Essays in Family Economics

by

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Dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in the Department of Economics
in the Graduate School of Duke University
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Abstract

This dissertation considers how families affect economic decisions across two different settings. In Chapters 2 and 3, I use data from Indonesia to understand the role that flexibility plays in job choice for women and how it interacts with roles as caretakers. These chapters take different approaches to the same broad set of questions. In Chapter 2, I ask whether the cost of temporal flexibility varies between wage employment and self-employment, especially for mothers. I find all women are willing to give up a portion of their wage rate to work fewer hours and have more flexible hours. However, the cost to women of fewer hours and more flexible hours varies by whether a woman is self-employed or wage employed and whether she has children. All self-employed women and wage-working mothers are willing to give up more than 10% of their wages for a 10% increase in flexibility but the trade-off is steeper for mothers in wage employment than in self-employment. In Chapter 3, I use qualitative in-depth interviews to better understand the nuances that go into work decisions for both women and men and how these choices affect and are affected by their children. This study echoes the first in that women often discussed the importance of flexibility in their work arrangements, in particular to their choices in self-employment. These findings have implications for policies and programs designed to foster entrepreneurship in developing countries. Chapter 4 asks questions about how parents provide for children – albeit in a very different context. Using panel data from the United States, the paper examines the influence

of parental wealth and income on children's college attendance. It further considers parental financing decisions, children's graduation, the quality of college attended, and whether parental financing affects the subsequent indebtedness of parents and children. Higher levels of parents' wealth and income increase the likelihood that children attend college with financial support relative to not attending college. Parental wealth furthermore increases the likelihood that children graduate from college. Finally, we show descriptive evidence that parental support for college increases the subsequent level of housing debt that parents hold but does not reduce student debt for children.

To Mark, my love

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1

Introduction

When attempting to understand economic decisions early economists almost uniquely considered a unitary man but not the rest of his household. Beginning in the 1950's with Mincer and continuing with Becker (1960, 1965, 1976), the study of economics began to include the study of not just a unitary man but his spouse and children, too. Since then there as been immense growth in this area of economic study and now a vast literature about the importance of households and families exists.[1] Economics now takes seriously how canonical models of economic decision making may change when interacted with models of household decision making and the needs of family. At the heart of these insights is the fact that is it almost impossible to understand the economic optimization problem of agents without considering that agent's family and the deeply interdependent decisions they make.

Parents, in particular, optimize not just over their own personal welfare but that of their children. They act to aid and enable their children's development in myriad ways both rational and altruistic. This fact is no less important to understanding

[1]For limited examples of this broad literature see: McElroy and Horney (1981a), Lundberg and Pollak (1993), and Chiappori et al. (1988).

economic decisions for being obvious. This dissertation deliberately considers this phenomenon as a starting place to understanding complex problems of economic optimization; namely, labor market engagement choices and educational financing. The first two chapters consider the differential role women often take when it comes to child rearing and care how it affects the degree and manner to which they engage in the labor market. The third chapter considers the choices that parents make in whether and how to finance their children's education and the impact these decisions have children's educational outcomes and both parties subsequent debt. They are united by the acknowledgment that to consider any of these problems without deliberate consideration of the family would be to fundamentally misunderstand the economic problem at hand.

Families are documented to pay particularly important roles in the economic decisions of women, especially mothers, which tend to be are highly dependent on the demands of the household, specifically, children.[2] Women who balance household duties such as childcare and the potential to support their family financially face trade-offs between the hours spent in income generating activities and in home work. Chapters 2 and 3 of this work consideration these trade-offs with special attention paid to the role that self-employment can play in this dynamic. They consider the context of Indonesia, a setting in which women both play traditional roles but are also economically active. It is also a setting in which self-employment plays a prominent and economically important role. Chapter 2 I ask whether working hours and temporal flexibility are more or less costly in self-employment than wage employment, especially for mothers. I use household and labor market data from Indonesia to account for sorting between self-employment, wage work, and home work, and estimate their associated wages, hours, and flexibility. I find that all

[2]See Baker, Gruber, Milligan (2008), Bertrand, Goldin, Katz (2010), Lachance-Grzela and Bouchard (2010), and Anderson, Binder, Kraus (2002) among others.

women need additional marginal wages to induce more work hours, but that self-employed women need less inducement than wage-employed women, while mothers need more. In other words, in utility terms, hours are less costly in self-employment than in wage employment and more costly for mothers than for non-mothers. I also find that women value temporal flexibility and are willing to give up significant portions of their wage rate for increased flexibility, but that this trade-off is steeper for mothers in wage employment than in self-employment.

Chapter 3 asks the same two questions: do women value flexibility and do they use self-employment to access it? However, it takes a different approach to answering these questions. Using fifty in-depth qualitative interviews with Indonesian men and women, I find that women, in particular, pay close attention to the impact their work has on their capacity to care for their children. They discussed a desire to be primarily caretakers but to also create extra security through labor market activity. In particular, many of them use in the inherent flexibility of self-employment to accommodate the needs of their families while also working. This work complements the findings in Chapter 2 and adds nuance to the narrative told there. It is important to consider this dual goals, caretaking and working, when considering the many programs aimed at entrepreneurial women. If these programs designed to increase business returns do not appreciate the full utility maximization problem women are facing they risk targeting the wrong constraints to meet their goals.

Finally, Chapter 4 considers the role of parental wealth and income on children's college attendance, outcomes, and financing choices in the United States. This work is joint with V. Joseph Hotz, Emily Weimers, and Joshua Rasmussen.[3] Using the

[3]The majority of data cleaning and sample creation was handled by Joshua Rasmussen. I significantly revised the data and together with Joshua we undertook all of the empirical exercises. I integrated all of the secondary data. Joe and Emily were responsible for the initial writing which was revised by me for the purposes of this dissertation. The strategy, model decisions, and direction of the paper was jointly decided.

Panel Study of Income Dynamics, we ask how parental wealth and income affect first children's college attendance and financing decisions finding that higher levels of parents' wealth and income increase the likelihood that children attend college with financial support relative to not attending college. However, it is also important to consider the ultimate outcomes of these decisions – namely the educational outcomes like graduation and college quality but also the subsequent indebtedness of both the parents and children. We show that parental wealth increases the likelihood that children graduate from college and descriptive evidence that parental support for college increases the subsequent level of housing debt that parents hold but puzzlingly does not reduce student debt for children. This is important to consider in light of the increasing cost of college and the important role it plays on children's eventual outcomes.

2

Motherhood, Self-Employment, and the Cost of Flexibility

2.1 Introduction

Labor market decisions for women, especially mothers, are highly dependent on the demands of the household, specifically, children.[1] Women who balance household duties such as childcare and the potential to support their family financially face trade-offs between the hours spent in income generating activities and in home work. In particular, there is evidence that workers, especially women, value flexibility in work arrangements (Goldin (2014), Goldin and Katz (2011, 2016), Liu (2016), Pallais and Mas (2017)). Several studies have found the penalties to flexibility higher in self-employment than in wage employment (Goldin and Katz (2011, 2013)), yet these studies have focused exclusively on developed countries. The cost of flexibility in a developing-country context is unclear.

Self-employment is often very different in developing contexts than the entrepreneurs that Goldin and Katz (2011, 2016) discuss. Indeed, up to 50% of individuals are self-

[1]See Baker, Gruber, Milligan (2008), Bertrand, Goldin, Katz (2010), Lachance-Grzela and Bouchard (2010), and Anderson, Binder, Kraus (2002) among others.

employed in some sense in developing contexts, and their businesses tend to have low returns and remain small scale (Gindling and Newhouse, 2014). In Indonesia, the context for this study, there are high levels of informality, especially for women (World Bank, 2013). Women in this population are the target of a myriad of development programs that aim to increase the returns to their enterprises, yet it is important to understand how women make decisions about time investment in their businesses and time spent raising their children.

In this paper, I ask whether working hours and temporal flexibility are more or less costly in self-employment than wage employment, especially for mothers. I use household and labor market data from Indonesia to account for sorting between self-employment, wage work, and home work, and estimate their associated wages, hours, and flexibility. I allow for work-specific sources of observed and unobserved sources of heterogeneity in women's preferences for sector-specific job characteristics. I find that all women need additional marginal wages to induce more work hours, but that self-employed women need less inducement than wage-employed women, while mothers need more. In other words, in utility terms, hours are less costly in self-employment than in wage employment and more costly for mothers than for non-mothers. I also find that women value temporal flexibility and are willing to give up significant portions of their wage rate for increased flexibility, but that this trade-off is steeper for mothers in wage employment than in self-employment. Self-employed women and mothers are all willing to give up more than 10% of their wages for a 10% increase in flexibility. Specifically, I estimate that self-employed mothers would take a wage cut of one third to work one fewer day per week over a working year.

This paper contributes to several literatures. First, I contribute to the literature on women's labor market choices and flexibility establishing the cost of flexibility in Indonesia, a developing country with different institutional features than the devel-

oped countries used in previous work. Second, I differentiate between wage employment and self-employment and find differences in the trade-offs faced by women in these sectors. I also contribute to a literature detailing the nature of and outcomes of the self-employed in developing countries. I provide more evidence on sources of sorting by considering wage-working women's outcomes alongside self-employed women. I also contribute to the insights documented in Bernhardt et al. (2016), who seek to understand the importance of the household in entrepreneurial outcomes in developing countries. My results may suggest one reason why studies have found that female-run businesses have lower returns than male-run businesses, and they may have implications for future field and survey work as well as policy.

In Section 2.2 I further discuss the literature on women's labor market demand for flexibility and the literature on self-employment in developing contexts. Section 2.3 details the empirical context and data for this study. Section 2.4 covers the motivating descriptive exercises and defines temporal flexibility in this study. Section 2.5 presents a multi-sector choice model in which job choice is a function of characteristics and preferences. Section 2.6 discusses the generalized Roy model approach, which is used to estimate the model. Section 2.7 presents results and willingness-to-pay parameters. Section 2.8 discusses the implications and limitations of this work.

2.2 Literature

Labor market decisions for women, especially mothers, are highly dependent on the demands of the household, specifically, children. Across levels of development and education, women are responsible for the majority of childcare and household duties, even as their earning potential increases (Lachance-Grzela and Bouchard, 2010). The decision of how and how much to participate in the labor market must

balance with the family's income, demands of childrearing, availability of help, and other factors. Women commonly exit the labor force or decrease their hours once they bear children (Lundberg and Rose (2000), Baker, Gruber, and Milligan (2008)). Women who stay in the labor force often face wage gaps compared to non-mothers (Anderson, Binder, Kraus, 2002).

Women's labor market choices involve the structure of the job, and in particular, its flexibility (Goldin, 2014). Amenities or "various aspects of workplace flexibility," as Goldin (2014) refers to them, matter especially for women, yet, flexibility is associated with lower earnings or a "penalty" (See also: Goldin, Bertrand, and Katz (2010), Goldin and Katz (2011)). Liu (2016) finds that preferences for part-time work increase after children among women but not men, and notes that this explains part of the gender wage gap. Mas and Pallis (2017) find that individuals will accept lower wages for more flexible work arrangements and that women are more likely to select flexible work arrangements than men.

The desire for flexibility is common amongst workers, and entrepreneurs often cite this as a positive quality of the nature of their work (Hamilton (2000), Hurst and Pugsley (2010)). This interacts with other sources of selection; previous research in developed countries has established that women select into entrepreneurship differently and this, in part, may be driven by household considerations (Boden (1999), Jennings and McDougald (2007), Fairlie and Robb (2009), Williams (2004)). There is relatively little attention paid to the effect of children or desire for flexibility in direct comparison to wage employment When explicitly considered the penalties to flexibility have been found to be higher in self-employment than wage employment (Goldin and Katz (2011), Goldin and Katz (2016)). However, these studies focus exclusively on developed countries and high-powered professions. How the cost of flexibility varies outside these specific settings is unknown.

Developing countries are a natural and important context to consider this question. The rate of self-employment in developing countries is very high. Indeed, up to half the population is self-employed in some sense (Gindling and Newhouse, 2014), and an increasing number of these individuals are women (World Bank, 2013). What is well established in this context is that entrepreneurs are extremely heterogeneous in terms of both observable and unobservable characteristics and that they tend to be small-scale with low returns. In spite of that fact, there is mixed evidence on interventions to increase returns, especially for women (McKenzie et al. (2008), Fafchamps et al., (2014), McKenzie and Woodruff (2013), Karlan, Knight, and Udry (2012)). In spite of evidence of constraints around financing, capital, or training, interventions to alleviate these constraints do not show clear results across entrepreneurs.

Yet, much of this work abstracts from household considerations when considering the employment decision, in spite of the importance of households to labor supply decisions[2]. Falco and Quinn (2010) point to households as a potentially important source of heterogeneity in the self-employed that is often unobserved. One study that addresses the importance of household is Field et al. (2016), which helps to explain some of the mixed experimental results by showing that business aid flowed to higher return, male-run businesses within households; however, as the authors note, why female-run businesses have lower returns is an open question. Furthermore, the population in many of these studies focuses on individuals who already selected into self-employment, which tells us little about how trade-offs may differ in wage work. Blattman and Dercon (2015) try to address this issue by randomizing industrial job offers, cash grants, and business training in Ethiopia. They found high turnover and evidence that nonwage aspects of jobs may be important, especially to women.

[2]Singh (1986), Strauss and Thomas (1995).

Women may be sorting into entrepreneurship as a way of balancing family and income, and thus entrepreneurial activities may represent a marginal form of labor market participation for women for whom childrearing is a primary responsibility and priority. This changes the fundamental nature of their businesses and their goals, yet is often unacknowledged in the myriad of development programs that focus on access to finance, capital, and business training for the self-employed. My work applies insights from the literature on women's labor market choices in the tradition of Goldin and Katz to better understand this sorting.

2.3 Empirical Context

The empirical context for this study is Indonesia, a country where entrepreneurship plays a significant economic role and women are increasingly found amongst the self-employed (World Bank, 2013). In Indonesia, women also still adhere to traditional gender roles, especially in rural areas. Using the Indonesian Family Life Survey (IFLS) and focusing on married women, I am able to observe labor market choices and family composition.

2.3.1 Indonesia & IFLS

Indonesia is the world's fourth most populous country, and in recent years it has experienced robust economic growth.[3] In 2004, Indonesia achieved middle-income status, and although Indonesia is a quickly developing country, it is also one in which women still play largely traditional gender roles, especially in rural areas. Women participate in the labor force at a rate of 51%, which is low compared to

[3]The exception of the 19971998 Asian financial crisis, which placed Indonesia's economy in turmoil. For more information on the effects of the Financial Crisis, see Thomas and Frankenberg, (2000).

other countries at similar level of development[4] as a result of marriage, children, and relatively low educational attainment (Asian Development Bank, 2016). While fertility rates are decreasing and age of first marriage is increasing, labor market engagement and outcomes are very much segregated by gender (Utomo, 2016). The 2010 National Socioeconomic Survey indicates that in 57% of married couples the husband primarily works and the wife is primarily responsible for housekeeping, while only 33% of couples indicate that both primarily work. Qualitative interviews with a wide cross-section of Indonesians of both genders confirm these patterns with women in all sectors indicating that childcare is a primary priority.[5] This presents an opportunity to consider women's labor market choices in a context in which women do have choices over their labor market decisions but may also feel constrained by home demands.

Entrepreneurship features prominently in the economy of Indonesia with micro, small, and medium enterprises contributing 47% of GDP and employing 57% of the population (World Bank, 2014). Fostering entrepreneurship has increasingly become a focus of governmental and international programs in Indonesia, particularly for women. The Indonesian government's Mid-term Development Plan (RPJMN 20152019) discusses the importance of micro, small, and medium enterprises (MSMEs) to Indonesia. In particular, women are a substantial and growing segment of this population, but their businesses tend to be smaller and less productive (World Bank, 2014). Women own half of MSMEs in Indonesia and 23% of small and medium enterprises (SMEs) (Asia Foundation, 2013). Using 21 years of labor market data, the Asian Development Bank (2016) finds that the presence of children is important to women's labor market participation and selection into en-

[4]Vietnam's female labor force participation rate is 73% and Thailand's is 64% (Asian Development Bank, 2016).

[5]See the Chapter 3 for further details on qualitative field work.

trepreneurship; however, the nature of female entrepreneurship varies compared to male entrepreneurship, with women's businesses being smaller scale and less formal than men's businesses (Asian Development Bank, 2016).

This study takes advantage of the Indonesian Family Life Survey (IFLS), a panel survey that begins in 1993 with waves in 1998, 2001, 2007, and 2014. It began with 7,000 households and 22,000 individuals and followed households and their split off households over time. The full span of the waves ultimately covers 19,000 households and 83,000 individuals. It is representative of 83% of the Indonesian population, with remarkably low attrition rates given the context and span of the data.[6] The retention rates are as high, if not higher, than any longitudinal data set is the U.S. or Europe (IFLS 5, Field Report). Individual household members are asked whether they have been working and have any earnings, regardless of whether they have been working in a wage job, agriculture, self-employment, etc. This allows me to avoid attributing data for enterprise earnings to a named owner or entire household. Moreover, these questions are asked of anyone who did any income earning activity at all, even just a few hours. This allows me to consider even individuals who might primarily be occupied in other tasks such as home work if they earn any income at all over the year. I also observe patterns of labor supply over weeks per year and normal weekly hours, the composition of the household, and pregnancy histories for all women.

2.3.2 Sample & Description

The sample used in this study consists of married women ages 16-56 in the 2000, 2007, and 2014 waves of the IFLS.[7] This is the population for whom the trade-off

[6]Retention rates for all waves are 92-95%.

[7]This avoids direct observation of the 1998 financial crisis, which shocked both real earnings and sector choices (Thomas and Frankenberg, 2000). While the data I use are not free from the influences of this disruption, they are further removed allowing me to consider sorting patterns after this upheaval.

between home work and income generation are of particular interest. This sample largely captures childbearing activity. The rate of marriage is 60% by age 24 for women and 96.2% by age 39 (Himawan et al. 2017). The average birth rate is 2.6 children per woman and the childlessness rate by age 50 is less than 3% with very little child-bearing outside of marriage (Asian Development Bank, 2016). Given that the vast majority of women in my sample have children at some point in the sample, I will primarily use a dummy variable indicating if a woman has her own child under the age of 16 in the household to indicate "motherhood." While this simple measure does not capture all aspects of motherhood it has the advantage of being the most straightforward. Additionally, the patterns found Section 2.4 and the first stages of the model are robust considering the many dimensions of childcare including the number of children and age of the youngest child.

Table 2.1: Sector Counts by Motherhood Status

	No Child	Has Child	All
Wage	1,569	4,097	5,666
	0.26	0.24	0.25
Self-Employed	1,447	3,620	5,067
	0.24	0.21	0.22
Home	3,063	9,142	12,205
	0.50	0.54	0.53
All	6,079	16,859	22,938

Has Child indicates has a child under age 16

Share of women in that sector is included below counts.

I categorize each individual within the sample into a sector: wage, self-employment, or home.[8] Table 2.1 shows the distribution across sectors for the entire sample.[9]

[8]There are also further distinctions between government workers, private workers, and casual workers in agriculture and those outside of it, self-employed with unpaid workers, those without, those with permanent workers, and unpaid workers; however, these categories are simplified for the analysis and results suggest that, although different, little information is lost in the combination.

[9]Sample consists of 13,110 individuals. Of these, 35% are in all three waves, 38% are in at least two, and 26% appear once.

Women are most likely found in the home sector. There are slightly more wage working women that self-employed women. These categories are constructed using data on the primary activity of all respondents at the time of the survey and what they report to be doing for work. If someone participates in an income-generating activity at least one hour per week, that individual is categorized as either wage employed or self-employed based upon their self-reported primary activity.[10] If the individual does not participate in any income generation, either because he or she is not engaged in any labor activity or because he or she is an unpaid worker, that individual is placed in the home sector.[11]

Table 2.2: Sample Means over Sector and Child Status

	Home		**Wage**		**Self-Emp**	
	No Child	Child	No Child	Child	No Child	Child
Individual Characteristics						
Age	38.35	31.83	38.21	33.81	42.61	35.73
Years Work Exp	3.65	2.67	9.85	8.22	10.69	7.33
Education						
Primary	0.58	0.44	0.42	0.32	0.63	0.45
Junior	0.17	0.23	0.12	0.16	0.18	0.21
Senior	0.20	0.27	0.22	0.26	0.16	0.27
Advanced	0.05	0.05	0.24	0.26	0.04	0.07
Household Characteristics						
Num. Adults	4.45	3.76	3.93	3.79	4.32	3.69
Other HH Earnings	8.78	8.87	9.03	9.14	8.87	8.97
Addl Female in HH	0.42	0.35	0.37	0.39	0.42	0.38
H in Wage	0.30	0.44	0.64	0.70	0.36	0.48
Observations	3063	9142	1569	4097	1447	3620

Variables here are used as controls in further work.

I will use control variables through the analysis that account for demographic and

[10]This conservative definition of the home sector is used in part to help pick up on marginal labor market activity; however, results are robust to moving the bottom tail of low-hour workers to the home sector.

[11]Unpaid workers are placed in the home categories for several reasons. First, because they do not earn direct income, so the value of their labor is a contribution to joint production. Second, it ensures uniformity throughout the analysis between labor market outcomes and selection. Third, unpaid workers are more similar to home sector individuals than the self-employed in terms of covariates.

household differences. Table 2.2 shows the covariate means over the sample divided between women in each sector and by motherhood status. Notably, women without children are older on average, indicating their children have grown and left the home. Women in the home sector report less overall work experience than women who report working. There are also differences over education—women in wage work are more likely to have some education beyond senior schooling (equivalent to high school). They also have higher household earnings and are more likely to have husbands in wage work, as opposed to self-employment[12]. These covariates, while important as controls, are not the primary focus of the analysis and will primarily be excluded from results. The age and education differences between mothers and non-mothers and between sectors emphasize the importance of controlling for these life-cycle effects in further descriptive exercises found in Section 2.4.

2.4 Preliminary Evidence

Descriptive results presented below show that women differ on several observables characteristics between motherhood status and sector. Using regression adjusted analysis, I present evidence on sorting according to motherhood status and differences in earnings and hours. The presence of children is associated with a decreased probability of wage employment. Children also countervailing effects on earnings and hours for women in wage employment and self-employment, however. Dispersion of working hours and weeks help to explain some of these patterns. To better understand this dispersion and its relation to temporal flexibility, in Section 2.4.3 I propose a measure of temporal flexibility designed to describe deviations in working hours' patterns from norms in the data.

[12]There is almost no unemployment amongst the husbands of this population-less than 5%.

2.4.1 Sorting on Motherhood

The distribution of women in the workforce (either in wage employment or self-employment) is similar to nationwide rates, with 53% of women in the home sector. Of those working, 25% are in the wage sector and 22% are in self-employment (See Table 2.1). Means vary slightly when differentiating between the presence of children, with 24% of non-mothers in self-employment; however, controlling for the demographic and household covariates in Table 2.2, as well as for time and geographical fixed effects, there are are robust sorting patterns across work-home activities by motherhood that are not obvious in the raw means.

Table 2.3: Sorting by Motherhood Status

	Home	Wage	Self-Emp
Multinomial Logit with Controls			
Has Child		0.76***	0.97
		(0.03)	(0.04)
Constant		0.04***	0.00***
		(0.01)	(0.00)
Marginal Probability by Child Status			
Has Child	0.037***	-.045***	0.007
	(0.0089)	(0.0071)	(0.0074)
Marginal Probability by Number of Children			
Number of Children	0.023***	-.0291***	0.005*
	(0.0038)	(0.0033)	(0.0029)
Marginal Probability by Children Ages			
Under 6	0.082***	-0.076***	-0.006
	(0.0081)	(0.0067)	(0.0067)
Ages 5-10	0.005	-0.026***	0.021
	(0.008)	(0.0066)	(0.0063)
Ages 11-15	-0.021**	0.004	0.016**
	(0.0089)	(0.0071)	(0.0065)
N	12706	5786	5281

Exponentiated coefficients; Standard errors in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

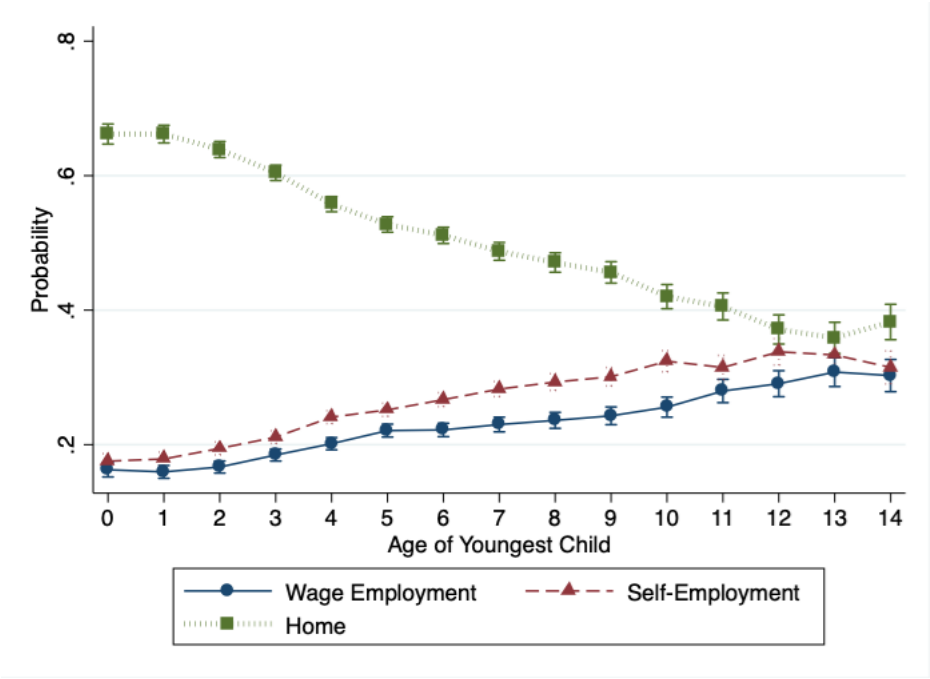
85% of the 13369 women in the sample have a child at some point in panel

Table 2.3 shows that the relative risk of wage employment goes down in the

presence of children while self-employment is not significantly affected. Women with children are 3.7% more likely to be at home and 4.5% less likely to be in wage work. While women are staying home at greater rates in the presence of children, this is coming primarily out of wage work—children have no significant affect on the propensity to be self-employed. There are, of course, many dimensions of motherhood which could affect these patterns. Using the number of children as the measure, more children are associated with an increased relative risk self-employment compared to wage employment. Ages of children could also affect sorting. While women with young children (before primary school) stay home at the highest rates as seen in Table 2.3 and Figure 2.1, women with young children are also relatively more likely to be in self-employment than wage employment. These show that while women sort into sectors based upon a variety of factors, including age and education, there is evidence that the presence of children remains an important margin of sorting.[13] I find that men do not exhibit the same sorting patterns around the presence of children as women, and that the presence of children makes no difference in the marginal probability of wage or self-employment but simply lessens the probability of unemployment (see Table A.1 and Table A.2 in the Appendix for similar exercises comparing men and women). Lebow et al. (2018) use the IFLS to consider labor market outcomes for both men and women before and after the birth of child and find a large decline in labor supply for women, resulting in lower earnings with no response from other household members. They find these effects to be transitory and not to affect long term labor market participation for women.

[13]A pattern descriptively confirmed by Asian Development Bank (2016) using an alternative data set and differing sample.

FIGURE 2.1: Predicted Probability over Age of Youngest Child



2.4.2 Earnings & Hours

Children appear impact the marginal probability of selecting in specific sectors but also affect the manner in which women engage in the labor market through both labor supply and returns to working. Table 2.4 shows means over earnings measures in the first panel, measures of working hours in the second panel, and means over work-time status. Earnings are higher for wage workers than for self-employed workers, for both mothers and nonmothers. Wage employed mothers work less total hours, less weekly hours, and less years than nonmothers. However, self-employed mothers work more total hours and more weekly hours.[14] Wage working mothers are less likely to be full-time than non-mothers, where part-time is defined as working less than 35 hours a week and part-year is working less than 39 weeks a year.

[14]Figures 2.2-2.4 illsutrate that working hours for self-employed women are more varied. Table A.3 shows earnings and hours divided by these full-time/part-time distinctions.

Table 2.4: Earnings and Hours Means

	Wage		Self-Emp	
	No Child	Child	No Child	Child
Earnings				
Log Earnings	8.42	8.39	7.97	7.95
Yearly Earnings	12863.70	11935.83	8679.47	8513.59
Log Wage Rate	1.70	1.76	1.42	1.46
Wage Rate	12.62	12.49	13.87	13.61
Hours and Weeks				
100s Hrs Yr	16.78	15.47	18.81	19.18
Weekly Hours	39.87	37.52	42.89	44.73
Weeks per Year	41.10	40.38	42.75	41.15
Part-time vs. Full-time				
Full-time	0.54	0.49	0.47	0.46
Part-time	0.32	0.37	0.43	0.42
Part-year	0.24	0.25	0.21	0.25
Part-time, part-year	0.10	0.12	0.12	0.13
Observations	1682	4104	1653	3628

Part time weekly is defined as less than 35 hours

Part time yearly is less than 39 weeks

Table 2.5: Hours & Earnings

	Log Yearly Earnings		Yearly Hours		Log Wage Rate	
Has Child	-0.11***	-0.14**	-1.67***	-1.75**	0.03	-0.00
	(0.04)	(0.07)	(0.38)	(0.68)	(0.03)	(0.05)
Self-Emp	-0.34***	-0.13	-1.11**	0.08	-0.04	-0.06
	(0.05)	(0.10)	(0.48)	(0.96)	(0.03)	(0.07)
Has Child x Self-Emp	0.05	0.22**	1.62***	1.81*	-0.01	0.11
	(0.06)	(0.09)	(0.53)	(0.93)	(0.04)	(0.06)
Constant	4.84***	5.86***	3.63*	-3.02	0.23	0.12
	(0.23)	(1.10)	(2.15)	(11.10)	(0.15)	(0.78)
Ind. FE	No	Yes	No	Yes	No	Yes
R^2	0.37	0.43	0.11	0.05	0.35	0.40
N	10304	10304	10686	10686	10304	10304

Standard errors in parentheses

All specifications include controls for age, education, household composition, and province.

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 2.5 shows the regression-adjusted results for earnings, hours, and wage rates with and without individual fixed effects. There is evidence of a "motherhood penalty" in yearly earnings for working the wage sector, both with and without individual fixed effects. Self-employed women appear to make less than wage employed women, though this is not precisely estimated with individual fixed effects. Yet, the motherhood penalty is actually reversed in self-employment-mothers in self-employment make more than nonmothers. Mothers work less yearly hours but mothers in self-employment actually more hours that nonmothers. However, wage rate results are more ambiguous as to the sign of these effects and are not precisely estimated.

FIGURE 2.2: Working Hours Patterns

FIGURE 2.3: Working Hours Patterns

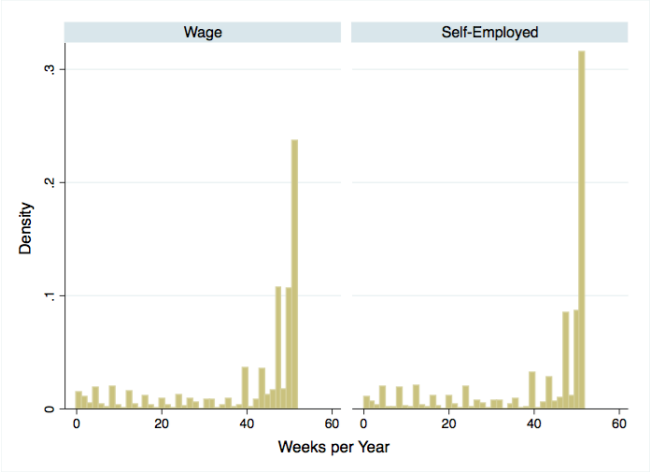
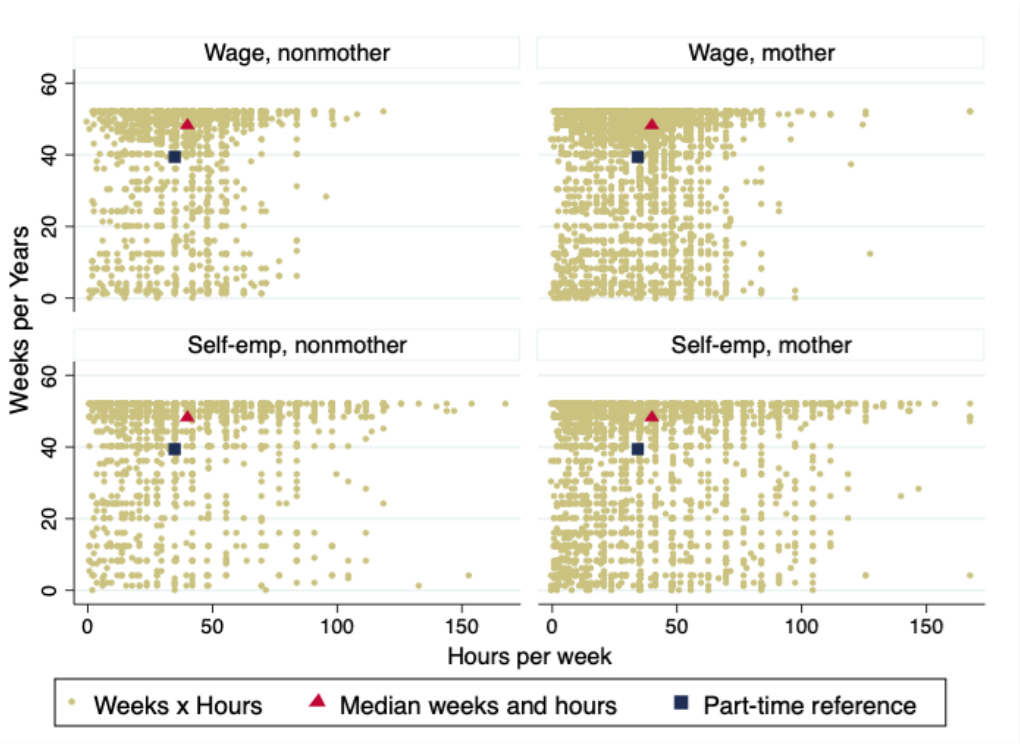


FIGURE 2.4: Working Hours Patterns

Together, these results may suggest that it easier in some sense, though not more productive, to work more hours in self-employment with children than in wage employment with children. One reason for this could be the nature of the hours worked. There is indeed a dispersion of working hours between self-employed and wage-employed women and between mothers and non-mothers. Figures 2.2-2.4 shows the variation between self-employed and wage employed women over total hours, weeks per year, and hours for week. Self-employed women have a higher variability

in the hours they work. Furthermore, variation in hours is different by motherhood status. Figure 2.5 depicts this dispersion by motherhood status and sector over the number of weeks worked per year by the number of hours worked per week. It is notably more varied for all mothers, but also for self-employed women. More combinations of weeks per year and hours per year are observed in self-employment than in wage employment.[15] Evidence from previous work indicate that workers, in particular women and mothers, care about the numbers of hours worked but also the way in which these hours are arranged. Section 2.4.3 explores this idea.

FIGURE 2.5: Weeks and Hours by Child and Work Sector



[15]Notably, Figure 2.5 shows reporting of weekly hours than may not be reasonable. All results in the descriptive exercises and later model are robust to both dropping individuals who report more than 100 hours a week and to winsorizing them.

2.4.3 Flexibility

Flexibility in the workplace maybe important for women, especially for those with children. Temporal flexibility, is described by Goldin and Katz (2011) as the ability to have "job interruptions, short weeks, part-time work and work flexibility during the day." I will focus on the hours per week and weeks per year (and thus the total hours per year). Goldin and Katz (2011, 2016) focus on the part-time, part-year dummy variables to measure this flexibility. Part-time is defined as fewer than 35 hours a week and part-year is fewer than 39 weeks a year. Holding total hours of work constant, one individual could choose to concentrate work fewer (or more) weeks per year and work more (or fewer) hour per week.

In this setting, defining clear cut-off points to delineate part-time or part-year work is difficult. Using dummies to indicate the status of workers can covers variation within groups that may be important. For instance, someone working 36 hours a week is full-time and someone working 34 hours a week is part-time. In this sample, the mean yearly hours for a part-time worker in wage employment is 789 hours, while the mean yearly hours for someone in self-employment is 692 hours, yet they would be assigned the same dummy. There are fewer institutional incentives to shift workers in only full-time or part-time roles in Indonesia, especially in self-employment, which is primarily informal. As Figure 2.5 illustrates, the dispersion between hours and weeks does not indicate the presence of clear bunching.

I propose a measure of flexibility that captures departures from a "standard" number of weekly hours and weeks per year. Let $Dist_{ijt}$ in Equation 2.1 be defined as the Cartesian distance between the median hours and weeks works in the sample. This distance captures all departures, including those that include many more hours than is typical. That is not the type of flexibility I seek to measure, so f'_{ijt} in Equation 2.2 assigns a zero to those who work more than the product of the median hours

per week and weeks per year. Figure 2.6 illustrates this principle, distinguishing the combinations of weekly hours and weeks per year that are not considered more flexible, even though they depart from a standard. Finally, f_{ijt} in Equation 2.3 weights $f^{'}_{ijt}$ by the number of hours worked.[16]

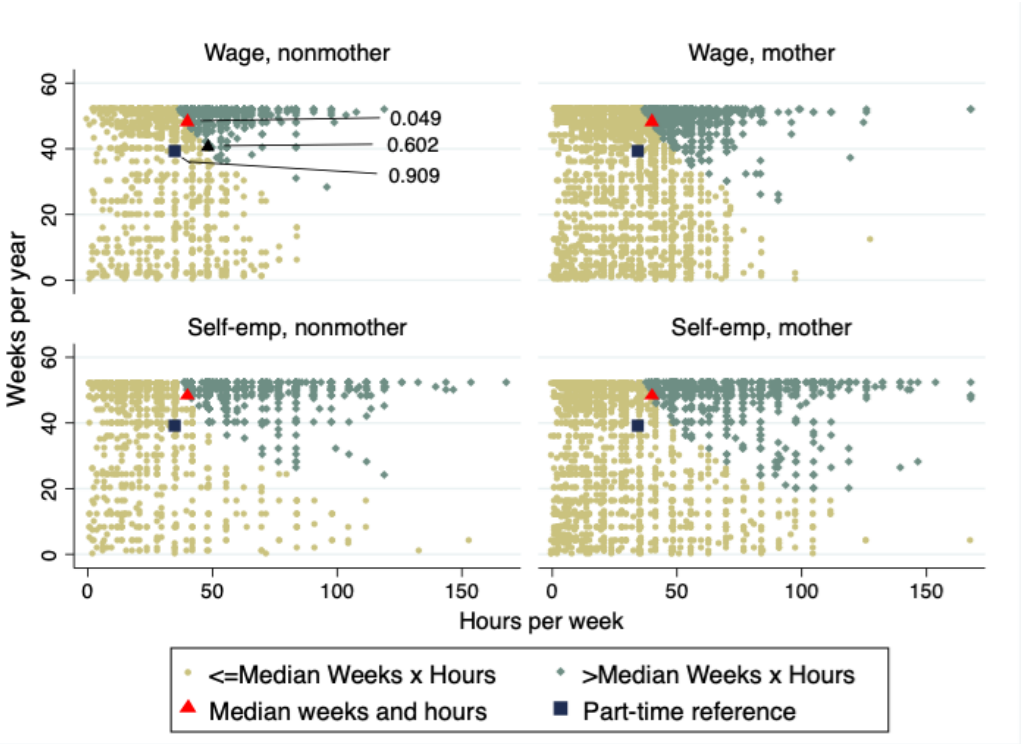
$$Dist_{ijt} = \sqrt{(HoursWk_{ijt} - 40)^2 + (WksYr_{ijt} - 48)^2} \tag{2.1}$$

$$f^{'}_{ijt} = \begin{cases} Dist_{ijt} & \text{if } HourYr_{ijt} \leq 40_{HrWk} \cdot 48_{WkYr} \\ 0 & \text{otherwise} \end{cases} \tag{2.2}$$

$$f_{ijt} = \frac{f^{'}_{ijt} + 1}{HoursYr_{ijt} + 1} \tag{2.3}$$

[16]In order to avoid zero measures, one is added to hours and flexibility.

FIGURE 2.6: Weeks and Hours by Child and Work Sector



As Figure 2.6 reflects, an individual who works 48 weeks a year and 40 hours a week will have a flexibility measure of 0.045 while an individual in the home sector has a flexibility measure of 63.48. Individuals working more than the 1,920 hours a year that result from 48 weeks and 40 hours a week will have a flexibility score of below 0.045. As hours become fewer and more irregular, the flexibility score increases. The value of the flexibility score does have an inherent meaning, but only a relative one, and should be thought of as representing departure from a norm.

Table 2.6 shows the resulting means of the flexibility score measure. Note that it conforms to notions of part-time vs. full-time work as previously used but also provides a more nuanced measure. It also has the expected correlational relations for both earnings and hours. Table 2.7 provides an additional check on the consistency of the score by considering the flexibility score of workers in the primary industries in the sample. Wage workers in agriculture, who are likely to be employed part-

Table 2.6: Flexibility Score Summary Statistics

	Wage		Self-Emp	
	No Child	Child	No Child	Child
Flexibility Score				
Mean 3.94	4.60	4.33	5.43	
	(8.74)	(9.56)	(8.29)	(10.16)
Median 0.71	0.76	1.18	1.21	
Part-time vs. Full-Time				
Full-time	0.43	0.42	0.68	0.72
Part-time	2.51	3.02	3.76	4.02
Part-week	8.21	8.73	7.79	8.14
Part-time, part-year	19.59	20.97	17.45	22.35
Correlations				
Earnings	-0.46	-0.53	-0.34	-0.39
Yearly Hours	-0.58	-0.60	-0.46	-0.48
Observations	1674	4087	1640	3614

year, have a higher flexibility score than those who are self-employed. Both have higher flexibility score than retail workers, who presumably are required to maintain a certain number of set hours. Women who work in manufacturing or retail and likely have shift work have lower flexibility scores. These suggest the flexibility score does reflect the type of departure from a "typical" working year that I wish to capture.

2.5 Model

Section 2.4 shows evidence that the nature of labor market engagement varies between self-employment and wage employment and between mothers and nonmothers. There are more "bundles" of hours observed in self-employment than in wage employment and higher flexibility, as defined by the flexibility score. However, there are

Table 2.7: Flexibility Scores by Industry and Sector

	Self-emp	Wage
Agriculture	5.38	6.22
	(9.37)	(10.70)
	628	1201
Manufacturing	5.85	3.91
	(10.51)	(9.14)
	927	1253
Retail	4.218	3.61
	(8.64)	(8.73)
	2782	619
Soc. Services	6.12	3.33
	(9.70	(7.36)
	320	1522
Real Estate	6.90	4.78
	(11.48)	(10.36)
	333	665

Mean, SD in parentheses, count

also lower overall earnings—suggesting that women may be using self-employment to gain more flexibility. Yet, the cost of that flexibility is unclear. The model presented here is designed to evaluate trade-offs between wages, hours, and flexibility. Often a compensating differentials framework would be used to recover willingness to pay for these amenities in which hours and flexibility were on the right side of a wage equation; however, as Bonhomme and Jolivet (2009) point out, there is a "pervasive absence" of these types of compensating differentials when search frictions are present and when the characteristics of a job and its wages are correlated. With this in mind, I will take an approach in which wage is not a function of the endogenous characteristics of hours and flexibility, and instead will present a model where women choose between bundles of wages, hours, and flexibility.

2.5.1 Setup & Payoff Functions

Each person, i, at time t chooses to be in one of three "sectors." Let j denote the sector option, which is defined to be:

$$j \equiv \begin{cases} 0, & \text{if in the home sector,} \\ 1, & \text{if in the wage work sector,} \\ 2, & \text{if in the self-employment sector.} \end{cases}$$

Associated with those sectors are bundles of job characteristics characteristics. Within the $j = 1, 2$ employment sectors, individual i at time t has a job that is characterized by the following observed job characteristics:

$$\begin{aligned} y_{jit} &= \text{wage rate of job in the } j \text{ sector} \\ h_{jit} &= \text{hours of work of job in the } j \text{ sector} \\ f_{jit} &= \text{temporal flexibility score of job in the } j \text{ sector} \end{aligned}$$

Where f_{jit} is the flexibility score discussed in Section 2.4.3. For the $j = 1, 2$ sectors let the vector $\boldsymbol{C}_{jit}$ denote the vector of the job characteristics $y_{jit}, h_{jit}, f_{jit}$ for sector $j = 1, 2$. Each individual has a component of utility that is common to all three sectors:

$$\alpha_{j0} + \alpha_{j1} Kids_{it} + \boldsymbol{\alpha}_{j2} \boldsymbol{X}_{it}$$

Where $\boldsymbol{X}_{it}$ is a vector of demographic and household characteristics, $Kids_{it}$ is

an indicator for whether the woman has children (or "kids") at time t. Women in sectors $j = 1, 2$ also derive utility from the sector-specific utility from the job in sector j, defined by its sector-specific job characteristics, $C_{jit} = (y_{jit}\ h_{jit}\ f_{jit})$, and whether one has *kids*, i.e., by $Kids_{it}$.

$$\beta_{j1} y_{jit} + \beta_{j2} h_{jit} + \beta_{j3} f_{jit} + \beta_{j4} y_{jit} \cdot Kids_{it} + \beta_{j5} h_{jit} \cdot Kids_{it} + \beta_{j6} f_{jit} \cdot Kids_{it}$$

The utility associated with each sector j is given by:

$$\begin{aligned} U_{0it} &= \alpha_{00} + \alpha_{01} Kids_{it} + \boldsymbol{\alpha}_{02} \boldsymbol{X}_{it} + \varepsilon_{0it} \\ U_{jit} &= \alpha_{j0} + \alpha_{11} Kids_{it} + \boldsymbol{\alpha}_{j2} \boldsymbol{X}_{it} + \beta_{j1} y_{jit} + \beta_{j2} h_{jit} + \beta_{j3} f_{jit} \\ &\quad + \beta_{j4} y_{jit} \cdot Kids_{it} + \beta_{j5} h_{jit} \cdot Kids_{it} + \beta_{j6} f_{jit} \cdot Kids_{it} + \varepsilon_{1it} \end{aligned} \tag{2.4}$$

Let ε_{jit} be identically Gumbel distributed and $\boldsymbol{X}_{it}$ be the full set of explanatory variables needed to describe the choice between the j alternatives. Agents form expectations over $\boldsymbol{C}_{jit}$ and then agents choose j based on their ex-ante expectation of these values.

2.5.2 Parameters of Interest

Note that the parameters $\beta_{j1}, \beta_{j2}, \beta_{j3}, \beta_{j4}, \beta_{j5}, \beta_{j6}$ can be used to characterize the marginal willingness of agents to pay, *in utility terms*, for hours of work (h_{jit}) and temporal flexibility (f_{jit}) *in terms of wages* (y_{jit}) for each sector $j, j = 1, 2$. One can measures how these marginal willingnesses differ between women who do not have and those do have children and also between sectors. In particular, one is interested in:

$$\gamma_{hj}^{nm} \equiv \frac{\beta_{j2}}{\beta_{j1}}, \text{ non-mothers' willingness to pay for hours of work}$$

$$\gamma_{fj}^{nm} \equiv \frac{\beta_{j3}}{\beta_{j1}}, \text{ non-mothers' willingness to pay for temporal flexibility}$$

$$\gamma_{hj}^{m} \equiv \frac{\beta_{j2} + \beta_{j5}}{\beta_{j1} + \beta_{j4}}, \text{ mothers' willingness to pay for hours of work}$$

$$\gamma_{fj}^{m} \equiv \frac{\beta_{j3} + \beta_{j6}}{\beta_{j1} + \beta_{j4}}, \text{ mothers' willingness to pay for temporal flexibility}$$

in each sector $j, j = 1, 2$.

This marginal willingness to pay indicates the value and costliness of various work characteristics in terms of wages and, importantly, how these may be different between women in wage work and self-employment and between mothers and non-mothers. I do not explicitly model fertility in this study. The presence or absence of children will be taken as given in my sample and the difference between them is considered a source of timing heterogeneity. Given that most women in this context have children, and indeed 85% of women in my sample will have a child in their household at some point in the data. Results should be interpreted with this framing in mind.

2.5.3 Identification

The primary challenge to identification in this setting is selection, that is, $\boldsymbol{C}_{jit}$ is only observed if work sector j, where $j = 1, 2$ is chosen. To retrieve the parameters of interest, I required the expected value of $\boldsymbol{C}_{jit}$ for both $j = 1, 2$ for all j. Furthermore, $\boldsymbol{C}_{jit}$ is endogenous to choice of sector so that agents make decisions based on their expectation of $\boldsymbol{C}_{jit}$, $\boldsymbol{X}_{it}$, and ε_{jit}. Each c_{jit} within $\boldsymbol{C}_{jit}$ (so that $c_{jit} = \{y_{itj}, h_{itj}, f_{itj}\}$)

has an associated error term υ_{cjit}, that are not orthogonal to the ε_{jit}s for $j = 1, 2$:

$$\boldsymbol{\upsilon_{cjit}} \not\perp \boldsymbol{\varepsilon_{it}}, \forall j, j = 1, 2, \text{ where} \qquad \boldsymbol{\varepsilon_{it}} = (\varepsilon_{0it}\ \varepsilon_{1it}\ \varepsilon_{2it})'$$

$$\boldsymbol{\upsilon_{cjit}} = (\upsilon_{c0it}\ \upsilon_{c1it}\ \upsilon_{c2it})' \tag{2.5}$$

These issues lend themselves to a generalized Roy model estimation; methods and assumptions I have made allow me to use a Roy framework to estimate the model. Similar to Eisenhauer, Heckman, and Vytlacil (2015) and D'Hautefoeuille and Maurel (2014), I will use exclusion restrictions in order to identify the model. Identification hinges on the nonlinearity of the model and the validity of the exclusion restrictions: factors that affect the probability of sector choice without affecting individual outcomes in each sector except through selection.

The intuition follows a Heckman selection approach, where one addresses endogeneity in the outcome functions through the use of exclusion restrictions; however, I make two primary departures from this literature. First, instead of accounting for a single sector-specific endogenous variable (typically y_{jit}) over two sectors, I will need to account for a three-sector choice with three sector-specific endogenous variables: $y_{jit}, h_{jit}, f_{jit}$. Following Bourguignon, Fournier and Gurgand (2007)[17], I can use selection instruments that enter into the choice function without entering the outcomes equations to retrieve non-biased estimates of $y_{jit}, h_{jit}, f_{jit}$. This requires a set of instruments for each outcome that meets the exclusion restriction criteria. The second departure is that in a typical Roy model setup one does not retrieve the $\beta_{j1}, \beta_{j2}, \beta_{j3}, \beta_{j4}, \beta_{j5}, \beta_{j6}$ and instead is interested on the corrected coefficients in the endogenous sector specific variables:

[17]See Appendix A for details

$$c_{jit} = \boldsymbol{\pi}_{cj1}\boldsymbol{Z}_{cit} + \upsilon_{cjit} \tag{2.6}$$

Where $\boldsymbol{Z}_{it}$ contains all variables that determine the outcomes for $y_{jit}, h_{jit}, f_{jit}$ (i.e., the variables in $\boldsymbol{X}_{it}$ less the exclusion restrictions). Note that in this setup, π_{yj1}, π_{yj2} are not of primary interest but only used to create $\hat{y}_{jit}$, $\hat{h}_{jit}$, $\hat{f}_{jit}$. Once $\hat{y}_{jit}$, $\hat{h}_{jit}$, $\hat{f}_{jit}$ are recovered, they can be used to estimate the latent utility function in Equation 2.4 up to a normalization from the home sector.

2.5.4 Instruments for C_{ijt}

There are two broad sets of selection instruments or exclusion restrictions used to identify the model. The first set consists of weighted employment instruments that are divided between wage employment and self-employment. The second set of instruments is based upon the overall local labor force participation rate. These variables proxy for local labor market conditions that plausibly affect the probability of sector choice without directly affecting individual outcomes in each sector. The use of the selection instruments varies depending upon the outcome for which the resulting correction terms are meant. All variables are created from SAKERNAS, a national labor force survey from Badan Pusat Statistik (BPS), the Indonesian National Statistics Agency. SAKERNAS is a national labor force survey that surveys individuals 15 years and older and captures characteristics of the Indonesian workforce. It is the main source of statistics on economic activity related to unemployment, underemployment, informal earnings, and hours worked. The data are representative of the Indonesian workforce.

The first set of instruments follow in the spirit of a Bartik shock, where in-

struments are industry shares for each locality that are combined and weighted by national employment numbers (Diamond (2016), Goldsmith-Pinkham, Sorkin, and Swift (2018)). These instruments are used as exclusion restrictions for hours worked (h_{ijt}) and flexibility (f_{ijt}). Given changes in the level of geographic detail and sampling sizes over time (see Table A.4), I will depart from a more classic shock instrument that uses changes over time, and instead, constrict measures that only use data from a given year. I propose to use the share of employment in locality l and industry $k$which is in sector $j$as a local variable factor that is then weighted by country-wide employment in that sector, less the locality to reflect the general importance of the industry. These are then summed up over all industries. I will refer to these as weighted employment.

$$I_{\ell j} = \sum_{k} \underbrace{\frac{E_{k\ell j}}{E_{\ell j}}}_{\text{Ind. Share in } j,\ \ell} \underbrace{(E_{kj} - E_{k\ell j})}_{\text{All Emp in } k,\ j,\text{ Leave out } \ell} \tag{2.7}$$

This form attempts to exploit variation in self-employment and wage employment in local markets and industries without introducing inconsistencies that exist year-to-year in the SAKERNAS data. I use provincial-level data in 2000 and kabupaten-level (or province-level) data in 2007 and 2014, as well as urban and rural splits. A few things are apparent in Table A.4. First, there is significant covariation in overall levels of employment by area between self-employment and wage employment. This is natural as more economically robust and densely populated areas will have more of each type of employment. Once there is a division of employment counts by geography and industry, however, these correlations become much more varied. Some areas have high self-employment or wage employment, as well as variation in industry concentrations and variations regarding which type of employment is

concentrated in which industry. To illustrate this, consider Figure A.1. In some geographies and industry, there is a negative correlation between self-employment and wage employment, indicating that they replace one another, while in others, they are positive, meaningst they exist along side one another. It is variation in the allocations of local industry shares that forms the basis of the instrument, and they are weighted according to the employment in that particular industry in the country, less the local employment. In this way, the weighted scheme combined all the instruments into a single instrument weighted according to general economic importance.

These are used to instrument for the hours worked and flexibility score. For each to be a valid instrument, it should not affect outcomes for the endogenous variable in which it is used, except through selection. I argue that these types of instruments primarily affect selection into sectors, but not the intensive margin of activity. Insofar as these proxy for national productivity levels that vary according to local industry share instruments, they may enter into earnings but can reasonably be excluded from hours of labor and flexibility.

The second set of instruments is based upon labor force participation with two variations—these are used as instruments for the wage rate (y_{ijt}). First, the rate of all those who work and second, the rate of those who report work and household activities such as housekeeping.

$$LFP_{\ell} = \frac{\text{Employed Ind}}{\text{Work Age Individuals}} \tag{2.8}$$

$$LFPxH_{\ell} = \frac{\text{Employed Ind also report home work}}{\text{Work Age Individuals}} \tag{2.9}$$

The advantage of these measures is that they take into account more local and

demographic information than a simple employment rate, and capture variation in local labor force characteristics and their propensity to participate in either labor force activity or labor force activity and home activity combined. Given that the Bartik-life instruments are meant to proxy for local productivity it is less convincing to argue that these instruments do not affect wage rates and so the set of instruments that does varies. These labor force participation measures, however, are factors would primarily affect the margin of participation and not the productivity therein (i.e., the wage).

2.6 Estimation

Estimation of the model takes place in two steps. First, the first-stage choice model is estimated using the exclusion restrictions. This is used to derive the selection correction terms of Bourguignon, Gurgand, and Fournier (2003), which are then placed into Equation 2.6. Predictions from these are used to retrieve the selection corrected expected value of each c_{ijt}, i.e., $\hat{c}_{ijt}$ regardless of whether i is found in sector $j = 1, 2$. These are then placed within the structural utility Equation 2.4 to retrieve the willingness-to-pay parameters.

2.6.1 First-Stage Choice Model

Correcting for this selection in a setting where there are more than two choices presents several empirical problems. Lee (1983) and Dubin and McFadden (1984) both propose solutions to a multinomial selection bias correction model, and Dahl (2002) presents a semiparametic innovation on those foundations. Bourguignon, Fournier, and Gurgand (BFG) (2007) survey these methods and find that a flexible specification such as Dubin-McFadden and variants of Dahl's model are optimal given applied microeconomic practicalities. I will follow a variant on Dubin-McFadden, as

suggested in the BFG paper. Details of this process are found in Appendix A.2, so I will only show the generalities here.

Consider the first-stage choice model in which the choice between the three sectors is estimated using $\boldsymbol{X}_{it}$, which includes the exclusion restrictions:

$$U_{jit} = \alpha_{jt0} + \alpha_{jt1} Kids_{it} + \boldsymbol{\alpha}_{jt2} \boldsymbol{X}_{it} + \epsilon_{jit} \tag{2.10}$$

So that the probability that an individual is found in sector j is as follows.

$$P_j = \frac{exp(\alpha_{jt0} + \alpha_{jt1} Kids_{it} + \boldsymbol{\alpha}_{ji2} \boldsymbol{X}_{it})}{(\alpha_{kt0} + \alpha_{kt1} Kids_{it} + \boldsymbol{\alpha}_{ki2} \boldsymbol{X}_{it})} \tag{2.11}$$

Note that the set of exclusion restrictions used depends upon the outcome being considered $(y_{ijt}, h_{ijt}, f_{ijt})$. Table 2.8 shows the relevance of the various exclusion restrictions to the selection choice. These weighted employment measures affect the probability of selection, as do their squares. For the wage, I first, the weighted employment measures are interacted with the husband's sector so that while they may affect her selection through her husband's choice of sector, it does not affect her outcomes directly. Second, I use the labor force participation measures.

This "first stage" shows the relevance of the exclusion restrictions to the choice model and, by assumption, they will be excluded from the estimation of any job characteristics.

2.6.2 Selection Corrected Projections

After using the procedure outlined in Appendix A.2 from Bourgignon, Fournier, and Gurgand, one generates selection correction terms for each c_{ijt}, and so Equation

Table 2.8: Multinomial Logit: First Stage

	Instrument Set 1: Hours and Flex		Instrument Set 2: Wage Rate	
	Wage	SE	Wage	SE
Wghted Wage Emp.	1.23***	1.20**		
	(0.09)	(0.09)		
Wghted Self-Emp.	0.61***	0.50***		
	(0.09)	(0.07)		
Wghted Wage Emp. Sq.	0.98***	0.99**		
	(0.01)	(0.01)		
Wghted Self-Emp. Sq.	1.03***	1.05***		
	(0.01)	(0.01)		
Wghted Wage Emp.x H in Wage			1.05***	1.07***
			(0.01)	(0.02)
Wghted Self Emp Emp.x H in SE			1.02***	1.01
			(0.01)	(0.01)
LF Part. Rate			0.29***	1.12
			(0.13)	(0.47)
LF & Home Rate			1.72**	1.49*
			(0.42)	(0.36)
Constant	0.37	0.04***	0.17***	0.01***
	(0.23)	(0.02)	(0.06)	(0.00)
N	23773.00		23773.00	
r2_p	0.22		0.22	

Exponentiated coefficients; Standard errors in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

2.6 becomes:

$$c^*_{ijt} = \boldsymbol{\pi}_{cj1}\boldsymbol{Z}_{cit} + \lambda_c(\Gamma) + w_{cjit} \tag{2.12}$$

Where $E(w_{cjit})$ is mean independent of $\boldsymbol{Z}_{cit}$ and $\lambda_c(\Gamma)$ represent the selection correction terms. The results are found in Table 2.9. The coefficients are the correlation between υ_{ijt} and linearized normal distribution of ε_{ijt} multiplied by the squared variance of υ_{ijt}. These are not easily interpretable as in the classic Heckman selection correction setup; however, they are significant across all sectors for all outcomes, which indicates the importance of the selection correction process.

In this setting, the variables and coefficients in Table 2.9 are not of primary interest. Instead, I need to predict the job characteristics for jobs that were not chosen. In order to do so, I perform the regression of c^*_{ijt} found in Equation A.10 using only individuals found in sector j. I then use linear prediction to retrieve $\hat{y}_{jit}$, $\hat{h}_{jit}$, $\hat{f}_{jit}$, where $\hat{c}_{ijt}$ is the linear prediction for the entire population. This allows me

Table 2.9: Corrected Results: Selection Terms

	Log Wage Rate		Hours per Year		Flexibility Measure	
	Wage	SE	Wage	SE	Wage	SE
Selection Correction Terms: $\lambda(\Gamma)$						
Wage	-0.36***	-1.24***	-7.91***	-23.18***	8.90***	23.07***
	(0.11)	(0.43)	(1.07)	(4.36)	(1.30)	(4.41)
Self-Emp	1.36***	0.01	3.56	-2.28**	0.32	1.29
	(0.25)	(0.11)	(2.41)	(0.99)	(3.03)	(1.01)
Home	-0.53**	-0.81**	-3.58*	-9.64***	5.00*	8.57**
	(0.23)	(0.33)	(2.10)	(3.19)	(2.70)	(3.48)
Constant	-0.02	-1.34**	1.43	-17.13***	13.55***	28.35***
	(0.26)	(0.56)	(2.31)	(5.01)	(3.25)	(5.38)
r2	0.46	0.23	0.11	0.10	0.12	0.08
N	5612	5005	5612	5005	5612	5005

Standard errors in parentheses

Education, geography, age and time coefficients are omitted.

* $p < .1$, ** $p < .05$, *** $p < .01$

to recover the expected bundle of characteristics for every i in each j.

2.6.3 Structural Multinomial Logit

Once there exists a $\hat{y}_{jit}$, $\hat{h}_{jit}$, $\hat{f}_{jit}$ for each individual regardless of the sector in which she is found, these can then be used to estimate Equation 2.4, where I then want to retrieve the estimates in Equation 2.5. Note that each of these variables is different by individual depending on the sector chosen, where $\boldsymbol{X}_{it}$ is constant no matter the sector. This setup lends itself to a mixed logit estimation method. Once estimated I can retrieve the vector of β_j variables.

2.7 Results

I will first present the results on the predicted outcomes for each sector. These represent the selection-corrected outcomes as well as the counterfactuals for each individual i. Using these and the results from the structural multinomial, I will then present willingness-to-pay parameters and their interpretation.

2.7.1 Predicted Outcomes

The results of the exercise described in Section 2.6.2 are in Table 2.10. In the row labeled "Chosen j" one can see the observed sector choice for individuals. In the subsequent rows, one sees the selection corrected or counterfactual mean outcomes for each group followed by the observed outcomes. In the first column, wage workers have a corrected wage of 7.21 thousand rupiah per hour and would have earned an average of 6.29 thousand rupiah per hour in self-employment[18]. Self-employed individuals, however, would earn more in their counterfactual wage jobs, while women who stay at home would earn more in self-employment. The hours estimates indicate that women in wage would work would counterfactually work more in self-employment and self-employed women would counterfactually work less in wage employment. Flexibility scores are higher in self-employment than in wage employment for all groups.

Table 2.10: Selection Corrected Outcomes and Counterfactuals

	Wage Rate: $\hat{y}_{jit}$			Hours per Year: $\hat{h}_{jit}$			Flexibility Score: $\hat{f}_{jit}$		
Chosen j	**Wage**	**Self-Emp**	**Home**	**Wage**	**Self-Emp**	**Home**	**Wage**	**Self-Emp**	**Home**
Wage	7.21	5.20	4.36	15.82	17.62	4.97	4.42	4.91	8.92
	(1.06)	(1.06)	(1.10)	(0.56)	(0.63)	(0.92)	(0.67)	(0.72)	(1.16)
Self-Emp	6.29	4.83	5.46	15.96	19.02	4.41	6.66	5.10	10.34
	(1.10)	(1.08)	(1.16)	(0.83)	(0.72)	(1.40)	(0.97)	(0.76)	(1.74)
Observed Mean	12.50	13.57		15.84	19.05		4.41	5.08	
Observations	5786	5281	12706						

mean values; standard errors in parentheses
All wages are in thousands of 2014 IDR

These patterns of sorting are supportive of a model in which self-employment may be more flexible but lower paid, with hours that are potentially less intensive; however, the structural estimation of the utility function is needed to understand the actual costs to these choices and how they may vary by sector and motherhood status. Table 2.11 show the structural multinomial results that make use of the

[18]$1 USD is approximately 15 thousand rupiah.

predicted outcomes in Table 2.10.

Table 2.11: Structural Parameter Estimates

	Wage	Self-Emp
Wage Rate	0.0001***	0.0005***
	(0.00001)	(0.00002)
100s Hours Year	−0.138***	−0.078***
	(0.005)	(0.005)
Flexibility Score	0.071***	0.551***
	(0.016)	(0.020)
Child Interactions		
X Wage Rate	0.00002	0.00003*
	(0.00001)	(0.00002)
X 100s Hours Year	0.004	−0.017***
	(0.006)	(0.006)
X Flexibility Score	0.013	0.071***
	(0.014))	(0.018)
Constant	0.719***	3.497***
	(0.286)	(0.313)
Observations	23,736	
R^2	0.385	
Log Likelihood	−14,781.130	
LR Test	18,491.810*** (df = 58)	

Bootstrapped standard errors

Table 2.11 shows the coefficients on $\hat{y}_{jit}$, $\hat{h}_{jit}$, $\hat{f}_{jit}$ as well as their interactions. These go in the expected direction where hours of work are a disamentity and wages and flexibility are an amenity.

2.7.2 Willingness-to-Pay Parameters

Table 2.12 shows the estimates for $\gamma^{nm}_{jh}, \gamma^{nm}_{jf}, \gamma^{m}_{jh}, \gamma^{m}_{jh}$. The first panel shows the willingness to pay (WTP) for hours of work by sector and mother status, while the second shows the willingness to pay for flexibility by the same. Each of these panels shows the willingness to pay in 2014 Indonesian Rupiah (IDR) with their standard

errors. Below the standard errors are the mean estimated corrected wage rates for each group for reference. The third and fourth panels show results from hypothesis testing over the differences in the values of each γ term.

All groups in the sample have a negative willingness to pay for more hours on the labor market and positive willingness to pay for flexibility, which confirms the idea that hours of work are a disamentiy while flexibility is an amenity. The marginal willingness-to-pay estimates found in the top panel can be interpreted as the amount a woman is willing to reduce her wage rate in order to work one fewer hour or the additional amount she would need to work one more hour. Wage-working women need to be paid more in order to induce them to work more hours than self-employed women, as do mothers.[19] This implies that hours on the labor market are more costly for mothers in utility terms and that they need higher pay to induce them away from home time; however, these hours are less costly in self-employment than wage employment. This could be due to the intensity of the work hours, which while not measured, is anecdotally different for women in self-employment who report multitasking and having their children present during work hours (see Appendix A).

Women do value flexibility, however, and are willing to give up wages to access more of it. A 0.5 increase in the flexibility score can result from working 1 fewer day per week over 48 weeks. These values represent the marginal reduction in wage rate a woman is willing to accept to gain this flexibility. It costs wage-working women more to access flexibility, and mothers are willing to sacrifice more earnings. Although earnings are lower in self-employment than in wage employment, the penalty to flexibility is lower as well.

From the third panel we see that we cannot reject that wage women who have and do not have children have different WTP parameters; however, hours on the labor

[19]The difference between mothers and non-mothers for wage work is not significant in this case.

Table 2.12: Willingness to Pay Parameters

	Nonmothers	Mothers
WTP for 1 hour of work, γ_{hj}		
Wage Employed: γ_{hw}	-23.60**	-33.90
	(5.75)	(10.60)
Mean Wage Rate	6143	6250
Self-Employed: γ_{hse}	-1.53***	-2.10***
	(0.12)	(0.11)
Mean Wage Rate	3693	3958
WTP for Flexibility, γ_{fj}		
Example: 40 hrs a week 48 weeks, to 32 hrs a week, 48 weeks		
Wage Employed: γ_{fw}	606.81***	1004.98***
	(211.06)	(0.184)
Mean Wage Rate	6143	6250
Self-Employed: γ_{fse}	550.89***	513.30***
	(6.49)	(5.81)
Mean Wage Rate	3693	3958
Testing: Mothers vs. Nonmothers	P-value	
$H_0 : \gamma_{hw}^{nm} = \gamma_{hw}^{m}$	0.22	
$H_0 : \gamma_{hse}^{nm} = \gamma_{hse}^{m}$	0.00	
$H_0 : \gamma_{fw}^{nm} = \gamma_{fw}^{m}$	0.09	
$H_0 : \gamma_{fse}^{nm} = \gamma_{fse}^{m}$	0.22	
Testing: Self-Emp vs. Wage	P-value	
$H_0 : \gamma_{hw}^{nm} = \gamma_{hse}^{nm}$	0.00	
$H_0 : \gamma_{fw}^{nm} = \gamma_{fse}^{nm}$	0.78	
$H_0 : \gamma_{hw}^{m} = \gamma_{hse}^{m}$	0.00	
$H_0 : \gamma_{fw}^{m} = \gamma_{fse}^{m}$	0.10	
Parameters presented in 2014 IDR.		
Standard Errors are bootstrapped.		
SD in parentheses, * $p < .1$, ** $p < .05$, *** $p < .01$		

market for self-employed women who have children are more costly than for those who do not. The flexibility parameters are different for wage employed women at 10% level that is, women who have children and work in wage employment have a higher willingness to pay for flexibility than those without children. When considering differences between self-employed and wage-employed women by motherhood status, we can reject the null that the values are the same at a 10% level for all but for non-mothers' WTP for flexibility. Women in wage work, whether mothers or not, have a higher cost for hours on the labor market than for self-employed women. Furthermore, women who are mothers in wage work have a higher WTP for flexibility

than mothers in self-employment. This can be interpreted as a higher cost/higher value to flexibility when in the wage sector.

Most parameters estimated are statistically different from zero. However, the point estimates for γ_{wh}^{m} and, to a slightly lesser extent, γ_{wh}^{nm} are very large in magnitude. It does not take a tremendous increase or decrease in hours to reach 100% or more of the mean wage rate. While these results require more investigation, they may reflect demand-side frictions. These could manifest in several ways, but it could be that some of the predicted bundles are not common or not feasible and reflect very steep trade-offs. If a bundle exists but is difficult to find or access jobs that provide them, then the WTP parameter will reflect this difficulty, i.e., include any "search costs" to the bundle. These estimates lead to problematic results in Table 2.13.

Table 2.13: Willingness to Pay over Changes in Hours & Flexibility

	No Child	Child
10% Decrease in Mean Work Yearly Work Hours		
Wage	-61.97%	-94.05%
95% Conf Inv.	(-33.66, -95.33)	(-32.25,-135.36)
Self-Emp	-7.95%	-10.29%
95% Conf Inv.	(-6.68, -9.17)	(-8.77,-10.90)
10% Increase in Mean Flexibility Score		
Example: 1 day less a week for 48 weeks		
Wage	-7.58%	-14.88%
95% Conf Inv.	(2.52, 13.35)	(14.87, 14.89)
Self-Emp	-12.96%	-11.99%
95% Conf Inv.	(11.70, 12.22)	(11.73, 12.25)
Combined: 40 hours, 48 weeks, to 32 hours, 48 weeks		
Wage	-157.59%	-224.13%
Self-Emp	-30.84%	-33.21%
Estimates represent willingness to pay in terms of the percentage of the estimated mean wage for each group.		

Table 2.13 gives an elasticity-oriented approach to the values in Table 2.12. The first panel shows the cut in wage rates, in percentage terms, that each group will take in order to work 10% fewer hours. As discussed earlier, the magnitudes of the

wage cuts are not reasonable here and not precisely estimated as reflected by the confidence intervals; however, we can reject that they are the same as self-employed women. The values for self-employed women here are more precise. Those without children will only accept a 10% decrease to work fewer hours, while those with children will accept a slightly larger than 10% decrease. All groups, excepting wage-employed non-mothers, are willing to sacrifice more than 10% of their wage rate for a 10% increase in flexibility. The third panel shows the combined effect of these factors through the change in flexibility score and hours that a departure of one day a week for a full working year provides. The wage estimates are inflated by the WTP parameters on the wage hours; however, the self-employed estimates are more reasonable.

2.8 Discussion

These results indicate that self-employed women are willing to sacrifice one third of their hourly wages to work one day fewer per week. This is a substantial cut in earnings and has implications for the types of programs that are aimed at small-scale female entrepreneurs. It implies that programs need to consider a utility-based approach that appreciates the many roles women fill when considering how to improve their businesses. It also implies that business growth strategies that require more hours and/or less flexibility may be undesirable to women. These settings show clear evidence of financing, training, and capital constraints; however, it may be important to consider childrearing and family constraints in concert with these more commonly considered stumbling blocks.

These results are subject to several caveats. First, this study uses a relatively limited definition of flexibility, which, although it attempts to adjust standard strategies in the literature to this case, still reflects only part of the concept of flexibility. Sec-

ond, this approach necessarily takes children as given and cannot address questions over whether to bear children and how this may affect earnings and sorting. Finally, as mentioned earlier, there are potentially important demand-side factors that are not explicitly addressed here. Namely, some bundles may be costly to attain or infeasible. This could bias the WTP estimates in either direction. In one case where the counterfactual bundles predicted are not available, the WTP may actually be higher, but it may also mean that the WTP reflects the costliness of attaining these bundles. Insofar as the ability to create bundles is more limited in the wage sector, this may help to explain the less-reasonable estimates. One way of addressing this is to attempt to more explicitly control for things that may control the cost of attaining bundles such as transportation times, etc.; however, a second method would be to think about estimating and predicting the bundle in tandem, not separately.

My results indicate that hours spent working are costly to women and that they value flexibility in those hours. Hours are more expensive for mothers than for non-mothers but they are also more expensive for wage workers than for self-employed workers. The penalty that women pay for more flexibility is higher for women in wage work and especially for wage-working mothers. In particular, wage-working mothers face a higher penalty for flexibility than self-employed mothers; however, all women will give up earnings to work fewer hours and gain more flexibility. Self-employed mothers would give up almost a third of their wage rate for a 10% decrease in hours and 10% increase in flexibility, equivalent to working one fewer day per week over a working year. This has important implications for how we should think about programs that seek to increase returns to women entrepreneurs, especially small-scale businesses.

3

The Art of Flexibility: Balancing Work and Home

3.1 Introduction

An enormous amount of economic activity in developing countries consists of individuals running their own enterprises. More and more often, women are engaging with the labor through self-employment, especially in developing countries (Tambunan, 2009). Entrepreneurs are the target of a myriad of development programs that focus on access to finance, capital, and business training for the self-employed among other things. The World Bank's web page on entrepreneurship research refers to it as a "pillar of economic growth". Programs directed at female entrepreneurs are particularly in vogue, as they are touted as a pathway to empowerment and poverty reduction.

Governments and world organizations are actively promoting female entrepreneurship (Cho and Honorati, 2013; Naudé, 2014). This is particularly true in Indonesia where self-employment is an economically large and meaningful part of production.[1] In particular, the Indonesian government's Mid-term Development Plan

[1]Micro, small, and medium enterprises contributing 47% of GDP and employing 57% of the

(RPJMN 20152019) discusses the importance of micro, small, and medium enterprises (MSMEs) to Indonesia with a particular focus on women (Tambunan, 2007).

This emphasis on female entrepreneurship is common, yet, unlocking the unrealized potential of these entrepreneurs has proven illusive. The response to many traditional programs that target entrepreneurs in developing countries have been heterogeneous, especially for women. These mixed results have been underwhelming and often somewhat puzzling (McKenzie and Woodruff (2013), de Mel, McKenzie, Woodruff (2008), Fafchamps et al. (2014), Falco and Haywood (2016), Falco and Quinn (2010), Karlan, Knight and Udry (2012)). Given what would appear to be clear constraints (lack of business knowledge, for instance), why do interventions to alleviate these constraints not have a larger effect?

Chapter 2 suggests one answer: the desire for and relative cost of flexibility across working arrangements. The quantitative approach used in Chapter 2 fills an important gap in measuring this valuable amenity across work sectors but is limited in its ability to tell a more nuanced story about how and why women make decisions, outside of the reveled preference in the data. Therefore, as a complement to this effort I performed 50 in-depth semi-structured interviews with men and women in Indonesia and discussed their approaches to work and home life. These interviews were designed to do several things. First, they were meant to understand the guiding principles to sector choice to both confirm and, if necessary, reform the model used in Chapter 2. Second, they were meant to provide more detailed and nuanced insight to the lives of Indonesians – from where they live and work to who spends the most time with their children and how they feel about these arrangements – than could be provided by a household survey. In the course of the interviews the interview team wished to discuss why individuals choose their sector of work, how they value

population (World Bank, 2014). Women own half of MSMEs in Indonesia and 23% of small and medium enterprises (SMEs) (Asia Foundation, 2013),

flexibility, and how it interacted with family lives.

Several primary themes emerged. First, children and family are the priority of women in the sample while men emphasized this much less. Second, women value flexibility in work arrangements but find it is easier to be flexible and take care of children when they are self-employed. Third, family caretakers play an important role in allowing women to engage with labor market activities. Fourth, women describe the purpose and desired outcomes of their businesses as lifestyle oriented while men tend to want to growth and to build wealth. Other in-depth interviews with a similar population have framed their investigation in traditional economic terms, citing Schumpeter, and psychological ones, citing theories around resilience (Loh and Dahesihsari, 2013). Yet, they have found similar themes to this work: namely the need for holistic consideration of work and family commitments, with 93% of the 30 women interviewed citing their family as their first priority. These themes echo the importance of the policy discussion mentioned in Section 2.8; namely, that policies must take into account the multiple roles women play in their households. Policies designed around traditional framings of entrepreneurial activities may fail to address the relevant constraints and needs of self-employed women with children.

3.2 Background

This project serves as a complementary activity to what is a largely quantitative dissertation chapter on the subject using Indonesian data. Chapter 2 seeks to confirm hypotheses concerning women's labor market choices and valuation of flexibility using quantitative methods based on questionnaire answers. However, it is limited in its ability to describe individual women's experiences and variation within groups of women. This paper uses in-depth, semi-structured interviews to validate, complement, and expand upon the quantitate work found in Chapter 2. We asked both

women and men of various ages and educational backgrounds what sort of activities took up most of their time (i.e. their own business, working for someone else, working in the home) and then investigating why they made those choices.

3.3 Methods

Semi-structured, in-depth, in-person interviews were conducted with 50 individuals across the islands of Java and Sumatra.[2] These interviews were designed to better understand the way that individuals make decisions over childcare and household responsibilities and their labor supply, and also to supplement the analysis of the primary data of the IFLS. Semi-structured are ideal for balancing rigor and replicability with room for individual expressions (Robert Wood Johnson Foundation, 2008).

3.3.1 Framework

The framework for these semi-structured interviews follows recommendations found in Kallio et al. (2016) which recommends five phases of development for semi-structured interviews: 1) identifying the prerequisites for using semi-structured interviews, 2) retrieving and using previous knowledge, 3) formulating the preliminary semi-structured interview guide, 4) pilot testing the interview guide, and 5) presenting the complete interview guide. The topic of study in this case lent itself to semi-structured interview because of the complex and interrelated nature of people's perception of their work and home choices. I used previous knowledge from the quantitate work found in Chapter 2 to formulate the the preliminary interview guide which is defined as a list of questions which conversation towards the research topic (Whiting, 2008). Semi-structured interviews allow for dialogue during the interview

[2] 80% of the sample is in Java or Sumatra.

and allow for changes to be made to things like the order of the questions. The questions are meant to be in-depth and open-ended, allowing interviewees to insert their personal experiences and feelings and contains both main themes and follow-up questions. The questionnaire was pilot tested internally between the research team and in the field with several potential study participants.

3.3.2 Participants and Sampling

I used quota sampling to select individuals. There existed several preselected criteria for participation including marital status and parenthood (or impending parenthood). However, in order to achieve sufficient variation in experiences I sought to balance the sample towards women and across the three broad categories of labor market participation. I sought to gather a sample that varied in education, work force experience, and urban residence. The members of the sample were identified and initially contacted by my local research aids, Retno Augustin and Fitriani Kembar. They are Indonesian nationals with prior experience in both research and NGO activity in gender issues. They identified participants for interviews based upon availability and fit using a standardized script which emphasized the voluntary nature of the study and the general purpose. At the time of the interview each participant received an informed consent form in Indonesian Bahasa which was approved the Duke Internal Review Board (Reference: IRB Study 0434). The consent form was also explained in any local dialects as necessary. Permission was requested to record interview via audio. Proposed respondents were people who known by them or recommended by the team?s acquaintances, where the selection based on marital status, economic status, and occupation. It achieves the goals of being both more straightforward and less costly than a random sampling strategy while providing information and context on work choices.

Subjects were preselected to be married, adult men and women who either had children, or in a very cases, were a child in the very near future. Respondents were located in Java or Sumatra and were from the following provinces: North Sumatra (Sumatera Utara), Riau, Jakarta, West Java (Jawa Barat), Central Java (Jawa Tengah), East Java (Jawa Timur), and Yogyakarta Special Region. Within each province interviews took place in at least two locations, often urban and rural. These regions were chosen for both practical and data driven purposes. While Indonesia is geographically immense the population is concentrated in the main islands and indeed 80% of the sample included in Chapter 2 resides in Java or Sumatra where interviews took place. Focusing on the aforementioned regions balanced the need to include varied experiences with the reality of in country travel limitations.

We oversampled women, who made up 84% of the interviews, and took care to get a mix of individuals in wage work, home work, and self-employment. It is important to note this sample is not random and not conducted from a scientific sampling frame, thus any general conclusions should be cautious if drawn at all; however, the primary purpose of the interviews is to give further insight and texture to the primary data and is useful when considering further steps. The interview covered how each individual spent his or her weeks and how each divided time between work and non-work activities. I asked how people cared for their children and which family members were primarily responsible for childcare. I asked if people had interest in other sectors and activities as well.

3.3.3 Data Collection

The interviews were based upon the questionnaire in Appendix B. They were designed with three primary goals. The first was to enable a detailed exploration of individual's views and experiences in regards to their work and family choices.

Second, they were influenced by the text of the Indonesian Family Life Survey's Individual Work module which formed the basis for the qualitative analysis performed in chapter 1. By allowing the questions regarding classification to comply closely the IFLS some level of uniformity was guaranteed between analyses. Third, they were designed in hope of eliciting insight in further work to explore the topic of childcare and work choice (this goal will be discussed more extensively in Section 3.5).

Interviews were recorded and notes were taken during the interview by both the primary interviewer (most often Retno or Fitriani) and the secondary interviewer. Real-time translation and participation of the secondary interviewer varied by subject. In cases in which the subject had some level of English understanding there would be occasional stops to discuss themes or relay quotes. In cases in which the subject did not speak English or the primary interviewer felt it would be detrimental all discussion between interviewers was delayed until after the conclusion of the interview. Most interviews took place in Bahasa but some were conducted in Javanese. Notes were shared systematically by interviews and compiled in English. Translated transcripts of each interview are not available due to the prohibitive cost of transcription and translation. Thus the results are drawn primarily from notes taken by myself, Retno, and Ani both at the time of interview and in the following weeks. Some interviews have been partially translated for use in this study.

Interviews primarily took place in the home of the subject – although in some urban areas it was easier for the subject to meet in an office or public place. If possible, each subject was interviewed by him or herself. This was especially important in the interviews of women for whom the presence of husband or other male family member could have influenced her answers or comfort level. In 3 of the 50 interviews, this was not possible and was noted in notes and analysis.

3.4 Results

Several themes were apparent throughout the interview process and I have divided them into 4 overall categories: 1) the priority of children for women (less for men), 2) the importance of flexibility in all work, but it's ease in self-employment, 3) the role of family caretakers, and 4) difference in purpose between male and female businesses. These themes were pertinent across all levels of education, geographic location, and age.

Table 3.1: Qualitative Interview Statistics

	Count	Age	Primary Caretaker	Children First Priority
Women	48	35.6	0.90	0.96
Self-Employed	12	39	1.00	1.00
Wage Employed	17	31.6	0.29	0.12
Home Work	13	36.5	1.00	1.00
Men	8	35	0.00	0.13
Self-Employed	3	37	0.00	0.00
Wage Employed	5	33.5	0.00	0.25

The first primary theme found across the interviews was that children are described as a priority for women across all fields while men describe earning as their primary responsibility. Women across all sectors (home, wage, and self-employed) emphasized the importance of being able to perform their household duties while working. Women often described themselves as housewives and full-time workers, but frequently explained that children and family obligations "always come first." One woman with a successful business that employs over 20 people initially described herself as a "housewife" when asked her occupation. One subject describes it as follows "My number one job is only to support my husband...I am at home full-time but sometimes help him to manage and pay his employees...my daughter is my priority" (Female, 34, Home Sector). Another interviewee was running at 25 year tailoring

business and described how "real women must care for children...I cared for mine and now for my daughter's children and I always work...when I worked more I could pay for our daily life but always children" (Female, Self-employed, 56).

Men, regardless of sector, paid less attention to childcare arrangements, noting "My wife does all the things with the children...that is her job" (Male, Self-employed, 52). However, some men, who tended to be younger, did mention their important role in helping with childcare: "I care for the children when my wife is running her business and I am not working" (Male, Wage Employed, 41). One interviewee runs his own agribusiness with hopes to expand, "...I want to open more stores in different locations...but I also want to nurture my babies and play with my kids" (Male, Self-employed, 24).

The second theme concerns flexibility and its importance in work arrangements of all kinds. Flexibility was frequently cited as crucial to working arrangements. One woman in an urban area describes how her work allows her to come home for lunch so she is able to check in on the children and their caretaker daily. Several other women explained that when difficulties arose (e.g., sickly child or loss of an alternative caretaker), they transitioned out of wage work in order to be self-employed. One interviewee described her hopes for her daughter as "I hope that she can flexible as a woman later because I realize that maybe it is the art of being a woman...to be flexible in work...in life...so wherever her husband takes her she can be what she wants" (Female, Wage Employed, 33). Another wage worker discussed changing manufacturing jobs for flexibility, "My new job has similar pay with less hours and a more flexible schedule...sometimes I can bring children to office if I need to" (Female, Wage employed, 37).

However, flexibility was frequently expressed as the primary benefit in many self-employment arrangements. One interviewee is working as a free lancer in her field

to help accommodate her children and husband's hectic schedule, "I can blend my family and work life" (Female, Self-Employed, 31). One woman said her business doing home cleaning allowed her to always "take her children to work" (Female, Self-employed, 37). Another woman, said "I am from West Sumatra, we have entrepreneurial spirit. I can be flexible and independent" (Female, Self-employed, 38). In one case, a woman quit her higher paying job in textile manufacturing to work in a small sewing collective for less earnings but said "I can do more things at home, I am not away all day...I get to make my own designs and decide my work" (Female, Self-employed, 34).

The third theme was that family members (primarily mothers or mothers-in-law) are the primary caretakers when help is needed – these family ties are crucial to work and home balance for women who are working. Almost all of the women in the sample who are not the primary caretakers (all wage workers) use a family member to care for their children, most often their mothers or mothers-in-law. One interviewee says "My mother spends the most time with the children [while I am working], I trust her but other I trust not as much for so much time" (Female, Wage Employed, 26). Another woman discussed how she recently resigned from working as an accountant for over 10 years to start a baking business though she does not have "special skills' in baking. She said, "I left [my job] because my child is sick very much – I go to the doctor sometimes daily...my mother-in-law is starting to care for her other grandchildren and [her child] does not want to go to child care. It is expensive, too" (Self-employed, 35). Another woman said she is only able to have her business because her sister cares for her child (Female, Self-employed, 27). This was described as crucial as several prefer not to use daycares or to limit their use to times when family members cannot help. Many prefer to be home with children and emphasize that self-employment allows them to do this. One woman was building a

shop stall in her front room said she was to work but also be home with her children "I can do both if my work is my home" (Female, Self-employed, 44)

Last, there was a division in the description and purpose of jobs for men and women. Men discuss wanting to grow their businesses as discussed above saying things like "I want my son to take over the business someday." Men discussed creating wealth or an inheritance for children: "I want to expand my business...I have been working so my soon can take over it when I am old. My daughter studied marketing to help run the business, too" (Male, Self-Employed, 56). Women use work income and businesses as extra income and security but seldom emphasize growth and advancement while men discuss income and wealth creation and the desire to create legacy for the family. Several women describe their business activities as an additional source of financial security for their family or way of covering additional expenses, but, often when asked about growth, many say that while they want to grow, they like the scale of their businesses as they are. One interviewee "...if my business is running well then I can have more time with my daughter. Since my business is running well I don't have to focus most of my time in the business" (Female, Wage Employed, 33). One woman who has worked in a bank for several decades discussed her hesitancy to take promotions through her career, "...working is for extra security...I want to spend time with children and grandchild..." (Female, Wage employed, 51). Some women experienced pressure from their partners to invest less time or energy into their businesses and to rely more wholly on the husband's income. One said that although her previous enterprise "...made profits and made a difference in things I can buy...but my husband thought it was too much time and I need to pay attention to children" (Female, 31, Home Sector). Another ran a successful tailoring business with a desire to start a catering business but her husband felt the time commitment would be "too much for a married woman" (Female, 38,

Self-employed).

3.5 Discussion

This paper explores the views and experiences of adult parents in Java and Sumatra across various occupations. It especially focuses on the choices women make to accommodate motherhood and work. Taken together with Chapter 2, it suggests a fundamental reality of self-employment for women revolves around making it easier for them to work and take care of their children and household duties. In a traditional culture in which women across geography, age, education, and social class consider children to be the first priority of their lives one must consider if certain traditional interventions to increase business returns are desirable, appropriate, or effective. Through in-depth interviews Loh (2013) comes to the conclusion that lack of business information and financial access hampers female entrepreneurs. This may well be true but any program that seeks to improve business outcomes must do so with a fundamental understanding of how the business owner conceptualizes and understands the role of the business in her life.

The next natural question is then how to best design programs, entrepreneurship focused or otherwise, that will aid these women. Answers to questions about preferences over business goals and childcare arrangements in concert with the findings in Chapter 2 suggest several directions forward. One would be to offer more childcare in general but perhaps especially in concert with programs designed to foster female entrepreneurship. Increased access to high quality childcare could increase labor market engagement in all forms and alleviate childcare burdens on women. However, as noted above, many women prefer to be the primary caretakers for their children. In this case it is important to understand if high profits or more labor market engagement is first-best end to seek or a means to another development goal

like child welfare or female empowerment. While these may all go hand in hand, they need not something like a cash transfer should be measured against more traditional business interventions or even childcare.

4

The Role of Parental Wealth and Income in Financing Children's College Attendance and Its Consequences

Joint with V. Joseph Hotz[1] Emily Wiemers[2] Joshua Rasmussen[3]

4.1 Introduction

The costs of a college education in the United States has increased dramatically over the past 30 years for both both private and public universities.[4] These increases costs have lead many to ask how parents and children can reasonably and sustainably finance a college degree without incurring debilitating debt. Parents are the most usual natural source of financial support for their children's post-secondary education

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[4]Since 1987-88, published college tuition costs (tuition and fees), adjusting for inflation, have increased an average of 8.8% per year in public 4-year institutions, 4.4% in non-profit private 4-year universities, and 4.0% in public 2-year colleges (College Board, 2017).

with some studies estimating that parents cover over 30% of college costs.[5] The decisions parents make about college financing may have long-run impacts on the financial circumstances of both parents and children. This paper analyzes the role that parental resources play in whether children attend college and whether parents provide financial support. Furthermore, we document the the quality and cost of the college they attend, whether they graduate, and the implications of college financing decisions for subsequent levels of parental and student debt.

Early work in this area primarily considered the impact of parents' resources on children's college attendance, finding little evidence that parental income had an indepdent effect on the likelihood of college attendance once the child's ability and academic preparation were account for (Cameron and Heckman, 1998, 2001; Keane and Wolpin, 2001; Cameron and Taber, 2004). More recent research, however, has considered how this relationship between parental income and the college attendance decisions of children may have changed over time. Given the structural changes in the cost of college it is not necessarily surprising that they found parental income to be predictive of children going to college, even after controlling for the ability and/or academic preparation of children (Belley and Lochner, 2007; Lochner and Monge-Naranjo, 2011, 2012). It is important to additional distinguish between income and wealth as other other studies have examined the impact of parental wealth, most notably housing wealth, on college attendance and other outcomes for young adults (Belley and Lochner, 2007; Lovenheim, 2011; Lovenheim and Reynolds, 2013). Lovenheim (2011) finds that increases in housing wealth during a child's teenage years increase the probability that the child attends college and that these effects are larger after 2000 when home equity loans became more common. Lovenheim and Reynolds

[5]Based on a survey of college students and their parents in 2017, parents cover 31% of the cost of their child's college costs, second only to costs covered by scholarships and grants (35%) (SallieMae, 2017).

(2013) show that among children who go to college, increases in parental housing wealth increase the likelihood of their child attending a flagship public university and that children from low-income families are more likely to complete college. Finally, Cooper and Luengo-Prado (2015) show that children of homeowners who live in areas where house prices increased during a child's teenage years are more likely to enroll in college and attend higher ranked colleges, though they are not more likely to graduate.

The model that underpins these papers is that parents use their resources – both income and wealth – to finance their children's college attendance (Keane and Wolpin, 2001; Lochner and Monge-Naranjo, 2011, 2012). Students make use of parental resources as well as loans[6] and grants-in-aid[7] in funding college education. College debt persists after they complete or stop attending college, affects their subsequent labor market choices, (Rothstein and Rouse, 2011) and their ability to finance housing and other activities (Mezza et al., 2015; Cooper and Wang, 2014; Bleemer et al., 2017).

Relatively less is known about the effect of parental financing on these outcomes for children or the financial situation of parents. Two notable exceptions are (Lochner et al., 2018) who show that parental financial transfers reduce student debt repayment problems in the Canada Student Loan Program, and, (Faber and Rich, ming) who show that commuting zones that experienced increases in the rate of college attendance had increases in home foreclosures in subsequent years. Both of these papers indicate the presence of important and ongoing effects of between parental

[6]There also is a sizable literature on the importance of student loans. Since 2004, the share of undergraduate students who have taken federal subsidized and unsubsidized student loans has increased from 28% in the 2004-05 academic year to 36% in 2014-15, with a decreasing share of students only having subsidized loans (College Board, 2015).

[7]In terms of such grants, in 2015, colleges and universities provide 41% of such aid, 37% from federal sources, 14% from employers and private sources, and 8% coming from state governments (College Board, 2015).

financial support for college for the subsequent financial outcomes of both parents and children.

This paper considers three related issues concerning parent's investments in their children's human capital and the consequences of how these investments are financed. First, we consider how parental income and wealth, measured by housing wealth, directly affect how parents finance college and the probability that children go to college. This is broadly similar in several ways to (Lovenheim, 2011) and (Lovenheim and Reynolds, 2013)[8] with several important extensions. First, do we not only examine how both housing wealth and parental income affect the attendance decision but also whether parents actually help pay for their child to go to college by merit of observing parental transfers. While this mechanism was implied in earlier work, we are able to measure it directly. Second, we consider income in additional to parental wealth through housing on college attendance and financing decisions and find both to be important.

Second, we examine the effect of parental housing wealth and income on outcomes beyond the attendance of college – namely whether graduate from college and the cost or quality of the college children attend. While college attendance has increased in the U.S., graduation rates have not (Bound et al., 2010; Bound and Turner, 2011) and indeed are are quite low; among individuals who began seeking a bachelor's degree at a 4-year institution in the U.S. in the fall of 2009, only 59% completed that degree within 6 years (McFarland et al., 2017). Thus is vital to consider not only the college attendance choice as an outcome supported by parental income wealth but the probability that child will actually graduate.[9] Furthermore, given the literature

[8]These papers examine the effects of housing wealth on whether or not their child attends college and whether they attend the flagship university in their state-of-residence

[9]We note that previous work using the PSID by (Cooper and Luengo-Prado, 2015) find that increases in parental housing wealth increase the income of children as adults, has not found any effects of parental wealth on college completion.

on differential returns across the type of college students attend it is important to consider various measures of quality – including 4-year versus 2-year institutions (Kane and Rouse, 1995), public versus private colleges (Scott et al., 2006) and, more generally measures like the selectivity of admissions and quality of faculty (Black and Smith, 2004, 2006; Black et al., 2005; Dillon and Smith, 2017b). Accordingly, we examine whether parental wealth and income improves the "quality" of college that children attend.

Last, we consider the subsequent indebtedness levels of both parents and children. The attention to the rising student loan debt and its consequences for young adults highlights the importance of understand who accumulates debt. However, parents also take on debt to finance a college education, often in the form of home equity loans [10] This debt is also likely to persist when the child attend college and while it may an efficient way to finance college costs in the presence of well-functioning capital markets, it does expose borrowers to the repayment risks arising from uncertain future income streams and/or unanticipated fluctuations in the value of their collateral. In examining financing decisions and subsequent indebtedness of both parties we are able to understand if parental support reduced students' debt even as it increases their own.

To answer these three questions, we use data from the 2013 Panel Study of Income Dynamics (PSID) and the Roster and Transfers Module which obtained information from all parents in the PSID on the financial help (transfers) they provided to each of their adult children for education and on the educational attainment of each adult child (Schoeni et al., 2015). We also exploit the data collected in the PSID on family wealth and debt, especially with respect to the value of the family's home and what they owe in debt on mortgages, and the debt of their children, especially in the form

[10]Based on the 2017 survey cited in footnote 5, 27% of students' college costs were financed by loans, with 30% taken by parents and 70% by the student.

of student loan debt.

When considering these issues is crucial to disentangle association and causation. An association between parental housing wealth and children's college attendance and financing may simply reflect sorting across families with respect to unobserved parental preferences for higher education and their own earnings capacity as well as the earlier investments in and unobserved traits (e.g., abilities) of children. To address this issue, we construct measures of changes in local housing and labor market conditions to use as instruments for parental housing wealth and income at various points in their life cycles, as well as the income of their children in early adulthood. This strategy extends previous work (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Cooper and Luengo-Prado, 2015) which uses data on local housing conditions to measure the effects of housing wealth on college attendance decisions.[11] The detailed geographic information included in the PSID makes it possible to incorporate data on local labor and housing markets to identify plausibly exogenous changes in parental resources and examine the effect of these changes in parental income and wealth on transfers parents make to fund their children's college education. At the same time, we note that obtaining causal effects of whether or not parents finance their children's college education on the subsequent indebtedness of both parents and children is more challenging, even with the instrumenting strategy described above. As a result, we view the findings we present below as suggestive – rather than definitive – of the causal links between parental financing decisions and subsequent indebtedness.

We find that increases in parents' income and wealth increase the likelihood

[11] Our approach is also in the spirit of the literature on the effects of changes in wealth and income on household consumption. See, for example, (Paiella and Pistaferri, 2017), (Browning et al., 2013), and (Carroll et al., 2011) for analyses of the effects of changes in housing wealth on consumption. Though we do not use changes in housing wealth and income as explanatory variables, we do use changes in wealth and income from sources that are less likely to be endogenously determined as a way to identify the effects of housing wealth and income on college attendance and financing decisions. Unlike the literature on the effects of changes in wealth and income on consumption, which pays particular attention to distinguishing between permanent and transitory changes in wealth and income, we do not attempt to explicitly disentangle these effects in our analysis.

of children attending college through the mechanism of parental transfers. But, increases in parental income have a larger effect on college attendance than increases in parental wealth. In contrast, increases in parental wealth increase the likelihood that children graduate from college but we find no effect of increases in parental income on college graduation. We find evidence that the importance of parental wealth on college graduation is explained by parent's obtaining home equity loans when their child starts college. We find that neither parental income or wealth affects indicators of the type (e.g., 4-year vs. 2-year or private vs. public) or the quality of colleges children attend though sample sizes are reduced in these specifications due to data availability. Finally, we find suggestive evidence that parental financing of college increases parents' subsequent indebtedness and but little evidence that it reduces their children's student debt.

The remainder of the paper is organized as follows. In Section 4.2 we describe the PSID data and the samples and measures we use in our analyses. In Section 4.3, we consider the effect of parental income and wealth in children's college attendance and parental financing decisions. In Section 4.4, we examine how parental income and wealth affects the likelihood of their child graduating from college and the quality and type of school the child attends. Finally, in Section 4.5, we consider the correlation between children's college attendance and parental financing decisions and the subsequent indebtedness of parents and their children. We offer concluding comments in Section 4.6.

4.2 The PSID Data

The PSID began in 1968 with sample of approximately of 18,000 people and 5,000 households. If an individual was included in the PSID sample in 1968 that individual is considered to have the PSID "gene" and this gene is passed to all those who are

born to or adopted by someone with the gene. This design creates genealogical based recruitment scheme for the study and means that each wave has a sample of extended families who may or may not be in the same household. The PSID roster of each family is not always complete because some children (particularly stepchildren and children who have left the PSID sample), and some parents (for example in-laws without the PSID gene) are not included in the sample. The 2013 Roster and Transfers Module was designed to complete the parent-adult child information in the PSID and to describe the transfers that parents and adult children make to one another.

4.2.1 The 2013 PSID Roster and Transfers Module

We use the Roster and Transfers Module of the 2013 PSID in which respondents (PSID heads and spouses) are asked to list and describe their adult children and stepchildren age 18 and older, as well as their parents, stepparents, and in-laws (including in-laws from long-term cohabiting relationships) and to report financial and time transfers to and from their parents and adults children (see Schoeni et al. (2015) for a more complete description of the module). Importantly for our purposes, parents report the age and educational attainment of their adult children and the financial transfers for school they have given to each of their children since the age of 18. The module included data on whether assistance was provided and the amount of assistance.

4.2.2 Samples

We begin our sample construction with the parents and adult children reported in the 2013 Roster and Transfers Module. We consider adults children both when they were 18 and decisions about college are made and when they are 24 and some of the

consequences of these choices can be observed. Starting with children in the Roster and Transfers Module we find the year in which they turned 18 using the Childbirth and Adoption History, augmented by the age report in the Rosters and Transfers Module. We augment the Parent ID file with the Roster and Transfers Module and then link each child to his or her father or mother. We restrict our sample of parent-child pairs to those in which the parents were present as a head or wife of the PSID in the year this child was age 18[12] in order to observe parents' housing wealth and household income. In keeping with this requirement, we restrict our sample to homeowners so that we able to understand the effect of parental housing wealth on our outcomes of interest.[13] We also restrict the years in which the child turns 18 to be after 1997 as there are several data elements we require in our analysis which are only available beginning in 1997.[14] Finally, following Lovenheim (2011) we trim the top 1% of changes in house prices prior to the child turning 18 which removes 14 parent-child pairs. After all of these sample selections, we have a sample of N = 2,868 parent-child pairs with which to estimate the effect of parental wealth on college attendance and parental transfers for college.

To examine the consequences of college attendance and financing decisions on educational and financial outcomes, we examine the parent-child pairs in our main sample in the year in which the child turns 24 which limits us to considering parent-child pairs in which the child turned 18 prior to 2009.[15] For the outcome of parental

[12]If the parents are not a PSID head or wife in the year in which the child turns 18 we go back one year at a time until the child age 13 at which point we drop the child-parent pair.

[13]This restriction reduces our sample by approximately 35%. While not included in the paper, we estimated versions of the empirical models described below that included parents who were not homeowners at the time their child(ren) were age 18, adjusting for the fact that we could not estimate the effects of their home equity but could estimate the effects of their income on the college and financing decisions for their children. The resulting estimates of the effects of parental income on these decisions when one included non-homeowning parents were similar to those we present below based on homeowning parents.

[14]The housing price measure from Zillow which we used to construct a measure for changes to local housing markets had inadequate geographic coverage prior to this period.

[15]If the relevant data are not available for the child or parent in the year in which the child is

debt, this restriction yields a sample size of 2,580 for housing debt and 2,571 for non-housing debt that includes credit card debt, and auto loan debt. For the outcome of college completion, we further limit the sample to children who attended college which yields a sample size of 1,418 parent-child pairs.

When considering the college quality and child indebtedness outcome we are limited to two subsample of children: (a) those who are a PSID head or wife by age 24 or (b) those who are members of their parents' household at age 24 but are interviewed as part of the Transition to Adulthood (TA) study. The TA study is designed to follow children as they transition into adulthood and includes questions about which college children attended as well as information on income and debt. We construct a total sample of 1,756 adult children with which to analyze their non-housing debt at age 24 and 1,196 with which to analyze student loan debt at that age. We have a smaller sample of children to analyze student debt at age 24 because the PSID only started asking about this source of debt separately in 2011. For the outcomes of college cost and quality, we further limit the sample to children who attended college and whose college can be linked to the data from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) database which yields a sample size of 856 for tuition and 854 for four-year degree status. Public/private status of the college and our measure of college quality which we construct from the IPEDS data are only available for children who attend a four-year college which limits our sample to 704 for public/private college status, and 705 for college quality.

Table 4.2 provides a summary of the sizes of these various samples that we use in our analysis below. In Appendix C, we also present descriptive statistics of the demographic characteristics of the parents and children, measured at the time the

age 24 we go back one year at a time until the child is age 22 and forward one year at a time until the child is 27.

Table 4.1: Sample Sizes

Samples	N
Parent-Child Pairs for Analyses of:	
Child's College Choices ($EduFin0$, $EduFin1$, $EduFin2$) & Amount of Transfer	2,866
Whether Child Graduated from College	1,418
College Tuition Costs, Conditional on Attending	856
Whether Child attended 4-year College, Conditional on on Attending	854
Whether attended Private College, Conditional on attending 4-Yr College	704
College Quality Index, Conditional on attending 4-Yr College	705
Parent-Child Pairs when Child at age 24 for Analyses of:[1]	
Parents' Mortgage Debt	2,580
Parents' 'Other' Debt	2,571
Children's 'Other' Debt	1,756
Children's Student Loan Debt	1,196

[1] Data on the debt of children at or near when they are age 24 is obtained from either the regular PSID survey or from the the Transition to Adulthood (TA) survey which covers children who are age 18 or older regardless of whether they have become the head of their own household.

children were age 18, of the sample of the 2,866 parent-child pairs used in our analysis of college education decisions.

4.2.3 Measures

The following are measures we use throughout our analysis. Here we describe how each constructed while in later sections we provide summary statistics.

College Attendance and Graduation: We measure college attendance and college graduation using the Roster and Transfers data. We consider a child to have attended college if the parents report in the Roster and Transfers data that the child has attended some college or has a college degree. This measure is somewhat different from the previous literature (Lovenheim, 2011; Lovenheim and Reynolds, 2013; Cooper and Luengo-Prado, 2015) which uses the annual PSID data to determine enrollment. The benefit of the measure from the Roster and Transfers data is that is considerably easier to identify students who enroll in but do not complete college. This is important to understanding the potential difference in effects of attending vs. graduating from college. We measure college graduation by a parental report that

the child's highest level of educational attainment is college graduate or more.

Financial Transfers for College: Parents are considered to have given a financial transfer to a child for educational expenses if they report having done so in the long-term transfers question in the Roster and Transfers Module. We eliminate the small number of cases in which parents report that their child has educational attainment below "some college" and report having given a transfer for post-secondary educational expenses. We measure the amount that parents report giving to their child in 2013$.[16]

College Cost and Quality: We link responses from the main PSID interview or the TA study on the college attended to measures of college cost and quality available from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) database. We obtain the annual tuition costs for a full-time student at that institution in the year they would have started college. In doing so we use the state of residence of the parent at that time to determine whether children would have paid in-state or out-of-state tuition at any public institutions.[17] For college quality we use three separate measures. First, we measure whether the institution grants 4-year degrees. Second, we use whether a child attended a private university, where we restrict our attention to students who attend a 4-year university. Finally, we use the college quality index used in Black and Smith (2004), Black et al. (2005), Black and Smith (2006), Dillon and Smith (2017b), and Dillon and

[16]We note that the decision to measure the amount of transfers in 2013$ is not straightforward. Though parents were asked the question on amounts of transfers in 2013, it is not clear whether the reported amounts in terms of current dollars or the dollar value(s) at the time the transfers were made. We have re-run our specifications of regressions for the effects of parental housing wealth and income on the amount of transfers given to support a child's college education under either of these two assumptions about parental reporting. While the magnitudes of the corresponding coefficients differed, none of the inferences we make below were affected. Accordingly, we only present results under the assumption that parents reported the amounts of these transfers in current (2013) dollars.

[17]We use in-state tuition if the parents resided in the same state as the institution in the year the child turned 18, and out-of-state tuition otherwise.

Smith (2017a).[18] The index is based on the following measures of colleges' selectivity and resources: college's mean SAT or ACT scores; percent of applications rejected; average salary of faculty involved in instruction; and the undergraduate faculty-student ratio.[19] The index is the first principal component of these four indicators of college quality measured in 2008.[20]

Parental Housing Wealth and Income: Over the entire span of the PSID, heads of households or their proxy are asked whether they are a homeowner and, if they are, to provide an estimate of the value of their home and the remaining balance, if any, on their home mortgages and/or home equity loans. Mortgage debt includes all primary and secondary mortgages, along with home equity loans and lines of credit on the individual's primary residence. Then, we define an estimate of the parents net home equity as the reported market value of their home less any remaining mortgage balances. Parental income is measured by total family income reported in the annual PSID family data.

Parental and Child Indebtedness: We consider several forms of indebtedness for both parents and their children. For parents, we consider mortgage debt, the sum of all their primary and secondary mortgages along with home equity loans, and all other non-housing debt, including outstanding credit card and medical debt, as well as other outstanding loans. These measures are obtained in the PSID wealth module which has been included in every survey since 1997. For children, we examine debt in the form of outstanding student loans, as well as total other non-housing debt. Student loan debt is obtained from the TA survey and from the PSID wealth module

[18]We thank Nora Dillon and Jeff Smith for providing us with the latest version of these quality indices for 4-year and 2-year colleges in the U.S.

[19]These dimensions of quality for colleges in the U.S. are obtained from the Integrated Post-Secondary Education Data System (IPEDS) and college rankings by *U.S. News & World Report*.

[20]The particular version of college quality index we use takes on values from -9 to $+9$ and is constructed to have a mean of 0 across all of 4-year colleges and universities in the U.S.

after 2011. Total non-housing debt is measured in the TA survey and in the PSID wealth module.

4.3 Effects of Parental Wealth and Income on Children's College Attendance and Its Financing

In this section we examine children's college attendance decisions and parents' role in helping to finance their children's choices. In particular, we are interested in how changes in parents' wealth and income affect these choices. We begin by defining the notation for college attendance and parental financing thereof as well as parental income and housing wealth and discussing the empirical distributions of parental wealth and income across college attendance and financing decisions in our sample. We then describe our econometric strategy for estimating the causal impact of parental wealth and income on the decision of children to attend college and the decision of parents to help pay for it and discuss our empirical findings.

4.3.1 Modeling Children's College and Parental Financing Choices

We define the following variables to characterize the college attendance and parental financing decisions for the j^{th} child of the i^{th} parent when the child is age 18:

$$EduFin0_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ did } \textit{not} \text{ enroll in college,} \\ 0, & \text{otherwise.} \end{cases} \tag{4.1}$$

$$EduFin1_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents didn't help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{4.2}$$

and

$$EduFin2_{ij,18_j} = \begin{cases} 1, & \text{if child } j \text{ of parent } i \text{ enrolled in college \& parents did help pay,} \\ 0, & \text{otherwise.} \end{cases} \tag{4.3}$$

where $EduFin0_{ij,18_j} + EduFin1_{ij,18_j} + EduFin2_{ij,18_j} = 1$.

Conditional on $EduFin2_{ij,18_j} = 1$, we can measure the *amount of financial help* parent i provided to child j in support of the child's college attendance. Denote this amount as $CollTrans_{ij,18_j}$.

Table 4.2: Sample Sizes

Samples	N
Parent-Child Pairs for Analyses of:	
Child's College Choices ($EduFin0$, $EduFin1$, $EduFin2$) & Amount of Transfer	2,866
Whether Child Graduated from College	1,418
College Tuition Costs, Conditional on Attending	856
Whether Child attended 4-year College, Conditional on on Attending	854
Whether attended Private College, Conditional on attending 4-Yr College	704
College Quality Index, Conditional on attending 4-Yr College	705
Parent-Child Pairs when Child at age 24 for Analyses of:[1]	
Parents' Mortgage Debt	2,580
Parents' 'Other' Debt	2,571
Children's 'Other' Debt	1,756
Children's Student Loan Debt	1,196

[1] Data on the debt of children at or near when they are age 24 is obtained from either the regular PSID survey or from the the Transition to Adulthood (TA) survey which covers children who are age 18 or older regardless of whether they have become the head of their own household.

Table 4.3 shows the distribution of $EduFin$. In our sample, 44% of children do not enroll in college, 30% enroll but do not receive financial help from parents and 26% enroll in college with a transfer from a parent. The mean amount of the transfer

is $7,800.

As noted above, we focus on how parental housing wealth and parental income influence these decisions. To begin, we characterize the housing measures we construct from the PSID data. Let $MktValue_{imt_{18,j}}$ denote the *parents' estimated market value of their home* (measured in 2013 dollars) located in market m (which is in state s) in the year in which child j was age 18 (t_{18_j}). Further, let $MortBal_{imt_{18_j}}$ denote the remaining balances on parents' home mortgages and home equity loans as of year t_{18_j}, again in 2013$. Then, we define an estimate of the parents *(net) home equity* as:

$$H_{imt_{18_j}} = MktValue_{imt_{18_j}} - MortBal_{imt_{18_j}}. \tag{4.4}$$

Let $Y_{imt_{18_j}}$ denote the parent i's *total household income* in year t_{18_j} when they were residing in local labor market m.

Table 4.3: Child's College Enrollment Choices & Parental Transfers for College among Homeowning Parents & College-Age Children in PSID, 1997-2015[1]

Variable	Mean
Child's College Enrollment Choices:	
Child does not enroll ($EduFin0$)	0.44
Child enrolls, no transfer ($EduFin1$)	0.30
Child enrolls, transfer ($EduFin2$)	0.26
Amount of Transfer ($CollTrans$)[2]	$0.78

[1] Statistics weighted using PSID family weights.
[2] Conditional on those students who attended college at age 18. Dollar amount is in 10K of 2013$.

In Table 4.4 we display how parental housing wealth, $H_{imt_{18_j}}$, and annual income, $Y_{imt_{18_j}}$, differ by college attendance and parental financing decisions. The patterns of parental net equity and income across college attendance and financing decisions are predictable. The parents of children who attend college without financial sup-

port have \$21,200 [= $\$50,200 - \$29,000$] more in net home equity and \$22,300 [= $\$75,100 - \$52,800$] more in income when their child is age 18 compared to the parents of children who do not attend college. The parents of children who attend college with financial support have \$63,400 more in net home equity and \$45,200 more in income than those whose children attend college without parental financial help.

To model parental-child college and financing decisions, let the utility/payoff for $EduFink_{ij,18_j}$ be denoted by $U^*_{kijm,18_j}$ and assume that choice $k = 0$ is the base category. The payoff functions for parent i of child j made when the child is age 18 are given by:

$$U_{kijm,18_j} = \lambda^U_{k0} + \lambda^U_{k1} H_{imt_{18_j}} + \lambda^U_{k2} Y_{imt_{18_j}} + \boldsymbol{\lambda}^U_{k3} \boldsymbol{X}_{ij} + \boldsymbol{\lambda}^U_{k4} \boldsymbol{M}_{mt_{18_j}} + \phi^U_{kt_{18_j}} + \delta^U_{ks} + \varepsilon^U_{kijm,18_j}, \tag{4.5}$$

for $k = 0, 1, 2$, where the $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are defined above, $\boldsymbol{X}_{ij}$ is a vector of demographic characteristics of parents i and their j^{th} child, $\boldsymbol{M}_{mt_{18_j}}$ is a vector of time-varying characteristics of location m in year t_{18_j}, $\phi_{t_{18_j}}$ and δ_s are year and state-of-residence *fixed effects*, respectively, and $\varepsilon_{kijm,18_t}$ are choice-specific unobserved parent and child traits. We include in $\boldsymbol{X}_{ij}$ a set of demographic characteristics including

Table 4.4: Parents' Net Equity, Parental Income by College Attendance and Parental Financing when Child was Age 18[1]

	Full Sample	$EduFin0$ (No Coll)	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
Parents' Net Equity ($H_{imt_{18_j}}$)	\$5.73	\$2.90	\$5.02	\$11.36
Parents' Income ($Y_{imt_{18_j}}$)	\$7.69	\$5.28	\$7.51	\$12.03

[1] Statistics weighted using PSID family weights. Dollar amounts are in 10K of 2013\$.

the age, marital status, race, and education of the parent. Also included are a set of

variables describing the family structure of the child's household at age 18 including whether the household is headed by a single-female, the number of children in the household under age 16, whether there is a child in the household who is less than five years older than child j, whether there is a child in the household who is less than five years younger than child j, and the gender of child j. (See C for the list of these variables and their sample means.)

We include in $\boldsymbol{M}_{mt_{18_j}}$ the average weekly wage and employment rate in market m in year t_{18_j}, where the latter variables are taken from the Quarterly Census of Employment and Wages (QCEW). We use a share-weighting approach to make the average weekly wage more accurately reflect the labor market teenage workers would face if they do not attend college. We use the Current Population Survey to calculate the composition of industries that teenagers are employed in nationally in each year and apply these weights to local industry-specific wages. We also control for the college-wage premium for younger workers directly. Following (Lovenheim and Reynolds, 2013) we use data from the Current Population Survey to calculate the college-wage premium for young workers in the state, s, in which market m is located in year t_{18_j} as the ratio of hourly wages of 25 - 40 year olds with a bachelor's degree (BA) to the hourly wages of 25 - 40 year olds whose highest level of educational attainment is a high school diploma. We also include the college - associate degree wage premium calculated as above but using individuals with an associate's degree as the comparison group. As long as high-skilled labor demand is not highly localized, these state-level measures control for the demand for high-skilled vs. low-skilled labor for younger workers.

We characterize the optimal college/financing choice for child j, $k^{\dagger}$, as follows:

$$k_i^{\dagger} = \arg\max_k U_{kijm,18_j}, k = 0, 1, 2. \tag{4.6}$$

Assuming that the random variable, $\varepsilon^U_{kijm,18_j}$, has a Type II extreme value distribution and assuming that we treat $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ as exogenous to child j's college enrollment and parental financing decisions, it follows that the model of the college attendance and its financing choice can be estimated as a multinomial logit model.

As noted in the Introduction, the assumption that $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ are exogenous is a strong one. Accordingly, we wish to allow for the potential endogeneity of these two variables in the estimation of the payoff functions in (4.5). To deal with the endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$, we use a control function estimator (Blundell and Powell, 2003) applied to the multinomial logit specification (Petrin and Train, 2010; Wooldridge, 2014). This estimator can be implemented in two stages. In the first stage, we regress the endogenous variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ on exogenous regressors, including the exogenous variables, $\boldsymbol{X}_{ij}$ and $\boldsymbol{M}_{mt_{18_j}}$ in (4.5) and year and state-of-residence fixed effects, as well as a vector of instrumental variables, $\boldsymbol{Z}_{imt_{18_j}}$ (which we define in the next section) to account for the endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$.

That is, these first-stage regressions are:

$$H_{imt_{18_j}} = \boldsymbol{\pi}^H_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^H_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^H_3 \boldsymbol{M}_{mt_{18_j}} + \phi^H_{t_{18_j}} + \delta^H_s + \nu^H_{imt_{18_j}}, \quad (4.7)$$

$$Y_{imt_{18_j}} = \boldsymbol{\pi}^Y_1 \boldsymbol{Z}_{imt_{18_j}} + \boldsymbol{\pi}^Y_2 \boldsymbol{X}_{ij} + \boldsymbol{\pi}^Y_3 \boldsymbol{M}_{mt_{18_j}} + \phi^Y_{t_{18_j}} + \delta^Y_s + \nu^Y_{imt_{18_j}}, \quad (4.8)$$

One then retrieves the residuals from these regressions, which we denote as $\widehat{\nu}^H_{imt_{18_j}}$ and $\widehat{\nu}^Y_{imt_{18_j}}$, respectively. In the second stage, we estimate a multinomial logit model where we include $\widehat{\nu}^H_{imt_{18_j}}$ and $\widehat{\nu}^Y_{imt_{18_j}}$ as additional regressors, with separate coefficients, in the payoff functions in (4.5). To account for the estimation error in $\widehat{\nu}^H_{ijmt_{18_j}}$ and $\widehat{\nu}^Y_{ijmt_{18_j}}$ and the quasi-ML nature of estimation in the second stage, we adjust the estimation

of the variance-covariance matrix of the λs as characterized in (Wooldridge, 2014). We use bootstrap to calculate these standard errors.

Finally, conditional on $EduFin2 = 1$, we can estimate the impacts of parental housing wealth and household income on the amount of the parents' transfer, $CollTrans_{imt_{18_j}}$. Mimicking the specification of payoffs in (4.5), we estimate the following OLS regression:

$$CollTrans_{imt_{18_j}} = \lambda_0^T + \lambda_1^T H_{imt_{18_j}} + \lambda_2^T Y_{imt_{18_j}} + \boldsymbol{\lambda}_3^T \boldsymbol{X}_{ij} + \boldsymbol{\lambda}_4^T \boldsymbol{M}_{mt_{18_j}} + \phi_{t_{18_j}}^T + \delta_m^T + \varepsilon_{imt_{18_j}}^T \tag{4.9}$$

where all of the control variables are the same as described above but we use MSA level fixed effects for urban residents and state level fixed effects for rural residents instead of state-level fixed effects.

To account for the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (4.9), we employ an instrumental variables estimator (2SLS), using the same vector of instruments, $\boldsymbol{Z}_{imt_{18_j}}$, used in the control function estimator of the parameters in the payoff functions in (4.5) which we describe next.

4.3.2 Instrumental Variables: Changes in Local Housing Prices and Wages

As noted above, we seek to instrument for parent's housing wealth, $H_{imt_{18_j}}$, and income, $Y_{imt_{18_j}}$, in the estimation of the payoff functions for the college education and financing choices parents make for their jth child. In this section, we describe the variables we use as instruments (Z) in our analyses and how they are constructed.

We use changes in local housing market prices and changes in labor market wages as our instruments. In particular, we construct measures of the change in the parents' housing wealth and parental income immediately before child j reaches age 18 to serve as instrumental variables for parental housing wealth and income in the estimation of

our college attendance and financing models and our estimation of the effects of these decisions on subsequent educational outcomes described in Section 4.4. In spirit of the approach in (Lovenheim and Reynolds, 2013), we use changes in market-level measures of average housing values in the local market in which parents resided in the year in which the child was age 16, i.e., in year t_{16_j}. We use lagged values of changes in local market conditions for two reasons.

The first is to avoid the potential endogeneity issue that would arise from parents moving between localities at the time of their child's college decision (either to improve their ability to finance college though something like the sale of a home or to reduce the cost of college through something like moving to receive in-state tuition). Second, parents likely base their assessment of their ability to use home equity as collateral for a loan based on local housing values 1-2 years prior to the actual decision rather than the changes in the exact year of attendance. We note that (Lovenheim, 2011) and (Lovenheim and Reynolds, 2013) use a similar strategy. We will employ the same strategy when constructing measures of the changes in local labor market conditions that may be expected to affect personal income.

Our instrument for changes in local housing values is constructed as follows. For the locality, m, in which parents reside in year $t_{16,j}$, we obtain housing price indices, HPI_{mt}, from external data sources to construct the percentage change in local housing values. Where possible, i.e., where we have data on local housing prices, we define the local housing market at the zip code level and, where possible, we use housing price indices constructed by Zillow. For zip codes where a Zillow price index is not available in year $t_{16,j}$, we use the Zillow index for the county in which the parents/child reside in that year. When a price index is not available for the parents' county of residence, we use the price index of the MSA- or state-of-residence. Finally, for some years and locations in which the parents in our data

reside in markets not covered by Zillow data, we make use of the housing price index constructed by the Federal Housing Finance Agency (FHFA) as our measure of HPI_{mt}. With the resulting indices, we construct the percentage change in this index over a 4-year period centered on year t_{16_j},

$$\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}}. \tag{4.10}$$

We note that by using percentage changes in housing price indices, HPI_{mt}, rather than simple changes, we minimize any problems of non-comparability of the Zillow and FHFA housing price indices.[21] We then "scale" this percentage change by the net home equity the parents report in year t_{16_t} to form our housing market instrument:

$$\Delta HPI_{mt_{18_j}} \equiv H_{imt_{16_j}} \left[\frac{HPI_{mt_{18_j}} - HPI_{mt_{14_j}}}{HPI_{mt_{14_j}}} \right]. \tag{4.11}$$

We note that we found that trimming the changes affects the precision of our results.

For our instrumental variable for local labor market conditions, we use data from the QCEW to obtain the average annual wages in each county, m, in each year, t. We then construct average wages by county-of-residence of parents for the years around when their child was age 16, i.e., t_{16_j}. We denote these average wage measures by $\overline{W}^P_{mt}$. We then construct the percentage changes in these average wages, i.e.,

$$\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{mt_{14_j}}}, \tag{4.12}$$

[21] We trimmed these changes when they were exceedingly large in absolute value.

and scale it by parent's annual income in year $t_{16,j}$ to construct the following instrumental variable:

$$\Delta W^P_{mt_{18_j}} \equiv Y_{imt_{16_j}} \left[\frac{\overline{W}^P_{mt_{18_j}} - \overline{W}^P_{mt_{14_j}}}{\overline{W}^P_{m,t_{14_j}}} \right]. \tag{4.13}$$

Thus, our vector of instruments is given by $\boldsymbol{Z}_{imt_{18_j}} \equiv (\Delta HPI_{mt_{18_j}}, \Delta W^P_{mt_{18_j}})$. The statistics for tests of the joint significance of the instruments for both parental net equity and income are in Appendix Table C.2.) and indicate sufficiently strong instruments.

4.3.3 Empirical Results

Table 4.5 presents the results of estimating (4.5) and (4.9). For the college choice and financing models, (4.5), we show estimates of the marginal effects of parental net equity (H) and income (Y) on children's college choices ($EduFin0, EduFin1$ and $EduFin1$) for the unadjusted multinomial logit specification as well as those for our preferred estimates based on the control function estimator. For the models of amounts conditional on a transfer, (4.9), we present OLS and 2SLS coefficient estimates for H and Y.

In Panel A of Table 4.5, we present estimates of the marginal effects of parents net (home) equity when their child was age 18 ($H_{imt_{18_j}}$) and parents' annual income at that age ($Y_{imt_{18_j}}$) for the unadjusted multinomial logit specification. A \$10,000 increase in home equity decreases the likelihood that the child does not attend college by 0.39 percentage points, increases the likelihood that they attend college but with no parental transfer by 0.03 percentage points and increases the likelihood that they go to college and their parents provide financial help by 0.36 percentage points, with the first and the last of these effects being statistically significant at least the

Table 4.5: Marginal Effects of Changes in Wealth and Income on College & Financing Choices and Amount of Financing[1]

	College and Financing Choices:			*Amount of Transfer:*	
	$EduFin0$	$EduFin1$ (Coll, but	$EduFin2$ (Coll &		
	(No Coll)	No Transfer)	Transfer)	OLS	2SLS[2]
Variable	(1)	(2)	(3)	(4)	(5)
Panel A. Schooling and Financing Choice, Multinomial Logit					
$H_{imt_{18_j}}$	-0.0039^{*}	0.0003	0.0036^{***}		
	(0.0021)	(0.0015)	(0.0012)		
$Y_{imt_{18_j}}$	-0.0196^{***}	0.0085^{***}	0.0111^{***}		
	(0.0032)	(0.0028)	(0.0026)		
N			2.651		
Panel B. Schooling and Financing Choice, Control Function[2]					
$H_{imt_{18_j}}$	-0.0035	-0.0022	0.0058^{**}		
	(0.0051)	(0.0045)	(0.0028)		
$Y_{imt_{18_j}}$	-0.0214^{***}	0.0045	0.0169^{***}		
	(0.0056)	(0.0046)	(0.0045)		
N		2.645			
Panel C. Transfer Amounts, OLS and 2SLS					
$H_{imt_{18_j}}$				0.0316^{***}	0.0205
				(0.0118)	(0.0199)
$Y_{imt_{18_j}}$				0.0769^{***}	0.1510^{***}
				(0.0162)	(0.0357)
R^2				0.400	0.375
N				2.551	2.551

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, the high school and college wage premium, year fixed effects, and state fixed effects.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the control function and 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^{P}_{mt_{18_j}}$. See Section 4.3.2 for a description of these instruments.

10% level. Similarly, a $10,000 increase in parents' annual income decreases the likelihood that the child does not attend college by 1.96 percentage points, increases the likelihood that they attend college but with no parental transfer by 0.85 percentage points and increases the likelihood of the child going college and receiving financial help from their parents by 1.11 percentage points, with all three of these effects being being statistically significant at the 1% level.

In Panel B of Table 4.5 we account for the potential endogeneity of parental home equity and income on these choices. We find that a $10,000 increase in parental housing wealth increases the likelihood of attending college with a parental transfer by 0.58 percentage points. The effect of a $10,000 increase in income is over twice as large, increasing the likelihood of attending college with a parental transfer by 1.69 percentage points and decreasing the likelihood of not attending college by 2.14 percentage points, with both of these effects being precisely estimated.

In order to compare the effects of parents' net home equity and income on comparable terms, we compute estimates of the elasticities for these variables. For our preferred control function estimates, the elasticity of parental income with respect to not going to college is -0.374 and for going to college and receiving financial help is 0.500. In contrast, for parents' net housing equity the elasticities are much smaller at (-0.046 and 0.128, respectively).[22]

Our estimates of the effects of parental housing wealth (H) on the likelihood of a child attending college – here measured as the negative value of the estimates of H on not attending college – are consistent with and quite similar in magnitude to those in (Lovenheim, 2011), although only the multinomial logit estimates are statistically significant. Furthermore, we find that increases in parental income (Y) increase the likelihood of attending college – again measured as the negative of the effects on

[22]These elasticities are evaluated at the means of both the probabilities of $EduFin0$ and $EduFin2$ and $Y_{imt_{18_j}}$ and $H_{imt_{18_j}}$ found in Table 4.3.

not attending college – which is consistent with the findings in (Belley and Lochner, 2007; Lochner and Monge-Naranjo, 2011), and (Lochner and Monge-Naranjo, 2012). Moreover the latter effects are statistically significant for both our multinomial and control function specifications. But, as discussed above, our findings make clear that the mechanism through which parental income and wealth affect college attendance is through their effects on the the likelihood that parents choose to help finance their child's education. Furthermore, the effects of H and Y on the college and transfer choice ($EduFin2$) are statistically significant for both the multinomial logit and control function specifications, while the effects of both of these variables on the college but no parental transfer small and not statistically significant for our preferred control function specification.

The estimated effects of parental home equity and parental income on the amount of parental transfers for their children's college education, for both OLS and 2SLS, are found in Panel C of Table 4.5. Ignoring the endogeneity of parental home equity and income, the OLS results indicate that a $10,000 increase in net home equity would increase the amount of parental financial support by an average of $316, while a comparable increase in parents' income would increase the average amount transferred by $769. In our preferred 2SLS specification, we find that a $10,000 increase in home equity increases parental transfers by only $205 and this effect is no longer statistically significant. However, we find that increases in parental income now have a much larger effect on the amount of parental transfers, with a $10,000 increase in parental income resulting in an average increase in parental transfers $1,510, with the latter effect being precisely estimated. Translating these effects of parental home equity and income on parental financial support for their children going to college to elasticities, we again find that the elasticity for net home equity is fairly small (0.151) while the elasticity with respect to parental income is sizable

(1.489).

Taken together these results strongly suggest that both parental wealth and parental income are important in determining both the likelihood of their children attending college and, importantly, their parents helping to finance it. But, that the effects of changes in parental income on college attendance and financing decisions are larger than similar changes in parental wealth. One important difference between our work and prior work on the role of housing wealth in college attendance decisions is the time period that we analyze. (Lovenheim, 2011) focused on the years between 2000 and 2005 when house prices were growing rapidly and home equity lines of credit were plentiful. In contrast, we include both an earlier period (1997 - 1999), and, more importantly, the later period (2006 - 2013) in which house prices fell or were largely stagnant and home equity lines of credit became increasingly difficult to obtain. Changes in the ability to access home equity lines of credit have played a role in explaining the relative importance of income in college attendance and financing decisions. When home equity lines of credit become more difficult to access, parental income may have become a more likely source for financing large consumption expenses like their children's college educations. It is also possible that family income became more important in the ability to access credit in the aftermath of the Great Recession which would exacerbate the importance of income for being able to provide financial assistance for college. We return to this issue below in the discussion of our results for college graduation.

4.4 Effects of Parental Wealth & Income on College Graduation and Costs & Quality of Colleges Attended

Section 4.3 shows that in our sample parental income increases the likelihood that children go to college and this is primarily driven by directing increasing the actual transfer amount from parents for children and while this is also true of parental wealth (i.e. home equity) it is not a true. It is important to not just consider the broad decision to attend college but whether the outcomes associated with college earnings premiums, like graduation and quality, are also affected.

4.4.1 Children's College Attainment & Quality

We use the Rosters and Transfers Modules to measure whether each child j of parent i that attended college at age 18 graduated from college ($Grad_{ij,18_j}$) Using data from IPEDS we obtain the annual tuition cost for a full-time student at child j's institution in the year he or she would have started college ($Tuition_{ij,18_j}$). $4YrColl_{ij,18_j}$ denotes whether the institution was a 4-year college or university and $Private_{ij,18_j}$ denotes whether it was a private institution. The quality index is denoted by $Quality_{ij,18_j}$.[23] Table 4.6 shows the mean values for all quality measurements and it is clear that on average, they are higher for children who attend college with parental financial support than those who attend without it. In particular, $Quality_{ij,18_j}$ increases from 0.07 for college attended by children who did not receive financial help from their parents to 0.49 for those that did.

Using changes in parental income and wealth in the years before a child turns 18 as instruments for income and housing wealth we examine how parental income and parental housing wealth affect college quality, mirroring the specifications on college

[23]See Section 4.2.3 for further reminders on details of measurement including the quality index.

Table 4.6: College Graduation, Annual Tuition, Types of College and College Quality[1]

Variable	Full Sample	Attended College	$EduFin1$ (Coll, but No Transfer)	$EduFin2$ (Coll & Transfer)
Graduated from College $(Grad)^2$	0.27	0.40	0.37	0.43
Annual Tuition $(Tuition)^2$		\$9,608	\$7,776	\$10,924
Attended 4-Year College $(4YrColl)^2$		0.82	0.76	0.87
Attended Private College $(Private)^3$		0.33	0.31	0.35
College Quality Index $(Quality)^3$		0.33	0.07	0.49

[1] Statistics weighted using PSID family weights. Tuition amounts are in 2013\$.
[2] Conditional on those students who attended college at age 18.
[3] Conditional on those who attended a 4-year college at age 18.

attendance and financing decisions in Section 4.3.3. We estimate regressions of the following form:

$$CollOut_{qij,18_j} = \lambda^O_{q0} + \lambda^O_{q1} H_{imt_{18_j}} + \lambda^O_{q2} Y_{imt_{18_j}} + \boldsymbol{\lambda}^O_{q3} \boldsymbol{X}_{ij_{18_j}} + \boldsymbol{\lambda}^O_{q4} \boldsymbol{M}_{mt_{18_j}} + \phi^O_{qt_{18_j}} + \delta^O_{qm} + \varepsilon^q_{ij,18_j}, \tag{4.14}$$

for $CollOut_q = Grad$, $Tuition$, $4YrColl$, $Private$ and $Quality$ and where $\phi^O_{qt_{18_j}}$ and δ^O_{qm} are year and the parents' county fixed effects, respectively. The vector, $\boldsymbol{X}_{ij_{18_j}}$, used in (4.14) is the same as the one used in equations (4.5) and (4.7) through (4.9) except that also includes a dummy variable for whether the child has become a head or wife in a PSID household by age 24. This extra variable controls for the source of data from which college information is obtained (PSID main interview versus Transition to Adulthood).[24]

Lasly, to account for the potential endogeneity of $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ in (4.14), we

[24] As noted in Section 4.2.2, if adult children have become a head or wife of a PSID household by age 24, their data can be drawn from the PSID main interview and is, in principle, available for all of the years, t_{24_j}, that we analyze. In contrast, if adult child j does not become a head of wife of a PSID household by 2013 – the year of the last wave of the PSID used in our analyses – we use data about the characteristics of the college child j attended from the PSID Transition to Adulthood sample. But this latter sample is only available for more recent (calendar) years. Thus, including this extra dummy variable in (4.14) allows us to account potential differences across these two different sources of data used to determine the dependent variables, $Tuition_{ij,18_j}$, $4YrColl_{ij,18_j}$, $Private_{ij,18_j}$ and $Quality_{ij,18_j}$.

use a 2SLS estimator for (4.14), using $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$, that were defined in Section 4.3.2 and used in the control function estimation in Section 4.3.3.

4.4.2 Empirical Results

Panel A of Table 4.7 presents estimates of the effects of parental income and net housing equity children's outcomes conditional on attending college with OLS estimates in columns (1) and (3) and 2SLS estimates in columns (2) and (4). First, we consider whether the child graduates from college. We find evidence that parent's net equity at the time of the college decision increases the probability that their child graduates from college. Unlike our findings on college attendance, however, we do not find any effect of family income on college graduation once we control for the endogeneity of family income.These results indicate that while parental resources when the child is 18 affects college enrollment they do not necessarily affect graduation rates in the same manner. Only parental wealth at 18 increases the probability of graduation while both wealth and income increase the probability of attendance. This may be because parents who experience an increase in housing wealth can secure loans to finance their child's entire college career.[25] Parents' whose income increases when their child is age 18 may be able to finance college enrollment but this increase, once the level of income is accounted, is not enough to sustain the child over his or her college career.

To better understand if this may be the case we consider the effect of a parental home equity loan when the child was 18 on the probability of graduation beyond the effect of parental wealth and income (H and Y)[26] Adding this indicator variable to the regression in (4.14) for *Grad* as the outcome, we find that having a home

[25]Indeed, these home equity loans of this type are common, almost 12% of parents in our sample had such a loan when their child was age 18.

[26]Results are not shown in Table 4.7.

equity loan at the time the child is age 18 increases the likelihood that the child graduates from college by 8.6 percentage points.[27] These results suggest that home equity loans are an important channel though which parents are able to continue to provide financial support throughout their child's college years. Combined with the larger effect of parental income than parental wealth on college attendance, the results suggest that increases in family income change choices about college only at a short lag length, whereas wealth effects are more enduring.

Panels C and C present the OLS and 2SLS estimates of the effects of parental net equity and income on the various attributes of the college the children attended. We consider first the types of colleges attended, however, these effects are rather small in magnitude. For example, a $10,000 increase in parental net equity would result in the child going to a college that is only slightly more expensive, ranging from $99 based on OLS estimates to $112 based on the 2SLS estimates. (Recall from Table 4.6 that the average annual tuition of college attended is $9,682.) Similarly, a $10,000 increase in parents' home equity would increase the probability of attending a private college by 0.2 percentage points (based on OLS) and would reduce it by 0.7 percentage points (based on 2SLS). Furthermore, none of the effects of parental home equity are precisely estimated. Parental income's effect on tuition, types and quality of the college attended is imprecise and rather small in each specification with the exception of OLS estimates on the quality of college attended.

The lack of precision in the estimates of the effects of parental home equity and income may be due, in part, to the smaller sample sizes used to estimate the effects found in Table 4.7 compared the likelihood of graduation in Panel A of Table 4.7.

[27] We also estimate a specification in which we treat having a home equity loan at age 18 as an additional endogenous variable, using a set of squared changes in local home prices and local labor markets and their interactions as additional instruments, and find that in this specification, having a home equity loan when the child is 18 also increases the likelihood of graduation. The results for this augmented specification of the likelihood of a child graduating from college are found in Table C.4.

The samples used to estimate the effects presented in Panels B and C of Table 4.7 are almost half of those used to estimate the effects for college graduation in Panel A because of limitations in the sample we are able draw from[28]. Although we note in Appendix Table C.2 that the first-stage results are slightly above the conventional cutoff value.

In summary, it appear that increases in parental wealth do result in statistically significant but small increases the likelihood that children will graduate from college. Our finding for the likelihood of graduation is notable, since (Cooper and Luengo-Prado, 2015) did not detect any effects of parental housing wealth on college graduation, despite the fact that parental housing wealth appears to increase the labor earnings of their adult children. One reason for the greater precision of our results is that we use the better measure of the educational attainment of children available in the 2013 Roster and Transfers data. At the same time, our findings do not clearly indicate that greater parental income (or housing wealth) decidedly alters the likelihood of their child attending a more expensive college, a private one, or a more highly ranked one, although the smaller sample sizes used to estimate these effects may have contributed to latter null findings.

4.5 Consequences of Parental Financing Decisions for Parents' and Child's Subsequent Indebtedness

The other primary outcome we consider is subsequent levels of indebtedness for both parents and children. We provide evidence of the consequences of decisions about attending college and parental financing on levels of debt held by both parents and children after the college years. We outline our strategy for estimating these

[28]See 4.2 for details on sample size differences

relationships, explicitly examining whether children who attend college and their parents end up accumulating more debt, whether parental financial support for college leaves parents with more debt, and whether such support reduces the amount of debt children accumulate.

4.5.1 Modeling the Effects of College/Financing Choices on Later Financial Debt of Parents and Adult Children

Let $Debt_{nht_{a_j}}$ be the debt of household n where $n = i$ for the parent household and $n = j$ for the child household, of type h, measured in year t_{a_j} when child j is age a. We choose $a = 24$ as six-years after enrollment decisions and when financing for higher education is largely complete. For parents, we consider mortgage debt ($MortBal_{it_{24_j}}$), and all other non-housing debt ($OthDebt_{it_{24_j}}$), both measured when the child is age 24 (t_{24_j}). For children, we examine debt in the form of outstanding student loans ($StudentDebt_{jt_{24_j}}$), as well as total non-housing debt ($OthDebt_{jt_{24_j}}$), both measured in t_{24_j}.

In Table 4.8, we display the mean values of mortgage and total non-housing debt for parents and student loan and other non-housing debt for children at age 24. Parents, on average, have \$69,500 in mortgage debt and \$13,400 in other debt when their child is age 24. Parents whose child did not attend college have much lower levels of debt: \$45,400 in mortgage debt and only \$8,400 in other debt. Parents of children who did attend college but did not provide financial help hold higher debt balances: \$59,400 in mortgage debt and \$13,500 in other debt. Finally, parents who helped finance their child's college education have much higher amounts of both types of debt: \$100,100 in outstanding mortgage debt and \$18,000 in other debt.

At age 24, children, on average, hold \$12,300 in student debt and the same amount in total non-housing debt. Those children who did not attend college, not

surprisingly, hold almost no student loan debt, $2,200 (presumably because of other education-related expenses) and $8,000 in total non-housing debt. Children who attended college but received no help from their parents hold only somewhat more debt than the average child, but a good deal more than their counterparts who did not attend college: $15,000 in other debt and $16,800 in outstanding student loans. Finally, among those children who went to college and got financial help from their parents, their debt levels were slightly, but only slightly, lower than those who went to college without parental help: $13,200 in total non-housing debt and $16,900 in student debt, the same as those who had no help from parents. These levels of student debt are very similar to those estimated by (Andreski et al., 2015) who show that the estimates of student loans from the PSID TA study are similar to those in the National Postsecondary Student Aid Survey.

These findings, while descriptive, suggest several interesting patterns. Parents may be absorbing some, but not all, of children's debt post-college and that when they help to finance their children's education they end with up more debt of own, in particular mortgage debt. To understand if these relationships are causal we use specification which differ from those in Sections 4.3 and 4.4. Here we focus on the direct effect of college attendance and parental financing decisions on the additional amount of debt parents and children accumulate. This requires some additional controls and creates new challenges for identifying causal relationships.

More precisely, let $Attend_{ij}$ be an indicator variable equal to 1 if child j of parent i attends college and zero otherwise,[29] and define $AttendFin_{ij}$ to be the indicator variable equal to 1 if child j attends college and parent i provides funds to finance it and zero otherwise,[30] We are interested in the effects of these variables on parents'

[29] $Attend_{ij} = 1$ if either $EduFin1_{ij} = 1$ or $EduFin2_{ij} = 1$ and equals zero otherwise.

[30] That is, $AttendFin_{ij} = EduFin2_{ij}$.

and children's debt when the child reaches age 24 in year t_{24_j}, net of other factors. More precisely, for parents we seek to estimate the following specification for two sources of debt:

$$\begin{aligned} Debt_{hit_{24_j}} &= \beta^P_{nh0} + \beta^P_{h1} Attend_{ij} + \beta^P_{h2} AttendFin_{ij} + \beta^P_{h3} Y_{imt_{24_j}} \\ &\quad + \boldsymbol{\beta}^P_{h4} \boldsymbol{X}_{it_{24_j}} + \phi^P_{ht_{24_j}} + \delta^P_{hm} + u^P_{hit_{24_j}}. \end{aligned} \tag{4.15}$$

for $Debt_h = MortBal, OthDebt$, $Y_{imt_{24_j}}$ is the parents' income in year t_{24_j}, $\boldsymbol{X}_{it_{24_j}}$ is a vector of parent i's characteristics in that year, $\boldsymbol{M}_{mt_{24_j}}$ are the corresponding characteristics for parents' location m at t_{24_j} and $\phi^P_{t_{24_j}}$ and δ^P_s are year and the parents' county fixed effects, respectively. Included in $\boldsymbol{X}_{it_{24_j}}$ are the same characteristics described in Section 4.3.1 where all time-varying covariates are measured in year t_{24_j} instead of year t_{18_j} used in our previous analyses. In addition, we include non-housing wealth of the parent at age 24, the value of the home measured at age 18, and parental income at age 24.

Similarly, for the children at age 24, for parents we seek to estimate the following specification for their two sources of debt:

$$\begin{aligned} Debt_{hjt_{24_j}} &= \beta^C_{nh0} + \beta^C_{h1} Attend_{ij} + \beta^C_{h2} AttendFin_{ij} + \beta^C_{h3} Y_{jmt_{24_j}} \\ &\quad + \boldsymbol{\beta}^C_{h4} \boldsymbol{X}_{jt_{24_j}} + \phi^C_{ht_{24_j}} + \delta^C_{hm} + u^C_{hjt_{24_j}}. \end{aligned} \tag{4.16}$$

for $Debt_h = OthDebt, StudentDebt$, $Y_{jmt_{24_j}}$ is child j's income in in year t_{24_j}, $\boldsymbol{X}_{nt_{24_j}}$ is a vector of child j's characteristics at child age 24, and $\phi^C_{t_{24_j}}$ and δ^C_s are year and the child's state-of-residence fixed effects, respectively. Included in $\boldsymbol{X}_{nt_{24_j}}$ are all of the characteristics of the parent described in Section 4.3.1 where all time-varying covariates are measured in year t_{24_j}, along with an indicator variable for coresidence

with a parent, an indicator variable if the child is married in year t_{24_j}, an indicator variable for whether the child is a head of household in year t_{24_j}, and family income of the child at age 24.

Below, we present estimates of the effects of *Attend* and $AttendFin$ in specifications in (4.15) and (4.16) using ordinary least squares (OLS). However, it is more reasonable to assume that parents' and children's income when the child is age 24, $Y_{imt_{24_j}}$ that is included in (4.15) and $Y_{jmt_{24_j}}$ in (4.16), respectively, are likely to be endogenous, especially given that these variables are measured contemporaneously with the debt measures. Moreover, decisions concerning whether a child went to college but parents did not help finance it ($Attend_{ij} = 1$) or parents did help finance it ($AttendFin_{ij} = 2$) may be correlated with the unobserved factors that make up $u^P_{hit_{24_j}}$ and $u^C_{hit_{24_j}}$ in these debt specifications. This would be the case if the unobserved determinants of the college and parental financing choices accounted for in the payoff functions in (4.5), made when the child was age 18, and those in (4.15) and (4.16) are common across time and/or were serially correlated.

To account for the potential endogeneity of parents' and children's income when the child is age 24 in the debt regressions, we follow the strategy we used to instrument parental income at age 18 in the college choice and financing specifications discussed in Section 4.3.2 and define as a new instrumental variable the local labor market variable $\Delta W^P_{mt_{24_j}}$, which is defined in the same way as $\Delta W^P_{mt_{18_j}}$ for the market, m, in which person n ($n = i$ for parents and $n = j$ for children) resides in year t_{24_j}. We also define an additional instrument which which measures the distance child j was from the nearest a four-year public college in their county m when child j was age 18.[31]

[31]Using PSID geocode data on the location of their parents' residence at that age and geocoded data from IPEDS on the location of all public universities, we constructed the variable, $Dist4YrPub_{ijm}$, as the distance, in miles, to the nearest four-year public university. A comparable

A plausible set of instruments for *Attend* and *AttendFin* in (4.15) and (4.16) would be to use the local market variables, $\Delta HPI_{mt_{18_j}}$ and $\Delta W_{mt_{18_j}}$, measured at t_{18_j}, that were used to instrument $H_{jmt_{18_j}}$ and $Y_{jmt_{18_j}}$ in the control function estimator of the college enrollment and transfers decisions, and the 2SLS estimation of the amount of the transfer and the graduation and college quality outcomes. We employed these instruments, along with $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$, to instrument for *Attend*, *AttendFin* and $Y_{jmt_{24_j}}$ in a 2SLS estimation of the specifications in (4.15) and (4.16). But, the first stage results for both *Attend* and *AttendFin* in these specifications indicated very weak instruments, with the test statistics for the joint significance of these instruments for *Attend* and *AttendFin* never being greater than 9.8 and most of never being greater than 5.0. In contrast, and as reported in Appendix Table C.3, the first stage estimates for $Y_{jmt_{24_j}}$ using these same instruments produced test statistics greater than 22. Accordingly, in the analysis below, we report 2SLS results for the estimation of (4.15) and (4.16) in which we only account for the endogeneity of $Y_{jmt_{24_j}}$. Because of this, we take care not to over-interpret the 2SLS results presented below.

4.5.2 Empirical Results

Panel A of Table 4.9 presents the results of estimating the specification for parental debt in equation (4.15). We show estimates from OLS specifications in which college attendance and financing is taken as exogenous and from 2SLS specifications in which we instrument for the effects of parental income in year t_{24_j}. In these tables, we only display the effects of children attending college (*Attend*) and whether parents helped finance their child's college education (*AttendFin*) on parent levels of debt when their child was age 24. With respect to parents mortgage debt, both the

measure was used in (Card, 1995) and others as an instrument for schooling in the estimation of the returns to schooling.

OLS and the 2SLS results indicate that parents who provide children with a financial transfer for college have more outstanding mortgage debt six years after their child entered college, i.e., when their child is age 24, relative to parents whose child did not attend college. The OLS and 2SLS results indicate that parents who help finance their child's college attendance have more mortgage debt, $15,930 based on the OLS results and $15,920 with the 2SLS. Furthermore, both of these effects are precisely estimated. And, parents whose child attends college without receiving a financial transfer from parents do not hold more mortgage debt than parents whose child did not attend college. Panel A also includes estimates the effect of a child's college attendance and parental financing on the amounts of non-housing debt parents hold in year t_{24_j}. For both the OLS and the 2SLS results, we find that having a child who attends college increases parental non-housing debt when their child is age 24 relative to having a child who does not attend college ($3,460 with OLS and $3,420 with 2SLS), although these increases are much smaller than those for mortgage debt. Both of these effects are precisely estimated. With respect to the additional effect of parents helping to finance college ($AttendFin$), we find small positive effects on other debt, but neither the OLS or 2SLS estimates are statistically significant. As a result, one cannot reject the hypothesis that this source of debt does not differ between parents who provide financial transfers to their children to attend college those who do not.

In Panel B of Table 4.9 we present estimates of the effects of college attendance and parental financial support on the debt levels held by children at age 24. With respect to both the OLS and 2SLS results, we find that children who attend college ($Attend$) have substantially higher student loan ($14,430 based on OLS and $14,290 with 2SLS) and other forms of debt ($10,470 with OLS and $10,420 with 2SLS) than children who do not attend college and these effects are precisely estimated. In

contrast, children whose parents help to finance their college education do not hold less student debt or other forms of debt than children who attend college without parental financial support. These results suggest that there is not necessarily a reduction in student debt when parents provide financial support for college. One reason we may find similar levels of student debt among children whose parents finance and do not finance college is that students whose parents provide financial support for college are more likely to graduate and thus they pay for more total years of schooling. But, as noted at the end of the previous section, one must be cautious in interpreting these findings for the effects of college attendance and parental financing on parents' and children's subsequent levels of debt as causal, given that they do not account for the potential endogeneity of either *Attend* and $AttendFin$ our 2SLS results.

4.6 Conclusion

This paper examines the influence of parental housing wealth and income on college attendance and parental financial support for college and on college graduation rates and quality of college attended. It also examines the ramifications of these decisions on the subsequent indebtedness of parents and children. We use data from the PSID, especially data in the 2013 Roster and Transfers Module on the incidence and amounts of parental financial support for college. We instrument for the potential endogeneity of parental housing wealth and income with changes in parents' local housing and labor market conditions to generate causal estimates of the effect of parental housing wealth and income on educational outcomes. We find that increases in parental income and wealth increase the likelihood of children attending college, largely because it increases parental provision of financial support. The effect of an increase in parental income on college enrollment is larger than the effect of an

increase in parental wealth. But, parental wealth increases graduation rates, while parental income does not seem to have an effect on college graduation. We find that the effect of parental wealth on college graduation is related to parents taking out home equity loans which appear to have a large effect on the likelihood that a child graduates from college. We also find suggestive evidence that the decision to provide financial support for a child's schooling increases levels of parental mortgage debt. In contrast, students who attend college with financial support from parents do not have lower levels of student and other debt later in life than children who attend college without financial support.

These findings fill gaps in prior research by establishing that the mechanism through which increases in parental income and wealth affect college attendance is indeed through parental financial transfers. Our findings also complement recent work suggesting an increasingly important role for parental income in college attendance decisions. And, we provide the new evidence based on PSID data that the likelihood of children graduating from college increases with higher levels of parental wealth, likely due to the more complete data on children's college attainment gathered in the Roster and Transfers Module in the 2013 wave of the PSID. Finally, though our results about debt are more descriptive, they do indicate that parents who provide financial transfers to their children take on additional debt of their own. The increases in parental debt as a result of college financing decisions may simply reflect an efficient way to fund college tuition. Alternatively, this increase in parental debt may represent an intergenerational shifting of debt incurred with children going to college, one that represents a burden on parents that may adversely affect their later-life consumption or other measures of well-being. This is an important avenue for future research especially in light of the large increases in college tuition and in levels of student debt in recent years.

Table 4.7: Effects of Parents' Home Equity and Family Income on Probability of Child Graduating from College & the Quality of the College their Children Attended[1]

Variable	OLS (1)	2SLS[2] (2)	OLS (3)	2SLS[2] (4)
Panel A.	*Graduate from College:*[2]			
$H_{imt_{18_j}}$	0.000	0.011*		
	(0.002)	(0.005)		
$Y_{imt_{18_j}}$	0.004*	0.006		
	(0.002)	(0.004)		
R^2	0.291	0.266		
N	1,322	1,322		
Panel B.	*Annual Tuition Costs*[2]		*Attended 4-Year College*[2]	
$H_{imt_{18_j}}$	99.943*	112.302	0.003	−0.001
	(51.204)	(148.424)	(0.002)	(0.005)
$Y_{imt_{18_j}}$	19.887	4.892	−0.001	0.003
	(63.967)	(164.709)	(0.003)	(0.006)
R^2	0.397	0.397	0.288	0.280
N	786	786	793	793
Panel C.	*Attended Private College*[3]		*College Quality Index*[3]	
$H_{imt_{18_j}}$	0.002	−0.007	0.015	−0.024
	(0.003)	(0.009)	(0.010)	(0.026)
$Y_{imt_{18_j}}$	−0.002	0.002	0.020*	0.037
	(0.003)	(0.007)	(0.011)	(0.035)
R^2	0.300	0.283	0.343	0.304
N	653	653	640	640

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, whether the child is a head or wife at age 24, the high school and college wage premium, year fixed effects, and county fixed effects.
[2] The variables $H_{imt_{18_j}}$ and $Y_{imt_{18_j}}$ were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$. See Section 4.3.2 for a description of these instruments.
[2] Conditional on those students who attended college at age 18.
[3] Conditional on those who attended a 4-year college at age 18.

Table 4.8: Parents' & Child's Debt when Child Age 24, by College Attendance and Financing Decisions[1]

Variable	Full Sample	$EduFin0$ (No Coll)	$EduFin1$ (Coll, No Transfer)	$EduFin2$ (Coll & Transfer)
Parents' Debt:				
Mortgage Debt ($MortBal$)	\$6.95	\$4.54	\$5.95	\$10.01
Other Debt ($OthDebt$)	\$1.34	\$0.84	\$1.35	\$1.80
Child's Debt:				
Other Debt ($OthDebt$)	\$1.23	\$0.80	\$1.50	\$1.32
Student Debt ($StudentDebt$)	\$1.26	\$0.22	\$1.68	\$1.69

[1] Statistics weighted using PSID family weights. All debt amounts are in 10K of 2013\$.

Table 4.9: Effects of Child's College Attendance and Parental Financing on Parents' and Child's Indebtedness when Child is Age 24[1]

Variable	OLS (1)	2SLS[2] (2)	OLS (3)	2SLS[2] (4)
Panel A. Parents' Debt:[3]	*Mortgage Debt*		*Other Debt*	
No College (base category)				
Attends College (*Attend*)	-0.602	-0.604	0.346**	0.342**
	(0.466)	(0.467)	(0.163)	(0.155)
Attends with Financing (*AttendFin*)	1.593***	1.592***	0.235	0.800
	(0.568)	(0.533)	(0.184)	(0.695)
R^2	0.468	0.486	0.231	0.231
N	2,270	2,270	2,268	2,268
Panel B. Child's Debt:[4]	*Student Loan Debt*		*Other Debt*	
No College (base category)				
Attends College (*Attend*)	1.443***	1.429***	1.047***	1.042***
	(0.211)	(0.193)	(0.247)	(0.244)
Attends with Financing (*AttendFin*)	-0.116	-0.102	-0.307	-0.307
	(0.334)	(0.306)	(0.225)	(0.211)
R^2	0.286	0.285	0.108	0.108
N	1,152	1,152	1,587	1,587

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All debt amounts are in 10K of 2013$.

[2] The variables Parental Income in year t_{24_j} ($Y_{imt_{24,j}}$) for Panel A specifications and Child's Income in year t_{24_j} ($Y_{jmt_{24,j}}$) for Panel B specifications were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$. See Sections 4.3.2 and 4.5.1 for descriptions of these instruments.

[3] The explanatory variables included in Panel A regressions are as follows: characteristics of parents when child was 24 (age, marital status, family structure, education, sex, race), sex of child, non-equity wealth of the parent when the child is 24, value of home at 18, year fixed effects, and county fixed effects.

[4] The explanatory variables included in Panel B regressions are as follows: characteristics of parents when child was 14 (age, marital status, family structure, education, sex, race), sex of child, whether the child is a head or wife at age 24, whether the child is married by 24, year fixed effects, and county fixed effects.

5

Conclusion

Economics has progressed well beyond the single, male-oriented framework that marked its earliest days. Models, empirical methods, and data resources now accommodate a richer and more nuanced view of economic agents – one that recognizes their place within families. In particular, our models have necessarily to incorporate the often distinct choice sets that women face. The work in this dissertation seeks to highlight several areas in it is clear that a single agent framework falls short of providing real-world insight in both Indonesia and the United States.

Families and individuals within them face complex optimization problems. Parents, especially, are balancing current and future outcomes with scarce resources. By purposely considering the role that children pay in their economic decisions we are better able to understand these decisions and the best policies to improve outcomes.

Appendix A

Chapter 2 Appendix

A.1 Supplemental Empirical Exercises

FIGURE A.1: Histogram of Correlations between Self-Employment and Wage Employment by Geography and Industry, 2014

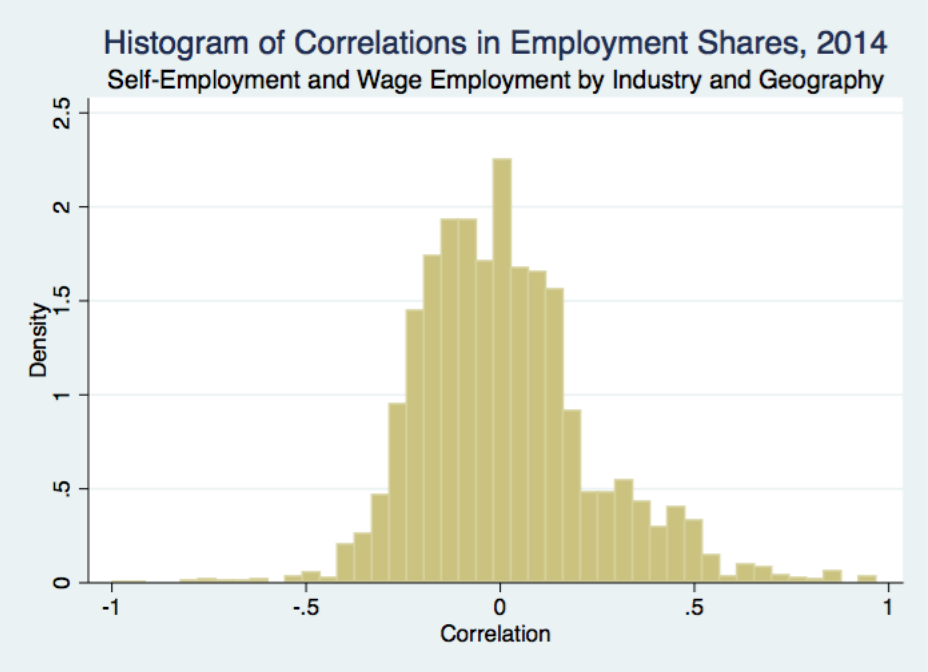

Table A.1: Multinomial Logit: Home, SE, Wage for Men and Women

	(1)		
	Wage	SE	Home
Female	1.00	1.18*	6.53***
	(.)	(0.10)	(0.59)
25-34	1.00	1.42***	0.76***
	(.)	(0.09)	(0.04)
35-44	1.00	1.86***	0.60***
	(.)	(0.12)	(0.03)
45-55	1.00	2.49***	0.79***
	(.)	(0.18)	(0.05)
Junior	1.00	0.94	0.95
	(.)	(0.04)	(0.04)
Senior	1.00	0.75***	0.74***
	(.)	(0.03)	(0.03)
Advanced	1.00	0.26***	0.17***
	(.)	(0.02)	(0.01)
Female	1.00	1.18*	6.53***
	(.)	(0.10)	(0.59)
Child in HH	1.00	1.02	0.52***
	(.)	(0.05)	(0.04)
Child in HH x Female	1.00	1.18**	2.40***
	(.)	(0.08)	(0.21)
Num. Adults	1.00	1.03***	1.02**
	(.)	(0.01)	(0.01)
Other Female in HH	1.00	1.05	0.94*
	(.)	(0.04)	(0.03)
N	35788.00		

Exponentiated coefficients; Reported as relative risk Ratios
* $p < .1$, ** $p < .05$, *** $p < .01$

A.2 Econometric Details

The follow proofs follow Bourguignon, Fournier, and Gurgand (2003).

Let each individual choose between j job choices where $j \in \{\text{wage, self-employed, home}\}$ according to the utility function U_j. This is Equation 2.4 in Section 2.5.1:

Table A.2: Marginal Propensity to Select into Sectors by Gender and Parent Status

		All		Conditional
	Wage Work	SE	Home	SE
Baseline				
Men	0.54	0.41	0.05	0.42
Women	0.17	0.16	0.66	0.51
Difference between Women & Men				
No Children	-0.23***	-0.11***	0.34***	0.03***
Children	-0.30***	-0.13***	0.43***	0.07***
Young Children	-0.31***	-0.15***	0.46***	0.08***
Differences Amongst Men				
Children	0.03 ***	0.003 **	-0.06 **	0.00
Young Children	0.01	0.03***	-0.04***	0.01
Differences Amongst Women				
Children	-0.04***	0.00	0.04***	0.05***
Young Children	-0.05***	0.00	0.5***	0.06***
N	35788	35788	35788	22,779

$$
\begin{aligned}
U_{0it} &= \alpha_{00} + \alpha_{01} Kids_{it} + \boldsymbol{\alpha}_{02} \boldsymbol{X}_{it} + \varepsilon_{0it} \\
U_{jit} &= \alpha_{j0} + \alpha_{11} Kids_{it} + \boldsymbol{\alpha}_{j2} \boldsymbol{X}_{it} + \beta_{j1} y_{jit} + \beta_{j2} h_{jit} + \beta_{j3} f_{jit} \\
&\quad + \beta_{j4} y_{jit} \cdot Kids_{it} + \beta_{j5} h_{jit} \cdot Kids_{it} + \beta_{j6} f_{jit} \cdot Kids_{it} + \varepsilon_{1it}
\end{aligned}
$$

For the purposes of this exercise let this utility function be simplied to:

$$U_j = x\beta_j + \varepsilon_j \tag{A.1}$$

There is an associated outcome function, c_{jit} for each $y_{jit}, h_{jit}, f_{jit}$ as in Equation 2.6:

Table A.3: Earnings and Hours by Work Status

	Wage		Self-Emp	
	No Child	Child	No Child	Child
Log Earnings Year				
Full-time	8.95	9.09	8.35	8.47
Part-time	8.62	8.43	7.96	8.01
Part-year	7.17	7.25	7.12	7.02
Part-time, part-year	6.55	6.46	6.86	6.79
Earnings Year				
Full-time	15195.12	16371.09	11107.63	11106.06
Part-time	15920.06	11360.46	7849.10	7309.29
Part-year	4909.57	4094.75	3871.16	4526.94
Part-time, part-year	3009.03	2490.93	3147.03	5534.32
Log Wage Rate				
Full-time	1.62	1.73	1.09	1.12
Part-time	2.03	1.96	1.72	1.79
Part-year	1.32	1.38	1.21	1.14
Part-time, part-year	1.83	1.87	2.04	2.22
Wage Rate				
Full-time	7.92	8.58	4.77	4.70
Part-time	16.32	14.44	12.77	12.21
Part-year	18.68	9.72	10.89	14.95
Part-time, part-year	20.88	28.78	53.70	47.73
Observations	1635	3977	1561	3444

mean coefficients; t statistics in parentheses

$$c_{jit} = \boldsymbol{\pi}_{cj1}\boldsymbol{Z}_{cit} + \upsilon_{cjit} \tag{A.2}$$

For the purposes of this exercise let function be simplified to:

$$c_j = z\pi_j + \upsilon_j \tag{A.3}$$

Table A.4: Variation in SAKERNAS Employment Data

	2000	2007	2014
Employment Levels			
Overall	28,727	255,108	180,593
Self-Employment	13,857	121,387	73,383
Wage-Employment	14,870	133,721	107,210
Correlations between Self-Employment and Wage Employment			
By Geography	0.84	0.87	0.80
By Industry	0.12	0.13	0.07
By Geography & Industry	0.18	0.21	0.09
Correlations between Self-Employed and Wage Employed Instruments			
Share of employment	0.03	0.08	0.02
Combined Instruments	0.18	0.11	0.11
Correlations of Employment Industry Shares over Time			
Self-Employment		0.56	0.51
Wage Employment		0.56	0.60
Geographic Areas	49	830	925
Industries	146	147	147

υ_j is not non-parametrically specified and $E(\upsilon_j|x,z) = 0$ while $E(\upsilon_j|x,z) = \sigma^2$, Vector z represents the maximum set of explanatory variables to describe the choice between the j alternatives and x contains the variables that determine earnings. Assume that ε_j be identically Gumbel distributed (i.e., the IIA hypothesis needed for a multinomial logit).

Identification, which I discuss in Section 2.5.3, stems the exclusion of some of the contents of x from z. Without loss of generality, let us consider the first outcome variable c_1, which is observed if and only if:

$$U_1 > \max_{j \neq 1} U_j \tag{A.4}$$

This is equivalvent to:

$$\epsilon_1 = \max_{j \neq 1}(x\beta_j + \varepsilon_j - x\beta_1 + \varepsilon_1) \tag{A.5}$$

Thus $\epsilon_1 < 0$.

McFadden (1973) shows that given the associated CDF and PDF we have that:

$$P(\epsilon_1 < 0|z) = \frac{exp(x\beta_1)}{\sum_j exp(x\beta_j)} \tag{A.6}$$

Thus we can use MLE to estimate the β_j terms; however, to estimate the parameters in the earnings equation (here, denoted π_j) we must take into account the fact that υ_j may not be independent of ε_j for all j. Lee (1983) generalized the Heckman selection process such that if $\Gamma = \{x\beta_1, x\beta_2, x\beta_3\}$ we have the conditional expectation:

$$E(\upsilon_1|\epsilon_1 < 0, \Gamma) = \int \int^0 \frac{\upsilon_1 f(\upsilon_1, \varepsilon_1|\Gamma)}{P(\varepsilon_1 < 0|\Gamma)} d\varepsilon_1 d\upsilon_1 = \Lambda(\Gamma) \tag{A.7}$$

Let:

$$P_k = \frac{exp(x\beta_k)}{\sum_j exp(x\beta_j)} \tag{A.8}$$

The relation between the components of Γ and the corresponding probabilities is invertible, so there exists some function λ, which can be substituted for Λ.

$$E(\upsilon_1|\varepsilon < 1, \Gamma) = \lambda(P_1, P_2, P_3)$$

$$= \lambda(\Gamma)$$

This then allows us to estimate c_1^* where w_1 is mean-independent of the content z.

$$c_1^* = z_1\pi_1 + \lambda(\Gamma) + w_1 \tag{A.9}$$

Avoiding distributional assumptions of Lee (1983), DMF assumes linearity; however, this allows there to be no assumptions on the covariances of the error terms between the selection equations and outcome equations. BFG suggest a variation on the original DMF methods, which makes the error in outcome equation (υ_j) linear on a set of normal distributions. Define the following as standard normal variables:

$$\varepsilon_j^* = J(\varepsilon_j) = \Phi^{-1}(G(\varepsilon_j))$$

This means that the values of υ_1 and ε_j^* are linearly related. Then we can consider r_j^*, which is the correlated between υ_1 and ε_j^*. It can be expressed as a linear combination, making the normalized linearity assumption put forth in BGF.

$$E(\upsilon_1|\varepsilon_1, \varepsilon_2, \varepsilon_3) = \sigma_\upsilon \sum_{j=2,3} r_1^* j \varepsilon_j^*$$

Where r_j is a correlation coefficient between υ_1 and ε_j (note: $V(\varepsilon_j) = \frac{\pi^2}{\sigma_\upsilon}$). This specification performed the best relative to others in Monte Carlo tests done by BFG in a case with lower dimensionality and proved to be robust and, in the case the IIA assumption, is violated. Let

$$m(P_j) = \int J(v - log(P_j))g(v)dv$$

Then we have:

$$E(\varepsilon_1^*|y_1^* > \max_{s \neq 1}(y_s^*), \Gamma) = m(P_1)$$

$$E(\varepsilon_j^*|y_1^* > \max_{s \neq 1}(y_s^*), \Gamma) = m(P_j)\frac{P_j}{P_j - 1}$$

the outcome equation becomes:

$$c_1^* = z_1\pi_1 + \sigma\left[r_1^* m(P_1) + \sum_{j=2,3} r_j^* m(P_j)\frac{P_j}{P_j - 1}\right] + w_1 \tag{A.10}$$

Note that w_1 if mean independent of x when $\lambda(\Gamma)$ terms are included. Let the content of $\lambda(\Gamma)$ that is used in our outcome equation for outcome j be denoted as such:

$$\lambda(\Gamma) = (\rho_{jj}, \rho_{jk}, \rho_{jl},)$$

These are the selection correction terms and represent a generalization of a Heckman two-step process. First, the estimates of ρ_j will indicate the presence of selection bias in the outcome equation, and indeed is directly proportional to the correlation between the error terms in the choice equation (ε_{ijt}) and those in the outcome equation (υ_{ijt}).

Appendix B

Chapter 3 Appendix

Interview Text

MEN AND WOMEN: ALL

A1. Tell us about how you spent your time last week. A2. Is this a typical week for you?

If YES ? A3 If NO ? A2a

A2a. Tell us about a normal week.

A3. Do you have any children?

If YES ?

Ensure solicit general ages (under 5, under 10, under 15, over 15) Solicit whether children within same household, if not, if they have their own household.

A3a. If applicable: who spends (spent) the most time caring for your children?

Solicit relation of that person (spouse, family member) and whether within household.

A3b. Does anyone else help regularly? (Monthly, weekly, daily.) Solicit relation of that person (spouse, family member) and whether within household.

If NO ? A4

A4. Let's return to how you usually spend your time. Does it usually include working in any way? This could include getting paid by employer, working on your own business, selling something you made, or helping (paid or unpaid) a family member run his or her business.

Solicit what category spouse would fall into.

If YES ? Solicit type of activity (further called: sectors)

Wage Work/Paid by another person outside of the home: Self-employment: Helping others in business, not paid:

If NO ? Not working/home sector

SELF-EMPLOYED SECTOR

SE1. Tell us more about your business. What type of work do you do? Solicit: in home or outside the home? If outside the home, is the space rented or owned by you or a family member?

SE2. Do you like having your own business? Why? Solicit ideas on benefits and

drawbacks if not offered.

SE3. Where do you conduct your business?

SE4. How long have you had your own business?

SE5. Why did you start it? What did you do before?

SE6. Are you interested in growing your business? Selling more, making more money, spending more time, learning about how to be better, as examples. Why?

If YES ? What is preventing you?

If NO ? Why not?

SE7. IF CHILDREN: Have you ever had your children with you while you work? Solicit: is this a benefit or necessary to you? If you had had someone else to care for them, would you want that?

SE8. If you could, would you prefer to either stay home or be a paid employee? If yes, solicit why he/she is in current sector.

WAGE WORK SECTOR

WW1. Tell us more about your job. What type of work do you do?

WW2. How long have you worked there? What did you do before this?

WW3. Where is your place of work? Is it far from your home?

WW4. Do you like your job? What are its benefits or drawbacks?

WW5. IF CHILDREN: Have you ever had your children with you while you

work? Solicit: is this a benefit or necessary to you? If you had had someone else to care for them, would you want that?

WW6. If you could, would you prefer to either stay home or have your own business? Why?

NONPAID SECTOR

NP1. Tell us more about your work for your family. Whose business is it?

NP2. What type of work do you do? Solicit: in home or outside the home? If outside the home, is the space rented or owned by you or a family member?

NP3. How long have you have been doing this work?

NP4. Do you like working for/with (NAME) ? Solicit ideas on benefits and drawbacks if not offered.

NP5. Do you ever consider having your own business?

NP6. IF CHILDREN: Have you ever had your children with you while you work? Solicit: is this a benefit or necessary to you? If you had had someone else to care for them, would you want that?

NP7. If you could, would you prefer to either stay home or go to wage job? If yes, solicit why he/she is in current sector.

NOT WORKING/HOME SECTOR

H1. What are your primary tasks during the day? H2. Did you ever work outside

the home?

If YES ? Why did you return home? If NO ? Why not?

H3. IF CHILDREN: Do you usually have your children with you while you work? Solicit: is this a benefit or necessary to you? If you had had someone else to care for them, would you want that?

H4. If you could, would you prefer to work in some other way? Solicit benefits and drawbacks.

If YES ? Solicit sector type and qualities of that job

Wrap Up Questions:

L1. What do you see yourself doing in 5 years? 10 years?

L2. Do you hope your children do similar work? L3. L4. We've covered a lot today. Is there anything else you think I should know about your work choices?

Appendix C

Chapter 4 Appendix

Table C.1: Characteristics of Homeowning Parents & College-Age Children in PSID, 1997-2015[1]

Variable	Mean
Parent Characteristics when Child was Age 18:	
Parent married/cohabiting	0.70
Parent HH Headed by Male	0.82
Number of children under 16 in parent HH	0.87
Age of parent House Head	45.58
Parents Non-White	0.29
Parent's Education:	
High school or less	0.21
Some College	0.51
College graduate	0.28
Child Characteristics:	
Sex of child (male=1)	0.48
Year child turned 18[2]	2004.50

[1] Statistics weighted using PSID family weights.
[2] The range of years in which children turned age 18 is 1998–2015.

Below we provide statistics for F-tests of the joint significance of the instrumental variables in the first-stage regressions for the control function and 2SLS estimators

used in the various analyses presented in the paper. In the Table below, we indicate the tables to which the test statistics of the first-stage regressions correspond and the instrumental variables used in these regressions. We note that F-test statistics with values less than 10 for first-stage regressions are considered evidence of weak instruments (Stock and Staiger, 1997).

Table C.2: F-Tests of Joint Significance of Instruments in First Stage Regressions[1]

Dependent Variable:	$Y_{imt_{18},j}$	$H_{imt_{18},j}$	$Y_{imt_{18},j}$	$H_{imt_{18},j}$
First Stage Regressions for Results in Table 4.5:				
	Coll. Choice & Financing		*Amt. Transferred*	
F-test	20.34	73.53	17.16	64.05
R^2	0.361	0.524	0.459	0.573
First Stage Regressions for Results in Table 4.7:				
	Graduate from College[2]			
F-test	61.30	35.02		
R^2	0.558	0.573		
	Annual Tuition Costs[2]		*Attended 4-Year College*[2]	
F-test	44.24	11.89	43.80	12.04
R^2	0.611	0.636	0.610	0.637
	Attended Private College[3]		*College Quality Index*[3]	
F-test	27.95	12.83	28.28	12.65
R^2	0.624	0.635	0.623	0.635

[1] The instruments used in all of these regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$ and $\Delta W^P_{mt_{18_j}}$.

[2] These regressions are for children who attended college at age 18.

[3] These regressions are for children who attended a 4-year college at age 18.

Table C.3: F-Tests of Joint Significance of Instruments in First Stage Regressions

Dependent Variable:	$Y_{nmt_{24}}$[1]
First Stage Regressions for Results in Panel A of Table 4.9:[2]	
Parents' Mortgage Debt at t_{24_j}	
F-test	22.36
R^2	0.789
Parents' Other Debt at t_{24_j}	
F-test	22.18
R^2	0.789
First Stage Regressions for Results in Panel B of Table 4.9:[3]	
Child's Student Loan Debt at t_{24_j}	
F-test	124.60
R^2	0.849
Child's Other Debt at t_{24_j}	
F-test	181.30
R^2	0.811

[1] The n subscript for $Y_{nmt_{24}} = i$ for parents and $= j$ for child.
[2] The instruments used in the parents' debt regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^P_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$.
[3] The instruments used in the child's debt regressions and for which the F-tests apply are: $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta W^C_{mt_{24_j}}$ and $Dist4YrPub_{ijm}$.

In this Appendix, we present an alternative version of the results for whether a parents' child graduated from college in Panel A of in Table 4.7 in which we include an indicator variable for whether the parents had a home equity loan when their child wage age 18 to the OLS and 2SLS regressions. (This indicator variable, $HEquityLoan_{imt_{18_j}}$, is equal to 1 if the parent had a home equity loan when child j was age 18 and equal to 0 otherwise.) The results are displayed in Table C.4.

Table C.4: Effects of Parents' Home Equity, Family Income, and Whether Parent had Home Equity Loan when Child was Age 18 on Whether Child Graduated from College, for College Attendees[1]

Variable	OLS (1)	2SLS[2] (2)
$H_{imt_{18_j}}$	0.0007	0.0153**
	(0.0021)	(0.0076)
$Y_{imt_{18_j}}$	0.0043*	−0.0032
	(0.0021)	(0.0085)
$HEquityLoan_{imt_{18_j}}$	0.0627	1.3499*
	(0.0405)	(0.8533)
R^2	0.292	
N	1,322	1,322

[1] Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The explanatory variables included in these regressions are as follows: characteristics of parents when child was 18 (age, marital status, family structure, education, sex, race), sex of child, average weighted wage rates for young people, employment rate when the child was 18, whether the child is a head or wife at age 24, the high school and college wage premium, year fixed effects, and county fixed effects.
[2] The variables $H_{imt_{18_j}}$, $Y_{imt_{18_j}}$ and $HEquityLoan_{imt_{18_j}}$ were treated as endogenous in the 2SLS specifications and were instrumented with $\Delta HPI_{mt_{18_j}}$, $\Delta W^P_{mt_{18_j}}$, $\Delta HPI_{mt_{18_j}} \times \Delta W^P_{mt_{18_j}}$, $(\Delta HPI_{mt_{18_j}})^2$, and $(\Delta W^P_{mt_{18_j}})^2$.

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