even though mothers work full-time, their children can perform as well as children with part-time working mothers if generous family policies are available.

Several significant relationships between school-related control variables and child achievement are worthwhile to discuss. School-related measures such as teacher support, achievement pressure, and school disciplinary climate were negatively associated with child achievement, and these counterintuitive findings were reported in other studies using the PISA data as well (e.g., Santo, 2007). Since those indices were measured based on students' reports, it is possible that endogeneity problems cause this.

Teachers, for example, may provide more support to children with low achievement. Children with high achievement may have more strict parameters of discipline, so that their perception of the disciplinary climate at school is worse than the perception by lower achievers (Santos, 2007). Further, a negative association between achievement pressure and child achievement may suggest that it is counterproductive to place too much pressure on students. These negative signs associated with school-related measures need to be further explored in the future research.

6.2. Limitations

This study suffers from several limitations that need to be addressed in the future study. First, due to the data availability, several measures utilized in this study are less ideal. For instance, to measure financial capital within the family, this study used a socio-economic index of parents and a family wealth index instead of exact income or wealth measures. Although these proxies are known to be highly correlated to income or wealth, they still suffer from several problems. Among others, one cannot differentiate between family income and wealth. Numerous studies relating family financial capital to child education argue that income and wealth have separate, independent impacts (Nam & Huang, 2008; Shanks, 2007; Zhan, 2006); however, this study cannot accurately address these questions.

Similarly, this study employs only one measure of the quality of family social capital, that is, parent-child interactions. Literature often suggests that the quality of social capital can be measured multi-dimensionally and several different measures need

to be used such as parental aspiration, parental support to school work, parental involvement in school meeting and so on (Astone & McLanahan, 1991; McNeal, 1999; Meier, 1999; Useem, 1992). Future studies should incorporate these multi-dimensional measures of family social capital to understand comprehensive mediating pathways.

Secondly, due to the cross-sectional features of this study, it is difficult to establish the causal relationships. International comparative data like the PISA allow researchers to explore variations across countries in the relationship between family-level resources and children's educational performance through incorporating various aspects of social contexts. However, as widely argued (Blau, 1999; Brooks-Gunn, Klebanov, & Duncan, 1996; Mayer, 2002), both family-level resources and children's educational achievement may be affected by unobserved parental characteristics. To the extent that this is true, causal claims from cross-sectional studies are weak. As various longitudinal data are available in many countries included in this study, future research may further explore this topic using the longitudinal data for several countries.

To solve the endogeneity problem inherent in multilevel modeling, this study utilized a series of alternative statistical procedures such as the Hausman-Taylor estimator and the Bartel's approach in addition to the random and fixed effect multilevel modeling. These alternative methods, however, only correct for possible endogeneity between random effects and predictors, and potential biases from the correlation between a level-1 error-term and predictors may still exist.[20]

[20] I tried to use the instrumental variable approach to additionally correct for the dependency between a level-one error-term and predictors; however, it was difficult to find a good instrument. Note that, if weak instrumental variables are used, estimates can be more severely biased.

Third, the sample is limited to 18 rich countries mostly due to data availability of family policy measures. Although this study includes more countries to the sample compared to previous research, it would be ideal to include an entire set of rich, advanced countries. To overcome the limitation in the sample selection, I selected countries so that different types of welfare state/family policy regimes could be included. Further, as the study sample only includes selected OECD countries, findings are mainly generalizable to those rich countries and might not be directly applicable to other less-developed or developing countries. For instance, nature of women's employment and its potential impact on child outcomes in less-developed countries are different from those in rich countries and so are social policy contexts. In less-developed countries, labor market participation rates among women are very low, and a large proportion of those who engaged in labor market tend to work at informal, agricultural sectors (Choi, 2002). In terms of child educational outcome, the issues at hand is to provide access to basic, primary education, not the achievement or development at the schools (Glick, 2002). Thus, work-childcare conflict, its potential influence on child development, and related family policy contexts have not been main agenda among researchers and policy-makers in those countries. Future research needs to be conducted to examine whether findings from this study can be extended to less-developed countries.

In the same vein, the findings of this study are only generalizable to 15-year-old students in those rich countries. It would be an interesting topic to explore whether the results of this study hold for another sample such as families with younger children.

These can be addressed in the future research utilizing the dataset with representative samples of younger children.

Last, this study does not fully include potentially crucial factors associated with children's educational achievement. Since the focus of this study is on various aspects of resources within the family, family policy contexts, and their interactions, other relevant factors are not conceptualized nor tested in the model. Children's educational performance is a function of numerous contextual factors and complex relationships among them (Bronfenbrenner, 1989, 2006; Haveman & Wolfe, 1995). For instance, some researchers focus on internal belief systems of children (e.g., academic self-efficacy, self-concept, or self-esteem) with regard to child development or education; others examine the role of school or community-level predictors and their interactions. In terms of country-level macro-contexts, cross-country variations in other policy areas (e.g., educational policy) or cultural contexts and norms relevant to child development and education might be also important. Although this study includes many of these factors as control variables, future studies should develop and empirically test the conceptual framework in which more comprehensive factors relevant to child education are considered.

VII. Implications and Conclusion

This chapter suggests the implications for research and policy.

First of all, this study provides additional empirical evidence to the growing literature regarding the determinants of children's educational achievement. The research agenda in this study contributes to articulating how various aspects of family-level resources such as family financial, human, and social capital play different roles with regard to children's educational achievement for the cross-country sample of rich countries. Further, since this study empirically tests the mediating role of family social capital in the relationship between other family resources and child education, findings from this study shed lights on the complex mechanism through which family resources exert their impacts on child education.

More importantly, this study incorporates family policy contexts to the model that have been ignored by previous literature and find supportive evidence that family policy matters for child education. Although literature well recognizes the multifaceted, multilevel contexts associated with child development and education (Bronfenbrenner, 1989; Haveman & Wolfe, 1995), previous literature tends to focus only on family, school, or community-level factors and their interactions. This study expands the academic knowledge on the determinants of children's educational well-being by explicitly conceptualizing and testing the role of family policy contexts as well as their interactions with other factors.

Third, this study utilized advanced statistical procedures to produce unbiased, consistent estimates and findings were robust to the use of different approaches. To correct for clustered structures of the data, this study utilized multilevel modeling techniques. Possible endogeneity between random effects and predictors in multilevel modeling was further addressed by alternative methods. Thus, this study adds unbiased, consistent, and robust empirical evidence to the literature.

Enhancing child development and educational outcomes is one of the crucial issues that most contemporary societies should address. Since children's achievement at the school is not only such a strong predictor of success in a later life, but has positive impacts for the whole society, society and government should take the lead in providing relevant policy and programs to promote children's educational outcomes. In this regard, the cross-country nature of this study can provide important policy implications for the United States based on other countries' experiences. As this study shows, the dual-earner support model characterized by a moderate-to-high level of income supports and a high level of maternity/parental leave and ECEC is most effective to promote child outcomes. Thus, the United States may consider introducing and expanding these lines of policies and programs.

It is well-known that the United States lags behind other rich countries in terms of family policy (Kamerman & Kahn, 2001). The United States is one of the few countries that do not have universal child/family allowances. The United States does not have extensive paid maternity/parental leave benefits as well. Although the Family and

Medical Leave Act (FMLA) was introduced in 1993 which mandated a minimum of twelve weeks of unpaid maternity leave, only more than half of working women are eligible (Rossin, 2010). Moreover, since 1993, only California (in 2004) and New Jersey (in 2008) have mandated paid maternity leave. The United States makes meager investments in ECEC, and ECEC policies are mainly targeted to children in low-income, disadvantaged families. In this system, parents are largely responsible for providing and purchasing for their children (Meyers & Gornick, 2006). Therefore, more comprehensive family policy could be built upon what the United States already has.

Even though the United States does not have explicit, extensive family policy, it has several policy measures that have been proved to be effective in enhancing the well-being of families and children as well as that fit the U.S. social, political, and cultural contexts. For example, the U.S. government spent about $50 billion on the Earned Income Tax Credit (EITC) in 2009, and 6.5 million people including 3.3 million children were lifted from the poverty line due to this program (Williams and Johnson, 2009). Innovative policy initiatives such Child Development Accounts (CDAs) are emerging and expanding to encourage families to accumulate savings that can be used for their child's education. Building on these policy measures, the United States can introduce a moderate-level of child/family allowances, expand paid leave benefits to the federal-level, and invest more in the ECEC programs.

Next, as discussed in the study limitation, findings from this study may not directly provide policy implications for less-developed or developing countries, mainly because the nature of family-level resources, their impacts on child achievement as well

as policy environments differ between affluent and less-developed countries. With this limitation in mind, however, this study may shed some lights on policy directions in less-developed countries. At the Millennium Summit in 2000, for example, the United Nations adopted Millennium Development Goals (MDGs) that are the world's time-bound and quantified goals and targets for addressing extreme poverty in its many dimensions (UN Millennium Project, 2005). Among others, important targets include achieving decent education and full-time employment for women and providing universal primary education for children in less developed countries over the world. As this study show that mothers' education is one of the crucial factors associated with child achievement, this study can provide empirical evidence to justify the MDGs. More importantly, although the target of providing full-time employment for women may be important to eradicate poverty and to promote gender equality, it may have a negative impact on child achievement unless proper family policies are in place to support working mothers. Therefore, MDGs may consider at least a modest-level of family policies in order to offset potential negative impact associated with mothers' full-time work and thus to promote both women's employment and child achievement.

Back to the policy implications for the United States, important issues that need to be addressed include whether it is feasible to introduce a European-style, comprehensive family policy under the current social, economic, and political environments, and whether these policies are effective for the United States. The prospects for family policy expansion may be better than previously thought. As discussed earlier, considerable research has shown that U.S. children fare worst among rich countries and researchers

and policy-makers have concerned about this situation in conjunction with low-level of public commitment to families and children. Public spending on children and their families can be conceived as investment for future development and there is a wide agreement that public intervention on early stages of the life is far more effective and it could substantially reduce future costs (OECD, 2009). Several researchers also argue that many American parents and policy-makers are expressing support for more extensive family policies and a comprehensive family policy are far more fit to the United States than conventional wisdom often suggests (Gornick and Meyers, 2004; Kamerman, 1996). Further, social service provisions such as paid maternity/parental leave and publicly-provided care and education are pro-work and pro-child policies that fit well the U.S. contexts.

Researchers and policy-makers should pay more attention to finding effective ways to ensure the well-being of U.S. children, and, as this study suggests, expanding family policy may be one of the alternatives for the future policy directions.

Reference

Adams, R., & Wu, M. (2002). *PISA 2000 technical report*. Paris: OECD.

Alexander. K. L., Entwisle. D. R., & Horsey. C. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of Education,* 70, 87-107.

Andersson, B. E. (1992). Effects of day care on cognitive and socio-emotional competence of thirteen year-old Swedish school children. *Child Development,* 63, 20-36.

Astone, N. M., Constance, A. N., Scheon, R., & Kim, Y. J. (1999). Family structure, parental practices and high school completion. *American Sociological Review,* 56, 309-320.

Backman, O., & Ferrarini, T. (2010). Combating child poverty? A multilevel assessment of family policy institutions and child poverty in 21 old and new welfare states. *Journal of Social Policy,* 39(2), 275-296.

Bafumi, J., & Gelman, A. (2006). *Fitting multilevel models when predictors and group effects correlate*. Paper presented at Annual Meeting of the Midwest Political Science Association, Chicago, Il.

Baker, M. (1995). *Canadian family policies: cross-national comparisons*. Toronto: University of Toronto Press.

Baker, D. P., & Stevenson, D. L. (1986). Mothers' strategies for school achievement: Managing the transition to high school. *Sociology of Education,* 59, 156-167.

Ballinger, G. A. (2004). Using generalized estimating equations for longitudinal data analysis. *Organizational Research Methods,* 7(2), 127-150.

Baltagi, B. H., Bresson, G., & Pirotte, A. (2003). Fixed effects, random effects or Hausman-Taylor? A pretest estimator. *Economics Letters,* 79(3), 361-369.

Bambra, C. (2004). The worlds of welfare: illusory and gender-blind? *Social Policy and Society,* 3, 201-212.

Bambra, C. (2005). Cash versus services: worlds of welfare and the decommodification of cash benefits and health care services. *Journal of Social Policy,* 34, 195–213.

Bambra, C. (2007). Defamilisation and welfare state regimes: A cluster analysis. *International Journal of Social Welfare*, 16, 326-338.

Barker, G., & Maloney, T. (2000). *Final regression results on the cognitive achievement of children in the Christchurch health and development study with corrections for*

attrition from this longitudinal study (Treasury Working Paper 00/06). New Zealand: New Zealand Treasury.

Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.

Bartel, B. L. (2008, July). *Beyond fixed versus random effects: A framework for improving substantive and statistical analysis of panel, time-series cross-sectional, and multilevel data*. Paper presented at the Political Methodology Conference, Ann Arbor, MI.

Bassani, C. (2006). A test of social capital theory outside of the American context: Family and school social capital and youths' math scores in Canada, Japan, and the United States. *International Journal of Educational Research*, 45, 380-403.

Bassani, C. (2007). Five dimensions of social capital theory as they pertain to youth studies. *Journal of Youth Studies*, 10(1), 17-34.

Bassani, C. (2008). Social capital and disparities in Canadian youth's mathematics achievement. *Canadian Journal of Education*, 31(3), 727-760.

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods*, 11(2), 142-163.

Becker, G. S. (1991). *A treatise on the family*, Cambridge, MA: Harvard University Press.

Becker, G. S. & Tomes, N. (1979). An equilibrium theory of the distribution of income and intergenerational mobility. *Journal of Political Economy*, 87, 1153-1189.

Becker, G. S. & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labour Economics*, 4, S1-S39.

Behrman, J. (1997). *Mother's schooling and child education: A survey* (Discussion Paper 025). PA: University of Pennsylvania Department of Economics.

Berger, M. L., Hill, J., & Waldfogel, J. (2002, May). *Family leave policies and child outcomes*. Paper presented at the annual meeting of the Population Association of America, Atlanta, GA.

Bourdieu, P. (1985). The forms of capital. In J.G. Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education*, (pp.241-258). New York, NY: Greenwood Press.

Blake, J. (1981). Family size and the quality of children. *Demography*, 18, 421-442.

Blau, D. M. (1999). The effect of income on child development. *The Review of Economics and Statistics*, 81(2), 261-276.

Blau, P., & Duncan, O. T. (1967). *The American Occupational Structure*. New York, NY: John Wiley & Sons.

Bowen, N. K., & Bowen, G. L. (1999). Effects of crime and violence in neighborhoods and schools on the school behavior and performance of adolescents. *Journal of Adolescent Research*, 14, 319-342.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53, 371-399.

Breusch, T., Ward, M. B., Nguyen, H., & Kompas, T. (2010). *On the fixed-effects vector decomposition* (MPRA Paper 21452). Germany: University Library of Munich.

Bronfenbrenner, U. (1989) Ecological systems theory. *Annals of Child Development*, 6, 187-249.

Bronfenbrenner, U. & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner (Ed.). *Theoretical models of human development*. Volume 1 of *Handbook of Child Psychology* (6th ed.). Editors-in-chief: W. Damon & R. M. Lerner. Hoboken, NJ: Wiley.

Brooks-Gunn, J., Klebanov, P. K., & Duncan, G. J. (1996). Ethnic differences in children's intelligence test scores: Role of economic deprivation, home environment, and maternal characteristics. *Child Development*, 67(2), 396-408.

Brooks-Gunn, J., Han, W, & Waldfogel, J. (2010). First-year maternal employment and child development in the first seven years. *Monographs of the Society for Research in Child Development*, 75(2), 1-147.

Chaplin, D. (2003, November). *Hierarchical linear models: Strengths and weaknesses*. Paper presented at the annual meetings of the Association for Public Policy Analysis and Management, Washington, D.C.

Chase-Lansdale, L., & Pittman, L. (2002). Welfare reform and parenting: Reasonable expectations. In M.K. Shields (Ed.). *Future of Children* (pp.167-183). Los Altos, CA: The David and Lucile Packard Foundation.

Chevalier, A. (2004). *Parental education and child's education: A natural experiment* (IZA Discussion paper no. 1153). Bonn, Germany: Institute for the Study of Labor.

Chevalier, A., & Lanot, G. (2001). *The relative effect of family and financial characteristics on educational achievement*. London: Centre for the Economics of Education, London School of Economics and Political Science.

Choi, S. (2002). *Women, work, and early childhood: The nexus in developed and developing countries* (UNESCO Policy Brief on Early Childhood). Paris, France: UNESCO.

Chevalier, A., Harmon, C., O'Sullivan, V., & Walker, I. (2005). *The impact of parental income and education on the schooling of their children* (Working Paper 05/05). Dublin, Ireland: The Institute for Fiscal Studies.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95-120.

Coleman, J. S. (1990). *Foundations of social theory*. Cambridge, MA: Harvard University Press.

Conger, R. (2005). *The effects of poverty and economic hardship across generations*. CA: Center for Public Policy Research.

Conger, R., & Conger, K. J. (2002). Resilience in Midwestern families: Selected findings from the first decade of a prospective, longitudinal study. *Journal of Marriage and Family*, 64, 361-373.

Conger, R., Conger, K. J., Elder, G. H., Lorenz, F. O., Simons, R. L., & Whitbeck, L. B. (1992). A family process model of economic hardship and adjustment of early adolescent boys. *Child Development*, 63(3), 526-541.

Conger, R., Conger, K. J., & Martin, M. J. (2010). Socioeconomic status, family processes and individual development. *Journal of Marriage and Family*, 72(3), 685-704.

Conley, D. (2001). Capital for college: parental assets and postsecondary schooling. *Sociology of Education*, 74, 59-72.

Cronoe, R. (2004). Social capital and the interplay of families and schools. *Journal of Marriage and Family*, 66, 267-280.

Currie, J. (2000). *Early childhood intervention programs: What do we know?* (Working Paper No. 169). Chicago, IL: Northwestern University/University of Chicago Joint Center for Poverty Research.

Daly, M. (1994), Comparing welfare states: towards a gender friendly approach, in D. Sainsbury (Eds.), *Gendering Welfare States*, London, UK: Sage.

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology*, 19(2), 292-304.

Dika, S. L., & Singh, K. (2002). Applications of social capital in educational literature: A critical synthesis. *Review of Educational Research*, 72(1), 31-60.

Dixit, K., & Pal, R. (2010). The impact of group incentives on performance of small firms: Hausman-Taylor estimates. *Managerial and Decision Economics*. doi: 10.1002/mde.1494

Downey, D. B. (1995). When bigger is not better: Family size, parental resources, and children's educational performance. *American Sociological Review*, 60, 746-761.

Duncan, G. J., Brooks-Gunn, J., & Klebanov, P. K. (1994). Economic deprivation and early childhood development. *Child Development*, 65(2), 296-318.

Duncan, G. J., & Magnuson, K. A. (2003). Off with Hollingshead: Socio-economic resources, parenting, and child development. In M. H. Bornstein & R. H. Bradley (Eds.), *Socio-economic status, parenting, and child development* (pp. 83-106). Mahwah, NJ: Erlbaum.

Dustman, C., & Schonberg, U. (2008). *The effect of expansions in maternity leave coverage on children's long-term outcomes* (Discussion Paper No. 3605). Bonn, Germany: Institute for the Study of Labor.

Dynarski, S. (1999). Does aid matter? Measuring the effect of student aid on college attendance and completion (NBER Working Paper No. W7422). Washington, D.C.: National Bureau of Economic Research.

Dynarski, S. (2000). Hope for whom? Financial aid for the middle class and its impact on college attendance (NBER Working Paper No. W7756). Washington, D.C.: National Bureau of Economic Research.

Ebbes, P., Bockenholt, U, & Wedel, M. (2004). Regressor and random-effects dependencies in multilevel models. *Statistica Neerlandica*, 58(2), 161-178.

Engster, D., & Stensota, H. O. (2009, September). *Do family policy regimes matter for children's well-being?* Paper presented at the annual meeting of American Political Science Association, Toronto, Canada. Retrieved from http://ssrn.com/abstract=1449816

Ermisch, J. F., & Francesconi, M. (2001). Family matters: Impacts of family background on educational achievements. *Economica*, 68, 137-156.

Esping-Andersen, G. (1990). *Three worlds of welfare capitalism.* Princeton, NJ: Princeton University Press.

Esping-Andersen, G. (1999). *Social foundations of postindustrial economies*. Oxford, England: Oxford University Press.

Ferrarini, T. (2006). *Families, states and labour markets: institutions, causes and consequences of family policy in post-war welfare state*. Cheltenham: Edward Elgar Publishing.

Foster, M. E., & McLanahan, S. (1996). An illustration of the use of instrumental variables: Do neighborhood conditions affect a young person's chance of finishing high school? *Psychological Methods*, 1(3), 249-260.

Friedman, M. (1962). *Capitalism and Freedom*. Chicago: University of Chicago Press.

Fuchs, T., & WoBmann, L. (2004). *What accounts for international differences in student performance? A re-examination using PISA data*. Retrieved from http://www.oecd.org/dataoecd/29/47/33680685.pdf

Fustenberg, F., & Hughes, M. E. (1995). Social capital and successful development among at-risk youth. *Journal of Marriage and Family*, 47, 893-904.

Ganzeboom, H. B. G., Graaf, P. M., Treiman, D. J., & Leeuw, J. D. (1992). A standard international socio-economic index of occupational status. *Social Science Research*, 21, 1-56.

Garnier, H. E., Stein, J. A., & Jacobs, J. K. (1997). The process of dropping out of high school: A 19-year perspective. *American Educational Research Journal, 34*(2), 395-419.

Gauthier, A. H. (1996). *The state and family: A comparative analysis of family policies in industrialized countries*, Oxford: Clarendon Press.

Gauthier, A. H. (1999). The sources and methods of comparative family policy research. *Comparative Social Research*, 18, 31-56.

Gauthier, A. H. (2002). Family policies in industrialized countries: is there convergence? *Population*, 57(3), 447-474.

Gauthier, A. H. (2003). *Comparative family benefits database, version 2* (University of Calgary). On-line.

Gauthier, A. H., & Bortnik, A. (2001). *Comparative maternity, parental and childcare database, version 2* (University of Calgary). On-line.

Glick, P. (2002). *Women's employment and its relation to children's health and schooling in developing countries: Conceptual links, empirical evidence, and policies* (Working Paper). NY: Cornell University.

Goldberger, A. S. (1989). Economic and mechanical models of intergenerational transmission. *American Economic Review*, 79, 504-513.

Gornick, J., & Meyers, M. (2004). More alike than different: Revisiting the long-term prospects for developing European-style work/family policies in the United States. *Journal of Comparative Policy Analysis*, 6(3), 251-273.

Gornick, J. & Meyers, M. (2006). *Welfare regimes in relation to paid work and care* (RFAS No. 1-2006). New York, NY: Department of Political Science, City University of New York.

Gornick, J., Meyers, M., & Ross, K. (1998). Public policies and the employment of mothers: a cross-national study. *Social Science Quarterly*, 79(1), 35-54.

Gough, I. (2001). Social assistance regimes: A cluster analysis. *Journal of European Social Policy*, 11(2), 165-170.

Greene, W. (2010). *Fixed effects vector decomposition: A magical solution to the problem of time invariant variables in fixed effects models?* (Working Paper). New York, NY: New York University.

Guo, G., & Harris, K. M. (2000). The mechanisms mediating the effects of poverty on children's intellectual development. *Demography*, 37(4), 431-447.

Hall, J. C. (2006). Positive externalities and government involvement in education. *Journal of Private Enterprise*, 21(2), 165-175.

Hampden-Thompson, G. & Pong, S-L. (2005). Does family policy environment mediate the effect of single-parenthood on children's academic achievement? A study of 14 European countries. *The Journal of Comparative Family Studies*, 36(2), 227-248.

Han, W., Waldfogel, J., & Brooks-Gunn, J. (2001). The effects of early maternal employment on later cognitive and behavioral outcomes. *The Journal of Marriage and the Family*, 63, 336-354.

Hanifan, L. J. (1916). The rural school community center. *Annuals of the American Academy of Political and Social Science*, 67, 130-138.

Hanushek, E. A. (2002). *The long run importance of school quality* (NBER Working Paper W9071). Washington, D.C.: National Bureau of Economic Research.

Harknett, K., Garfinkel, I., Bainbridge, J., Smeeding, T., Folbre, N., & McLanahan, S. (2003). *Do public expenditures improve child outcomes in the U.S.: a comparison across fifty states* (Working Paper No. 53). Syracuse, NY: Center for Policy Research, Syracuse Univeristy.

Hausman, J. A., & Talyor, W. E. (1981). Panel data and unobservable individual effects. *Econometrica,* 49, 1377-1398.

Haveman, R.H. & Wolfe, B.L. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature*, 33(4), 1829-1878.

Hill, M., Duncan, G. (1987). Parental family income and the socioeconomic attainment of children. *Social Science Research*, 16, 39-73.

Huang, L. (2008). Social capital and student achievement in Norwegian secondary schools. *Learning and Individual Differences*. Retrieved from http://dx.doi.org/10.1016/j.lindif.2008.11.004

Israel, G. D., Beaulieu, L. J., & Hartless, G. (2001). The influence of family and community social capital on educational achievement. *Rural Sociology,* 66(1), 43-68.

Jenkins, S. P., & Schluter, C. (2002). *The effect of family income during childhood on later-life attainment: Evidence from Germany* (DIW Discussion paper no. 317). Berlin, Germany: German Institute for Economic Research.

Joshi, H. & Verropoulou, G. (2000). *Maternal employment and child outcomes: analysis of two birth cohort studies*, London: The Smith Institute.

Kalil, A. & Ziol-Guest, M. (2005). Single mothers' employment dynamics and adolescent well-being. *Child Development*, 76(1), 196-211.

Kamerman, S. B. (2003, September). *Welfare States, family policies, and early childhood education, care, and family support*. Paper presented at the Consultation Meeting on Family Support Policy in Central and Eastern Europe, Budapest, Hungary.

Kamerman, S.B. & Kahn, A. (Eds.). (1997). *Family change and family policies in Great Britain, Canada, New Zealand, and the United States*. New York: Oxford University Press.

Kamerman, S. B., Neuman, M., Waldfogel, J., & Brooks-Gunn, J. (2003). *Social policies, family types and child outcomes in selected OECD countries* (DELSA/ELSA/WD/SEM(2003)6). Paris: OECD.

Karoly, L. A., Greenwood, P. W., Everingham, S. S., Hoube, J., Kilburn, M. R. , Rydell, C. P., Sanders, M., & Chiesa, J. (1998). *Investing in our children: what we know and don't know about the costs and benefits of early childhood intervention*. Santa Monica, CA: RAND.

Kenny, D. A., Bolger, N., & Korchmaros, J. D. (2003). Lower level mediation in multilevel models. Psychological methods, 8(2), 115-128.

Kirsch, I., Braun, H., Yamamoto, H, & Sum, A. (2007). *America's perfect storm: Three forces changing our nation's future*. Princeton, NJ: Educational Testing Service.

Klebanov, P. K., Brooks-Gunn, J., & Duncan, G. J. (1994). Does neighborhood and family affect mothers' parenting, mental health, and social support? *Journal of Marriage and Family*, 56(2), 441-455.

Korpi, W. (2000). Faces of inequality: gender, class, and patterns of inequalities in different types of welfare state. *Social Politics*, 7(2), 127-191.

Koster, F., & Bruggeman, J. (2008). The institutional embeddedness of social capital: A multi-level investigation across 24 European countries. *Policy & Politics*, 36(3), 397-412.

Krull, J. L., & MacKinnon, D. P. (2001). Multilevel modeling of individual and group level mediated effects. *Multivariate Behavioral Research*, 36(2), 249-277.

Lareau, A. (1989). *Home Advantage: Social class and parental intervention in elementary education*. Washington, D.C.: Falmer Press.

Lee, V. E., & Croninger, R. G. (1994). The relative importance of home and school in the development of literacy skills for middle-grade students. *American Journal of Education*, 102, 286–329.

Lee, J., Grigg, W., & Donahue, P. (2007). *The Nation's Report Card: Reading 2007* (NCES 2007-496). National Center for Education Statistics, Institute of Education Sciences, US Department of Education, Washington, D.C.

Lefebvre, P., & Merrigan, P. (1998). The impact of welfare benefits on the conjugal status of single mothers in Canada: Estimates from a hazard model. *Journal of Human Resources*, 33(3), 742-757.

Leibowitz, A. A. (1977). Parental inputs and children's achievement. *Journal of Human Resources*, 12(2), 242-251.

Leibowitz, A. A. (2003, June). *An economic perspective on work, family and well-being*. Paper presented at the Work, Family, Health, and Well-being Conference, Washington, D.C.

Leitner, S. (2003). Varieties of familialism. *European Societies*, 5(4), 353-375.

Lerner, R. M. (1995). *America's youth in crisis: Challenges and options for programs and policies*. Thousand Oaks, CA: Sage.

Lewin-Epstein, N, & Stier, H. (n.d.). *Family, gender, and work*. Retrieved from http://essedunet.nsd.uib.no

Lloyd, D. N. (1978). Prediction of school failure from third-grade data**.** *Educational and Psychological Measurement*, 38, 1193-1200.

Magnusson K. A., Ruhm, C., & Waldfogel, J. (2004). *Does prekindergarten improve school preparation and performance?* (NBER Working Paper No. 10452). Cambridge, MA: National Bureau of Economic Research.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparision of methods to test the significance of the mediated effect. *Psychological Methods*, 7, 83-104.

Mayer, S. (1997). What money can't buy: Family income and children's life chances. Cambridge, MA: Harvard University Press.

Mayer, S. (2002). *The influence of parental income on children's outcomes: A review report*. New Zealand: New Zealand Ministry of Social Development.

Mayer, S., & Lopoo, L. M. (2008). Government spending and intergenerational mobility. *Journal of Public Economics*, 92, 139-158.

McLanahan, S., & Sandefur, G. D. (1994). *Growing up with a single parent: What hurts, what helps*. Cambridge, MA: Harvard University press.

McNeal, R. B. (1999). Parental involvement as social capital: Differential effectiveness on science achievement, truancy, and dropping out. *Social Forces*, 78(1), 117-144.

Meier, A. (1999). *Social capital and school achievement among adolescents* (CDE Working Paper No.99-18). Madison, WI: Center for Demography and Ecology, University of Wisconsin-Madison.

Melhuish, E. C. & Moss, P. (1991). *Day care for young children: International perspectives*. London, UK: Tavistock/Routledge.

Meyers, M., & Gornick, J. (2003). Public or private responsibility? Early childhood education and care, inequality, and the welfare state. *Journal of Comparative Family Studies*, 34(3), 379-411.

Meyers, M., Rosenbaum, D., Ruhm, C., & Waldfogel, J. (2002). *Inequality in early childhood education and care: what do we know?* Social Inequality Program: Russell Sage Foundation.

Micklewright, J., & Schnepf, S. V. (2004). *Educational achievement in English-speaking countries: Do different surveys tell the same story?* (Discussion Paper No. 1186). Bonn, Germany: Institute for the Study of Labor.

Misra, J., & Moller, S. (2004). *Familialism and welfare regimes: poverty, employment, and family policies*. Cambridge, MA: Social and Demographic Research Institute, University of Massachusetts.

Misra, J., Budig, M. J., & Moller, S. (2007). Reconciliation policies and the effects of motherhood on employment, earnings, and poverty. *Journal of Comparative Policy Analysis*, 9(2), 135-155.

Mokomane, Z. (2009, September). *Work-family conflict and gender equality in South Africa*, Paper presented at the 26th IUSSP International Population Conference, Marrakech, Morocco.

Morris, P., Duncan, G. P., & Rodrigues, C. (2004). *Does money matters? Estimating impacts of family income on children's achievement with data from random-assignment experiments* (Unpublished Manuscript). MDRC and Northwestern University.

Morrow, V. (1999). Conceptualising social capital in relation to the well-being of children and young people: A critical review. *The Sociological Review*, 47(4), 744-765.

Mundlak, Y. (1978). On the pooling of time-series and cross-section data, *Econometrica*, 46, 69-85.

Nam, Y., & Huang, J. (2008). *Changing roles of parental economic resources in children's educational attainment* (CSD Working Paper No. 08-20). St Louis: Center for Social Development, Washington University in St Louis.

Nam, Y., & Huang, J. (2009). Equal opportunity for all? Parental economic resources and children's educational attainment. *Children and Youth Services Review*, 31(6),625-634.

NICHD-ECCRN. (1999). Child care and mother-child interaction in the first 3 years of life. *Developmental Psychology*, 35, 1399-1413.

NICHD-ECCRN. (2000). The relation of child care to cognitive and language development. *Child Development*, 71, 960-980.

Nunnally, J. C. (1967). *Pychometric theory*. NY: McGraw Hill.

OECD (2002). *Babies and Bosses: reconciling work and family life in Australia, Denmark, and the Netherlands*. Paris, France: OECD Publications.

Oliver, M., & Shapiro, T. (1997). *Black wealth/white wealth: A new perspective on racial inequality*. New York: Routledge.

Orloff, A. S. (1993). Gender and the social rights of citizenship: the comparative analysis of gender relations and welfare state. *American Sociological Review*, 58, 303-328.

Orr, A. J. (2003). Black-white differences in achievement: The importance of wealth. *Sociology of Education*, 76, 281-304.

Parcel, T., & Defur, M. J. (2001). Capital at home and at school: Effects on child social adjustment. *Journal of Marriage and Family*, 63, 32-47.

Parcel, T., & Menaghan. E. G. (1994). Early parental work, family social capital, and early childhood outcomes. *The American Journal of Sociology*, 99(4), 972-1009.

Park, H. (2005, September). *Public policy and the effect of sibship size on educational achievement: A comparative study of 20 countries*. A paper presented at the annual meeting of Population Association of America, Philadelphia, PA.

Parker, S., Greer, S., & Zuckerman, B. (1988). Double jeopardy: The impact of poverty on early child development. *The Pediatric Clinics of North America*, 35, 1227-1240.

Paxton, W. (2001). The asset-effect: An overview. In J. Bynner & W. Paxton (Eds.), *The asset effect*. London: IPPR.

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kangan, S. L., & Yazejian, N. (2001). The relation of preschool child care quality to children's cognitive and social developmental trajectories through second grade. *Child Development*, 72(5), 1534-1553.

Perna, L. W., & Titus, M. A. (2005). The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *Journal of Higher Education*, 76(5),485-518.

Phipps, S. (1999a). Economics and the well-being of Canadian children. *Canadian Journal of Economics*, 32(5), 1135-1163.

Phipps, S. (1999b). *An international comparison of policies and outcomes for young children*. Canadian Policy Research Network, Inc. Ottawa, CN: Renoulf Publishers.

Plumper, T., & Troeger, V. E. (2007). Efficient estimation of time-invariant and rarely changing varaibles in finite sample panel analyses with unit fixed effects. *Political Analysis*, 15(2), 124-139.

Pong, S., Dronkers, J., & Hampden-Thompson, G. (2003). Family policies and children's school achievement in single versus two-parent families. *Journal of Marriage and Family*, 65, 681-699.

Robert, P. (2003, May). *Social capital and educational achievement: The PISA 2000 results*. Paper presented at the meeting of Measurement for policy: A workshop on social capital measurement, Budapest, Hungary.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

Ragin, C. (1987). *The comparative method: Moving beyond qualitative and quantitative strategies*. Berkeley and Los Angeles: University of California Press

Ram, B., Abada, T., & Hou, F. (2004, April). *The effect of early maternal employment on children's cognitive outcomes: the Canadian experience*. Paper presented at the annual meeting of the Population Association of America, Boston, MA.

Rapkin, B. D., & Luke, D. A. (1993). Cluster analysis in community research: Epistemology and practice. *American Journal of Community Psychology*, 21(2), 247-277.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear modeling: Applications and data analysis methods*. Newbury Park, CA: Sage.

Ruhm, C. (2000). Parental leave and child health. *Journal of Health Economics*, 19(6), 931-960.

Ruhm, C. (2004). Parental employment and child cognitive development. *Journal of Human Resources*, 39(1), 155-192.

Rubin, D. B. (1987). *Multiple imputation for nonresponse in survey*. New York: John Wiley & Sons, Inc.

Santos, M. E. (2007). Quality of Education in Argentina: determinants and distribution using PISA 2000 test scores. *Wellbeing and Social Policy*, 3(1), 93-119.

Sainsbury, D. (1994). Women's and men's social rights: Gendering dimensions of welfare states. In: D. Sainsbury (Eds.), *Gendering welfare states*. UK: London, Sage.

Sainsbury, D. (1996). *Gender, equality and welfare state*. New York: Cambridge University Press.

Saint-Arnaud, S., & Bernard, P. (2003). Convergence or resilience? A hierarchical cluster analysis of the welfare regimes in advanced countries. *Current Sociology*, 51(5), 499-527.

Sandefur, G. D., Meier, A., & Hernandez, P. (1999, September). *Families, social capital, and educational continuation*. Paper presented at the annual meeting of the Population Association of America, New York, NY.

Schafer, J. L. (1997). *Analysis of incomplete multivariate data*. New York: Chapman and Hall.

Schafer, J. L., & Olsen, M. K. (1998). Multiple imputation for multivariate missing-data problems: A data analyst's perspective. *Multivariate Behavioral Research, 33*, 545-571.

Schlee, B. M., Mullis, A. K., & Shriner, M. (2009). Parents social and resource capital: Predictors of academic achievement during early childhood. *Children and Youth Services Review*, 31, 227-234.

Schneider, B., & Coleman, J. S. (1993). *Parents, their children, and schools*. Boulder, CO: Westview.

Sherraden, M. (1991). *Assets and the poor: A new American welfare policy*. Armonk, N. Y.: M.E.Sharpe.

Shonkoff, J. & Phillips, D. (2000). *From neurons to neighbourhoods*. The science of early childhood development. Washington, D.C.: National Academic Press.

Snijders, T. A. B., & Bosker, R. J. (1999). *An introduction to basic and advanced multilevel modeling*. Thousand Oaks, CA: Sage.

Tanaka, S. (2005). Parental leave and child health across OECD countries. *Economic Journal*, 115, F7-F28.

Teachman, J. D., Paasch, K., & Carver, K. (1996). Social capital and dropping out of school early. *Journal of Marriage and the Family*, 58, 73-783.

Tracey, D. H., & Young, J. W. (2002). Mothers' helping behaviors during children's at-home oral-reading practice: Effects of children's reading ability, children's gender, and mothers' educational level. *Journal of Educational Psychology*, 94(4), 729-737.

Turner, R. (2006, December). *PISA-The programme for international student assessment: An overview*. Paper presented at the ACSPRI Social Science Methodology Conference, Sydney, Australia.

UNICEF (2007), *Child poverty in perspective: An overview of child well-being in rich countries* (Innocenti Report Card 7). Florence, Italy: UNICEF Innocenti Research Centre.

UN Millennium Project (2005). *Investing in development: A practical plan to achieve the Millennium Development Goals*. New York.

Vandell, D. L. & Wolfe, B. (2000). *Child care quality: does it matter and does it need to be improved?* (Special Report No. 78). Madison, WI: Institute for Research and Poverty, University of Wisconsin.

Waldfogel, J. (1996). *The impact of the Family and Medical Leave Act on coverage, leave-taking, employment and earnings*. New York, NY: Columbia University.

Waldfogel, J. (2002). *A cross-national perspective on policies to promote parental investments in children*. New York, NY: Columbia University.

Waldfogel, J. (2007). Parental work arrangements and child development. *Canadian Public Policy*, 33(2), 251-271.

Waldfogel, J., Han, W., & Brooks-Gunn, J. (2002). The effect of early maternal employment on child cognitive development. *Demography*, 39(2), 369-392.

Warm, T.A. (1985).*Weighted maximum likelihood estimation of ability in Item Response Theory with tests of finite length* (Technical Report CGI-TR-85-08). Oklahoma City, OK: U.S. Coast Guard Institute.

Wayman, J. C. (2003, April). *Multiple imputation for missing data: What is it and how can I use it?* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

William Shanks, T. R. (2007). The impact of household wealth on child development. *Journal of Poverty*, 11(2), 93-116.

Winegarden, C. R., & Bracy, P. M. (1995). Demographic consequences of maternal leave programs in industrial countries: Evidence from fixed-effects models. *Southern Economic Journal*, 61, 1020-1035.

Winter, I. (2000). *Family life and social capital: Towards a theorized understanding* (Working Paper No. 21). Melbourne: Australian Institute of Family Studies.

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*, Cambridge, MA: Massachusetts Institute of Technology.

Xu, J. (2008). Sibship size and educational achievement: The role of welfare regimes cross-nationally. *Comparative Education Review*, 52(3), 413-436.

Yeung, W. J., & Conley, D. (2008). Black-white achievement gap and family wealth. *Child Development*, 79(2), 303-324.

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J. (2002). How money matters for young children's development: Parental investment and family process. *Child Development*, 73(6), 1861-1879.

Yucel, R. M., & Zaslavsky, A. M. (2005). Imputation of binary treatment variables with measurement error in administrative data. *Journal of American Statistical Association,* 100(472), 1123-1132.

Zhan, M. (2006). Assets, parental expectations and involvement, and children's educational performance. *Children and Youth Services Review,* 28(8), 961-975.

Zhan, M., & Sherraden, M. (2003). Assets, expectations, and children's educational achievement in female-headed households. *Social Services Review,* 77(2), 191-211.

Appendix A. Descriptive Statistics for the Sample with Multiple Imputation

Table A-1. Descriptive Statistics (from the PISA data after multiple imputation)

Variable		Mean (Standard deviation) or percentage of frequency
Dependent variable		
Educational achievement		
Standardized reading score		508.41 (96.34)
Independent variable		
Family Human Capital		
Father's education		4.32 (1.44)
Mother's education		4.32 (1.42)
Family Financial Capital		
Parents' socio-economic index		49.02 (16.42)
Wealth index		0.17 (0.87)
Family Social Capital		
Single parent family	Yes	84.15%
	No	15.85%
Number of siblings		1.87 (1.32)
Mothers' work	Full-time	46.85%
	Part-time	22.45%
	No	30.70%
Parent-child interactions		20.22 (4.38)
Control variable		
Student-level		
Age (months)		188.45 (3.45)
Female	Yes	50.29%
	No	49.71%
Language	Yes	90.82%
	No	9.18%
Teacher support		0.08 (1.00)
Achievement press		0.04 (0.98)
Teacher-student relationship		0.04 (0.97)
School disciplinary climate		0.10 (0.98)
School-level		
Teacher support (school-level)		0.09 (0.43)
Achievement press (school-level)		0.05 (0.39)
Teacher-student relation (school-level)		0.05 (0.37)
School disciplinary climate (school-level)		0.10 (0.40)
School size		648.57 (472.95)
School resources		0.008 (0.99)
Student-teacher ratio		12.60 (4.54)

N=87,664 (Student-level) N=3,336 (School-level)

Appendix B. The effect of family policy contexts on child achievement

Table B-1. The role of family policy contexts: Standardized coefficients

Variable		Random-effect model β (Standard errors)	Random-effect model with interactions β (Standard errors)
Student-level independent variables			
Family Human Capital			
Father's education		0.030 (0.004)***	0.032 (0.005)***
Mother's education		0.041 (0.004)***	0.045 (0.005)***
Family Financial Capital			
Parents' socio-economic index		0.140 (0.004)***	0.136 (0.004)***
Wealth index		0.010 (0.004)*	0.009 (0.004)*
Family Social Capital			
Single parent family		–0.048 (0.007)***	–0.046 (0.008)***
Number of siblings		–0.063 (0.004)***	–0.064 (0.004)***
Mothers' work	Full-time	–0.025 (0.008)**	–0.044 (0.009)**
	Part-time	0.074 (0.012)***	0.072 (0.016)***
Parent-child interactions		0.126 (0.004)***	0.126 (0.004)***
Student-level controls			
Age (months)		0.039 (0.003)***	0.039 (0.003)***
Female		0.255 (0.006)***	0.255 (0.006)***
Language		0.190 (0.012)***	0.191 (0.012)***
Teacher support		–0.009 (0.004)*	–0.008 (0.004)*
Achievement press		–0.022 (0.003)***	–0.023 (0.003)***
Teacher-student relationship		0.047 (0.004)***	0.047 (0.004)***
School disciplinary climate		–0.042 (0.003)***	–0.042 (0.003)***
School-level controls			
Teacher support (school-level)		–0.148 (0.014)***	–0.148 (0.014)***
Achievement press (school-level)		–0.024 (0.011)*	–0.023 (0.011)*
Teacher-student relation (school-level)		0.019 (0.011)	0.018 (0.011)
School disciplinary climate (school-level)		–0.135 (0.010)***	–0.135 (0.010)***
School size		0.114 (0.010)***	0.115 (0.010)***
School resources		–0.059 (0.009)***	–0.059 (0.009)***
Student-teacher ratio		0.027 (0.011)*	0.027 (0.011)*
Country-level Family policy contexts			
Dual-earner support		0.304 (0.157)*	–0.019 (0.173)
General support		0.041 (0.145)	0.078 (0.151)
Interaction terms			
Dual X Single parent			–0.085 (0.038)*

General X Single parent	0.010 (0.020)
Dual X Wealth index	–0.034 (0.019)†
General X Wealth index	0.012 (0.010)
Dual X Sibling size	0.013 (0.010)
General X Sibling size	0.008 (0.006)
Dual X mother's education	0.009 (0.013)
General X mother's education	–0.014 (0.007)*
Dual X father's education	0.012 (0.012)
General X father's education	–0.011 (0.007)†
Dual X socio-economic status	0.003 (0.001)***
General X socio-economic status	0.000 (0.001)
Dual X Work full-time	0.092 (0.039)*
General X Work full-time	0.084 (0.019)***
Dual X Work part-time	–0.010 (0.049)
General X Work part-time	0.019 (0.025)

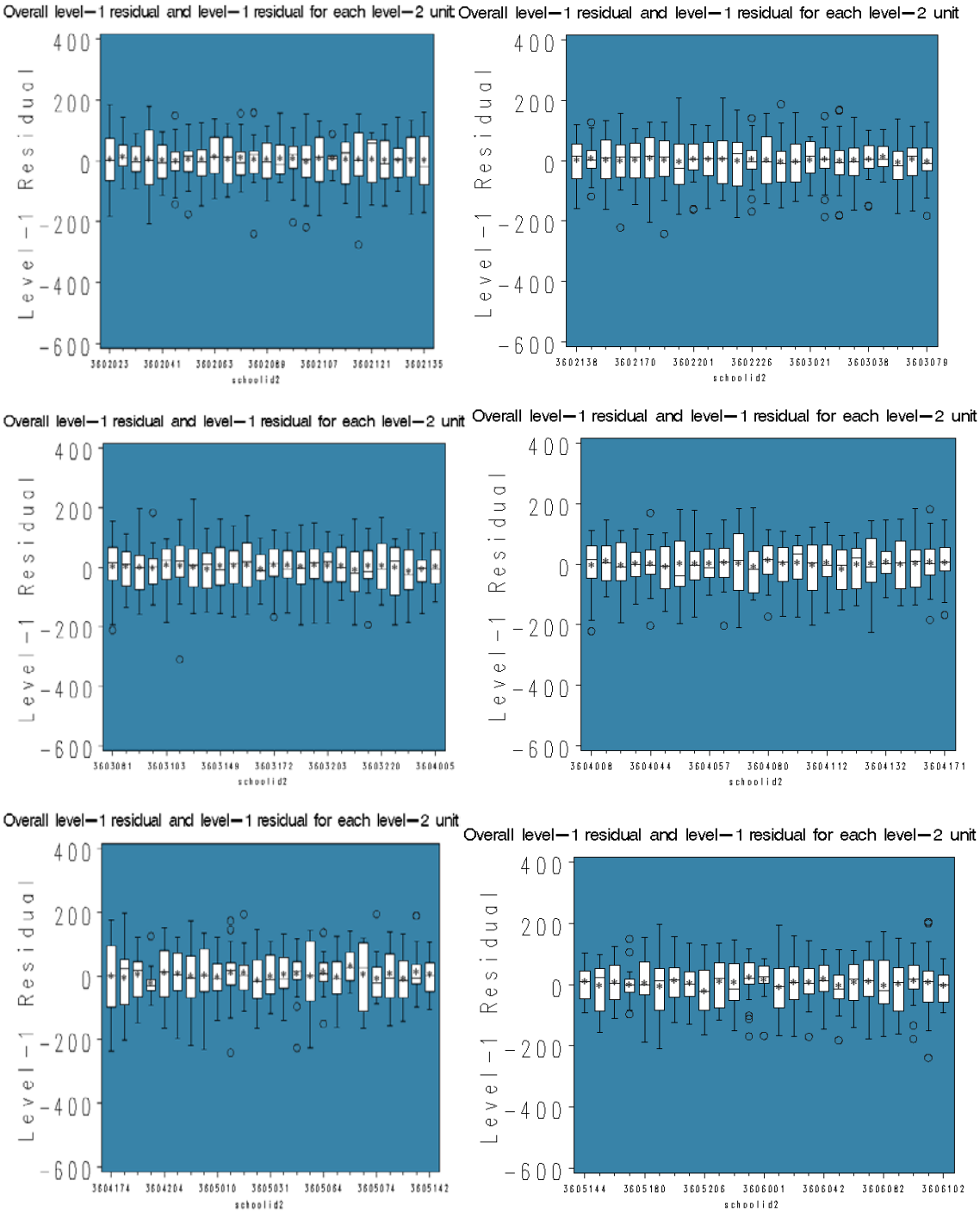
Note: (1) The random-effect model allows both school and country-level random intercepts; (2) The estimates are combined across 5 imputed datasets; (3) Since the PROC MIXED procedure in SAS does not provide standardized coefficients, both dependent and independent variables were standardized first with a mean of 0 and a standard deviation of 1, and then the same model was run using these standardized variables to obtain standardized coefficients.

Appendix C. Regression Diagnostics for Multilevel Modeling

One of the important steps in analyzing data with multilevel modeling is to conduct diagnostic procedures. Like the Ordinary Least Square (OLS), the validity of inferences based on multilevel modeling depends on how the data meet several assumptions, and these assumptions include residual normality, linearity, homogeneity of variance and influential outliers at both lower- and upper- level (Hox, 2002; Raudenbush & Bryk, 2002).

The diagnostic analyses are based on the two-level random effect model (with country-level fixed effect) presented in Table 5-3. The analysis is conducted using the SAS macro MIXED_DX developed by Bell, Schoeneberger, Morgan, Kromrey, and Ferron (2010). As presented below, the results suggest that there is no evidence of severe violations of assumptions.

Overall Level-1 Residual and Level-1 Residual for Each Level-2 Unit[21]



[21] Due to the space limit, box and whisker plots for the overall level-1 residuals and the level-1 residuals for first few level-2 units are presented.

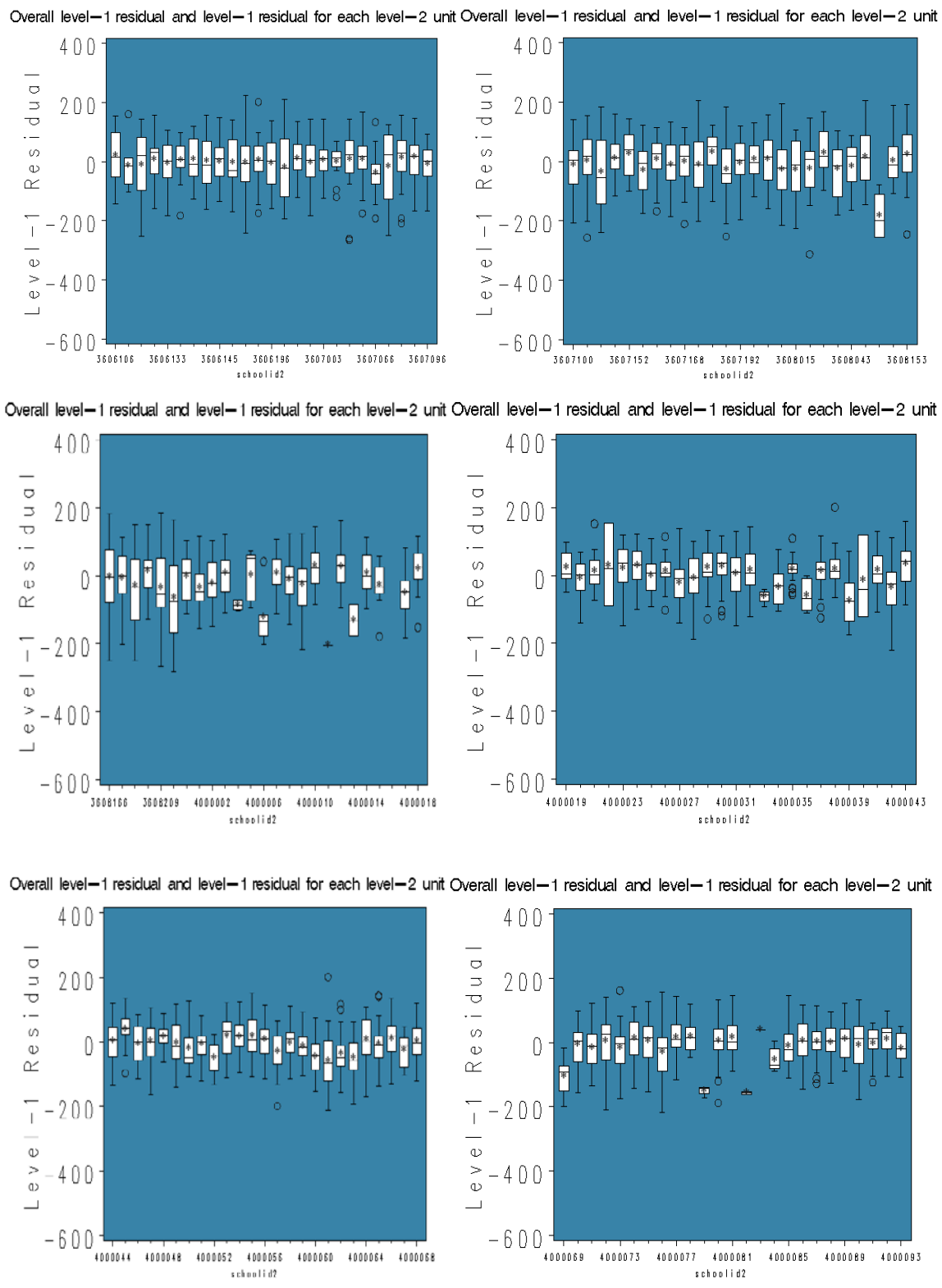


Figure C-1. Overall Level-1 Residual and Level-1 Residual for Each Level-2 Unit

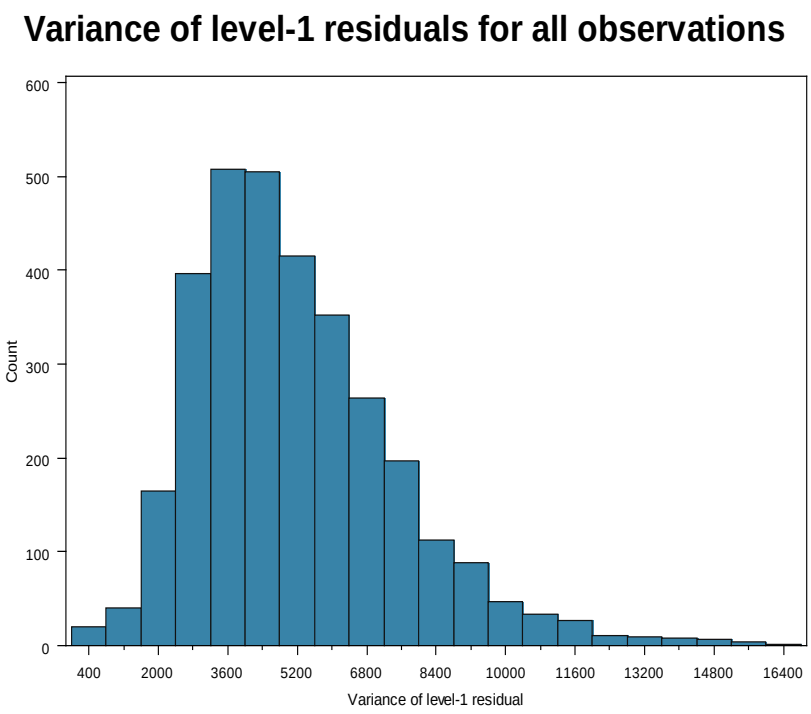


Figure C-2. Variance of level-1 residuals for all observations

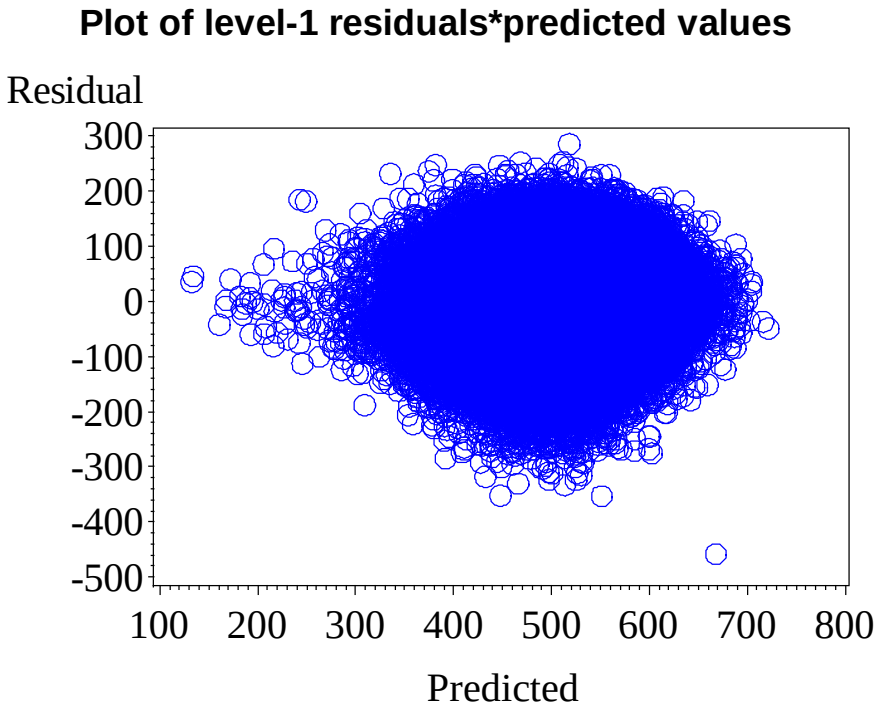


Figure C-3. Plot of level-1 residuals versus predicted values

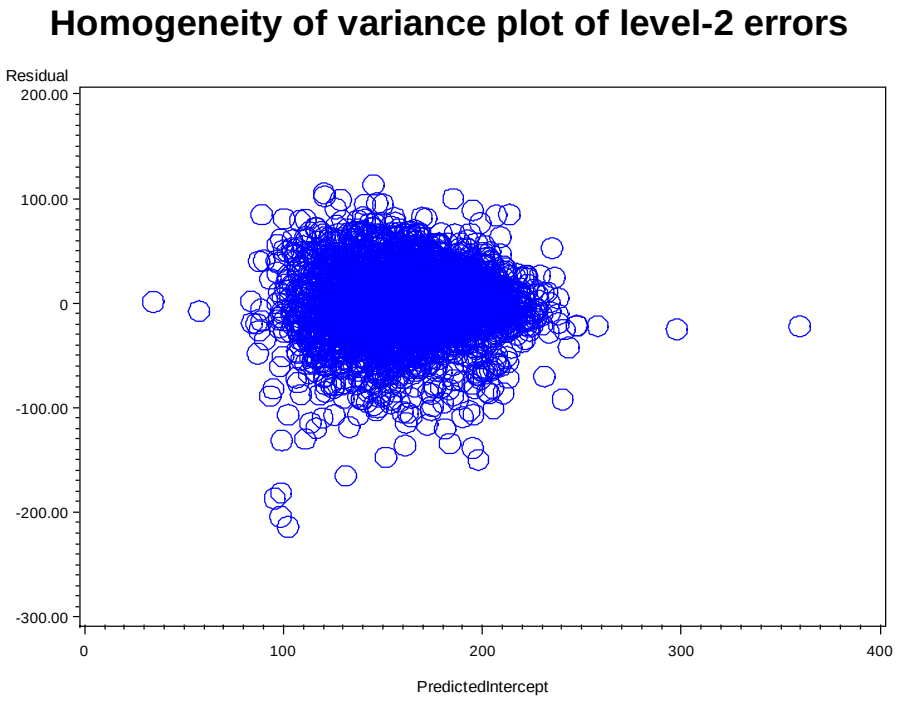


Figure C-4. Homogeneity of variance plot of level-2 errors

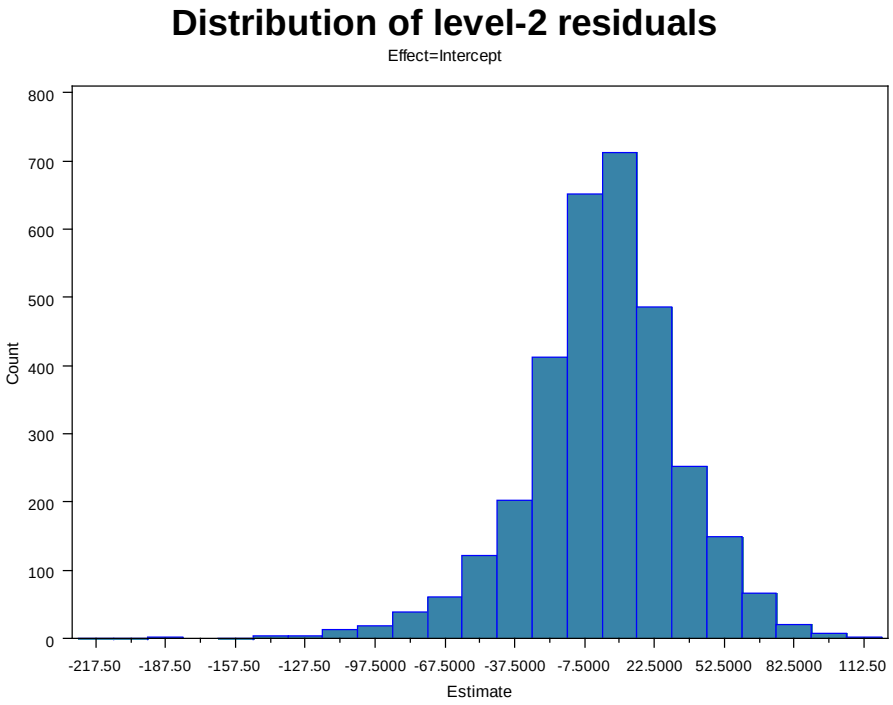


Figure C-5. Distribution of level-2 residuals

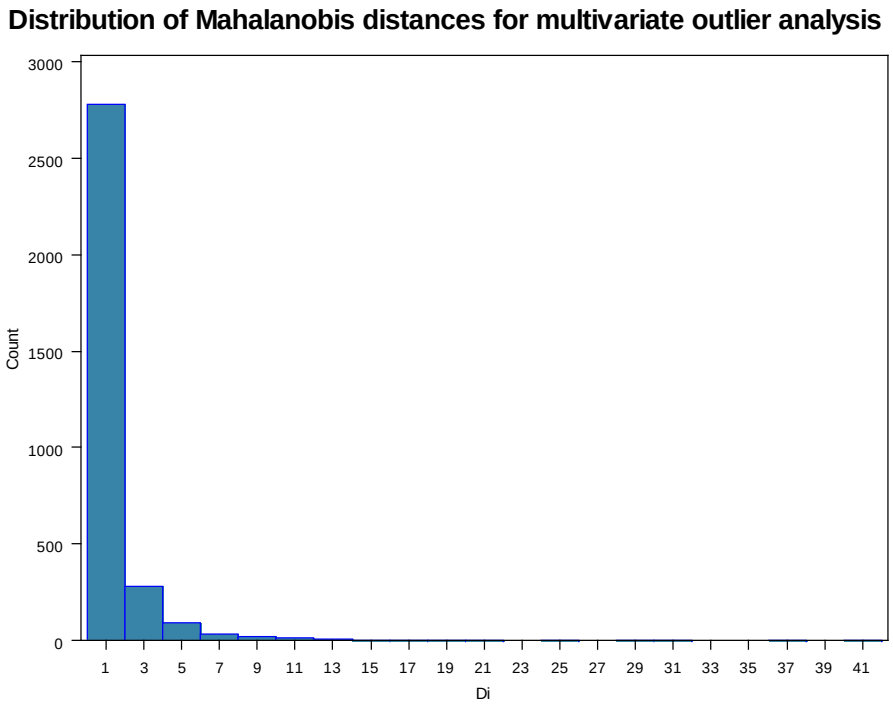


Figure C-6. Distribution of Mahalanobis distances for multivariate outlier analysis