

Essays on Marital Instability, Household Behavior, and Social Policy in Developing  
Countries

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## **Dedication**

This dissertation is dedicated to my family: Mauricio, Magdalena, and the future Santiago.

## **Abstract**

The three chapters in this dissertation add new knowledge to the current literature regarding the economic consequences of marital instability and family policies on household behavior and composition. Using newly developed integrated census microdata from IPUMS-International, the first chapter is an empirical analysis of global trends in marital instability from 1970 to the present. Factors associated with the probability of being separated or divorced are identified for multiple countries over time, finding that education and local economic development are associated with marital instability. The second chapter examines the effects of exogenous changes in family policy and administrative processes on one household decision, children's education. Specifically, the legalization of divorce and family court wait times for divorce are analyzed. Results show that implementing pro-homemaker divorce legislation shifts the bargaining power within married couple households towards the wife, as does the speed with which family courts process divorce cases. The final chapter identifies the potential undercount of lone-mother families when using headship status as a proxy for lone-mother families in 24 countries and identifies characteristics of lone-mothers associated with an increase the probability they are household heads. Overall, these chapters expand the boundaries of current knowledge on the relationship between family policy, household resource allocation, and family composition within households.

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## **Chapter 1-Introduction**

This dissertation is a collection of three essays focusing on the economics of family life and wellbeing, household behavior, and family composition. While it is best described as a work in demographic economics, there exists a strong policy analysis component that analyzes the extent to which social policies influence household behavior. The most interesting results of this dissertation argue for a more refined and intentional look at how social policies, originally intended for other purposes, can have strong and significant affects in advancing economic development if they are constructed in a manner that improves development indicators economists care about, such as health, education, and poverty. Additional results show that trends in marital instability around the world differ by country, and that women's economic opportunity and the economic development process are associated with trends in separation and divorce.

The three chapters that follow are: (1) "Global Trends in Marital Instability from 1970 to the Present: Do Economic Opportunity and Economic Development Matter?" (2) "Does the Right to Divorce Affect Bargaining Power within Marriage? The Case of Chile" and (3) "The Mismeasurement of Lone-Mother Families: What Are the Implications for Development Policy?" Each chapter focuses on an economic aspect of family life that influences, or is influenced by, the ways in which families make decisions regarding their family or household structure and the investments they make within the household, specifically towards the younger generation(s).

Chapter one begins by describing demographic trends of marital instability in eleven countries, highlighting two main options for dissolving a marital relationship:

divorce and separation.<sup>1</sup> The evidence suggests that, in general, the dynamics of marital dissolution in developing countries are different from marital dissolution in developed countries, and a review of census data from many countries, obtained from the Minnesota Population Center's IPUMS-International Project, shows that separation (while remaining married) occurs at a higher rate than divorce in many developing countries; however, in developed countries like the United States, divorce rates are much higher than separation rates (Minnesota Population Center 2008). While societal norms, rules, and expectations most likely drive some of these differences, most countries have marital policies and laws that provide different economic incentives for men and women who choose divorce over separation. For example, economic resources from an ex-partner that are available to a divorced mother (or father) who has custody of her or his children might be very different than the resources available from the ex-partner of a separated mother (or father). For this reason, it is important to understand why trends in separation and divorce differ around the globe.

While this first chapter provides insight into trends in marital instability over four decades, a more important contribution is that it identifies several economic factors associated with these changes. Specifically, it provides support for Becker's (1981) role specialization theory and Schoen et al.'s (2002) economic opportunity hypothesis. Schoen et al. suggest that, in general, the creation of economic opportunities for women will not deteriorate marriage. Instead, they argue that a proportion of marriages at any given time are comprised of unhappy individuals who would leave the marriage if given

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<sup>1</sup> The Merriam-Webster dictionary provides the following definitions of divorce and separation. Divorce is "the action or an instance of legally dissolving a marriage." Separation is the "cessation of cohabitation between a married couple by mutual agreement or judicial decree." (<http://www.merriam-webster.com/>)

the opportunity and resources to do so. Providing women with economic opportunities, then, allows these already unhappy marriages to dissolve. While Becker's role specialization theory does not necessarily contradict this hypothesis, he does not specifically identify happiness as a variable contributing to marriage or the dissolution of marriage.

The data in this first chapter identify a relationship between married women's economic opportunities, societal work norms of married women, and the probability of being divorced or separated for both men and women aged 25 to 39. Increasingly low levels of economic opportunity for married women are associated with lower rates of divorce and higher rates of separation for both women and men. Low levels of economic opportunity for married men are not significantly associated with divorce rates for either men or women and are only associated with an increase in separation rates for women.

The outcomes related to economic opportunity are different for men and women. While it is true that for each separated or divorced woman, there must be an equivalent separated or divorced man, there are several plausible explanations as to why the outcomes for women might be different than for men. First, a census identifies the person's marital status at the exact moment the census is taken, and remarriage rates are higher for men than women in most countries. So, while it is true that for each divorced woman there must be a divorced man, if the divorced man has a higher propensity to remarry than his divorcee counterpart, in census data she might be identified as divorced while he is identified as married simply because he remarried sooner. This could cause more women than men to be divorced in any given census year. Second, this analysis is

conducted with persons aged 25 to 39.<sup>2</sup> In most countries, the age at first marriage is younger for women than men, implying that the age at separation or divorce is different for women and men and that the ex-partners for a subgroup of separated or divorced men and women are not necessarily included in the sample used. Finally, mortality rates are different for men and women in most countries. On average, men die earlier than women. This could also help explain the differences in outcomes.

Chapter one also analyzes the relationship between marital instability and economic development in multiple countries. An increase in the proportion of non-farm labor is linked to technological advances and economic development in countries around the world. After an industrial revolution, or an increase of manufacturing labor corresponding to a decrease in agricultural labor, the next phase of development generally leads to a decrease in labor's ratio of manufacturing to services. Increased urbanization is also an indicator of a country's development. Variables related to the proportion of non-farm labor, the ratio of manufacturing to services, and the percent of the population living in urban areas are added to the analysis. All variables are shown to be positively associated with an increase in marital instability, both separation and divorce.

While the evidence is not conclusive, it is clear that a positive relationship exists between economic opportunity, economic development (which expands economic opportunities in many countries), and marital stability. While factors associated with economic opportunity might not induce marital unhappiness, they, at a minimum, appear

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<sup>2</sup> The sample analyzed is limited to persons aged 25 to 39 in order to reduce the possibility of chronological mismatches between the event of a divorce or separation and the person's current employment status.

to provide additional options to those individuals who are not satisfied within their current marriage. Additional factors such as cultural norms and societal expectations surrounding divorce and separation are not included in this analysis as these concepts are challenging to measure. To the extent that these other factors are correlated with economic opportunity, economic development, and trends in marital instability, it is possible that the results reported here are also driven by these other external factors.

The second chapter delves deeper into economic issues of marital instability by conducting a household analysis of changes in marriage law and its effects on intrahousehold allocation decisions. Specifically, it analyzes the effects of a pro-homemaker divorce law on shifts in household investments in children's education. Using the case of Chile where divorce was not legal until 2004, this chapter takes advantage of a unique natural experiment setting. Most previous quantitative studies on divorce have been unable to identify the specific effects of divorce because of difficulties associated with a non-random sample. It is virtually impossible, not to mention unethical, to randomly assign married individuals to either stay married or divorce. It is, therefore, likely that individuals choosing to divorce have certain characteristics that are similar among themselves but different from individuals who choose to stay married. Under this setting, any analysis of divorce will pick up both the effects of divorce (if there are any) as well as the differences in characteristics across the two groups. A researcher will not be able to definitively identify whether or not divorce has had any effect.

Given the fact that divorce was not possible in Chile until 2004 and using panel data that follow the same individuals over time before and after the legalization of

divorce, this chapter is able to capture the actual effect of legalizing divorce on investments in children's education. Using a difference-in-difference estimation technique, it shows that, compared to cohabiting couples, married couples shifted the allocation of resources towards investments in their children's education after divorce was legalized.

The Chilean divorce law is pro-homemaker, providing the homemaker with a lump sum of money upon divorce that compensates her for time spent during the marriage out of the formal labor market to care for the children and the household. Since most homemakers in Chile are women, the implementation of this law is thought to have increased the bargaining power of women within married couple households. Prior research has shown that women invest more in household goods than men (Quisumbing and Maluccio 1999, Rubalcava et al. 2004, Schady and Rosero 2007). Therefore, increases in household investments, such as children's education, among married couple households means the hypothesis that intrahousehold bargaining takes place within the household cannot be rejected. The unitary household model described by Becker (1981), however, can be rejected with this evidence. The results support the advancement of household bargaining models that were first proposed by Manser and Brown (1980) and McElroy and Horney (1981).

The final chapter in this dissertation, although not directly an economic analysis, addresses an issue that is essential for any economic analysis of poverty alleviation, family formation, and economic development. Lone-mothers families are often assumed to have higher probabilities of falling into poverty and fewer economic opportunities than

other family types.<sup>3</sup> Because of this, they are frequently analyzed in economic studies on poverty. This chapter identifies a common measurement error. Most studies interested in lone-mother families use headship status, female-headed households, to identify the unit of analysis. This type of measure does not accurately analyze the socio-economic situation and vulnerability of lone-mother families because many lone-mother families live as subfamilies in another family member's household. Moreover, a large portion of female-headed households are older widows with adult children, highly educated divorced or separated women with children, or married women whose spouses are absent.

The analysis in this chapter, in addition to identifying the magnitude of lone-mother families mismeasured when female-headed household is used as a proxy, identifies characteristics of lone-mother families that increase the probability that they will be a female-headed household. Most lone-mother families that are also female-headed households have mothers who are older, have higher levels of education, work, live in an urban area, are not single (never married), and have older children. They are also more common in the United States than in any other country, except France and Hungary. Holding all else constant and controlling for country fixed effects, world-wide, lone-mother families were more likely to be household heads in 1970 than today.

These results begin to shed light on the dynamics and complexities of lone-mother families. The stereotypical lone-mother family consisting of a young, single (never married) mother with small children at home is not likely to be the head of her household. She is more likely to reside in the household of another family member where she and her

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<sup>3</sup> For purposes of this study, a lone-mother is defined as any or all mothers who have primary custody of their minor children and are not married or their spouse is absent from the household.



children would be counted as a subfamily under some other head of household. While lone-mother household heads are more common in the United States and other developed nations, they are less common in developing countries and have become less common in recent years. This implies that development economists, and others who conduct research on poverty and vulnerable populations, must be careful to accurately identify this vulnerable group for analysis.

Analyzing the realities of lone-mother families using female-headed household as the unit of analysis ignores an entire subgroup of lone-mothers who differ from their household head counterparts. There are multiple reasons why researchers use female-headed household as a unit of analysis, and one factor could be the lack of appropriate data. However, economists and poverty researchers should strive to collect the relevant data in order to understand the situation and environment of all lone-mother families. If extended family members provide them with additional support to keep them out of poverty, then, overall, they might not be as vulnerable as assumed to be. However, if their family takes advantage of them and does not provide opportunities for them to become self-sufficient, even though they may not be identified as living in poverty because the household income of their family's household is above poverty, researchers might still want to develop strategies for supporting the self-sufficiency of these vulnerable subfamilies.

Many recent household surveys conducted by economists do not count everyone in a dwelling as one household unless they share economic resources, such as income. Most lone-mother families living with other family members will share resources,

including food, payment of bills, transportation, and daycare responsibilities. To accurately analyze the realities of this group, future data collection *must* clearly and intentionally identify subfamily units and subfamily relationships within these households, even if they share income and resources.

All three chapters of this dissertation have received valuable feedback, comments, and suggestions in multiple public venues. The methodologies and analytical frameworks have been improved through presentations in the University of Minnesota Applied Economics Trade and Development Seminars, the University of Minnesota Applied Economics Departmental Seminars, and the Minnesota Population Center's Seminar Series. Earlier versions of chapter one and chapter two were presented at the Population Association of America 2009 Annual Meeting in Detroit, Michigan and have improved greatly from the feedback received during those sessions. An earlier version of chapter two received critical feedback during a session presentation at the Agriculture and Applied Economics Association 2009 Joint Annual Meeting in Milwaukee, Wisconsin. The first chapter won the 2009 IPUMS-International Research Award for Best Contribution in the Category of Outstanding Work by a Graduate Student Using IPUMS-International Data, competing with over 150 submissions from around the world.

The following chapters tell a story of the interrelatedness of family economics, economic development, and social policy. Their results show that economic development is linked to changes in family structure, that social and family policies have the power to advance economic development, and that our understanding of the development process and subgroups affected by that process is intricately related to the way in which we

conduct our analysis and identify the populations we aim to study. In an effort to truly understand the relationship between family, development, and social policy, these chapters and their accompanying analyses are beginning steps in the right direction.

## **Chapter 2-Global Trends in Marital Instability from 1970 to the Present: Do Economic Opportunity and Economic Development Matter?**

### ***Introduction***

This purpose of this chapter is to describe trends in marital instability over time and across countries and identify socioeconomic factors associated with these trends. It advances the literature on marital instability by exploring gender differences in divorce and separation among 25 to 39 year olds across a wide range of countries.<sup>4</sup> Because men and women experience marital instability differently, the analysis is conducted separately for each sex.<sup>5</sup> By examining the demographic and economic correlates of divorce and separation, the analysis can assess alternative hypotheses about increases in marital instability.

Social science researchers are interested in studying marital instability because of its importance in relation to child wellbeing, vulnerability to poverty, and other social ills attributed to family disruptions. Most of the literature analyzing marital instability focuses only on divorce (Stevenson & Wolfers 2006) or studies separation and divorce as one phenomenon (Martin & Bumpass 1989, Smock 1994, Ruggles 1997a, Ruggles 1997b). There is very little discussion of how rates of separation versus divorce might differ, let alone be driven by different factors. Additionally, little research has been done

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<sup>4</sup> While it is true that for each separated or divorced woman, there must be an equivalent separated or divorced man, there are several plausible explanations as to why the outcomes for women aged 25 to 39 might be different than for men aged 25 to 39. These explanations are discussed in detail later in this chapter.

<sup>5</sup> Possible reasons as to why they experience marital instability differently could be due to differences in remarriage rates, age at first (and subsequent) marriage(s), mortality rates, and societal norms regarding marriage and remarriage for men and women.

on trends in marital instability in developing countries and the factors that might drive those trends.

Until now, it has been nearly impossible to analyze factors associated with global trends in marital instability because of the simple fact that the requisite data have not been available. This study takes advantage of newly available integrated census data from the IPUMS-International project to analyze global trends in marital instability. The IPUMS-International project provides microdata from 130 censuses in 44 countries, most of which were previously inaccessible to scholars. The database harmonizes these micro-level census data over time and countries, significantly reducing the amount of time individual researchers must invest in data collection and cleaning.

Using the marital status variable, I first identify those individuals who are currently married, divorced, or separated (but still legally married). I then show trends in marital instability (divorce and separation) of ever married adults aged 20 to 59 from 1970 to the present in eleven countries. I construct a model to analyze factors associated with these trends by updating Ruggles' (1997a) model of marital instability to account for global differences in separation and divorce, as well as gender differences. My results show that having more education (secondary versus less than secondary), living in areas with high levels of employed married women ages 20 to 59, and the availability of good economic opportunities for married females ages 20 to 59 are associated with an increase in the probability of being divorced and a decrease in the probability of being separated (compared to being married) for women ages 25 to 39. For men, living in areas with high

levels of married women's employment (ages 20 to 59) is associated with an increase in the probability of being both divorced and separated.

### *Literature Review*

Economic theory argues that individuals enter marriage when their utility from being married (in other words, their benefits to being married) outweighs their utility (benefits) of being single (Becker 1981). Becker constructs a role specialization theory, which states that by specializing in particular spheres of the household, e.g. domestic work for women and bread winner for men, individuals will receive higher utility from being married because economies of scale and efficiencies are achieved. Economic theory also predicts that individuals will choose separation or divorce when the utility (benefits) of separating or divorcing outweighs the utility of being married. Therefore, as women start working more or men start participating more in household chores, there is less incentive to remain married because the efficiencies originally gained by the division of labor are reduced, and divorce or separation will increase. These economic arguments, however, do not acknowledge the power or role that *availability* of external resources can play in the decision making process.<sup>6</sup>

A similar theory in the sociology literature is the economic opportunity hypothesis (Schoen et al. 2002). This theory states that an increase in female labor force participation allows women in unhappy marriages to exit the marriage. Therefore, women's economic opportunity will only increase divorce rates if there are enough unhappy marriages that the aggregate desire to divorce or separate from one's spouse is

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<sup>6</sup> In this case, external resources refer to resources gained or available outside the home.

higher than the aggregate availability of resources when female labor force participation and economic opportunity is low. As additional resources become available through increased female employment, divorce and separation will increase. While Becker's theory focuses on changes in role specialization instead of happiness as driving trends in marital instability, both these theories predict an increase in marital instability as women's economic opportunities rise.

Oppenheimer (1994, 1997) argues that an increase in marital instability is a function of male, not female, economic opportunity. She states that, in the United States, a lack of male economic opportunities has contributed to marital instability more than an increase in female labor force participation. Ruggles (1997a) tests these two theories in the U.S. context and finds support for both of them; both female and male economic opportunities are associated with an increase in divorce.

While the literature on marital instability in developing countries is limited, a few studies have attempted to analyze trends in marital dissolution around the world. Trent and South (1989) present estimates of the structural determinants of country-level divorce rates using aggregate data from 66 countries. While their assumption that variables aggregated at the country-level, such as sex ratios, female labor force participation rates (that do not control for single versus married women), dominant religion, among others, influence the country-level divorce rate, it is unclear whether inter-country variation confounds their results. This could lead to omitted variable bias. Another concern is that they do not have data on some basic demographic factors that influence divorce rates, such as the age and sex structures and for each country. Overall, they find that their

constructed development index strongly influence the divorce rate and that female labor force participation and female average age at first marriage weakly influence the divorce rate. They find no evidence that religious tendencies of a country influence divorce rates. Given the methodological issues associated with this study, it is unclear whether their findings are merely associations or true causal relationships in the data.

Goldman (1981) conducts an analysis on marital instability in Latin American countries. She analyzes the dissolution of first unions, not distinguishing between consensual unions and marriage nor between divorce and separation, in Colombia, Panama, and Peru. She finds dissolution rates of 20 to 40 percent 20 years after marriage and higher dissolution rates among women in urban areas and those who enter marriage at young ages.

The divorce literature in the United States and other industrialized countries is abundant. Ruggles (1997a) analyzes trends in marital instability in the United States from 1880 to 1990. He advances the analytical tools for analyzing marital instability by generating local geographic variables of labor market conditions and economic opportunity for married men and women. Ruggles identifies five variables for his model that describe local labor markets: married female labor market participation, married male labor market participation, low economic opportunity for married women, low economic opportunity for married men, and nonfarm employment. Labor market participation for females and males are two aggregate variables: the percent of married women working ages 20 to 59 and the percent of married men working ages 20 to 59. For both genders, low economic opportunity is defined as: the percent of married women or



men aged 20 to 59 employed in jobs classified as elementary. Each of these variables, together with core demographic variables and census year fixed effects, are the explanatory variables used in his analysis.

While these variables are indicators of employment and economic opportunity, the percent of married individuals in the labor force is also a proxy for cultural and societal norms regarding married person's work and the percent in elementary occupations identifies the quality of work available to married individuals in a given region. While quality of work could be related to the proportion of married women working, the relationship is not that simple. There must be a match between skill and education level and type of jobs available in a local region. It is possible that widely available low economic opportunities in a particular area could cause high rates of employment if most married women in the area have low levels and education and skills.

By using these aggregated variables, he minimizes problems of causality in the relationship between marital status and women's employment status. Ordinarily, it is difficult to determine if women become employed because of necessity when they divorce or separate, or if women are able to divorce or separate because they are employed or know that they can readily find employment. This dilemma can be minimized by using aggregated local geographic variables to identify local labor market conditions and economic opportunity for *married* men and women, which is why he uses a larger age group (aged 20 to 59) to construct the aggregate variables. The percent of married women working can be considered a proxy for societal norms regarding married women's economic opportunity.

An individual's decision to divorce or separate does not significantly affect aggregated measures of married female employment, but a woman deciding to divorce or separate will be influenced by societal norms of work and access to resources. In this way, Ruggles is able to identify a relationship between local labor markets, economic opportunity, and marital instability. However, as he argues, a model using aggregate labor market conditions is far from perfect, and he is still unable to determine whether changes in marital instability trends occur because of changes in married women (or men)'s work or because of shifts in societal norms regarding female employment, divorce, and separation.

Ruggles (1997a) finds that local labor market conditions and economic opportunity are associated with changes in divorce and separation trends. Higher rates of married female labor force participation are associated with an increased probability of marital instability, while higher rates of male labor force participation are associated with a decreased probability of divorce and separation. Additionally, "...for men, low economic opportunity had the expected positive association with the probability of divorce or separation...low economic opportunity for women, however, had little impact before 1990...[and], nonfarm employment is strongly associated with the probability of being divorced or separated in all census years (p. 460)."

Oppenheimer (1997) and Preston (1997) both commented on Ruggles' analysis. The main critiques relate to model specification and whether Ruggles is measuring what he says he is measuring. Preston, unable to entirely interpret the significance of the percent in nonfarm labor, suggests the addition of particular variables to better

understand the effects of economic development. He suggests adding local geography variables of the ratio of manufacturing to services, some measures of size of place, and sex ratios. Additionally, he argues that the omission of educational attainment and the income of females are significant omissions that may contribute to some of his general misspecification questions. Finally, to reduce the effect of remarriage on the dependent variable, he suggests adding variables such as age at marriage, widowhood, and cohabitation.

Oppenheimer questions what effect differences in state policies regarding the ease or difficulty of achieving divorce might have on the probability of divorce or separation. She also argues that much of the observed marital instability reflects unhappiness with specific marriages versus with the institution of marriage and that this, therefore, does not directly relate to the theory that there is a declining gain to marriage as women's labor market participation increases but might be related to the economic opportunity hypothesis (Schoen et al. 2002). However, she does not provide any evidence to support this alternative perspective.

Overall, the Ruggles (1997) analysis and comments by Oppenheimer and Preston provide ample opportunity to update the Ruggles' model. Additionally, the limited research on marital instability in a global context and the availability of person- and household-level international census data from 1970 to the present provide a ripe opportunity for further research on the dynamics of marital instability around the world.

This study fills gaps in the literature by conducting an empirical analysis of divorce and separation trends around the world. It tests the role specialization theory and

economic opportunity theory by evaluating whether married women's economic opportunity within a local geographical unit is associated with changing trends in both divorce and separation. Additionally, it tests whether Oppenheimer's (1994, 1997) theory of the importance of male economic opportunity in the United States applies in a global context. Finally, it attempts to identify whether aggregated economic development variables are associated with changes in divorce and separation.

### *Data and Methodology*

The IPUMS-International (IPUMS-I) database consists of public use samples of census microdata from around the world, with variables standardized across countries and over time. The subsamples contain individual person- and household-level data. To date, IPUMS-International contains data from 130 censuses in 44 countries and has 279 million person records. For this chapter, the countries that are analyzed are those that have data available over at least two time periods and that contain a marital status variable detailed enough to distinguish individuals who are divorced from individuals who are separated (but still legally married). Under these criteria, a subset of 4.3 million adults aged 20 to 59 from 11 countries (Brazil, Costa Rica, Ecuador, Kenya, Mexico, Panama, Portugal, Spain, United States, Venezuela, and Vietnam) was extracted from the IPUMS-I database.

Following the methodology of Ruggles (1997a), and using data for persons aged 20 to 59, local-regional variables are constructed using the smallest geographic unit

available for each census.<sup>7</sup> The created local-regional variables are: percent of married women working, percent of married men working, percent of low female economic opportunity, percent of low male economic opportunity, and percent of non-farm labor. To best capture societal norms regarding the perception of normalcy and availability of married women's work, married women working includes only those women who are working and does not include unemployed women.<sup>8</sup> For consistency, married men working is defined as those who are currently employed and does not include those who are unemployed. Low economic opportunity is defined by the percent of occupations identified as elementary occupations in the International Standard Classification of Occupations (ISCO) scheme for 1988.<sup>9</sup> Elementary occupations include basic jobs such as doorman, street vendor, laundress, or domestic help. In almost two-thirds of the countries, the proportion of women in these types of occupations is equal to or higher than the proportion of men in these occupations.<sup>10</sup> Non-farm labor is defined as any industry not identified with agriculture.

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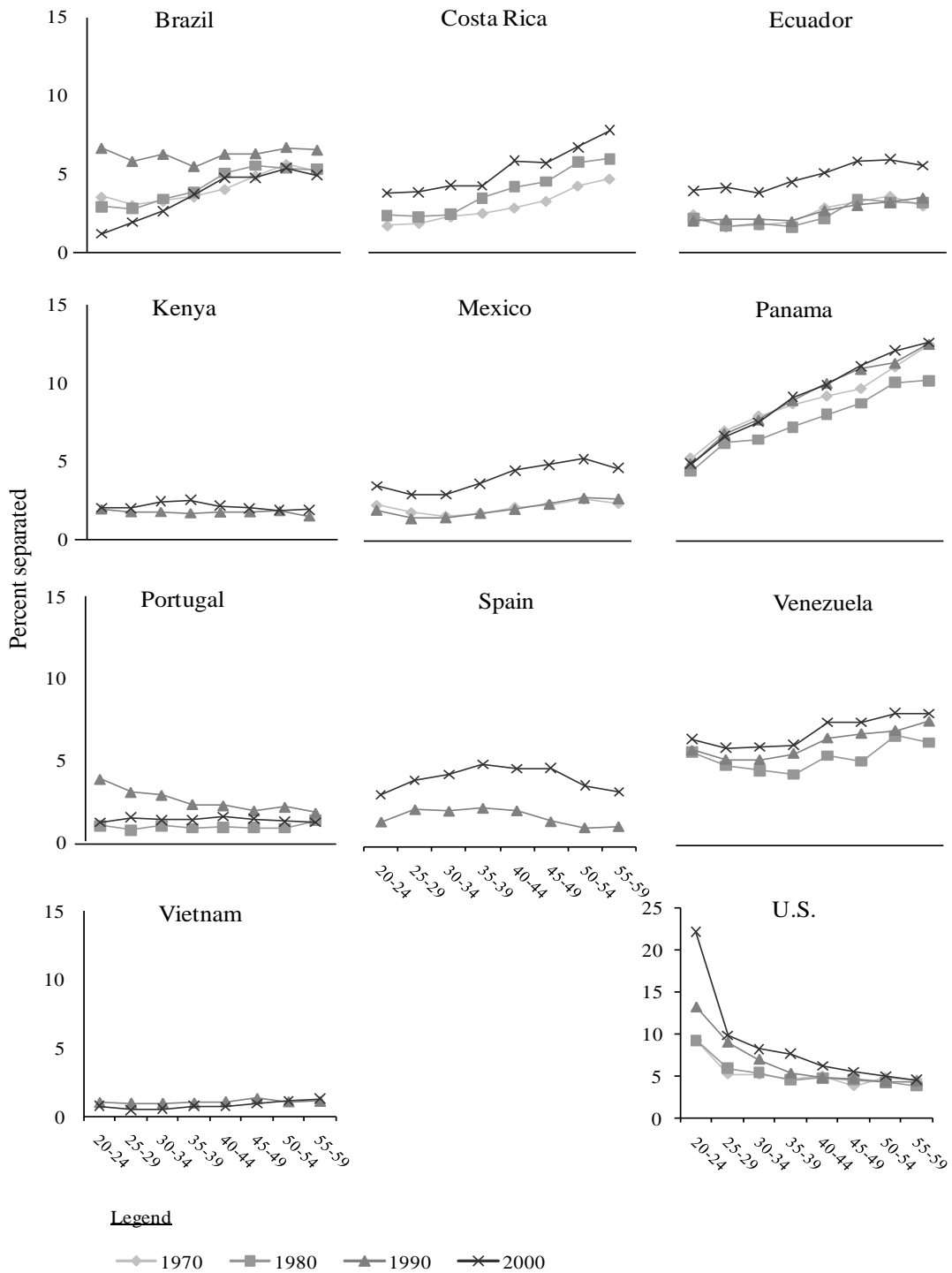
<sup>7</sup> These local-regional variables are constructed by aggregating at the lowest level of geography available in the public use samples. Brazil, Mexico, Spain, and Venezuela are aggregated at the municipality-level, Costa Rica and Ecuador at the canton-level (similar to a county-level in the United States), Panama and Kenya at the district-level, the United States at the state-level, and Vietnam at the province-level. To the extent that larger geographical units mask local regional realities, the samples with larger geographical units have the potential to generate imprecise estimates for these aggregated variables.

<sup>8</sup> Conducting a separate analysis that included unemployed individuals in the percent working variables found no significant difference in the findings.

<sup>9</sup> The classifications of occupations may differ slightly across country and within country over time. For more detailed information on the ISCO scheme and variations by country and over time, see <https://international.ipums.org/international-action/variables/173943>.

<sup>10</sup> With the exception of Costa Rica, France, Kenya, and the United States where the proportion of men in these occupations is higher than women.

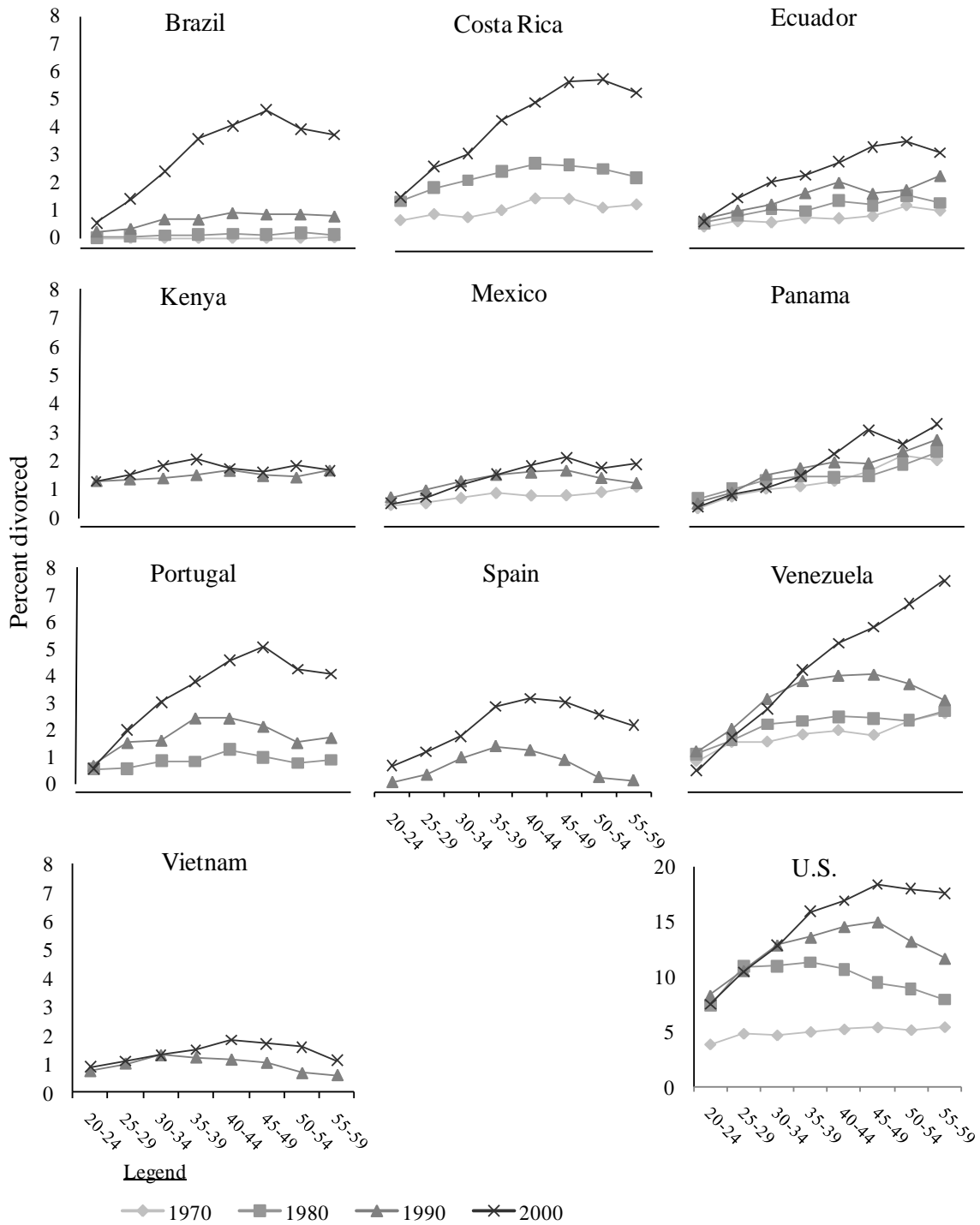
Figure 1.1-Percent Separated (Legally Married) of Ever-Married Adults Aged 20 to 59 by Country, Age, and Decade (1970 to Present)



Note: Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Figure 1.2-Percent Divorced of Ever-Married Adults Aged 20 to 59 by Country, Age Group, and Decade (1970 to Present)



Note: Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Using a bivariate logistical regression for analyzing factors associated with historical trends in marital instability (where divorce and separation are combined into one dichotomous variable) makes sense for the case of the United States (as in the Ruggles paper) because separation is often just a temporary state on the way to a more permanent state of divorce (or remarriage). This can be seen in Figure 1.1, where younger age groups have much higher rates being separated in the United States, but the percent ever-married who are separated declines sharply for those over 30, implying that they transition into more permanent states of divorce or remarriage.<sup>11</sup> However, in a multi-country analysis where the ways in which local laws, policies, and customs influence the manner in which individuals experience marital instability, it becomes essential to analyze separation and divorce as distinct phenomena.<sup>12</sup>

Figures 1.1 and 1.2 show that there is no apparent global link in the relationship between divorce and separation, and these two phenomena do not necessarily follow similar trends among countries. Therefore, to truly understand factors associated with marital instability around the globe, separation and divorce are analyzed as two independent, permanent options in a multinomial logistic regression. In this way, trends in divorce and separation are each compared to those persons who remain married.

Finally, based on comments from Oppenheimer (1997) and Preston (1997), educational attainment and three additional development indicators are added: the ratio of manufacturing to services, the ratio of females to males, and the percent of individuals

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<sup>11</sup> Note the scale difference for the United States.

<sup>12</sup> Diverse trends in separation and divorce by country could be related to cultural preferences or norms, different costs associated with divorce lawyers or divorce processes, diversity in divorce laws (e.g. not allowing unilateral divorce), or other factors.



living in an urban area. The development indicators are aggregated at the lowest level of geography, as described above. An industry variable constructed by IPUMS-I to standardize general industry codes across country and over time is used to create the ratio of manufacturing to services variable. Industrial classifications are divided into 12 groups in IPUMS-I. These groups are divided into a manufacturing or services group (agriculture is excluded) and a ratio of manufacturing to services is constructed for this analysis. Using an urban-rural status variable constructed by IPUMS-I, the percent of the population living in an urban area is created for this analysis.<sup>13</sup>

Using the marital status variable, I identify individuals who are married, divorced, or separated (but legally married) as the unit of analysis for a multinomial logistical regression.<sup>14,15</sup> Like Ruggles (1997), I analyze only those individuals aged 25 to 39 to reduce the potential for chronological mismatches between the event of a divorce or separation and a person's current employment status.<sup>16</sup> These ever-married adults, slightly more than one million (1,012,287) individuals, are the sample population for the regression analysis. Being divorced, separated, or married is regressed on selected characteristics, such as age, educational attainment, aggregate local economic indicators

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<sup>13</sup> Urban-rural status indicates whether the household was located in a place designated as urban or rural. For more information on the urban-rural status variable, see <https://international.ipums.org/international-action/variables/173572>.

<sup>14</sup> The underlying assumption when using a multinomial logistic regression is that the error term is logistic, versus a multinomial probit where the error term is assumed to be normally distributed.

<sup>15</sup> For simplicity of analysis, widows are excluded from the analysis. They make up approximately one to three percent of any given census population aged 25 to 39.

<sup>16</sup> If the sample is not restricted by age, it is possible that an individual identifies themselves as divorced and currently unemployed; however, their divorce could have happened when they were 25 and they are currently unemployed at the age of the census interview (say at age 45). It's highly possible that when they divorced at 25, they were employed in a good, high paying job. In order to diminish the likelihood of these scenarios in the dataset, the sample is restricted to those individuals aged 25 to 39, assuming that 25 is a likely age for individuals who marry in their late teens or early 20s to begin divorcing or separating.

(as listed above), and aggregate development indicators (as listed above), and include country and decade fixed effects.

The factors associated with marital instability differ for men and women. While it is true that for each separated or divorced woman, there must be an equivalent separated or divorced man, there are several plausible explanations as to why trends in marital instability might be associated with different factors for men than for women. First, a census identifies the person's marital status at the exact moment the census is taken, and remarriage rates are higher for men than women in most countries. So, while it is true that for each divorced woman there must be a divorced man, if the divorced man has a higher propensity to remarry sooner than his divorcee counterpart, in census data she might be identified as divorced while he is identified as married because he remarried faster. This could cause more women than men to be divorced in any given census year. Second, this analysis is conducted with persons aged 25 to 39. In most countries, the age at first marriage is younger for women than men, implying that the age at separation or divorce is different for women and men and that the counterparts for a proportion of separated or divorced men and women are not necessarily included in the sample used. Finally, mortality rates are also different for men and women in most countries. On average, men die earlier than women. This could also help explain the differences in outcomes.

Separate regressions are conducted for women and men, under the presumption that marital instability manifests itself differently for men and women, as described above. A regression run with both genders together and adding an independent variable for sex produces a strongly significant and large coefficient on sex (results not shown),

showing that, after conditioning on multiple variables, women are more than twice as likely to be divorced or separated than men at any given point in time and implying either that women who separate or divorce remain in that status longer than men or that women between the ages of 25 and 39 are more likely to be divorced or separated than their male counterparts because of gender differences in age at marriage and, therefore, age at separation or divorce. For these reasons, the analysis in this paper separates the samples by gender and conducts separate analyses accordingly.

### *Analysis*

Figure 1.2 shows trends in divorce for ever-married adults aged 20 to 59 for various countries from 1970 to the present. Note that the scale is different for the United States, shown in the final graph. Divorce is increasing over time for most age groups. Brazil, Costa Rica, Portugal, and Spain show large increases in the percent of adults divorced in 2000 compared to the previous census year. Is it possible that policy changes in marriage laws, societal norms, or advances in economic development influenced these large increases in the percent of adults divorced? Another interesting divorce trend is that Mexico, Panama, Venezuela, and the United States all show a decrease in the divorce rate for younger age groups (20 to 24 and 25 to 29). Finally, the United States is a major outlier with respect to divorce, showing rates that double, triple, and sometimes quadruple those of other countries.

Trends in separation do not follow similar patterns. Figure 1.1 shows the percent of separated (but still legally married) ever-married adults aged 20 to 59. Here note that

separation is not increasing for all countries as is divorce. It is decreasing in Brazil, Portugal, and Vietnam, all countries that showed an increase in divorce. All Latin American countries show an increase in separation as age group increases. In Portugal, Spain, and the United States, the percent separated starts decreasing as age increases. These differences in separation trends between developing and developed nations are evidence that while separation may be a step in the process to divorce (or remarriage) in the United States and other developed economies, it may, in fact, be a more permanent status in developing countries. Overall, figures 1.1 and 1.2 show that trends in marital instability around the world are different, especially when compared to the United States.

Table 1.1 provides descriptive statistics for ever-married men and women aged 25 to 39. While almost eight percent of women are divorced or separated, the proportion of men in a similar status is almost half that amount (4.3 percent). This could be explained by higher remarriage rates for divorced men in this age group than women. Men in the sample are older than women, which is not surprising given that the age at marriage for men is higher than women in most countries. Men in this sample have higher rates of primary and tertiary education than women.

Table 1.2 shows the coefficients and their significance for three multinomial logistic regressions identifying factors conditionally associated with the probability of divorce or separation for ever-married women ages 25 to 39. *Model One* identifies basic demographic characteristics. For comparative purposes, *Model Two* adds only the local economic indicators used in the Ruggles (1997) paper. The final model, *Model Three*, adds additional economic development indicators, as suggested by Preston (1997).

Table 1.1-Descriptive Statistics of Relevant Characteristics for Persons Ever-Married  
Aged 25 to 39 (Percents and Means), 1970 to Present

	Women	Men
<b>Marital status</b>		
Divorced	2.6	1.6
Separated, legally married	5.0	2.7
Married	92.4	95.7
<b>Age</b>		
25 to 29	35.4	31.7
30 to 34	34.0	35.3
35 to 39	30.6	32.9
<b>Educational attainment</b>		
Less than primary	37.9	33.8
Primary	38.1	41.4
Secondary	17.8	17.3
Tertiary	5.5	6.8
Unknown	0.7	0.7
<b>Local economic indicators</b>		
% married women working	35.6	35.1
% married men working	88.8	88.8
% low female economic opportunity	17.1	17.3
% low male economic opportunity	13.8	14.0
<b>Development indicators</b>		
% non-farm labor	77.6	77.3
Ratio of manufacturing to services	26.0	26.0
% living in urban area	61.8	62.2
<b>Marriage market conditions</b>		
Ratio of females to males	1.04	1.03
N	530,432	481,855

*Note:* Descriptive statistics include data from public use samples for Brazil, Costa Rica, Ecuador, Kenya, Mexico, Panama, Portugal, Spain, United States, Venezuela, and Vietnam with sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

Table 1.2-Multinomial Logistic Regression of Marital Instability on Selected Characteristics (Odds Ratios): Ever-Married Females Aged 25 to 39

	<i>Model One</i>		<i>Model Two</i>		<i>Model Three</i>	
	Divorced vs. Married	Separated	Divorced vs. Married	Separated	Divorced vs. Married	Separated
<i>Decade (Reference: 2000)</i>						
1970	0.46 ***	0.77 ***	0.45 ***	0.72 ***	0.47 ***	0.75 ***
1980	0.77 ***	0.77 ***	0.71 ***	0.74 ***	0.71 ***	0.74 ***
1990	0.93 ***	0.96 ***	0.88 ***	0.94 ***	0.88 ***	0.94 ***
<i>Country (Reference: United States)</i>						
Brazil	0.15 ***	0.67 ***	0.20 ***	0.69 ***	0.17 ***	0.53 ***
Costa Rica	0.32 ***	0.54 ***	0.55 ***	0.61 ***	0.51 ***	0.50 ***
Ecuador	0.20 ***	0.50 ***	0.31 ***	0.54 ***	0.26 ***	0.41 ***
Kenya	0.27 ***	0.27 ***	0.20 ***	0.24 ***	0.22 ***	0.30 ***
Mexico	0.19 ***	0.41 ***	0.28 ***	0.43 ***	0.25 ***	0.32 ***
Panama	0.17 ***	1.63 ***	0.25 ***	1.78 ***	0.22 ***	1.46 ***
Portugal	0.26 ***	0.25 ***	0.28 ***	0.24 ***	0.30 ***	0.24 ***
Spain	0.14 ***	0.41 ***	0.18 ***	0.40 ***	0.16 ***	0.33 ***
Venezuela	0.40 ***	0.85 ***	0.53 ***	0.84 ***	0.45 ***	0.65 ***
Vietnam	0.17 ***	0.12 ***	0.43 ***	0.17 ***	0.40 ***	0.14 ***
<i>Age (Reference: 35 to 39)</i>						
25 to 29	0.57 ***	0.87 ***	0.58 ***	0.88 ***	0.58 ***	0.88 ***
30 to 34	0.77 ***	0.92 ***	0.78 ***	0.93 ***	0.78 ***	0.93 ***
<i>Educational Attainment (Reference: Secondary)</i>						
Less Than Primary	0.29 ***	1.01	0.37 ***	1.18 ***	0.37 ***	1.18 ***
Primary	0.62 ***	1.22 ***	0.67 ***	1.27 ***	0.67 ***	1.27 ***
Tertiary	0.86 ***	0.69 ***	0.84 ***	0.68 ***	0.82 ***	0.67 ***
<i>Local Economic Indicators</i>						
Married Women Working (%)			1.58 ***	0.95	1.47 ***	0.66 ***
Married Men Working (%)			1.20	0.63 ***	1.13	0.58 ***
Low Female Economic Opportunity (%)			0.74 *	0.99	0.63 **	1.02
Low Male Economic Opportunity (%)			0.62 **	0.92	0.60 ***	0.86
<i>Development Indicators</i>						
Non-Farm Labor (%)			6.41 ***	2.26 ***	3.53 ***	1.19 **
Ratio of Manufacturing to Services					0.65 ***	0.87 ***
Living in Urban Area (%)					1.68 ***	1.67 ***
<i>Marriage Market Conditions</i>						
Ratio of Females to Males					1.28 **	1.91 ***
<hr/>						
Nagelkerke Pseudo R-Square	0.091		0.097		0.099	
N	530,432		530,432		530,432	

*Notes:* Local economic indicators and development indicators are aggregated for all individuals ages 20 to 59. Standard errors are in parenthesis [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

The addition of variables in *Model Two* and *Model Three* does not change the results much, with most differences occurring in the local economic indicator variables. The final, and most complete, model, *Model Three*, shows all explanatory variables as significant and in the expected direction for female divorce, except for the percent of working men (which is statistically insignificant). Under this model, and conditional on the other explanatory variables, women in 2000 are more likely to be divorced than in any other decade. The United States has the highest rates of divorce, after controlling for other factors. Older women are associated with a higher likelihood of divorce, and a high school education for women is associated with a higher likelihood of divorce than women with other education levels. A one percent increase in the percent of married women working is associated with a 1.5 percent increase in women being divorced. Low economic opportunity for married men and women is associated with women who are more likely to stay married or remarried than divorced.

Similar results can be seen for separation, with slight differences. Panama has the highest rates of separation after controlling for other factors.<sup>17</sup> Among women who have ever married, those with lower levels of education are associated with a higher likelihood to be separated than married and a lower likelihood of divorce, perhaps implying a more informal dissolution of marriage in lower socioeconomic status groups. In many countries, formally divorcing implies occurring financial costs or hiring a lawyer. Another plausible explanation is that men married to women from a lower socioeconomic status might have a higher propensity to informally abandon the family. An increase in the percent of married women and men working is associated with a decrease in the

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<sup>17</sup> Goldman (1981) also found Panama to have extraordinarily high rates of marital instability.

likelihood of separation for women, again providing evidence of a link between separation and socioeconomic status.

Findings of local trends in economic opportunity are no different. They are found to have a reverse relationship with separation than with divorce. As the percent of married individuals who work increases, the probability of divorce increases, but the probability of separation decreases compared to the probability of being married. While it is not possible to know exactly why these trends take place, plausible explanations can be tied to social norms and expectations of separation and divorce in diverse socioeconomic groups. As access to resources such as good jobs and education increase, separation rates decrease while divorce rates increase (compared to staying married).

Development indicators matter for women's marital instability. Non-farm labor is associated with divorce, with women being 3.5 percent more likely to be divorced with each one percent increase in non-farm labor and 0.2 percent more likely to be separated. All else constant, if a region has more manufacturing and less service sector jobs (implying that it is a less developed region), both divorce and separation are less likely for women.

Economic development has overarching implications for labor markets. This analysis shows that it is also associated with family composition. While it is unclear exactly how women's and men's labor market participation and economic development influence marital instability as economic development might also be influencing labor market participation rates (particularly for women), the results from this analysis show a clear positive conditional association between marital instability, labor market



participation rates, and economic development indicators, which is the direction one would expect.

Conditional on other explanatory factors, higher rates of urbanization are associated with higher rates of both divorce and separation for women aged 25 to 39. Given that rural areas tend to have higher rates of poverty and lower education rates, and are more traditional and have added barriers to accessing courts and judicial systems, it is not surprising to find a significant positive association between living in an urban area and marital instability.

The ratio of females to males in a local geographic area is used in this analysis as a proxy for marriage market conditions, where a ratio of females to males that is higher than one implies an “over supply” of women in the marriage market. The higher the ratio of single, separated, or divorced females to single, separated, or divorced males, the worse the marriage market for separated or divorced women, or, in this case, the re-marriage market, because there are less men with whom to remarry. Implying that higher ratios are associated with an increased likelihood of women to be divorced or separated at the time of the census, and this is what the findings in Table 1.2 indicate.

The results of the multinomial logistic regression for men have some similarities (see Table 1.3). Results show that men are more likely to be divorced or separated than married in 2000 than any earlier decade. Men in the U.S. are more likely to be divorced or separated than in any other country, conditional on other factors. As with women, less education is associated with higher rates of separation, and the equivalent of a high school education is associated with higher rates of divorce for men.

Table 1.3-Multinomial Logistic Regression of Marital Instability on Selected Characteristics (Odds Ratios): Ever-Married Males Aged 25 to 39

	<i>Model One</i>		<i>Model Two</i>		<i>Model Three</i>	
	Divorced vs. Married	Separated	Divorced vs. Married	Separated	Divorced vs. Married	Separated
<i>Decade (Reference: 2000)</i>						
1970s	0.30 ***	0.54 ***	0.31 ***	0.53 ***	0.31 ***	0.54 ***
1980s	0.63 ***	0.54 ***	0.61 ***	0.52 ***	0.61 ***	0.52 ***
1990s	0.77 ***	0.83 ***	0.75 ***	0.82 ***	0.75 ***	0.82 ***
<i>Country (Reference: United States)</i>						
Brazil	0.08 ***	0.25 ***	0.13 ***	0.27 ***	0.13 ***	0.28 ***
Costa Rica	0.18 ***	0.21 ***	0.39 ***	0.27 ***	0.40 ***	0.30 ***
Ecuador	0.11 ***	0.16 ***	0.21 ***	0.19 ***	0.20 ***	0.18 ***
Kenya	0.10 ***	0.11 ***	0.07 ***	0.09 ***	0.07 ***	0.09 ***
Mexico	0.09 ***	0.10 ***	0.16 ***	0.12 ***	0.17 ***	0.13 ***
Panama	0.09 ***	0.73 ***	0.15 ***	0.86 ***	0.14 ***	0.83 ***
Portugal	0.16 ***	0.11 ***	0.17 ***	0.11 ***	0.19 ***	0.12 ***
Spain	0.11 ***	0.25 ***	0.15 ***	0.26 ***	0.15 ***	0.27 ***
Venezuela	0.20 ***	0.31 ***	0.32 ***	0.34 ***	0.31 ***	0.33 ***
Vietnam	0.06 ***	0.04 ***	0.12 ***	0.06 ***	0.13 ***	0.07 ***
<i>Age (Reference: 35 to 39)</i>						
25 to 29	0.72 ***	1.01	0.73 ***	1.01	0.73 ***	1.01
30 to 34	0.86 ***	0.97	0.86 ***	0.97	0.87 ***	0.98
<i>Educational Attainment (Reference: Secondary)</i>						
Less Than Primary	0.36 ***	1.42 ***	0.47 ***	1.65 ***	0.46 ***	1.66 ***
Primary	0.65 ***	1.37 ***	0.70 ***	1.43 ***	0.69 ***	1.42 ***
Tertiary	0.70 ***	0.61 ***	0.68 ***	0.61 ***	0.68 ***	0.60 ***
<i>Local Economic Indicators</i>						
Married Women Working (%)			3.24 ***	1.10	3.25 ***	1.39 **
Married Men Working (%)			0.63	1.16	0.62	1.02
Low Female Economic Opportunity (%)			0.70	1.00	0.65	0.95
Low Male Economic Opportunity (%)			0.72	0.66 **	0.67	0.49 ***
<i>Development Indicators</i>						
Non-Farm Labor (%)			5.11 ***	2.05 ***	4.50 ***	1.72 ***
Ratio of Manufacturing to Services					0.70 ***	0.66 ***
Living in Urban Area (%)					1.10	1.28 ***
<i>Marriage Market Conditions</i>						
Ratio of Females to Males					1.05	0.53 ***
Nagelkerke Pseudo R-Square	0.112		0.117		0.118	
N	481,855		481,855		481,855	

*Notes:* Local economic indicators and development indicators are aggregated for all individuals ages 20 to 59. Standard errors are in parenthesis [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

As suggested earlier, Table 1.3 shows, however, that there are differences in the significance and direction of relevant coefficients for men compared to women. For men, just as for women, increased age is associated with an increased probability of being divorced; however, where age mattered for female separation, it does not matter for male separation. While the percent of married men working is associated with a decreased probability of separation and had no effect on the probability of divorce for women, the percent of married men working is not significantly associated with divorce or separation for men. However, as with females, the percent of married women working is a relevant factor for men. A one percent increase in the percent of women working is associated with a 3.3 percent increase in the probability of being divorced compared to being married for men. Additionally, it is associated with a 1.4 percent increase in the probability of being separated compared to being married for men.

While all development indicators are associated with divorce and separation for women, for men, all are associated with separation, but only the percent of non-farm labor and the ratio of manufacturing to services are associated with divorce (a 4.5 percent increase in the probability of being divorced for men). For both men and women, as the percent of non-farm labor increases, so does separation (a 1.7 percent increase for men). Less developed regions (identified as having more manufacturing than services) are associated with less separation (and less divorce). While urbanization is not associated with divorce for men, it is associated with an increase in separation. As with the results for women, it is unclear exactly what the relationship is between development, labor market opportunities and norms, and marital instability. However, these results show that

as economies advance, the probability of being divorced or separated is associated with increases for men as well as for women. Whether via more advanced economic opportunities or more liberal social norms regarding family stability, this analysis cannot say.

Surprisingly, the marriage market, or having an eligible second wife to remarry, is not associated with the probability of being divorced for men. Given the fact that there are half as many divorced men as divorced women in this sample, it is plausible that if divorced men remarry at faster rates than divorced women (one of the theories as to how there can be so many fewer divorced men than divorced women in our sample), the effect of the marriage market cannot be captured here. One of the limitations of conducting this analysis with census data is that between each year of available data, there exists 9 years during which data are unavailable. It is possible that the ratio of females to males, or the availability of a potential new wife, does influence divorce rates for men, but that divorced men remarry at such a fast rate, this effect cannot be captured using census data.

Even though marriage market conditions are found not to be associated with the probability of being divorced, they are found to have an associated with separation. Having more females than males in a local geographical area is associated with an almost double increase in being separated than married for men. Perhaps having a pool of available new potential wives pushes men down a fast track of separation-divorce-and-remarriage, meaning they spend relatively little time in a separated state compared to when the pool of available new wives is small or non-existent.

### *Limitations*

While it is possible that only the variables used in this analysis predict the probability of being divorced or separated, it is also possible that variables not represented here, such as changes in societal perceptions that influence both marital instability and married women's work, are driving at least some of the results. Therefore, even though the results are consistent with the role specialization hypothesis or the economic opportunity hypothesis, they are also consistent with a hypothesis that cultural change shifts the roles and societal expectations of women. Further analysis should be conducted to disentangle these separate hypotheses.

This analysis assumes that the covariates have the same effect in all countries, after controlling for country fixed effects. Additional analysis conducting separate regressions by country or interacting country variables with the covariates would disentangle the variations in the effects of these covariates at the country level and should be considered for future analysis.

Finally, to the extent that countries differ in timing, gender age gaps, and societal norms regarding marriage, the ever-married population has the potential to be systematically different across countries and, possibly, over time. These differences have the potential to create a selection effect and could, therefore, influence the estimated coefficients reported in the results of this paper.

## *Conclusion*

Many factors play a role in a couple's decision to separate versus divorce, including cultural and social norms and economic opportunities for both sexes, to name a few. Ruggles (1997) analyzes the rise in divorce and separation in the United States during the 20th century using explanatory variables associated with trends in marital instability, such as age, sex, employment opportunities, and labor force participation. Similarly, this analysis uses relevant demographic and socioeconomic variables to report associations of explanatory factors and differences in divorce and separation rates across the countries analyzed.

This chapter attempts to provide a more comprehensive understanding of marital instability in multiple countries. It describes the trends and differentials across countries and assesses the relationship with factors such as age, sex, employment, and education in relation to marital instability for each country. It also examines the impact of local economic and development indicators.

This analysis shows that trends in separation and divorce are different, and that trends in marital instability vary by country. It uses newly developed integrated census microdata from IPUMS-International to analyze global trends in marital instability for eleven different countries since the early 1970s. For both men and women, a high school education, compared to other education levels, is associated with a higher probability of divorce and a lower probability of separation. Married women's economic opportunities are associated with a larger positive effect on divorce than on separation. For both women and men, it is associated with increases the likelihood of divorce while decreasing

the likelihood of separation. While this analysis does not allow us to draw definitive conclusions regarding the influence of education and work on marital instability, there is a clear association between all of these factors.

The findings provide evidence that all these factors are associated with the probability of being divorced or separated but differently for men and women. Ruggles' finds that, when analyzing the probability of being either divorced or separated together, the percent of working married women and men and the percent of low economic opportunity for both genders are significant and in the direction expected in the United States. This analysis, however, finds that, when the probabilities of being divorced or separated are analyzed separately, the percent of married men working has no significant association (except for women's separation). The largest coefficients are on married women's economic opportunity and the percent of non-farm labor.

This chapter advances the literature by empirically testing theories of marital instability using multiple country data. The results provided limited preliminary evidence that neither Becker's (1981) role specialization theory nor Schoen et al.'s (2002) economic opportunity hypothesis can be rejected. However, the results do show that Oppenheimer's (1994, 1997) theory that the lack of male economic opportunities influences increases in divorce is not supported once separation is analyzed separately from divorce.

## **Chapter 3-Does the Right to Divorce Affect Bargaining Power within Marriage?**

### **The Case of Chile'**

#### *Introduction*

In recent years, many economists have argued that the unitary model of household utility, which assumes that households maximize a single utility function given an overall household budget constraint, does not accurately describe the economic behavior of households (Alderman et al. 1995, Behrman 1997, Bergstrom 1997, Gray 1998, Ermisch 2003). Some have found empirical evidence rejecting this model (Schultz 1990, Thomas 1990, Fortin and Lacroix 1997, Browning and Chiappori 1998, Rangel 2006). Instead, they argue, models should acknowledge the bargaining power of individuals to influence the allocation of household resources. This study examines the effects of exogenous changes in family policy and administrative processes on one household decision, investments in children's education.

Until November 2004, divorce did not exist in Chile. Instead, married couples wishing to dissolve their relationship had two options: separation (while remaining legally married) or a legal annulment. This study analyzes the effect of legalizing divorce in Chile on married family households. This new law created a new option for dissolving marriage. While in most cases it is very difficult to study the effects of divorce on children and families because of sample selection issues, this study takes advantage of the new law and panel data that follow the same individuals before and after the change in the law in order to tease out the effect of legalizing divorce on intrahousehold allocation



decisions regarding children's education. It also estimates the effects of exogenous variation in wait time for access to divorce, via family courts, on the same variable.

While testing the accuracy of the traditional unitary household model by capturing these types of effects using a difference-in-differences methodology with cross-sectional data has been done in previous research (Rangel 2006, Martínez 2007), this study is the first to use panel data to analyze the specific effects of having, versus not having, a divorce option, as well as the unintended consequences of administrative processes, on household bargaining and resource allocation. The motivation for this research is the claim that pro-female divorce legislation increases the bargaining power of women within marriage. In game theoretic models, each player has alternative options for game play. Chile's pro-homemaker divorce legislation transfers resources to wives upon divorce, which increases the threat point, or the point at which the alternative option of leaving the marriage is preferred to staying in the marriage, making the opportunity cost of marriage higher for wives. Additionally, shorter wait times to divorce increase the credibility of the threat to divorce, and thus increase the bargaining power of the wife.

Previous studies have shown that women invest more in some types of household goods, such as children's education and clothing, than men (Quisumbing and Maluccio 1999, Rubalcava et al. 2004, Schady and Rosero 2007). If, via increased bargaining power of married women through the legalization of divorce and shorter wait times to divorce, there is a significant increase in investments in one type of household good, children's education, then this study reinforces the recent finding that collective bargaining household models are a more accurate depiction of household behavior than

are unitary models. In addition, it provides evidence of unexpected impacts of family policies and administrative processes relating to marital instability on the behavior of stable families.

One of the most interesting results of this study is that policies created for *unstable* families directly influence the intrahousehold allocation decisions of *stable* families, as do administrative processes at the local level. In other words, the creation of divorce as an option for unstable families and the speed with which family court districts can process a divorce have significant and positive effects on stable families' investments in children's education.

### *Literature review*

There is limited research on the effects of government policies pertaining to marital instability on household resource allocation, and even less discussion of the implications in developing countries. This section reviews the economic literature on household behavior and intrahousehold allocation changes associated with both laws and programs.

As explained in the introduction, a common practice in economics, until the 1980s, was to model a household as maximizing a single, well defined utility function subject to a household budget constraint, which is now known as the unitary household model. Starting in the 1980s, game theoretic models were developed in which household members bargain over decisions related to household consumption based on the bargaining power they hold within the household, or based on the separate spheres they

occupy within the household (Manser and Brown 1980, McElroy and Horney 1981, Lundberg and Pollak 1993, Lundberg and Pollak 1994, Lundberg and Pollak 1996).

Both unitary and bargaining household models in their most general form are classified by Haddad et al. as collective models (1997). Models under this collective model format include Becker's (1973, 1974, 1981) altruism model, where an altruistic parent or partner cares about the preferences of their child or spouse/partner and, therefore, transfers income to that person; Chiappori's (1988) income-sharing rule model, where sharing rules are developed based on individual incomes; and the Manser and Brown (1980) and McElroy and Horney (1981) models of a specific bargaining process using game theory. McElroy (1990) defines her model as a Nash bargaining model that allows both non-wage income and external factors called "extra-household environmental parameters" (EEPs), such as policy changes to marriage or divorce law, to influence bargaining power within the household. EEPs shift the opportunity cost of being married and, therefore, have the potential to increase or decrease the gains to being married for men and women. Lundberg and Pollak (1993) create a separate spheres bargaining model that shows how shifts in intrahousehold allocation can be caused simply by making cash payments (i.e. for child allowances) to a mother instead of to a father, which can imply different equilibrium distributions.

Several studies have examined the effects of changes in divorce law and alimony rights on families and intrahousehold allocation (Gray 1998, Chiappori et al. 2002, Rangel 2006). Gray examines divorce-law changes, household bargaining, and married women's labor supply in the U.S. Using a bargaining model, he takes advantage of an

exogenous change in state divorce laws to analyze the response of women's labor supply to unilateral divorce laws. He finds evidence that rejects the neoclassical unitary model assumption of income pooling, but he cannot reject the bargaining model of household behavior as a plausible interpretation of household time allocation and decision-making.

Chiappori, Fortin, and Lacroix (2002) also analyze marriage markets, divorce legislation, and household labor supply. They find a causal relationship between marriage markets (sex ratios), divorce laws, and labor supply in that both sex ratios and pro-female divorce laws affect women's labor supply behavior and decision processes in the ways that one would expect, and those effects are sizeable. Passing divorce laws that are favorable to women increases the amount of money transferred from the husband to the wife after divorce. In addition, an increase in the proportion of males in the population increases the transfer of money to their wives because more men relative to women implies a better marriage and remarriage market for women, which increases the available options outside the marriage.

While the above studies analyze the effect of changes in divorce laws in the United States, family policies towards alimony and child support have also been shown to affect household allocation decisions in Latin American countries (Rangel 2006, Martínez 2007). Rangel finds that an exogenous policy change extending alimony rights and obligations to cohabitating couples in Brazil increased the bargaining power of cohabitating women, as shown by a decrease in their total hours worked (in formal labor as well as household labor) and increased investments in the education of their children. His study provides evidence of gender-specific intrahousehold allocation preferences.

Martínez finds that extending child support enforcement laws to out-of-wedlock children in Chile decreases the probability that men work, while increasing the probability that children attend school, again providing evidence that family policies have the potential to increasing women's bargaining power within the household. Both of these studies use an exogenous policy shock to analyze changes in women's bargaining power within the household, and both find that when mothers have more resources after union dissolution, increased investments are made in their children's education.

While child health and education are future household investments in the form of informal social security for the both parents in old age, investments in children's health and education have been shown to increase when women gain more bargaining power within the household (Quisumbing and Maluccio 1999, Rubalcava et al. 2004, Schady and Rosero 2007). Quisumbing and Maluccio show that having more assets controlled by women is associated with increased investments in children's education and clothing in four countries. Rubalcava et al. find that money put in the hands of women via a cash transfer program is more likely to be spent on children's goods, better nutrition, and investments in small livestock, all of which are investments back into the household.

Schady and Rosero find that unconditional cash transfers to women in Ecuador increase income shares spent on food expenditures in households with both men and women compared to female-only households. This is evidence that gender-specific bargaining occurs in Ecuadorian households and, when more resources are put into the hands of women, increased investments in household items such as food expenditures, can be observed.

These studies provide evidence that bargaining exists in households and that women allocate resources differently than men. While they show that government policies giving more power to women and cash transfer programs that transfer money to women shift the bargaining power from men to women and, thereby, influence intrahousehold allocation, more research is needed to understand specifically the effects of divorce on intrahousehold allocation decisions in married couple families, particularly in developing countries. The contribution of this study is that it uses rigorous econometric techniques to tease out the effect of divorce law on intrahousehold allocation decisions regarding children's education in Chile. It is also one of the first studies taking advantage of a natural experiment by using random variation in the administrative length of time to finalize a divorce to show the effects of unintended governmental processes on household behavior.

### ***Background***

As an interesting exceptional case, Chile has evolved a widely understood body of procedures for annulment, remarkably akin in their ingeniousness to the elaborate grounds for annulment in Church courts in Europe over the several centuries after the indissolubility of marriage was finally imposed (in 1563). They were then, as they are now in Chile, most easily utilized by families with adequate means to pursue their goals with the aid of lawyers.

Since a legal marriage in Chile can go forward only after a number of official facts are filed, it follows that any proof that the official record contains errors could become the grounds for annulment. This can be as trivial as the claim that the addresses of the prospective spouses were not correct. Needless to say, this possibility is not written explicitly into the law. On the other hand, it can only be done with the collusion of the couples as well as the court judges. Because an annulment does permit remarriage, it is, then, the Chilean "substitute" for a real divorce.

(Annulment does not apply to consensual unions, which legally are not marriages.) (Goode 1993, p. 189)

Prior to November 2004, no formal mechanism existed with which to divorce in Chile.<sup>18</sup> Disputing spouses either informally separated but remained legally married, meaning they were unable to marry anyone else, or legally annulled their marriage. Informal separation left the custodial parent vulnerable because limited formal mechanisms existed for transferring resources from the noncustodial parent to the custodial parent. While a partner can request a legal separation via the family court system and the custodial parent can formally request child support, this rarely occurred.<sup>19</sup>

Legal annulment in Chile requires both spouses to cooperate with each other because they must agree to report inaccuracies in their marriage license application (such as an inaccurate living address) to the judge who married them in order to annul their marriage.<sup>20</sup> In addition, legal annulment usually requires financial resources to pay legal fees. Therefore, spouses can only annul if 1) they agree to cooperate with each other, and 2) they have the necessary financial resources to pay for the annulment. Before divorce became legal, spouses wanting to end their relationship but choosing not to cooperate with each other or not having the necessary finances were able to be separated, but had to remain legally married.

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<sup>18</sup> This overview of the creation and existence of the Chilean divorce law comes from interviews with Gabriel A. Hernandez Paulsen, Professor of Family Law, University of Chile, in May 2009, and Luis Perez, Chilean Family Court Aide and Lawyer, in May 2009.

<sup>19</sup> The total number of legal separations in the entire country was less than 70 cases each year between 2005 and 2008 ([http://www.registrocivil.cl/f\\_estadisticas.html](http://www.registrocivil.cl/f_estadisticas.html)). The number of legal separations prior to 2005 is unavailable but via interviews I have learned there is not much difference before and after the legalization of divorce (Interview with Gabriel A. Hernandez Paulsen, May 2009).

<sup>20</sup> Any discrepancies about name, address, or other standard information given by the couple to the courts at the time of marriage is justification to claim the marrying judge “incompetent,” which provides a case for annulling the marriage.

In November 2004, divorce became part of the Chilean family law. With the implementation of the divorce law, disputing spouses had the option of formally divorcing their partner, thereby acquiring 1) the right to remarry and 2) the right to receive an economic compensation if they stayed in the household to take care of children or take care of the home during the marriage. According to this new law, upon divorce, the partner who set aside his or her career to take care of the family home or children is entitled to a payment from the other partner, called an economic compensation. The economic compensation is a lump sum of money to be paid all at once or in monthly installments until the entire amount is paid. Judges calculate the payment based on the assumed lost wages of the homemaker spouse. An average wage per year is calculated based on the homemaker's education, family background, and other socioeconomic factors. This wage is then multiplied by the number of years married during which the homemaker was staying at home taking care of the family. Over time, the technique used to calculate the economic compensation has changed.<sup>21</sup> However, during the time period covered by this study, calculating economic compensation was calculated in the fashion described above.

When couples decide to divorce, they can divorce only in the family court district corresponding to the county in which they live. Couples living in a county corresponding to a family court district with a very long wait time have no choice but to wait for their

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<sup>21</sup> Today, the goal of the economic compensation is to give the homemaker spouse enough money after divorce so that she does not become impoverished, but instead maintains a more or less equal status as she had during marriage, at least for the first few years after the divorce. It is assumed by the courts that providing this resource the first couple of years will allow the homemaker spouse enough time to be able to become independent after she has used up all of the economic compensation money. (Interview with Gabriel A. Hernandez Paulsen, May 2009; interview with Luis Perez, May 2009)



divorce to become finalized. They cannot go to a neighboring county/family court district with a shorter wait time to expedite the process.

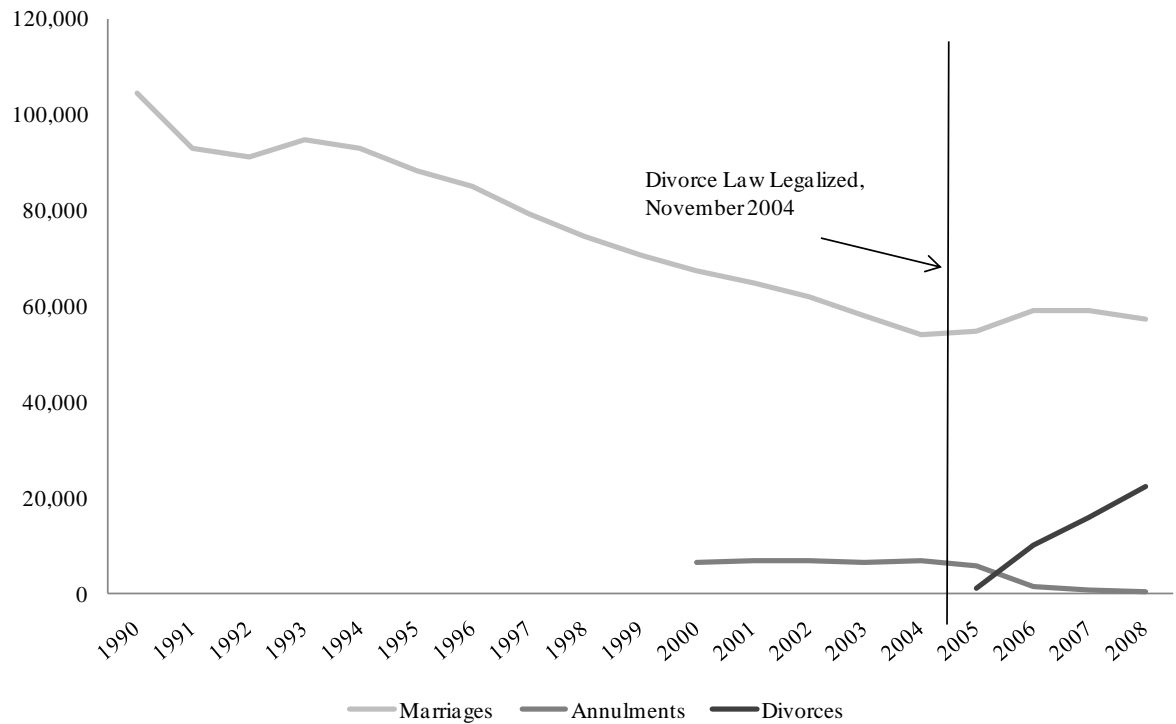
While divorce is now legal in Chile, it is still relatively uncommon. In 2008, there were approximately 22,000 divorces in a country of more than 10 million adults.<sup>22</sup>

Divorce was even less common in the years immediately following the legalization of divorce; in 2005 and 2006 together, there were less than 12,000 total divorces (Figure 2.1). If one makes the relatively harmless assumptions that all divorces involve two adults and that no one individual divorced more than once between 2005 and 2008, there were approximately 50,000 divorce cases in that time period, resulting in 100,000 individuals divorced. This upper bound constitutes less than 1 percent of the adult population. While there is not enough transition to divorce to study divorce rates or the implications of divorce on divorced parent households in the early years after the legalization of divorce, this study will show that the legalization of divorce had significant effects on the bargaining power and intrahousehold allocation decisions of married couple households shortly after the law went into effect. In other words, the divorce legislation appears to have had a large impact on intact families.

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<sup>22</sup> According to the 2002 Census of Chile, 74.3 percent of the population, 11.2 million persons, were age 15 or older (<http://www.ine.cl/cd2002/sintescensal.pdf>).

Figure 2.1- Number of Marriages, Annulments, and Divorces in Chile, 1990 to 2008



Data Source: Ministerio de Justicia, Servicio de Registro Civil e Identificación ([http://www.srcei.cl/f\\_estadisticas.html](http://www.srcei.cl/f_estadisticas.html))

### ***Data and Methodology***

This chapter uses panel data from the Encuesta de Protección Social (EPS),<sup>23</sup> as well as data from the Chilean court system. The EPS currently consists of three waves or rounds (2002, 2004, and 2006) that follow the same individuals over time. Since the original purpose of the survey was to collect labor and social security pension fund data, the first wave (2002) is nationally representative of all individuals who contribute to a public pension fund. The 2004 and 2006 waves, however, are nationally representative

<sup>23</sup> The Encuesta de Protección Social, or Social Protection Survey [title translation by author], is a survey administered by the University of Chile and the Chilean Ministry of Work and Social Prevention, in partnership with the University of Pennsylvania and the University of Michigan.

samples of the entire population.<sup>24</sup> The survey includes complete marital, fertility, and labor histories, as well as detailed information on the family in which the interviewee was raised. County-level identifiers are added to the dataset, so that family court administrative data can be merged into the EPS data.

For the purposes of this study, school attendance of the interviewees' children is analyzed. A sample of school age children (aged 5 to 21) whose parents were married or cohabitating with the same person over the entire panel (2002 to 2006) is constructed.<sup>25</sup> The sample includes approximately 900 children from cohabiting parents and approximately 4,200 children from married parent families (Table 2.1). Constructing the sample this way implies that children from parents whose legal marital status changed over time are excluded. Excluding this group is beneficial because it eliminates any confusion regarding whether those who change marital status are somehow confounding the results. Approximately five percent of the interviewee sample (and, hence, their children) are lost by limiting the sample to stable relationships.

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<sup>24</sup> A new subsample of individuals was added to the 2004 wave to make the panel representative of the entire population.

<sup>25</sup> Since the estimates reported are calculated using a method that differences over time and across groups, any unobserved heterogeneity that is stable over time between children from married parents and children from cohabiting parents is differenced out and will not bias the observed estimates.

Table 2.1-Descriptives of School Age Children (Age 5 to 21) by Legal Civil Status of Parent, 2002 to 2006

	2002		2004		2006	
	Parents are: Married	Cohabiting	Parents are: Married	Cohabiting	Parents are: Married	Cohabiting
<i>National Sample</i>						
N	4,203	897	4,274	894	4,182	907
Percent in School by School Type:						
Primary	94.0	93.9	92.6	92.2	93.1	91.0
Secondary	95.2	93.7	95.6	96.1	96.0	92.5
Tertiary	44.5	43.8	45.6	40.0	50.1	36.0
Average Age	11.8	11.9	13.0	12.9	13.9	13.7
<i>Urban Sample</i>						
N	3,350	679	3,403	673	3,403	686
Percent in School by School Type:						
Primary	93.7	93.5	93.3	93.2	93.7	92.0
Secondary	95.7	94.2	96.1	94.5	96.2	92.6
Tertiary	47.2	39.0	47.0	37.6	49.5	34.4
Average Age	12.6	12.5	13.2	13.2	13.7	13.7

*Note:* Age of child is used as a proxy for school type: primary consists of youth ages 5 to 11, secondary of youth ages 12 to 17, and tertiary of youth ages 18 to 21.

*Data Source:* Encuesta de Protección Social (EPS), 2009

Since complete marital histories exist for the interviewees, the actual marital history of the parent is used to construct parental marital status, instead of a variable for marital status or civil status at the time of the interview. A concern with using a marital status variable in household survey and census data is whether one's marital status from one survey to the next refers to the same partner. The definition of marriage and cohabitation used in this study ensures that a child identified as having married or cohabiting parents has parents who have been married to or cohabiting with the same partner in 2002, 2004, and 2006.<sup>26</sup>

A second source of data was collected by the author, together with the director of the Microdata Center at the University of Chile, by making a special request to the administrative offices of the Chilean Supreme Court. These data contain basic information about the date each divorce case started within each respective local family court district and the date the divorce case was finally settled by the family court from the beginning of 2005 to the end of 2006.<sup>27</sup> A divorce case is started when all paperwork is turned into the court, which means that all forms have been filled out completely and all requested information has been received. The data create a natural experiment environment because the wait time between submitting one's paperwork to the court and receiving a court date to finalize the divorce is driven solely by each court's individual

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<sup>26</sup> Married parents are identified as living with the same partner between 2002 and 2006 and identifying their relationship with that partner as married. Cohabiting parents are identified as living with the same partner between 2002 and 2006 and identifying their relationship with that partner as cohabiting.

<sup>27</sup> Electronic data on the dates of divorce cases in the Chilean family court system exist only for urban areas. Therefore, for the regressions that include average wait time for a divorce are limited to couples living in urban areas. According to the 2002 Chilean Census, 86.6 percent of the population lived in urban areas.

backlog and administrative procedures.<sup>28</sup> This additional dataset is merged with the panel data from the Encuesta de Protección Social (EPS) by *comuna* code and used to examine the effects of variation in local court administrative procedures on household resource allocation decisions (described in detail below).

### *Theoretical Model*

The household bargaining model used in this paper is based on those of Manser and Brown (1980) and McElroy and Horney (1981), which, in turn, are based on the Nash (1953) two-person cooperative game model. An application of the model for this paper is described below.<sup>29</sup>

In the model there are two individuals,  $m$  and  $f$ , in a married or cohabitating couple household, and they jointly allocate resources via a solution to a two-person, Nash cooperative game.<sup>30</sup> Each player in this game has a threat point, or a point at which some alternative situation becomes preferred to their original play in the game. The threat point is the utility received from dissolving the marriage. If the utility, or benefit, from remaining married falls below the threat point for one (or both) player(s), and that player's partner cannot transfer enough resources to him or her without the partner's own utility from marriage falling below the utility he or she would receive from leaving the

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<sup>28</sup> Any cases related to the family, including cases not associated with divorce, such as the distribution of inheritances from wills, adoption, or domestic violence cases, are also processed by the family court system. The backlog is driven by the combination of these cases and the way in which each family court administrator manages his or her court.

<sup>29</sup> Also see McElroy (1990) and McElroy (1997).

<sup>30</sup> In this model,  $m$  and  $f$  can be thought of as *male* and *female* or *mother* and *father*, etc.

marriage, then, assuming unilateral divorce exists, the first individual will choose to leave the marriage, and it will dissolve.

Assume that each individual has the following utility function if not married:

$$(2.1) \quad U_i(\mathbf{x}_0, \mathbf{x}_i, \ell_i) \quad \forall i = m, f$$

$$\text{s.t. } \mathbf{p}_0 \mathbf{x}_0 + \mathbf{p}_i \mathbf{x}_i + w_i \ell_i = I_i + w_i T + \alpha_i \quad \forall i = m, f \text{ (full income constraint)}$$

where  $\mathbf{x}_0$  are household public goods, including children's education,  $\mathbf{x}_i$  are private goods consumed by  $i$ ,  $\ell_i$  is the leisure consumed by  $i$ ,  $\alpha_i$  is the income transferred to or from partner  $j$  to partner  $i$  upon divorce. Notice that  $\alpha_i = 0$ , or no income is transferred, if divorce has not occurred.  $U^i$  is assumed nonnegative. Let  $T$  be the total time endowment for both  $m$  and  $f$  and  $I_i$  be the nonwage income for  $i = m, f$ . If an individual is neither married nor cohabitating, each person would maximize his or her own utility subject to a full income constraint, leading to their respective indirect utility functions:

$$(2.1.2) \quad V^i(\mathbf{p}_0, \mathbf{p}_i, w_i; I_i, \alpha_i) \quad \forall i = m, f$$

Assuming  $m$  and  $f$  are married,  $V^i$  is the threat point for leaving the marriage for  $i = m, f$  in a Nash bargaining model. The  $\alpha_i$  affects only the indirect utility function for being single because its influence is on the individual's outside option, or on what the individual can gain from choosing to divorce. If the individual stays married, they do not receive the benefits (or costs) of the divorce law or the wait time to divorce as they would

should they end the marriage. In other words,  $\alpha_i = 0$  in equation (2.1). Therefore, divorce legislation and administrative wait times affect household behavior of married couple families by increasing or decreasing the value of one's utility outside of the marriage and, in this way, directly influence the  $V^i$  and bargaining power of each individual. Since divorce laws and wait times for a divorce affect only married couples,  $\alpha_i = 0$  for all cohabitating couples.

An individual considering marriage dissolution has multiple threat points. For the case of Chile, there are three threat points:  $V^i_d$  = the threat point under divorce,  $V^i_s$  = the threat point under de facto separation, and  $V^i_a$  = the threat point under annulment. Whichever threat point is the highest is the true threat point used by the individual in considering whether to stay in the marriage or dissolve it. If  $V^i_d > V^i_s \geq V^i_a$  or  $V^i_d > V^i_a \geq V^i_s$  the legalization of divorce will increase the opportunity cost of staying married for mothers and decrease the opportunity cost for non-custodial fathers primarily because of the economic compensation clause tied to the divorce law. For cohabitating couples,  $V^i_s$  is the threat point before and after the legalization of divorce since the only outside option is the utility gained from separating from their partner.

For the couples in this model, the Nash-bargained solution to the joint maximization of the product of their gains from marriage or cohabitation is<sup>31</sup>:

$$(2.2) \text{ Max}_{\{x\}} [U^m(\mathbf{x}_0, \mathbf{x}_m, \ell_m) - V^m(\mathbf{p}_0, \mathbf{p}_{xm}, w_m; I_m, \alpha_m)][U^f(\mathbf{x}_0, \mathbf{x}_f, \ell_f) - V^f(\mathbf{p}_0, \mathbf{p}_{xf}, w_f; I_f, \alpha_f)]$$

s.t. (i)  $\mathbf{p}_0\mathbf{x}_0 + \mathbf{p}_{xm}\mathbf{x}_m + \mathbf{p}_{xf}\mathbf{x}_f + w_m\ell_m + w_f\ell_f = (w_m + w_f)T + I_m + I_f \equiv$  full income constraint

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<sup>31</sup> The product of their gains is used here instead of the addition of their gains strictly for ease of mathematical maximization purposes of the function being maximized.



$$(ii) \ell_i \leq T_i$$

$$(iii) \alpha_f = -\alpha_m$$

Under this problem,  $m$  and  $f$  will choose to dissolve the marriage if the gains to dissolving ( $g^i_d$ ) outweigh the gains to remaining married ( $g^i_m$ ). In other words, for this household maximization problem to be solved,  $g^i_m > 0$ , where  $g^i_m = U^i - V^i \forall i = m, f$ . If  $g^i_m < 0$  for partner  $i$  and  $g^j_m > 0$  for partner  $j$  where  $j = m, f$  and  $j \neq i$ , then partner  $j$  may choose to transfer resources to partner  $i$  to keep the marriage together if the transfer of resources still leaves partner  $j$  with some gain to marriage ( $\check{g}^j_m > 0$  where  $g^j_m > \check{g}^j_m$ ). If the transfer of resources is enough so that partner  $i$ 's gains to marriage become positive ( $\check{g}^i_m > 0$  after the transfer, where  $\check{g}^i_m > g^i_m$ ), then the marriage will not dissolve.

Also note that the constraint (iii)  $\alpha_f = -\alpha_m$ . It implies that as  $\alpha_f$  increases,  $\alpha_m$  will decrease by the same amount,  $V^f$  will increase, and  $V^m$  will decrease. In other words, the addition of a pro-homemaker divorce legislation and shorter wait times to divorce increases the present day value of married women's threat point, or indirect utility, under divorce ( $V^f_d$ ) by increasing her income via the lump sum transfer of economic compensation. This increases their bargaining power within the marriage, and, because of this increased bargaining power, increases investments in goods that women value, such as children's education. At the same time, the value of married men's threat point under divorce ( $V^m_d$ ) decreases, as does their bargaining power within the marriage.

The solution to the above maximization problem yields a system of demand equations.

$$(2.3) \quad x_j^* = h_j(\mathbf{p}; I_m, I_f, \alpha_f) \quad \forall j = x_0, x_m, x_f, \ell_m, \ell_f$$

where  $\mathbf{p} = (\mathbf{p}_0, \mathbf{p}_{xm}, \mathbf{p}_{xf}, w_m, w_f)$ . Notice that the demand for each good is a function of a price vector, non-wage income, and the lump sum transfer of income upon divorce. With this model, one can analyze the effects of shifts in the threat point, or opportunity costs of remaining together, from exogenous shocks, in this case the legalization of divorce and wait time to finalize a divorce. This paper analyzes changes in the demand for children's education,  $S_{igt}$ , driven by shifts in the threat point to divorce due to the new divorce law and to variation in the wait time to divorce.

Based on previous research, this chapter assumes that the mother's preferences imply that she will invest more in her children's education than would the father (Quisumbing and Maluccio 1999, Rubalcava et al. 2004, Schady and Rosero 2007). The model described above implies two hypotheses. *Hypothesis 1*: The legalization of divorce, which includes requirements for the economic compensation of homemakers, will cause the following changes to the opportunity cost of staying married: (a) the opportunity cost of staying married for men decreases (because of the implied transfer of money from husbands to wives via economic compensation), and (b) the opportunity cost of staying married for women increases. *Hypothesis 2*: *Hypothesis 1* implies that married women's bargaining power must have increased, so investments in their children's education among those families who stay married will increase after the legalization of

divorce. *Hypothesis 2* is tested in this paper. If hypothesis two is found to be true, then hypothesis one must also be true.

Does a divorce threat point, which includes an economic compensation, shift more intrahousehold bargaining power into the hands of women in those families that stay married? If so, given that prior research shows that women invest more in certain types of household goods and resources, such as children's education, one would expect to see an increase in investments in children's education in those families that remain married. Therefore, an increase in the bargaining power of married women in Chile, via the threat of divorce and its associated economic compensation, should increase investments in children's education in married couple households. It's also reasonable to expect the exogenous variation in divorce wait time to influence intrahousehold allocation of resources. The shorter the wait time, the more of a credible threat is the divorce. Therefore, shorter wait times are expected to translate into an increase in investments in household goods valued by the mother, such as children's education.

### *Estimation Methodology*

There are two difficulties in analyzing the effect of divorce on households: sample selection bias and endogeneity bias. Comparisons of divorce and married couple households have sample selection problems in countries where divorce has existed for many years, which is the case for most countries around the world, because divorced couples self-select into divorced status. These couples could have unobserved

characteristics or traits that differ from those of married couples, which confound attempts to estimate the impact of divorce on household behavior.

Problems of endogeneity are also common in these types of studies. While it may seem straightforward, for example, to analyze shares of income per individual in the household as a proxy for bargaining power within the household, it is unclear whether income creates more bargaining power for that individual within the household or whether one's individual characteristics (including the ability to persuade and other favorable characteristics associated with both increased income and household bargaining power) are increasing one's income as well as one's bargaining power. The method used in this study to minimize these issues is to introduce two exogenous factors, the legalization of divorce and variation in the wait time to divorce, as proxies for analyzing shifts in household bargaining. While this method has been applied in other studies (Chiappori et al. 2002, Rangel 2006, Martinez 2007), to the author's knowledge, this is the first time that having (versus not having) a divorce option is analyzed using panel data.

A difference-in-differences (DID) approach is used to identify the effects of the legalization of divorce on child education. This approach uses panel data to estimate the impact of a program or policy change on a variable of interest by comparing the change in that variable for the group that experienced the program or policy to the same change in a group that did not experience the program or policy. This estimation technique essentially uses the former as a treatment group and the latter as a control group. Children from married parent families are the treatment group as they are direct recipients of the

treatment, in this case, the legalization of divorce. Children from cohabiting parent families are used as a control group because their households are not influenced by the legalization of divorce, since their parents are not married. In other words, the legalization of divorce is not expected to change women's bargaining power in cohabiting households. Upon separation, cohabiting women are not eligible for the economic compensation that married women are eligible for under the new divorce law.

The following is the basic individual-level equation used for this analysis.

$$(2.4) \quad S_{igt} = \beta_0 M_g + \beta_1 T_1 + \beta_2 T_2 + \delta_1 M_g * T_1 + \delta_2 M_g * T_2 + v_{gt} + \varepsilon_{igt} \quad \forall i = 1, \dots, I_{gt}$$

where  $S_{igt}$  is the binary dependent variable indicating whether child  $i$  from group  $g$  at time  $t$  is in school,  $M_g$  is a dichotomous variable that equals one for the treatment group and zero for the control group (married parent versus cohabiting parent families, where the variable is equal to one if the child lives with married parents and zero if living with cohabiting parents),  $T_t$  is a set of year dichotomous variables (time fixed effects),  $v_{gt}$  is unobserved group effects at time  $t$ ,  $\varepsilon_{igt}$  is the individual-specific error term, and  $E[v_{gt}] = E[\varepsilon_{igt}] = 0$ . Since the treatment, the ability to divorce, was first implemented in early 2005,  $\delta_1$  should be equal to zero. The three time periods in the estimation are 2002, 2004, and 2006;  $T_0$ , the reference year (2002), is omitted from the equation above. To obtain consistent estimates of this equation one needs to assume that  $E[\varepsilon_{igt} | M_g, T_j] = 0$ . The estimate of  $\delta_2$  is the average treatment effect of divorce on children's school enrollment.

The difference-in-differences coefficient:  $\delta_2$  can also be estimated by  $[(S_m^2 - S_m^0) - (S_c^2 - S_c^0)]$ , where  $S_g^j$  is the sample average of the variable of interest in time period  $j$  for group  $g$ .<sup>32</sup> When estimating the effect of the legalization of divorce on children's education using difference-in-differences estimation, an unbiased estimate of the coefficient of interest,  $\delta_2$ , can be obtained by regression methods.

In general, this basic DID equation is sufficient to produce unbiased estimates, however if decisions regarding the dependent variable are made differently for subgroups within the sample and the decision-making process is correlated with explanatory variables not included in the regression equation, omitted variable bias will occur. In the case of school enrollment, the parental decision-making process is most likely different by school type.

For this reason, two approaches are considered here. First, dichotomous variables for school age of the child are added to equation (2.4) as a proxy for school type. Adding these variables is expected to improve the estimation since, for example, parental decisions to enroll their children in primary school are different from decisions to enroll them in secondary or tertiary school. Adding these variables gives the following equation.

$$(2.5) \quad S_{igt} = \beta_0 M_g + \beta_1 T_1 + \beta_2 T_2 + \delta_1 M_g * T_1 + \delta_2 M_g * T_2 + \gamma_1 Z_{igt} + v_{gt} + \varepsilon_{igt} \quad \forall i = 1, \dots, I_{gt}$$

where  $Z_{igt}$  are the individual-specific variables indicating school type: primary, secondary, and tertiary school. All other variables are the same as in equation (2.4).

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<sup>32</sup> Note that  $S_m^2 = E[S_{igt}|g = \text{Married parent}, t = 2006] = \beta_0 + \beta_2 + \delta_2$ ;  $S_m^0 = E[S_{igt}|g = \text{Married parent}, t = 2002] = \beta_0$ ;  $S_c^2 = E[S_{igt}|g = \text{Cohabiting parent}, t = 2006] = \beta_2$ ; and  $S_c^0 = E[S_{igt}|g = \text{Cohabiting parent}, t = 2002] = 0$ .

If decisions to enroll children in school vary by school type and, thereby, have differing effects on the rate of enrollment by school type (the binary dependent variable), an alternative approach is to run the basic regression equation (2.4) separately for each subgroup of the population. This, again, is expected to improve the estimation and, if the relationship between school type and school enrollment varies by school type, the estimated coefficients in these regressions will produce unbiased and accurate estimates. The results of this second approach are reported in the analysis below.

Finally, to account for the additional exogenous factor of variation in wait time for a divorce, a wait time variable and the appropriate interaction terms can be added to equation (2.5), as follows below.

$$(2.6) \quad S_{igt} = \beta_0 M_g + \beta_1 T_1 + \beta_2 T_2 + \delta_1 M_g * T_1 + \delta_2 M_g * T_2 + \gamma_1 Z_{igt} + \mu_1 W_{c2} + \mu_2 W_{c2} * M_g + \mu_3 W_{c2} * T_1 + \mu_4 W_{c2} * T_2 + \alpha_1 M_g * T_1 * W_{c2} + \alpha_2 M_g * T_2 * W_{c2} + v_{gt} + \varepsilon_{igt} \quad \forall i = 1, \dots, I_{gt}$$

where  $W_{c2}$  is the average wait time for divorce by court district in the last time period. All other variables are labeled as in equation (2.4). The variables of interest in equation (2.6) are  $\delta_2$  (the effect of legalizing divorce) and  $\alpha_2$  (the effect of one additional month of wait time to finalize a divorce). One expects  $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \alpha_1 = 0$  because wait time alone (or interacted only with marital status) is not expected to influence school enrollment rates for everyone nor is it expected to influence school enrollment rates prior to the legalization of divorce.

A key non-trivial identifying assumption with a difference-in-differences estimation is that the *trends* in school enrollment would have been the same for both groups in the absence of legalizing divorce (Angrist and Pischke 2009). This implies that the variable of interest, in this case children's enrollment in school, is affected similarly by any other environmental changes over time for both the treatment and control groups. One way to test this assumption is to observe the variable for each group before the actual treatment. While the means or percent of individuals affected do not need to have the same outcome, the trend from one time period to the next must be parallel. If the parallel assumption holds prior to the treatment, then the two groups can be compared using difference-in-differences estimation.

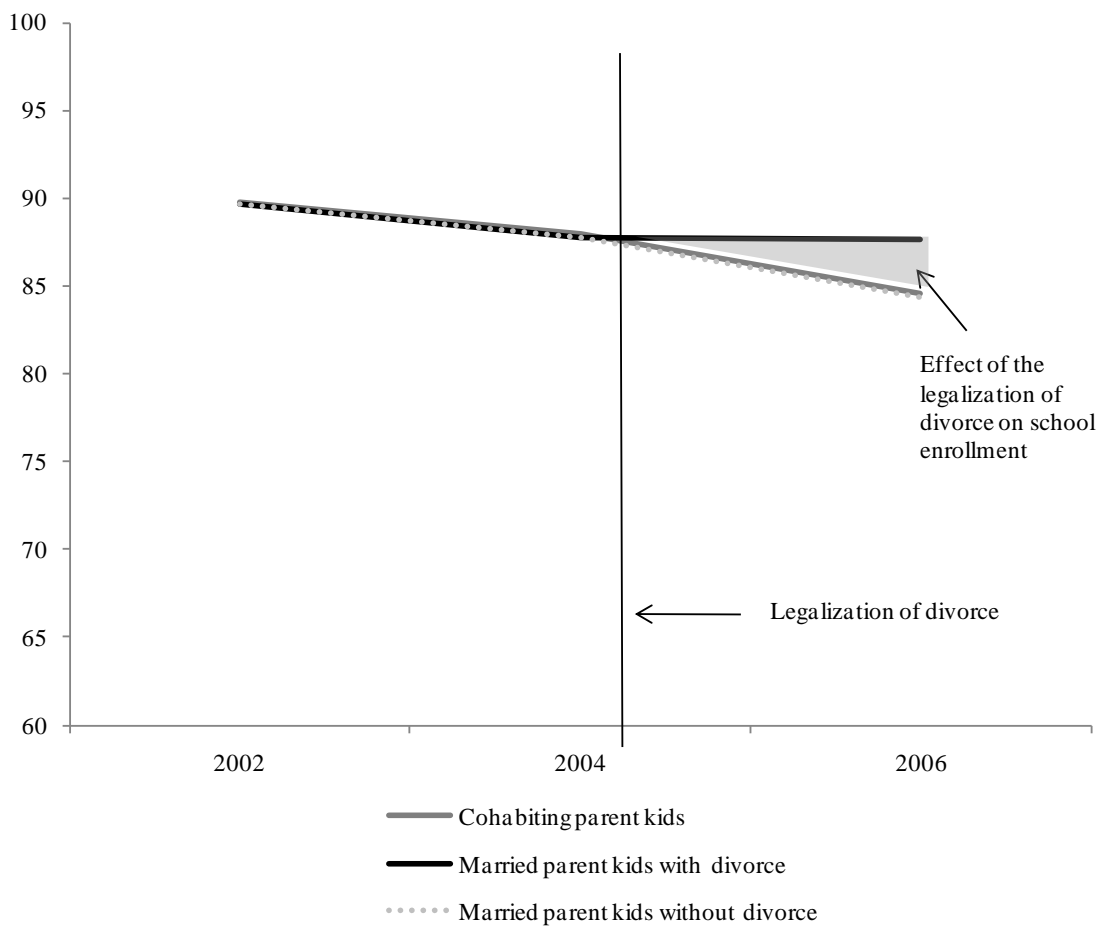
Figure 2.2 shows the rates of school attendance for children from married parent families compared to children from cohabiting parent families. The rate of school enrollment is parallel for both groups before treatment. However, after the legalization of divorce, cohabiting parent family children continue to experience a decrease in school enrollment while children from married parent families do not. Since the trends are parallel for waves one and two (2002 to 2004), a difference-in-differences estimation will report unbiased estimates of the coefficients in equations (2.4) to (2.6).

Since the binary dependent variable, children's school enrollment, is a variable indicating one if the child is in school and zero otherwise, all three estimation equations described above are estimated by using a logit regression with household fixed effects. Fixed effects controls for any household-specific time-invariant omitted variables that are the same for all children in a given household but vary across households. Using



household fixed effects eliminates any time invariant variables. For this reason, variables like  $M_g$  and  $W_{c2}$  are dropped from the estimated equations (although interactions of these variables with  $T_1$  and  $T_2$  are retained).

Figure 2.2-Percent of School Age Children (Age 5 to 21) Attending School by Parental Legal Civil Status and Year, 2002 to 2006



*Note:* Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

### *Analysis*

While Figure 2.2 shows an overall decrease in school enrollment for cohabitating parent children ages 4 to 21 and no change after the legalization of divorce for married parent children of the same age, Table 2.1 examines school enrollment rates at a more disaggregated level, separated by school level age groups, for both the national and urban samples. The enrollment rates of primary school and university aged children of cohabitating parent families experience a continual decrease, but the same is not true of their secondary school counterparts, whose school enrollment rate increased between 2002 and 2004 but decreased in 2006. Married parent children in secondary and tertiary school experienced continual increases in their school enrollment rates; however, their primary school counterparts did not. While not much variation is observed in primary school rates for either group, increasing variation over time in the percent of children in school can be observed between secondary and tertiary school aged children; rates for married parent children are tending up while rates for cohabitating parent children tend to decrease. Figure 2.1 masks the deviations based on type of schooling, but Table 2.1 gives clear indication that including dichotomous variables for school age categories and running separate regressions by school age type are appropriate steps in the estimation process.

Table 2.2-Logit Regression of School Attendance, National Sample, 2002 to 2006

		Model One	Model Two
		$\beta$	$\beta$
<i>Year dummies</i>			
	2002	reference	reference
	2004	-0.2485 (0.1602)	-0.1022 (0.1960)
	2006	-0.3480 ** (0.1491)	-0.3174 * (0.1854)
<i>Interaction terms</i>			
	Married parents in 2002	reference	reference
	Married parents in 2004	-0.0621 (0.1765)	0.0271 (0.2158)
	Married parents in 2006	0.2640 (0.1662)	0.4274 ** 0.2064
<i>Age groups</i>			
	Ages 4 to 10	–	reference
	Ages 11 to 17	–	0.5047 *** 0.0927
	Ages 18 to 21	–	-3.1355 *** 0.1205
	Log likelihood	-2571.52	-1633.53
	N observations	7365	7365
	N groups	1053	1053

*Notes:* All models include household-level fixed effects. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.  
*Data Source:* Encuesta de Protección Social (EPS), 2009

Table 2.2 shows the results from DID estimations of equations (2.4) and (2.5) for a nationally representative sample. *Model One* is a standard DID using time dummy variables and interaction terms for time and marital status of the parent (equation (4)). One would expect the married parents in 2006 variable (which is an interaction term of a married parent dummy variable with the dummy variable for 2006 and estimates the effect of legalizing divorce on school enrollment) to have a positive coefficient. While the coefficient is positive, it is statistically insignificant ( $p = 0.112$ ). The dummy variable for 2006 is negative and statistically significant at  $p = 0.020$ .

This regression, however, does not control for school type and, as described earlier, there is reason to believe that variations in the decision-making process for school enrollment by school type exist. The result of the first approach to control for variation by school type, adding dichotomous variables for school type, improves the estimation (*Model Two* in Table 2.2). Once school type is controlled for, the legalization of divorce variable has a larger, positive coefficient and is significant at  $p = 0.038$ . All age groups are strongly significant at  $p = 0.000$ . The second strategy, to estimate *Model One* using separate subsamples, is discussed later.

In order to accurately capture the reality of divorce in the Chilean context, an additional component is added to the regression: administrative wait times to finalize a divorce (by family court district). Each family court is composed of a small group of *comunas*, ranging from one to nine *comunas* in each group where the average is three or

four *comunas* per family court district.<sup>33</sup> As mentioned previously, individuals are required to process their divorce in the family court corresponding to the *comuna* in which they live. The exogenous difference in administrative wait times should influence bargaining power within the household. If divorce shifts the opportunity cost of remaining married, it does so only in the sense that the threat of divorce is truly credible. In regards to administrative wait times, the shorter the wait time, the more credible the threat of divorce becomes. If true, by adding a variable that identifies the average wait time for married couples to divorce in 2006 by family court district, one would expect to see a negative and significant coefficient. In other words, the longer the wait time, the less credible a threat the divorce is, and the less bargaining power the woman will gain in married couple households.

Administrative wait time data is available only for family court districts in urban areas. Therefore, the sample used to analyze administrative wait times is individuals living in urban *comunas*. In order to provide an accurate comparison of the results with and without wait time, *Model One* and *Model Two* from Table 2.2 are run again using the subset of individuals living in urban *comunas*. Notice that *Model One* and *Model Two* results for the urban sample show a positive and significant effect of legalizing divorce on children's education.

When administrative wait time added into the equation (see equation (2.6) and *Model Three* in Table 2.3) for an urban sample, it is negative and significant ( $p = 0.050$ ). The coefficient on the variable measuring the effect of the legalization of divorce remains

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<sup>33</sup> An exception is parts of the capital city Santiago, in which one family court district encompasses 19 *comunas*. As an urban area, *comunas* in Santiago are geographically very small but densely populated. The metropolitan area of Santiago has a total of 10 different family court districts.

strongly significant ( $p = 0.002$ ). School type remains a significant factor in predicting whether children attend school (for both types,  $p = 0.000$ ). Finally, the coefficient on the dummy for 2006 is negative and significant ( $p = 0.012$ ). This implies that there was some change between 2002 and 2006 that had a significant negative effect on all school children's enrollment compared to previous years, possibly an educational policy change or shifts in macroeconomic trends driving a need for younger adults to work, or at least not be in school.

When administrative wait times are added to the model, care must be taken in interpreting the coefficients. The coefficient on the independent variable for the effect of legalizing divorce is the estimate of the effect of divorce without any wait time, in other words, if the divorce could take place immediately. The coefficient on average wait time is the estimated effect of a one month increase in wait time. To estimate the effect given a wait time with the effect of the legalization of divorce, the estimated coefficient of wait time must be multiplied by the number of wait time months, and then added to the estimated coefficient for the legalization of divorce with zero wait time. In Table 2.3, for example, to understand the effect of legalizing divorce if the average wait time is two months,  $-0.06$  is multiplied by 2 and then added to the estimated coefficient on divorce, 1.45, so the true estimated coefficient of legalizing divorce given an average wait time of 2 months is 1.33.

Table 2.3-Logit Regression of School Attendance, Urban Sample, 2002 to 2006

		Model One	Model Two	Model Three
		$\beta$	$\beta$	$\beta$
<i>Year dummies</i>				
	2002	reference	reference	reference
	2004	-0.0948 (0.1894)	0.1994 (0.2340)	0.1991 (0.2340)
	2006	-0.4825 *** (0.1774)	-0.5531 ** (0.2207)	-0.5535 ** (0.2208)
<i>Interaction terms</i>				
	Married parents in 2002	reference	reference	reference
	Married parents in 2004	-0.2124 (0.2074)	-0.2601 (0.2548)	-0.2604 (0.2549)
	Married parents in 2006	0.4083 ** (0.1950)	0.6765 *** (0.2435)	1.4451 *** (0.4623)
<i>Age groups</i>				
	Ages 4 to 10	–	reference	reference
	Ages 11 to 17	–	0.5539 *** (0.1065)	0.5577 *** (0.1065)
	Ages 18 to 21	–	-3.0995 *** (0.1354)	-3.1000 *** (0.1354)
<i>Administrative changes</i>				
	Average wait time for married couples in 2006	–	–	-0.0579 * (0.0294)
	Log likelihood	-1977.58	-1264.47	-1262.54
	N observations	5618	5618	5618
	N groups	808	808	808

*Notes:* Average wait time is in months. All models include household-level fixed effects. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

While the sign and significance of the coefficients in a logit regression provide relevant information, the coefficients themselves do not explain the estimated effect of each explanatory variable. For that reason, the marginal effects of the full sample regressions and the urban sample regressions are shown in Table 2.4 and Table 2.5, respectively. Marginal effects show the effect on  $y$ , the dependent variable (in this case, the probability of enrollment), from a one unit change in  $x$ , the explanatory variable, holding all else constant. There are multiple ways to calculate marginal effects for a logit model. Two examples of how marginal effects can be calculated include calculating them at the average or for a representative agent (Cameron and Trivedi 2009). While in practice these methods tend to give similar results, if the explanatory variables are dichotomous, calculating marginal effects for a representative agent is more meaningful because calculating marginal effects at the average for a dichotomous variable will not refer to any particular category (neither the 0 nor the 1 case). Table 2.4 and Table 2.5 report these results for a representative agent who is a primary school aged child in 2006 living with married parents in a family court district with an average wait time of 4 months, which is the average wait time for the entire sample.



Table 2.4-Marginal Effects for Logit Regression of School Attendance, National Sample, 2002 to 2006

		Model One	Model Two
		dy/dx	dy/dx
<i>Year dummies</i>			
	2002	reference	reference
	2004	-0.0614 (0.0390)	-0.0255 (0.0490)
	2006	-0.0866 ** (0.0368)	-0.0778 * (0.0443)
<i>Interaction terms</i>			
	Married parents in 2002	reference	reference
	Married parents in 2004	-0.0155 (0.0440)	0.0067 0.0537
	Married parents in 2006	0.0651 (0.0405)	0.1062 ** 0.0505
<i>Age groups</i>			
	Ages 4 to 10	–	reference
	Ages 11 to 17	–	0.1215 *** 0.0214
	Ages 18 to 21	–	-0.4812 *** 0.0201

*Notes:* Marginal effects are calculated for a primary school aged child in 2006 living with married parents in a family court district with an average wait time of four months. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

Table 2.5-Marginal Effects for Logit Regression of School Attendance, Urban Sample, 2002 to 2006

		Model One	Model Two	Model Three
		dy/dx	dy/dx	dy/dx
<i>Year dummies</i>				
	2002	reference	reference	reference
	2004	-0.0236 (0.0470)	0.0492 (0.0570)	0.0403 (0.0458)
	2006	-0.1192 ** (0.0426)	-0.1321 *** (0.0494)	-0.1030 ** (0.0403)
<i>Interaction terms</i>				
	Married parents in 2002	reference	reference	reference
	Married parents in 2004	-0.0526 (0.0509)	-0.0649 (0.0634)	-0.0576 (0.0589)
	Married parents in 2006	0.0998 ** (0.0465)	0.1657 *** (0.0572)	0.3454 *** (0.0999)
<i>Age groups</i>				
	Ages 4 to 10	–	reference	reference
	Ages 11 to 17	–	0.1323 *** (0.0242)	0.1037 *** (0.0259)
	Ages 18 to 21	–	-0.4823 *** (0.0227)	-0.6032 *** (0.0496)
<i>Administrative changes</i>				
	Average wait time for married couples in 2006	–	–	-0.0122 * (0.0062)

*Notes:* Average wait time is in months. Marginal effects are calculated for a primary school aged child in 2006 living with married parents in a family court district with an average wait time of four months. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

The results shown for *Model Three* in Table 2.5 show an estimated marginal effect of the divorce law on primary school aged children in 2006 living with married parents in a family court district with an average wait time of four months to be 29.7 percent. In other words, holding all else constant, legalizing divorce increased school enrollment by 29.7 percent for children of married parents compared to children of cohabitating parents. Each additional month of wait time to finalize a divorce is estimated to decrease school enrollment by 1.2 percent for this representative agent group, and there was a general decrease in school enrollment of 10.3 percent for all children in 2006, regardless of their parent's marital status. These marginal effects explain the magnitude of the effect of legalizing divorce and administrative wait times. The effect of legalizing divorce is positive and large and was responsible for a significant increase in school enrollment of children from married parent families, holding all else constant.

Although the legalization of divorce clearly had a positive effect on children's education, interpreted as increasing women's bargaining power within married couple families, a question still remains as to which school age children benefitted the most. For that reason and because it is possible that enrollment decisions are made differently for youth depending on the level of school they are enrolling in, Tables 2.6 and 2.7 replicate *Model Two* and *Model Three* regressions in Table 2.2 and Table 2.4, respectively, but report separated regression results by school type. Table 2.6 shows the estimation equation (2.5) from above. Table 2.7 shows the full estimation equation (2.6), which includes average wait time to finalize a divorce. Table 2.7 results show that legalizing

divorce had a significant impact on secondary schooling of youth. It had no effect on primary school children, nor did it have any effect on tertiary school youth.

These estimates imply that the legalization of divorce had an effect of raising school enrollment for secondary or high school aged children. This makes sense given that these children might still be too young to be independently working, as is the case with those of university age, but are old enough to where their parents might consider having their children work informally to earn additional income for the household than to have them in school. Since youth enrollment at the tertiary-level is not only a parental choice, but also an individual youth choice, it is also not surprising that we find no significant effect on enrollment in tertiary-level education.

The marginal effects reported in Table 2.8 show that for a representative agent, the effects are large for high school age children. For a child in 2006 who is living with married parents in a family court district with an average wait time of four months, the legalization of divorce increased school enrollment for youth ages 12 to 17 by 42.8 percent. An additional month added to the wait time for a divorce decreased school enrollment by 2.2 percent for this same group, and there was a general decrease in school enrollment of 21.0 percent for all high school children in 2006, regardless of their parent's marital status.

Table 2.6-Logit Regression of School Attendance (*Model One* from Table 2) by School Age Group and without Wait Times, National Sample, 2002 to 2006

	Primary school	Secondary school	Tertiary school	
	$\beta$	$\beta$	$\beta$	
<i>Year dummies</i>				
2002	reference	reference	reference	
2004	-0.1933 (0.3113)	0.0890 (0.4038)	-2.7539 (1.0628)	**
2006	0.3680 (0.3473)	-1.0352 (0.3482)	-0.7817 (0.4615)	*
<i>Interaction terms</i>				
Married parents in 2002	reference	reference	reference	
Married parents in 2004	0.1027 (0.3417)	-0.3444 (0.4465)	2.6813 (1.0837)	**
Married parents in 2006	0.0865 (0.3849)	0.9583 (0.3864)	0.5398 (0.4950)	**
Log likelihood	-463.55	-335.88	-209.86	
N observations	1253	983	666	
N groups	299	248	238	

*Notes:* All models include household-level fixed effects. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

Table 2.7-Logit Regression of School Attendance (*Model Three* from Table 3) by School Age Group and with Wait Times, Urban Sample, 2002 to 2006

		Primary school	Secondary school	Tertiary school
		$\beta$	$\beta$	$\beta$
<i>Year dummies</i>				
	2002	reference	reference	reference
	2004	0.0738 (0.3976)	0.4546 (0.4842)	-1.5855 (1.1822)
	2006	0.2668 (0.4226)	-1.2463 *** (0.4351)	-1.0424 ** (0.5268)
<i>Interaction terms</i>				
	Married parents in 2002	reference	reference	reference
	Married parents in 2004	-0.0142 (0.4317)	-0.4635 (0.5285)	1.5809 (1.2192)
	Married parents in 2006	0.7854 (0.8656)	2.3683 *** (0.8603)	1.1640 (1.0550)
<i>Administrative changes</i>				
	Average wait time for married couples in 2006	-0.0493 (0.0546)	-0.1008 * (0.0546)	-0.0229 (0.0657)
	Log likelihood	-338.39	-253.3397	-141.33
	N observations	899	756	426
	N groups	205	192	149

*Notes:* Average wait time is in months. All models include household-level fixed effects. Standard errors are in parentheses [\* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ ]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

Table 2.8-Marginal Effects for Logit Regression of School Attendance by School Age Group and with Wait Times, Urban Sample, 2002 to 2006

		Primary school	Secondary school	Tertiary school
		dy/dx	dy/dx	dy/dx
<i>Year dummies</i>				
	2002	reference	reference	reference
	2004	0.0152 (0.0808)	0.0867 (0.0904)	-0.3332 * (0.1840)
	2006	0.0587 (0.0976)	-0.2096 *** (0.0768)	-0.2376 ** (0.1076)
<i>Interaction terms</i>				
	Married parents in 2002	reference	reference	reference
	Married parents in 2004	-0.0030 (0.0908)	-0.1024 (0.1289)	0.3260 * (0.1870)
	Married parents in 2006	0.1842 (0.1973)	0.5172 *** (0.1556)	0.2641 (0.2328)
<i>Administrative changes</i>				
	Average wait time for married couples in 2006	-0.0103 (0.0114)	-0.0222 *** (0.0083)	-0.0057 (0.0164)

*Notes:* Average wait time is in months. All models include household-level fixed effects. Standard errors are in parentheses [\* = p<0.10, \*\* = p<0.05, and \*\*\* = p<0.01]. Sample weights applied.

*Data Source:* Encuesta de Protección Social (EPS), 2009

## *Conclusion*

Studies analyzing the effects of divorce on child and family wellbeing perpetually face selection bias issues because individuals who divorce can have systemically different unobserved characteristics relative to those who remain married. This study uses national household panel survey data from 2002, 2004, and 2006, combined with a 2004 external shock to households in Chile in the form of family policy, the legalization of divorce, to analyze the effects of divorce on children's education. The study uses a difference-in-differences (DID) approach to minimize selection bias and endogeneity issues. Using panel data before and after the legalization of divorce, this chapter investigates the effect of the legalization of divorce on household resource allocation decisions regarding children's education. Specifically, child education is analyzed in cohabitating parent families, who are not affected by the legalization of divorce, and married parent families, who are affected by the new law.

More generally, this chapter analyzes the effect of divorce on household behavior. It tests whether a divorce law that mandates that an economic compensation be transferred to a homemaker upon divorce gives more bargaining power to wives in married couple households by examining the effects of the law on school enrollment. Based on previous literature on gender and intrahousehold allocation, it assumes that women invest in household public goods, such as children's education, at higher rates than men. The bargaining household model framework developed by Manser and Brown (1980) and McElroy and Horney (1981) cannot be rejected. This paper finds evidence that by increasing wives' opportunity cost of remaining married, the legalization of a pro-



homemaker divorce law increased school enrollment for children within married couple households in Chile, specifically for secondary school aged children. Additionally, it shows that burdensome administrative processes to obtaining a divorce also influence household bargaining power and resource allocation by altering the credible threat of divorce.

Legalizing divorce has had a significant effect on school enrollment for high school students from married parent families in Chile and in the direction one would expect. While other macro-level factors decreased school enrollment in 2006 for all secondary and tertiary aged children, legalizing divorce caused an increase in school enrollment for married parent high school age children. These results show that family policies and laws favoring homemakers can have positive, unintended consequences on families and investments in households.

Family policies created for one specific group can have unintended or unexpected effects on other groups. In this case, divorce legislation was created for unstable families, but this paper has shown that it influences resource allocation decisions in stable family households. It has also shown that family policies providing more bargaining power to homemakers have the potential to increase investments in household goods that women value. Although this study analyzes the effect of legalizing divorce, it can also be argued that changes to divorce laws and family policies that empower homemakers by increasing their bargaining power within the marriage could have similar effects. In this sense, my results are not just specific to the case of Chile but have implications for many countries.

## Chapter 4-The Mismeasurement of Lone-Mother Families: What Are the Implications for Development Policy?

### *Introduction*

Lone-mother families are of continual interest to development economists and policy analysts because of their assumed vulnerability to poverty and other social ills. Lone mothers are defined as mothers who have primary custody of their minor children, with no spouse in their household.<sup>34</sup> Researchers commonly use female-headed households as a proxy for lone-mother families; however this proxy is limiting, and sometimes inaccurate.<sup>35</sup> Female-headed households include women with no children, elderly women (including widows) with only adult children living in the household, and, if marital status is not a consideration, can include women who are married but are identified as the head of the household because of the absence of a spouse. As described, female-headed households contain multiple types of families, and not all these configurations fall within the lone-mother definition. In addition, if a lone-mother is not a household head, her family is not captured in the female-headed household proxy.

Numerous previous studies have analyzed the economic and social vulnerability of mothers and their children in developed countries by analyzing female-headed households (Bedard & Deschenes 2005; Conley & Ryvicker 2005; Daniels, Rettig, & delMas 2006; Rodgers 1991; Schmidt & Sevak 2006), and recently studies have attempted to capture the experiences of these families in developing countries (Arends-

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<sup>34</sup> A *household* is defined as all individuals living under the same roof and sharing economic resources.

<sup>35</sup> In this chapter, *female-headed household* is defined as all households where a single (never married), married (spouse absent), divorced, separated, or widowed woman is the household head.

Kuenning & Duryea 2006; Horrell & Krishnan 2007; Mitra, A. 2005; Yamano et al. 2006). By using female-headed households as the unit of analysis, these studies potentially include families not intended for analysis and exclude lone mothers who live as a subfamily within another family member's household. Therefore, the conclusions of these studies, however accurate for female-headed households, do not accurately uncover the vulnerabilities, experiences, and true characteristics of lone-mother families.

This has major implications for economic development policies that focus on reducing poverty among all lone-mother families; if the unit of analysis is instead lone mothers living as a head of household or as a subfamily within another household, then the situation and characteristics of lone mothers can be analyzed more accurately. The findings might conclude that lone-mother families, when provided with extended family social supports, are not as vulnerable as their household head counterparts. Studies might find that, if lone-mother families with extended family supports did not have these additional supports, they would truly be even more vulnerable than their respective counterparts who are household heads.

Studies analyzing female-headed households choose this unit of analysis for multiple reasons. The most common reason being a lack of available data on subfamily relationships within the household to identify lone-mother families residing in extended family member households. Household survey data, in general, is more likely than census data to provide this type of detailed subfamily relationship information, however many household surveys still lack detailed subfamily relationship data. Another reason for choosing female-headed households as a unit of analysis is an intentional choice on the

part of the researcher to focus on lone-mother families living on their own because they are considered to be the most vulnerable. Finally, in some instances, researchers simply overlook the lone-mother families living in extended family members households.

Whatever the reasons, this chapter argues that lone-mother families living with extended family members should be included in any research conducted on female-headed households. It shows that, for the most part, lone-mothers living with extended family members would be even more vulnerable to poverty and other social ills if they did not have the support of their extended family.

To date, there has been no systematic analysis across countries and over time of the magnitude of mismeasurement of lone-mother families when female headed households are used as the unit of analysis. While it is possible to conduct this analysis using household survey data, the strength in conducting this analysis with IPUMS-International (IPUMS-I) harmonized census microdata is that an analysis of multiple countries across time can be developed. For the first time, it is possible to identify lone-mother families in multiple countries without depending solely on household headship status by using the IPUMS-I data, which standardizes variables across time and over countries and includes technical variables identifying family interrelationships within the household (Minnesota Population Center 2008). In this sense, IPUMS-I data, with all the limitations that might exist with census data, is the preferred dataset for this analysis.

Using IPUMS-I data for 24 countries from 1970 to the present, this chapter identifies all lone-mother families, regardless of the mother's headship status. It then investigates the extent of underreporting of lone-mother families when female-headed

household is used as a proxy and sheds light on the complexity of lone-mother family structure and characteristics. The chapter also identifies policy implications of underreporting and simplifying lone-mother families. And, finally, it suggests changes for future data collection and reporting procedures.

### *Literature Review*

The literature on this topic focuses heavily on the female-headed household. In most previous studies, this is done by disaggregating self-reported female household heads into smaller units based on certain characteristics, or by the researcher defining female-headed households based on the economic activity, age, or personal income (including non-wage income) of household members (Clark 1984, Handa 1994, Kamerman 1984, Kennedy & Peters 1992, Rogers 1995, Rosenhouse 1994). While these studies show the complexity and diversity of female-headed households, none of them include lone-mother families where the mother is not a household head.

Clark (1984) most clearly describes the issue of mismeasurement in relation to lone-mother families. She demonstrates the difficulty and confusion in identifying female-headed households in census data and ethnographic research because of the way in which household and head of household are usually defined. More importantly, she highlights the lack of recognition of female-headed families versus female-headed households. She argues that Western scholars "...have confused family structure with household composition and have assumed residential unit, kinship unit, and domestic functions to be one in the same (p. 340)."

Kamerman (1984) finds that the mother-only type of household, which she defines as a household where the mother has, on average, two children and is not working, is a minority of all female-headed households in six of eight industrialized countries examined, and two-thirds of mother-only households are single-mothers who are in the workforce and have small children. While Kamerman does a thorough job of explaining the typical female-headed household in industrialized societies, she implicitly assumes that female-headed households capture all lone-mother family households within these countries.

In developing countries, Handa (1994) discusses the challenge in accurately identifying female- and male-headed households in survey data. While surveys generally report one individual as the head of household, using Jamaican data Handa finds that some female-headed households are economically supported by men and vice versa. He argues that the simple “male-female dichotomy also hides important differences in household income, demographic composition, and intrahousehold resource allocation within these two groups [female- versus male-headed households] (p. 1542).” The author argues that much care must be taken when relying on survey data’s identification of headship status. With an ever increasing interest in understanding the relationship between headship, gender, poverty, and child wellbeing, researchers must take care not to simplify the household and should take care to realize that self-defined headship status in survey data may not clearly identify who is providing principle economic support within the household. He shows that this type of simplification could lead to a misidentification of female-headed households.

Rogers (1995) sheds light on the complexity and difficulty associated with headship measurement in survey data by using data from the Dominican Republic to identify different definitions of female-headed households. She finds that in the Dominican Republic “self-defined FHH [female-headed households] are no more likely than other households to fall into lower or higher economic classes (p. 2035).” However, self-defined female-headed households are different from households defined as female-headed because no adult males (aged 18 to 60) are present or because the female earns over 50 percent of all earned income. The author does not restrict her analysis to those households where children are present, but her critiques of defining female headship are still relevant.

Rogers’ study results differ from Tienda and Salazar’s (1980) analysis of household member size among female-headed households. Rogers finds that Dominican female-headed households have one member less than the average non-female-headed household; where as Tienda and Salazar find that in Peru the female-headed household generally needs to add extended kin to her household in order to bring in more income. These differences may be primarily driven by the way in which the authors define female headed-households in each paper and not necessarily by true differences across countries. However, it is evident from these and other studies that lone-mother family households are diverse and complex.

Rosenhouse (1994), concerned about the implications of development policies focusing specifically on poverty reduction efforts for female-headed households, uses the World Bank’s 1985-86 Living Standards Measurement Study (LSMS) household survey

for Peru to compare two definitions of headship: *reported head* and *working head*.

*Reported head* is the person who others in the household have identified as the household head. *Working head* is the primary person providing economic support to the household, specifically defined as the person who worked the greatest proportion of hours and who bears chief economic responsibility for the control of household resources. She finds that "...female working heads are similar in age to male heads, and almost half of them are married. However, important disparities by education and labor force characteristics remain. The data indicate that households which appear to be at a disadvantage because of the work status and educational endowment of the head are more apt to adopt extended family living arrangements to increase the household's labor supply... female-headed households are more likely to be multi-generational (p. 33)." The author's results provide additional evidence that lone-mother families are complex and exist in multiple family arrangements, and not just as single, female-headed households.

Kennedy & Peters (1992) also critique studies that treat female-headed households as a homogenous group and show that different female-headed household groups treat investments in household human capital differently. They also note that not all female-headed households are poorer than their male counterparts.

There is much diversity among lone-mother families and female-headed households. This creates many problems associated with accurately identifying lone-mother families. For example, female-headed households include single, never married women without children, widows without children or with adult children, and married women whose husbands are temporarily absent (migrants).



While the literature discussed above provides critiques regarding the complexities of female-headed households, there is limited research to date on accurately measuring lone-mother families that include those where the mother is not the household head. Snyder and McLaughlin (2004) is one of the few studies in the U.S. that compares lone-mother families where the mother is the head to those where the family exists as a subfamily in another family member's house. Using the U.S. Current Population Survey, they compare urban and rural lone-mother families by headship status. They find that lone-mother families are more likely to be subfamilies in an extended family member's household in rural areas compared to urban. Additionally, they found that "...female-headed subfamilies have the highest poverty rates. If most female-headed subfamilies were to establish their own households using their current resources, they would live in poverty (p. 147)."

An example of a study that analyzes lone-mother families regardless of their headship status in less developed countries is Buvinic et al. (1992). The authors approach the lone-mother family from an alternative perspective. They use data collected on poor adolescent mothers who participated in an adolescent reproductive health program at the University of Chile to show that teenage pregnancy resulted in relatively few female-headed households, even though over three-fourths of the adolescent mothers were single at the birth of their first child. The authors acknowledge that many of these mothers are most likely to be heading female-headed subfamilies within a larger household than to be living in a household with their child's father where the child's father is identified as the head of household. The authors use a unique set of data to identify the problem addressed

in this chapter, that those lone-mothers most often identified as the most vulnerable, often are not captured in data where the unit of analysis is female-headed households.

The main critique provided in the literature above is that using headship as a proxy for lone-mother families is arbitrary in nature and defined differently across surveys and censuses. This chapter adds to this literature by highlighting another relevant and important measurement issue: not all lone-mother families have a mother who is a household head. Studies generally do not attempt to analyze lone-mother families living with other relatives where another relative is the head of household. This is an important subgroup of lone-mother families because, in order to understand their overall welfare, we need to understand not only the characteristics of those living on their own or as household heads, but also of those who have an informal support network via co-residence with other relatives.

This chapter, by identifying all lone-mother families, regardless of headship, and comparing these families to female-headed households, extends the current literature on and knowledge of the complexities surrounding lone-mother families. The following analysis sheds light on the potential undercount of lone-mother families in 24 countries when female-headed household is used as a proxy and identifies characteristic differences between lone-mothers that are household heads and their non-head counterparts.

## *Data and Methodology*

This chapter uses IPUMS-International data to analyze trends in lone-mother families for 24 countries, 6 developed countries and 18 developing countries.<sup>36</sup> The IPUMS-International Project provides microdata for international censuses from 1960 to the present; however, most countries do not have household-level data available until the 1970 round. Since household-level data are required for this analysis, the analysis focuses on trends from 1970 to the present.<sup>37</sup>

The IPUMS-International (IPUMS-I) Project harmonizes international census data. Harmonizing census data involves cleaning and recoding variables to be comparable across time and country, significantly reducing the amount of time needed by researchers to make different census data comparable for research. In addition, the IPUMS-I project creates technical variables pointing to household members with special relationships, such as the mother, father, and spouse of an individual, and identifying general household characteristics of each individual's family relationships, such as the number of children and ages of the youngest and oldest child living within the household of each individual within the household.

The results of this chapter rely heavily on three technical variables created by the IPUMS-International Project, SPLOC, NCHILD, and YNGCH. SPLOC is the spouse's location within the household. It is constructed using algorithms to identify probable spousal links and is based on the relationship of each individual within the household to

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<sup>36</sup> Developed countries are identified as *high-income economies* using the 2008 World Bank economy classification scheme (World Bank 2008).

<sup>37</sup> This analysis is conducted on all countries for which the relevant data are available. The selection of countries and decades used for analysis is solely determined by the availability of data in the IPUMS-International dataset.

the household head, as well as the age and marital status of each person. In general, each person must be at least 12 years old and have a marital status of *married* or *in a consensual union* to identify their probably partner within the household, if that partner exists.<sup>38</sup> With each probable spouse of each individual identified in a systematic way across countries and over time, the SPLOC variable is used here to identify mothers who do not have a spouse present within the household.

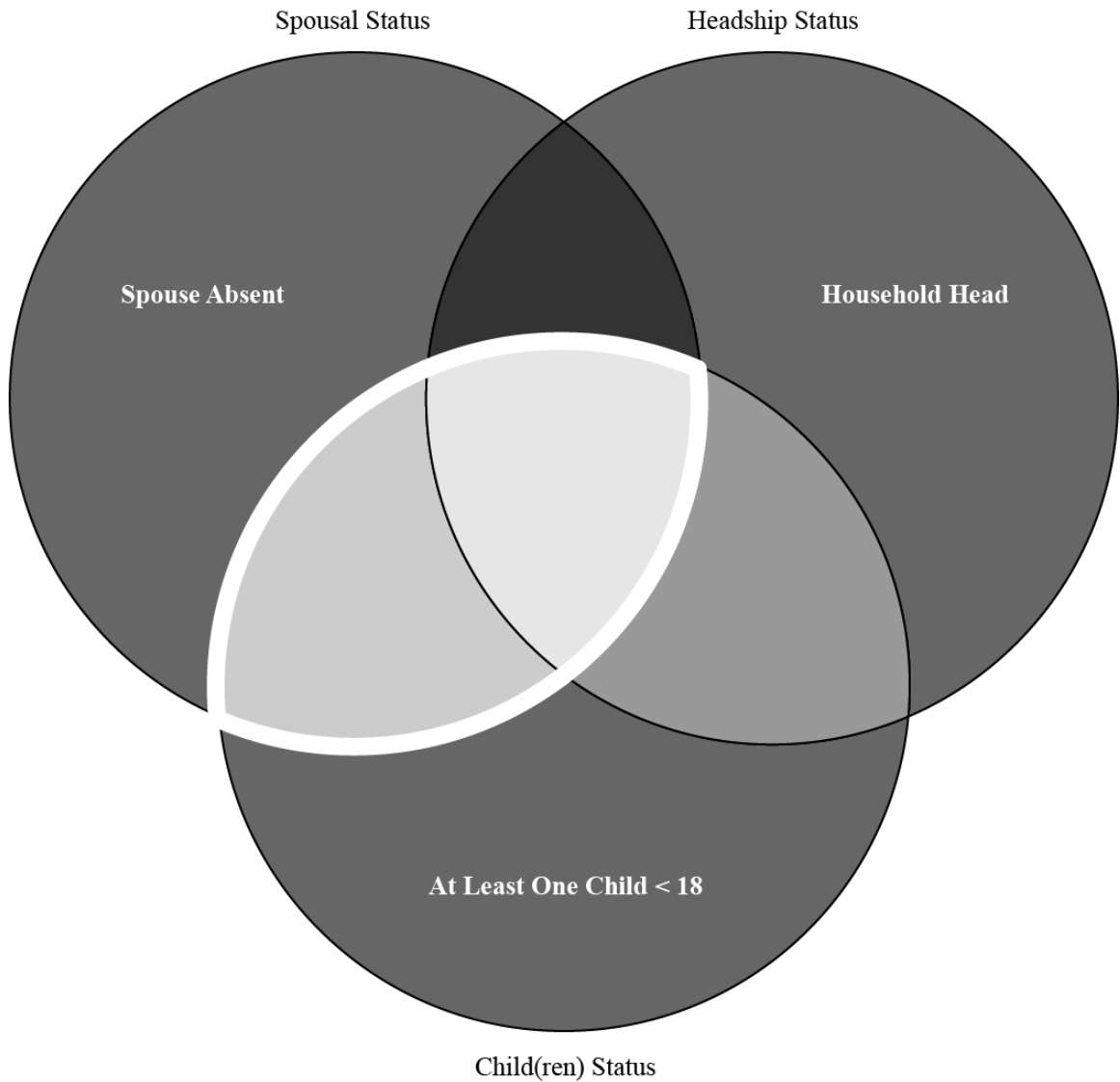
Mothers are identified in each household using NCHILD and YNGCH. NCHILD identifies the total number of probable children living in the household for each individual. YNGCH identifies the age of the person's youngest child within the household. Using these variables, a lone mother indicator variable is constructed if the person is female, her spouse is not in the household ( $SPLOC = 0$ ), she has children living in the household ( $NCHILD > 0$ ), and her youngest child in the household is 18 years old or younger ( $YNGCH \leq 18$ ).

Figure 3.1 shows the various dimensions of defining lone-mothers. Measures of female-headed households that do not control for the age of children or whether the woman has children are used by researchers, but these measures are beyond the scope of this analysis. Researchers may, in those instances, be interested in studying widowed household heads with only adult children in the household or household heads with no children in the household at all. In order to conduct an analysis that is comparable across subgroups, the definition of lone mother is constrained to include own children under the age of 18 for this analysis.

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<sup>38</sup> For a more detailed explanation, see <https://international.ipums.org/international-action/variables/SPRULE>.

Figure 3.1-Diagram of Multiple Configurations for Defining Lone-Mother Families



*Notes:* The area within the white bold line indicates the mothers analyzed for the purposes of this study. They have at least one child under the age of 18, are *not* married with a spouse present in the household, and can either be the household head or reside in a household where the household head is another individual, usually a relative.

As previously mentioned, and as Figure 3.1 shows, there are multiple definitions of lone-mothers. This chapter limits the analysis to mothers of minor children, regardless of headship status, but for whom a spouse is absent from the household. These mothers are represented inside the bold, white line in Figure 3.1. The mothers in the area of the diagram where all three circles intersect are the mothers usually analyzed when female headed household is used as the unit of analysis. This analysis compares those mothers to the mothers in the gray area outside of the three overlapping circle area but still within the bold, white line, where the mothers are not household heads. After identifying all lone mothers and lone-mother household heads, all households where at least one lone mother is present are identified as *lone-mother family households*.<sup>39</sup> All lone-mother family households where the mother is the head of the household are identified as *female-headed households*. Under this categorization, female-headed households are a subset of all lone-mother family households.

After constructing the appropriate measures for lone-mothers, the analysis reports descriptive statistics on measures for lone-mothers and sheds light on the extent of the mismeasurement issue when headship is used to identify lone-mothers. Once these general measures are examined, highlighting differences across countries, regions, and over time, the second part of the analysis identifies characteristics associated with an increased probability of a lone mother being a household head. While nonparametric

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<sup>39</sup> It is unlikely that large quantities of lone mothers exist in group quarters, which tend to primarily be military barracks, school dormitories, hospitals, and other institutions, so this analysis excludes any individuals living in group quarters. All mothers and households from the Vietnam sample are assumed not to be in group quarters because the 1999 census data from Vietnam do not have a group quarters variable. To the extent that some individuals in this sample reside in group quarters and that lone-mothers in group quarters are systemically different from lone-mothers in households in Vietnam, this could bias the results.

measures can provide knowledge of how particular characteristics might differ among these two groups, the goal of this analysis is to understand factors influencing the probability that a lone mother is a head of household. A logistical regression is, therefore, conducted to identify explanatory variables that predict the likelihood that a lone mother is a household head.

The dependent variable used in this regression analysis is a dichotomous variable identifying whether the lone mother is identified as the household head. Explanatory variables thought to influence the probability of a lone mother being a household head and included in this analysis are the age of the mother, the age of her youngest child within the household, the age of her oldest child within the household, marital status, whether or not the mother is in a polygamous marriage (relevant for African countries), educational attainment, labor force participation, and a dichotomous variable identifying whether or not the household is in an urban area. The age of the mother is her age in years, as is the age of her youngest and oldest children residing in the household. Four dichotomous variables are constructed using marital status: single (never married), married, divorced or separated, and widowed. In the logistic regression, the single, never married variable is excluded for comparison.

Two African countries used in this analysis have polygamous marriages identified in the data: Kenya and Uganda. The regression controls for being in a polygamous marriage by constructing a dichotomous variable if the mother is in a polygamous marriage, meaning her husband is married to more than one woman, and adding it to the analysis. Approximately 10 percent of women in the samples from these two African

countries have data missing for this variable. For purposes of this analysis, they are assumed not to be in a polygamous marriage. Additionally, mothers in all other countries are also assumed not to be in polygamous marriages.

Educational attainment is coded into four dichotomous variables: less than primary, primary, secondary, and tertiary education. Each variable refers to the level of education attained by the individual. There are subtle differences in the universe of this variable across countries, but most data is reported for all individuals or individuals over the ages of 3, 5, 6, or 7. Therefore, educational attainment data are available for almost all of the women in the sample.<sup>40</sup>

Whether one is employed can influence one's ability to reside in a separate residence or determine a need to live with family members because employment generates additional economic resources that are not available for housing needs if the individual is not working. Three dichotomous variables are constructed related to work. One variable is constructed identifying whether the mother is actively employed in the labor force. Another identifying if the mother is unemployed or currently searching for work. And, a third variable is created, which identifies mothers not in the labor force. Those not in the labor force are the excluded category for comparison purposes in this analysis.

Adding employment status into the regression creates a potential endogeneity problem. While it is true that mothers who work and receive an income are more likely to be able to maintain a household and, therefore, be a head of household, it is also true that

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<sup>40</sup> The exception is the census from France, which reports educational attainment only for individuals 17 and older. To the extent that lone-mothers age 16 and under exist in France, they are not captured in this analysis because of the educational attainment restrictions on data collection.



mothers who do not have extended family to rely on for whatever reason and are forced to be a household head, might seek employment out of necessity where they wouldn't have otherwise. In this sense, headship status has the potential to drive decisions regarding work. In an attempt to understand the severity of this issue, regressions are run with and without the employment status variables. Coefficients relating to the work variables should be interpreted with caution.

Other relevant variables included in the regression analysis relate to geography, time, and country effects. An urban dichotomous variable is constructed. To the extent that each country identifies urban and rural status differently, the coefficient on this variable should also be interpreted with caution.<sup>41</sup> Decade and country fixed effects are added to the model to control for changes over time and systematic differences between countries. Again, dichotomous variables are constructed to identify each decade of data and each country.

While the descriptive statistics in the analysis section report the potential undercount of lone-mothers for 24 countries, data limitations reduce the number of countries and samples available for the logistic regression analysis. To identify trends over time, countries must have at least two years of data to be included in the regression analysis. Given the explanatory variables listed above, Austria is not used because educational attainment data are not available. Rwanda is not used because educational attainment data are unavailable for one of the two samples. The Philippines is also excluded because of a lack of employment data in one of the two census years analyzed.

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<sup>41</sup> See <https://international.ipums.org/international/> for country-specific definitions of urban.

This leaves a primary regression analysis using 21 of the 24 countries (65 censuses overall from 1970 to 2000).

While the three countries listed above are excluded from the primary analysis, even more countries must be excluded in order to analyze the effect of urbanization as the urban variable exists in fewer IPUMS-I samples. Therefore, a second analysis is conducted adding the urban variable, but in addition to the three excluded countries listed above, China, Ecuador, Greece, Hungary, Spain, and the U.S are also excluded. These countries are excluded because a simple dichotomous variable identifying urban or rural status does not exist for at least two years for each country (including the restrictions on other variables listed above). In order to compare the first analysis with the second analysis, which adds the urban variable, the same models in the first analysis are run using the limited country dataset of 15 countries (45 censuses) without the urban variable. Then, the urban variable is added. The results of these logistic regressions are reported in the analysis section below.

The regression analyses are constructed as follows. *Model One* is a simple regression using just country variables. While it is unlikely that country effects are the main driver of headship status for lone-mothers, starting with this basic regression allows one to analyze the estimated overall effect societies might play on headship status. If there is no large difference in overall fit of the regression equation (the R-squared) between this basic regression and additional regressions that add in other explanatory variables, one can assume that cultural and societal norms play a dominant role in determining whether or not lone-mothers live independently. *Model Two* includes year

fixed effects to control for generational differences over time. *Model Three* includes, in addition to country and year fixed effects, the explanatory variables that are motivating factors assumed to influence lone-mother headship status: age of mother, age of youngest child, age of oldest child, marital status, whether or not the mother is in a polygamous marriage, and educational attainment. Employment status is explicitly excluded from *Model Three*, but added to *Model Four*.

As previously mentioned, while *Model One* thru *Model Four* described above are estimated on the full sample of 21 countries, the models are again run on the smaller sample of 15 countries for comparative purposes. Then, *Model Five* is then estimated, which is the same as *Model Four*, only it adds in an explanatory variable for urban status. The next section presents results on the magnitude of the potential undercount of lone mothers when female-headed household is the unit of analysis and reports results of explanatory factors influencing headship status of lone mothers.

### *Analysis*

The following sections provide descriptive statistics for lone mothers who are not household heads compared to those who are and identifies relevant characteristic distinctions between these two groups.

### *Lone-Mother Family Descriptive Statistics*

Since previous studies have used female-headed households as a unit of analysis to identify lone-mother families, this analysis begins by identifying the percent of households where a lone-mother family resides and the percent of households where a lone mother is the household head (Table 3.1).<sup>42</sup> Table 3.1 also shows the percentage potential undercount of lone-mother family households if female-headed household is used as the unit of analysis.

A household-level measure, compared to an individual-level measure, does not provide an accurate estimate of the extent of the potential undercount of lone-mother families for which the mother is not the household head; however, even if household is used as the unit of analysis, the potential undercount is large in many countries (Table 3.1). Ruggles and Brower (2003) identify multiple problems with using household as a unit of analysis. Most relevant for this chapter are that the number of households (the denominator in this case) is driven by factors unrelated to lone-mothers, such as the proportion of single, adult males who decide to live with their parents or changes in the living arrangements of the elderly. It is also impossible to construct an analysis at the household level that controls for changes in demographic composition, such as changes in age, sex, and educational structures, since households do not have these types of characteristics. It is the people living within the household that have these characteristics.

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<sup>42</sup> Ruggles and Brower (2003) provide multiple critiques of using household to measure family composition. However, for comparative purposes, household-level descriptive are reported here first.

Table 3.1-Percent of Households with a Lone-Mother Family by Headship Status, Country, and Decade, 1970 to 2000

	1970			1980			1990			2000		
	LMFH	LMHH	Percentage	LMFH	LMHH	Percentage	LMFH	LMHH	Percentage	LMFH	LMHH	Percentage
			Undercount			Undercount			Undercount			
<i>North America (excluding Mexico)</i>												
United States	6.1	5.0	18.4	7.6	6.4	15.9	7.7	6.1	20.0	8.1	6.5	20.5
<i>Europe</i>												
Austria	4.0	2.7	31.6	4.7	3.5	24.6	5.3	4.1	21.6	5.2	4.6	13.1
France	2.8	2.3	20.3	3.3	3.1	7.8	3.9	3.7	6.8	n/a	n/a	n/a
Greece	4.0	2.9	28.0	2.4	1.9	22.3	2.5	2.1	18.1	2.7	2.1	22.2
Hungary	5.5	4.3	20.4	4.8	4.2	11.5	6.2	5.7	7.3	5.5	4.9	11.3
Portugal	n/a	n/a	n/a	4.3	3.3	22.9	4.2	3.1	27.9	3.8	2.8	27.2
Romania	n/a	n/a	n/a	n/a	n/a	n/a	4.5	3.1	30.7	4.7	3.0	36.0
Spain	n/a	n/a	n/a	n/a	n/a	n/a	3.5	2.4	30.5	3.9	3.5	11.2
<i>Central and South America (including Mexico)</i>												
Argentina	7.1	4.8	32.9	8.1	5.0	38.8	n/a	n/a	n/a	10.3	6.3	38.6
Brazil	7.0	5.4	22.2	7.6	5.8	23.1	11.1	7.0	36.9	12.4	8.2	33.8
Chile	13.2	7.8	41.3	14.7	8.3	43.4	14.7	7.6	48.0	14.5	7.5	48.5
Colombia	20.0	13.6	32.1	17.1	9.5	44.5	17.0	10.1	40.8	18.1	11.2	38.3
Costa Rica	13.9	8.3	40.0	14.7	8.7	40.7	n/a	n/a	n/a	14.5	9.8	32.4
Ecuador	16.8	10.5	37.8	15.3	9.5	38.0	15.0	9.5	36.6	15.9	10.7	33.2
Mexico	10.8	7.5	30.9	n/a	n/a	n/a	11.3	8.1	27.9	12.8	7.6	40.4
Panama	15.8	10.0	36.8	17.5	10.6	39.6	17.4	10.2	41.7	16.5	9.6	41.7
Venezuela	16.9	11.1	34.1	18.7	11.5	38.4	18.7	11.8	36.9	18.9	11.2	40.6
<i>Africa</i>												
Kenya	n/a	n/a	n/a	n/a	n/a	n/a	27.4	21.2	22.7	25.6	20.1	21.7
Rwanda	n/a	n/a	n/a	n/a	n/a	n/a	18.6	12.8	31.1	27.4	22.9	16.4
Uganda	n/a	n/a	n/a	n/a	n/a	n/a	22.7	15.6	31.2	16.6	12.7	23.6
<i>Asia</i>												
China	n/a	n/a	n/a	10.9	9.0	17.2	6.4	4.9	23.0	n/a	n/a	n/a
Malaysia	n/a	n/a	n/a	n/a	n/a	n/a	9.7	5.9	39.4	6.1	3.7	40.5
Philippines	n/a	n/a	n/a	n/a	n/a	n/a	7.6	4.1	45.4	7.0	3.8	45.9
Vietnam	n/a	n/a	n/a	n/a	n/a	n/a	16.0	12.4	22.7	10.1	7.2	29.0

Notes: LMFH = lone-mother family households. LMHH = lone-mother headed household. Group quarters not available for Vietnam 1999, all dwellings in that census year are assumed to be households. Sample weights applied. Data Source: IPUMS-International (Minnesota Population Center 2008)

Table 3.2-Percent of All Mothers Who Are Lone-Mothers by Headship Status, Country, and Decade, 1970 to 2000

	1970			1980			1990			2000		
	LMF	LMH	Percentage Undercount	LMF	LMH	Percentage Undercount	LMF	LMH	Percentage Undercount	LMF	LMH	Percentage Undercount
<i>North America (excluding Mexico)</i>												
United States	13.7	10.8	21.0	19.6	15.9	19.1	21.9	16.7	23.6	23.6	17.9	23.9
<i>Europe</i>												
Austria	10.2	6.8	33.6	12.4	9.2	25.8	16.4	12.7	22.5	17.8	15.4	13.6
France	6.9	5.3	24.2	8.5	7.8	8.8	11.2	10.3	7.7	n/a	n/a	n/a
Greece	7.7	5.5	28.8	5.0	3.9	22.8	6.2	5.1	18.6	8.7	6.7	22.4
Hungary	11.5	9.3	19.7	11.7	10.3	12.2	16.7	15.3	7.9	17.6	15.7	10.5
Portugal	n/a	n/a	n/a	8.3	6.3	24.4	9.2	6.5	29.6	10.3	7.4	28.7
Romania	n/a	n/a	n/a	n/a	n/a	n/a	10.0	6.8	31.6	11.8	7.4	37.2
Spain	n/a	n/a	n/a	n/a	n/a	n/a	7.7	5.2	31.9	12.0	10.5	12.5
<i>Central and South America (including Mexico)</i>												
Argentina	13.5	8.7	35.9	15.1	8.6	42.7	n/a	n/a	n/a	20.5	11.8	42.6
Brazil	9.8	7.4	24.3	11.1	8.2	26.6	17.0	9.9	41.6	20.6	12.5	39.2
Chile	19.9	10.9	45.3	22.1	11.4	48.4	23.4	11.2	52.3	26.3	12.6	52.2
Colombia	28.5	17.6	38.3	24.6	12.0	51.5	25.8	13.8	46.6	30.6	17.2	43.8
Costa Rica	19.1	10.4	45.6	21.1	11.1	47.6	n/a	n/a	n/a	22.5	14.1	37.3
Ecuador	23.4	13.4	42.5	21.7	12.3	43.2	21.6	12.7	41.1	25.3	15.8	37.6
Mexico	15.1	10.4	31.4	n/a	n/a	n/a	15.6	10.6	31.9	18.6	10.3	44.5
Panama	25.7	14.7	42.7	27.5	14.9	45.6	28.3	14.8	47.8	28.4	15.1	46.8
Venezuela	23.6	13.9	41.0	26.7	14.1	47.0	27.4	15.4	43.8	28.4	15.3	46.1
<i>Africa</i>												
Kenya	n/a	n/a	n/a	n/a	n/a	n/a	42.2	29.2	30.6	41.1	29.5	28.2
Rwanda	n/a	n/a	n/a	n/a	n/a	n/a	26.6	16.8	36.7	39.3	30.7	21.7
Uganda	n/a	n/a	n/a	n/a	n/a	n/a	36.1	22.0	39.1	25.2	17.9	29.0
<i>Asia</i>												
China	n/a	n/a	n/a	14.3	11.7	18.3	8.6	6.5	24.1	n/a	n/a	n/a
Malaysia	n/a	n/a	n/a	n/a	n/a	n/a	14.0	8.0	42.8	9.3	5.3	43.3
Philippines	n/a	n/a	n/a	n/a	n/a	n/a	10.0	5.1	49.1	10.0	5.0	49.7
Vietnam	n/a	n/a	n/a	n/a	n/a	n/a	19.8	14.7	25.8	12.9	8.8	31.5

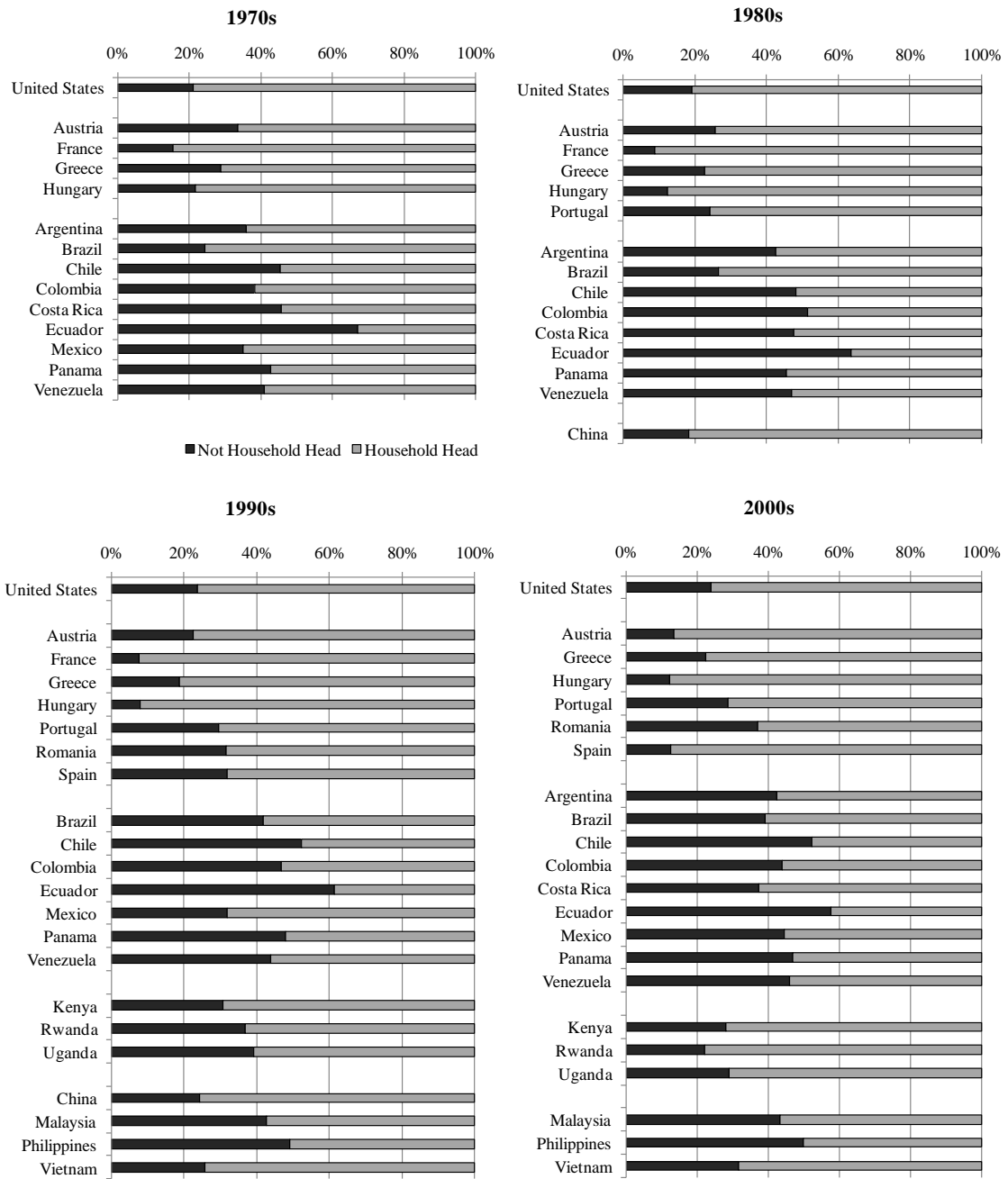
Notes: LMF = lone-mother family. LMH = lone-mother household head. Group quarters not available for Vietnam 1999, all dwellings in that census year are assumed to be households. Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

For these reasons and others, a new measure is created to identify the potential undercount of lone-mother families that more accurately estimates the potential undercount and allows for an analysis that controls for compositional changes, such as age and education. Table 3.2 reports the percent of all mothers that are lone-mother families and that are lone mother families where the mother is the household head. In all cases, any analyses using female-headed households as a proxy for lone mothers will underestimate lone mothers. In the United States in 2000, for example, approximately one-quarter of lone-mothers were not captured when headship status was used to identify lone-mothers (up from 21 percent in 1970). This potential underreporting is even larger in Latin American and Asian countries. In the Philippines in 2000, for example, one-half of all lone mothers would not be analyzed if policy analysts and researchers used female-headed households as a measure of lone-mother families (Table 3.2). Chile is another example where half of all lone mothers are not household heads.

Figure 3.2 visually depicts the extent of the potential undercount by country and decade. The dark lines represent lone-mothers where the mother is not the household head. The severity of the potential undercount is less in developed countries, such as the United States and France. However, almost half of all lone-mothers are missed in Latin American countries, one-quarter to one-third are missed in African countries, and anywhere from one-third to one-half in Asian countries, where extended family households are more common.

Figure 3.2-Proportion of Lone-Mothers by Headship Status of the Lone-Mother, Country, and Decade, 1970 to 2000



Note: Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)



Table 3.3-Direction of Change in Potential Undercount, Over Time and by Country, 1970 to 2000

	Directional Symbol	
<i>North America (excluding Mexico)</i>		
United States	+	
<i>Europe</i>		
Austria	-	
France	-	
Greece	*	
Hungary	*	
Portugal	*	
Romania	+	
Spain	-	
<i>Central and South America (including Mexico)</i>		
Argentina	~	
Brazil	*	
Chile	~	
Colombia	*	
Costa Rica	*	
Ecuador	*	
Mexico	+	
Panama	~	
Venezuela	*	
<i>Africa</i>		
Kenya	-	
Rwanda	-	
Uganda	-	
<i>Asia</i>		
China	+	
Malaysia	+	
Philippines	+	
Vietnam	+	
		<u>Legend</u>
	-	- Decreasing
	+	+ Increasing
	~	~ Steady
	*	* Fluctuating

*Note:* This analysis is based on data for countries from 1970 to 2000 where data is available. However, the following samples are excluded from the analysis due to data availability issues:: France 2000, Portugal 1970, Romania 1970 & 1980, Spain 1970 & 1980, Argentina 1990, Costa Rica 1990, Mexico 1980, Kenya 1970 & 1980, Rwanda 1970 & 1980, Uganda 1970 & 1980, China 1970, Malaysia 1970 & 1980, Philippines 1970 & 1980, Vietnam 1970 & 1980.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

By observing trends over recent decades, one can see that there are shifts in the magnitude of the potential undercount of lone mothers observed in many countries (Figure 3.2 and Table 3.3). Table 3.3 shows the direction of trends in the potential undercount over time. While trends fluctuate in many countries, the potential undercount in African countries has trended down in the past two decades, while trending up in Asian countries. And, in the United States, the potential undercount has been on the rise in the past four decades. These trends provide evidence that potential undercounting of lone-mothers is a global phenomenon, one that tends to be even more prominent in developing countries and will continue to be an issue as long as researchers use female-headed household as a proxy.

*Do Lone-Mothers Who Are Household Heads Differ from Their Non-Head Counterparts?*

While it is clear from the descriptive trends that all lone mothers will not be captured using headship as a proxy in any of the countries analyzed, questions still remain as to whether this has any effect on research and policy. Does it matter that researchers are potentially undercounting lone mothers if they are identified based on headship status? Are the characteristics of lone mothers who live with other family members different from those of lone mothers who are household heads, and what factors influence the probability that a lone mother is the head of her household? These are important questions. If factors influencing the headship status of lone mothers imply that lone-mother household heads are different than lone mothers who are not household heads, then development policies and poverty alleviation programs to support lone

mothers that are based on prior research are, at a minimum, at risk for ineffectiveness. Given limited resources available for these types of policies and programs, accurately measuring the realities of lone-mother families is of key importance to providing the most efficient and effective support possible.

In order to identify the factors influencing the headship status of lone mothers, logistical regressions are estimated. Using the variables and data described in the previous section, Table 3.4 provides descriptive statistics of the sample used in this analysis, a sample of all lone-mother families from 21 countries (1970 to 2000). As previously mentioned, three countries are excluded from this original analysis because of data limitations related to the explanatory variables used in the analysis.

Table 3.4 shows the descriptive statistics of this sample. The average age of a lone mother over all samples is 35.6. Lone-mother household heads are, on average, 39.5 years old, while their non-head counterparts are 28.7 years old, on average. The youngest child (within the household) of the former is around 7 years old and her oldest child (within the household) is around 12 years old, on average. Non-household-head mothers have younger children in their home, with the youngest child being approximately 5 years old and the oldest around 7 years old. Lone mothers' marital status is fairly evenly distributed. Slightly more than one-quarter are single, never married. Approximately 31 percent are married (spouse absent). Another 25 percent are either divorced or separated, and the rest (16 percent) are widowed. Non-household-heads have higher rates of being single (never married). Over 80 percent of lone mothers have not completed a secondary education, and half of those having completed less than a primary education. Only 3

percent of lone mothers have completed college. Additionally, over half of all lone mothers are employed, with approximately 60 percent in the labor force.

Table 3.4-Descriptive Statistics (Full Sample) by Headship Status, 1970 to 2000

	All Lone Mothers		Lone-Mother Heads		Lone-Mother Non-Heads	
	Mean or (%)	SD	Mean or (%)	SD	Mean or (%)	SD
<i>Age Variables</i>						
Age	35.6	11.1	39.5	10.5	28.7	8.7
Age of youngest child	6.8	5.5	8.1	5.6	4.5	4.5
Age of oldest child	11.7	8.2	14.6	7.8	6.6	6.0
<i>Marital Status</i>						
Single	28.2	45.0	16.6	37.2	48.4	50.0
Married	30.8	46.1	33.4	47.2	26.1	43.9
Divorced or Separated	25.2	43.4	27.8	44.8	20.4	40.3
Widowed	15.9	36.6	22.2	41.5	5.0	21.9
<i>Type of marriage</i>						
Polygamous Marriage	1.9	13.6	2.6	16.0	.6	7.7
<i>Education</i>						
Less Than Primary	41.0	49.2	44.9	49.7	33.9	47.3
Primary	40.8	49.1	37.0	48.3	47.4	49.9
Secondary	15.2	35.9	14.6	35.3	16.4	37.0
Tertiary	3.0	17.2	3.5	18.3	2.3	15.1
<i>Work</i>						
Employed	54.8	49.8	59.2	49.1	47.3	49.9
Unemployed	4.7	21.1	3.6	18.5	6.6	24.8
Not in Labor Force	40.6	49.1	37.2	48.3	46.1	49.8
N	1,081,022		689,051		391,971	

Note: Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Perhaps the most interesting, or thought provoking, result of these descriptive statistics is the large share of lone-mother families defined by married mothers (31

percent) for whom a spouse was absent during the census interview. While the data do not describe the reason for the spouse's absence, migration for work is a plausible explanation for many families. The vulnerability of these families is unclear. If the spouse is absent but sending back regular remittances that provide economic support for the family, then female-headed lone-mother family households where the father is absent might be better off than other lone-mother families. However, if the father is absent and is not sending back remittances or providing some type of support, that is if he has abandoned his wife and children, then these mothers and their families could be facing additional economic vulnerabilities than are their counterparts.

The results of the logistical regressions on the probability of being a household head, conditional on being a lone mother, are the following. *Model One* and *Model Two* from Table 3.5 show that country or societal norms alone are not driving the probability of lone mothers being a household head, as the R squared statistics are very low (0.066 and 0.068, respectively). *Model Three* and *Model Four* (Table 3.6) indicate that the probability of being a household head is associated with age, marital status, education, work, and location. Year and country fixed effects are included in the regressions. Country-level coefficients can be found in Table 3.7. The results show that lone-mothers who are household heads tend to be older and have older children than those who are not household heads. They are also more likely to be divorced, separated, or widowed than non-heads and have higher levels of education. They are also much more likely to work (49.5 percent more likely) than non-heads.

Table 3.5- Binary Logistical Regression (Full Sample) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), Models One and Two, 1970 to 2000

	Model One	Model Two
	Exp( $\beta$ )	Exp( $\beta$ )
<i>Country (Reference: France)</i>		
Argentina	.208 ***	.215 ***
Brazil	.278 ***	.295 ***
Chile	.148 ***	.154 ***
China	.567 ***	.624 ***
Colombia	.183 ***	.188 ***
Costa Rica	.203 ***	.211 ***
Ecuador	.215 ***	.225 ***
Greece	.466 ***	.473 ***
Hungary	3.783 ***	3.986 ***
Kenya	.350 ***	.390 ***
Malaysia	.193 ***	.216 ***
Mexico	.276 ***	.298 ***
Panama	.170 ***	.180 ***
Portugal	.385 ***	.424 ***
Romania	.278 ***	.310 ***
Spain	.527 ***	.586 ***
Uganda	.273 ***	.305 ***
Venezuela	.182 ***	.190 ***
Vietnam	.376 ***	.421 ***
United States	.517 ***	.543 ***
<i>Decade (Reference: 1970)</i>		
1980		.805 ***
1990		.757 ***
2000		.796 ***
Nagelkerke R Square	0.066	0.068
N	1,215,347	1,215,347

Notes: Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Table 3.6- Binary Logistical Regressions (Full Sample) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), Models Three and Four, 1970 to 2000

	Model Three	Model Four
	Exp( $\beta$ )	Exp( $\beta$ )
<i>Decade (Reference: 1970)</i>		
1980	.901 ***	.899 ***
1990	.892 ***	.891 ***
2000	.933 ***	.934 ***
<i>Age Variables</i>		
Age	1.148 ***	1.131 ***
Age Squared	.999 ***	.999 ***
Age of Youngest Child	.881 ***	.872 ***
Age of Youngest Child Squared	1.003 ***	1.003 ***
Age of Oldest Child	1.214 ***	1.217 ***
Age of Oldest Child Squared	.997 ***	.997 ***
<i>Marital Status (Reference: Single, Never Married)</i>		
Married	2.360 ***	2.495 ***
Divorced or Separated	2.189 ***	2.152 ***
Widowed	3.276 ***	3.357 ***
<i>Type of marriage</i>		
Polygamous Marriage	1.471 ***	1.471 ***
<i>Education (Reference: Less Than Primary)</i>		
Primary	1.056 ***	1.013 **
Secondary	1.129 ***	1.027 ***
Tertiary	1.423 ***	1.228 ***
<i>Work (Reference: Not in Labor Force)</i>		
Employed		1.495 ***
Unemployed		0.978 *
Nagelkerke R Square	0.450	0.451
N	1,084,545	1,071,519

*Notes:* Model includes country-level fixed effects (country coefficients found in Table 3.7). Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

Table 3.7-Country Coefficients for Binary Logistical Regression (Table 3.6) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), Models Three and Four, 1970 to 2000

	Model Three	Model Four
	Exp( $\beta$ )	Exp( $\beta$ )
<i>Country (Reference: France)</i>		
Argentina	.165 ***	.175 ***
Brazil	.205 ***	.206 ***
Chile	.122 ***	.133 ***
China	.370 ***	.322 ***
Colombia	.144 ***	.153 ***
Costa Rica	.181 ***	.193 ***
Ecuador	.169 ***	.185 ***
Greece	.255 ***	.273 ***
Hungary	3.346 ***	2.845 ***
Kenya	.523 ***	.460 ***
Malaysia	.089 ***	.090 ***
Mexico	.164 ***	.169 ***
Panama	.126 ***	.138 ***
Portugal	.258 ***	.256 ***
Romania	.179 ***	.184 ***
Spain	.405 ***	.440 ***
Uganda	.287 ***	.269 ***
Venezuela	.139 ***	.147 ***
Vietnam	.221 ***	.200 ***
United States	.580 ***	.629 ***

*Notes:* Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)



Surprisingly, such a simple regression analysis controlling only for core demographic variables and year and country fixed effects, explains almost half of the variation in determining whether or not a lone mother is a household head (R-squared coefficients are 0.450 and 0.451, respectively). Given that the R-squared coefficient was low in models with just country-level dichotomous variables, the increase implies that the ability to determine the headship status of a lone-mother is relatively straightforward and depends much more on her age, the demographics of her children, marital status, education, and employment status, than among country differences or societal expectations (among other things). Knowing this might help researchers understand the ways in which previous research results analyzing female-headed households might be biased or incomplete.

Next, a similar analysis is conducted on 15 countries that adds an explanatory variable indicating whether the mother lives in an urban area. Table 3.8 provides descriptive statistics for this sample, which do not vary greatly from the descriptive statistics of the larger sample in Table 3.4. Tables 3.9 thru 3.11 report the regression results. *Model One* thru *Model Four* replicate the previous models for comparative purposes. When compared to the previous estimates, the coefficients and their significance for the age variables, marital status, type of marriage, education, and work do not change much.

Table 3.8-Descriptive Statistics (Urban Indicator Sample) by Headship Status, 1970 to 2000

	All Lone Mothers		Lone-Mother Heads		Lone-Mother Non-Heads	
	Mean or (%)	SD	Mean or (%)	SD	Mean or (%)	SD
<i>Decade</i>						
1970	12.0	32.5	12.5	33.0	10.5	30.6
1980	17.3	37.8	16.0	36.7	19.4	39.5
1990	34.9	47.7	35.6	47.9	33.9	47.3
2000	35.9	48.0	35.9	48.0	36.3	48.1
<i>Age Variables</i>						
Age	35.4	11.3	39.7	10.7	28.7	8.7
Age of youngest child	6.6	5.5	8.0	5.6	4.5	4.5
Age of oldest child	11.7	8.3	14.9	7.9	6.7	6.0
<i>Marital Status</i>						
Single	29.4	45.6	16.8	37.4	49.5	50.0
Married	30.3	46.0	33.7	47.3	24.8	43.2
Divorced or Separated	24.1	42.8	26.3	44.0	20.6	40.5
Widowed	16.2	36.8	23.2	42.2	5.1	22.0
<i>Type of marriage</i>						
Polygamous Marriage	2.6	15.8	3.7	18.9	.8	8.7
<i>Education</i>						
Less Than Primary	43.8	49.6	49.5	50.0	34.2	47.4
Primary	41.2	49.2	36.9	48.3	48.4	50.0
Secondary	12.4	33.0	10.7	31.0	15.2	35.9
Tertiary	2.6	15.8	2.8	16.6	2.2	14.6
<i>Work</i>						
Employed	55.7	49.7	60.2	48.9	48.8	50.0
Unemployed	5.0	21.9	3.7	18.8	7.3	26.0
Not in Labor Force	39.3	48.8	36.1	48.0	44.0	49.6
N	807,536		497,166		310,370	

Note: Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Table 3.9- Binary Logistical Regression (Urban Indicator Sample) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), Models One and Two, 1970 to 2000

	Model One	Model Two
	Exp( $\beta$ )	Exp( $\beta$ )
<i>Country (Reference: France)</i>		
Argentina	0.196 ***	0.225 ***
Brazil	0.278 ***	0.304 ***
Chile	0.148 ***	0.158 ***
Colombia	0.183 ***	0.191 ***
Costa Rica	0.203 ***	0.219 ***
Kenya	0.350 ***	0.409 ***
Malaysia	0.193 ***	0.226 ***
Mexico	0.276 ***	0.310 ***
Panama	0.170 ***	0.187 ***
Portugal	0.385 ***	0.445 ***
Romania	0.278 ***	0.325 ***
Uganda	0.273 ***	0.319 ***
Venezuela	0.175 ***	0.202 ***
Vietnam	0.376 ***	0.440 ***
<i>Decade (Reference: 1970)</i>		
1980		0.718 ***
1990		0.687 ***
2000		0.700 ***
Nagelkerke R Square	0.041	0.045
N	931,420	931,420

*Notes:* Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

Table 3.10- Binary Logistical Regression (Urban Indicator Sample) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), Models Three and Four, 1970 to 2000

	Model Three	Model Four	Model Five
	Exp( $\beta$ )	Exp( $\beta$ )	Exp( $\beta$ )
<i>Decade (Reference: 1970)</i>			
1980	0.808 ***	0.799 ***	0.794 ***
1990	0.838 ***	0.833 ***	0.833 ***
2000	0.820 ***	0.819 ***	0.815 ***
<i>Age Variables</i>			
Age	1.149 ***	1.131 ***	1.128 ***
Age Squared	0.999 ***	0.999 ***	0.999 ***
Age of Youngest Child	0.880 ***	0.871 ***	0.868 ***
Age of Youngest Child Squared	1.003 ***	1.004 ***	1.004 ***
Age of Oldest Child	1.213 ***	1.216 ***	1.219 ***
Age of Oldest Child Squared	0.997 ***	0.997 ***	0.997 ***
<i>Marital Status (Reference: Single, Never Married)</i>			
Married	2.327 ***	2.478 ***	2.470 ***
Divorced or Separated	2.245 ***	2.217 ***	2.198 ***
Widowed	3.343 ***	3.443 ***	3.479 ***
<i>Type of marriage</i>			
Polygamous Marriage	1.472 ***	1.471 ***	1.475 ***
<i>Education (Reference: Less Than Primary)</i>			
Primary	1.072 ***	1.028 ***	0.984 **
Secondary	1.154 ***	1.048 ***	0.989
Tertiary	1.488 ***	1.283 ***	1.200 ***
<i>Work (Reference: Not in Labor Force)</i>			
Employed		1.492 ***	1.470 ***
Unemployed		0.937 ***	0.912 ***
<i>Geography</i>			
Lives in Urban Area			1.261 ***
Nagelkerke R Square	0.451	0.455	0.456
N	806,116	801,280	791,146

Notes: Model includes country-level fixed effects (country coefficients found in Table 3.11). Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

Data Source: IPUMS-International (Minnesota Population Center 2008)

Table 3.11-Country Coefficients for Binary Logistical Regression (Table 3.10) of Lone Mother Headship Status on Relevant Characteristics (Odds Ratios), 1970 to 2000

	Model Three	Model Four	Model Five
	Exp( $\beta$ )	Exp( $\beta$ )	Exp( $\beta$ )
<i>Country (Reference: France)</i>			
Argentina	0.180 ***	0.190 ***	0.190 ***
Brazil	0.212 ***	0.212 ***	0.209 ***
Chile	0.125 ***	0.136 ***	0.136 ***
Colombia	0.148 ***	0.156 ***	0.156 ***
Costa Rica	0.190 ***	0.202 ***	0.212 ***
Kenya	0.567 ***	0.493 ***	0.570 ***
Malaysia	0.093 ***	0.093 ***	0.099 ***
Mexico	0.171 ***	0.174 ***	0.177 ***
Panama	0.131 ***	0.143 ***	0.152 ***
Portugal	0.269 ***	0.266 ***	0.283 ***
Romania	0.183 ***	0.188 ***	0.200 ***
Uganda	0.322 ***	0.298 ***	0.342 ***
Venezuela	0.146 ***	0.152 ***	0.150 ***
Vietnam	0.231 ***	0.208 ***	0.235 ***

*Notes:* Statistical significance levels: \* =  $p < 0.10$ , \*\* =  $p < 0.05$ , and \*\*\* =  $p < 0.01$ . Sample weights applied.

*Data Source:* IPUMS-International (Minnesota Population Center 2008)

Adding urban to the analysis (Table 3.10), while creating minor differences in the coefficient sizes, provides no large scale changes in the direction or significance of the other explanatory variables. The additional information gathered from adding the urban status variable is that lone-mother household heads are around 26 percent more likely to live in an urban setting than in a rural setting. This result, while highlighting an issue of urban and rural diversity in lone-mother families, should come as no surprise. Rural areas have less resources and available housing for lone-mother families to live on their own. Poverty is also more pronounced in rural settings; perhaps driving a need for lone-mother families to live with extended family members instead of as an independent household. Finally, living in urban settings frequently takes place because individuals move away from their extended family networks in search of better employment opportunities. Whether lone mothers move to an urban area with their children in search of a better life via improved employment opportunities or whether one becomes a lone mother after transitioning to an urban location, without her extended family within close proximity, one would expect a female-headed household would be more likely to arise in an urban setting.

The general results of these regression analyses are not surprising. When considering the vulnerability of lone-mother families, those women considered most vulnerable to poverty and other social ills, single, never married young mothers with young children who are not in the labor force, generally tend to live within an extended family member's household. Whether this additional family support is improving the welfare and wellbeing of her family is a question not addressed by this analysis because

of data limitations. But, at a minimum, living with other relatives preliminarily suggests that these mothers are less vulnerable to poverty.

### *Limitations*

While these findings shed light on an important issue, there are limitations to consider regarding the analysis conducted in this chapter. First, family interrelationship variables constructed by the IPUMS-International project were used in this analysis to identify lone mothers. These variables identify familial relationships within the household for each household member. To the extent that the family interrelationship variables do not accurately reflect true relationships within the household, this has the potential to bias the results presented here, leading to potentially inaccurate conclusions.<sup>43</sup>

A follow-up study should be conducted comparing IPUMS-I family interrelationship variables with reported subfamily relationship variables found in household survey data. A feasible study of this type would be to compare the Chilean National Socioeconomic Household Survey (CASEN) data with the IPUMS-I Chilean census data. CASEN data collects true subfamily relationships within the dataset, and this could be compared to the relationship variables in IPUMS-I census data for Chile to check for accuracy.

The main intent of this chapter is to address issues of mismeasurement regarding lone-mothers. An additional analysis was conducted attempting to identify explanatory

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<sup>43</sup> More information about how the pointer variables are constructed can be found at [www.international.ipums.org](http://www.international.ipums.org).

characteristics that predict whether a lone-mother will be a household head. In reality, decisions about family living arrangements and cohabitation are much more complex. They are driven not only by individual preferences, but also by societal and cultural norms, geographic proximity, and availability of resources. To the extent that headship influences decisions regarding work, educational attainment, and geographic location, the results of this analysis should be interpreted with caution. At most, a claim can be made that there is an association between these variables and the probability of a lone mother being a household head. A next step in understanding the complexities of lone mothers and headship status should be to conduct a non-parametric comparison of characteristics between lone mothers living with extended family members and lone-mother household heads, in order to better understand how these two populations might differ.

### *Conclusion*

In conclusion, this analysis sheds light on a key measurement issue. Lone-mother families are not only families led by female-headed household mothers. They are very diverse. The definition of lone-mother families includes any and all families where minor children are present and the father is absent. This includes subfamily units within a larger extended family household, married mothers whose husbands are absent from the home, and widows. This chapter has shown that when using female-headed households as a unit of analysis, lone mothers and their families are consistently underreported around the world.



The fact that lone mothers are potentially undercounted when female-headed households are used as a proxy is of concern. But, if the characteristics of lone mothers who are household heads are not different from those of their non-head counterparts, then it does not matter that lone-mother families are mismeasured. The results presented here present preliminary evidence that the characteristics of lone-mother household heads are different from lone mothers living with extended family members. Lone mothers living with extended family members tend to be younger, to have younger children at home, to be single (never married), to have only a primary or secondary education, and to not be in the labor force. Lone-mother families living with extended family members tend to be the mothers whom development economists and policy analysts are most concerned about, especially when conducting research and implementing policies and poverty alleviation programs for this vulnerable group. If the measurement of the unit of analysis is inaccurate and the characteristics of those actually measured vary significantly from those not included in the analysis, research results could be misleading, which could lead to implementing ineffective programs.

The first step in correcting this measurement problem is to improve the measure. Household surveys and censuses should clearly identify all subfamilies within a household, based on familial relationships and not solely on the economic division of resources. Once data on household subfamilies are readily and consistently available, researchers can have a better understanding of the true vulnerability of lone-mother families. They might find that lone-mother families are not as vulnerable as once thought because they are able to depend heavily on their extended families, at least for a short

period of time. They might also find that lone-mother families are more vulnerable than originally thought. If lone-mothers living with extended family kin were unable to rely on them, the risk for lone-mothers of falling into poverty or experiencing other social hardships would be even more severe. What is clear at this point is that improved measurement must be the first step.

## **Chapter 5-Conclusion**

Families are an integral piece of the development process. Family instability, the way in which families configure their households, and household behavior are all connected to development topics, such as health, education, poverty status, and wellbeing. This dissertation delves into topics that intersect family economics, demographic economics, economic development, and policy analysis. It analyzes the relationship between marital instability, economic opportunity, and economic development. It identifies the effect of divorce policy on intrahousehold allocation decisions. And, finally, it uncovers a common measurement issue in studies of lone-mother families. These are only a few of the numerous topics of interest for research in this area, but they highlight major issues, uncover previously unknown results, and advance the literature in family economics, demographic economics, economic development, and policy analysis.

All three chapters have important and relevant findings. Chapter one provides evidence supporting the hypotheses that when women have more economic opportunities, either there is less incentive to remain married or those who are already in unhappy marriages finally accrue the resources to leave the marriage. It also shows a positive association between economic development indicators and marital instability. Chapter two is the first study available identifying the effects of the legalization of divorce on household behavior, showing that when a pro-homemaker divorce policy is implemented, households invest more in resources that homemakers (the vast majority of whom are women) value. The most interesting result of this chapter is the finding that social

policies not explicitly intended to advance economic development can do just that. This has important policy implications because implementing social policies has the potential to be less costly than implementing new development programs. Chapter three reminds researchers to proceed with caution when analyzing lone-mother families. Depending on their extended family environment, they might not be as vulnerable as many have thought. This last chapter highlights the importance of data collection. In order to accurately research the current situation of lone-mother families, data must be collected on all subfamilies and subfamily relationships within the household.

In conclusion, while these three chapters may, at face value, seem to have little in common, I argue that they are intricately linked. While this dissertation has shown that trends in marital instability are associated with economic opportunity and economic development, it is also true that an individual's ability to divorce or separate also depends on the ease or difficulty of divorce and separation created by marriage and divorce laws. While Chapter two shows that divorce laws influence household behavior of married parent families, it is also true that shifts in household investments are likely to occur once a married couple divorces or separates, although data available were not sufficient to conduct that type of analysis. Finally, this dissertation has shown that lone-mother families who are household heads are more likely to be women who are divorced or separated than single, never married women. Therefore, the female-headed lone-mother families analyzed in Chapter three are likely to be many of the same divorced and separated women analyzed in Chapter one.

There is no doubt that more research needs to be done in this area. Understanding the relationship between families, marital instability, and development is an important task for future economic research. Advances in this literature will better prepare policy makers and development economists to plan and foster future improvements in development around the globe. Finding policies that improve family life and create incentives for families to invest more in their members' health, education, and wellbeing, may have a much stronger effect on reducing poverty and advancing development than the creation of any new poverty alleviation or development program. Continued efforts should be made to advance the research in this area even further. The research presented in this dissertation is only the beginning.

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