Essays on Human Capital, Public Policy, and Decision-Making

By

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ABSTRACT

This dissertation shows that changes in human capital and economic factors lead to some variations in the decisions of individuals regarding welfare participation and fertility. It also provides evidence that public policy influences the way in which organizations behave in the market. The first chapter provides evidence that work in adolescence increases the stock of human and social capital, and develops psychological barriers that reduce the likelihood of participating in a welfare program and the amount of welfare receipt. The second chapter investigates the economic factors behind the recent rise of the one-child family in the United States. The study finds that an increase in the standard deviation of income is associated with a reduction in the probability of having the second child for mothers that are in the second quartile of income distribution. In the third chapter, the study investigates the decision of health care institutions regarding the quality of the service provided, and finds that policies that intended to reduce the cost and help the consumer by restricting the supply of health care facilities have decreased the quality of the service provided.

The first chapter employs welfare participation to investigate the impact of working during adolescence on outcomes later in life. I use National Longitudinal Survey of Youth (NLSY) 1979 data to investigate the impact of the average hours worked from age 14 through 19 on both the welfare payment and the probability of welfare participation in the twenties and thirties of the respondents' life. I use a variety of different model specifications, including instrumental variables and Heckman selection models, to check the robustness of the results. The study shows that working one extra full-time week per

year for an average individual between the ages of 14 to 19 will reduce the probability of receiving welfare in the twenties by 2.6 (10.8%) percentage points and the welfare payment received in the twenties by 6.3% per year. This impact is generated mainly from the hours worked during the ages of 17, 18 and 19.

The second chapter investigates the economic factors behind the recent rise of the one-child family in the United States. Using longitudinal data from the Panel Study of Income Dynamics (PSID) that runs from 1968 to 2013 and a variety of different model specifications with state and year fixed effect, including logistic regression, linear probability, and Cox proportional hazard models, I examine the effect of absolute income volatility on the decision of having an only-child family. The study distinguishes between absolute income volatility and negative changes in income and shows that an increase of $1,000 in the standard deviation of income is associated with a decrease of 26 percentage points in the probability of having a second child for mothers who are in the second quartile of income distribution. Mothers who are in the second and third quartiles of income distribution are more affected by the negative income changes if they experience high income volatility. These mothers are more likely to have a second child in response to negative income changes, most likely attributed to the marginal tax benefit that the second child would bring for mothers in these income categories.

The third and the final chapter investigates the effect of implementing the certificate of need (CON) laws on the quality of nursing homes care. Using a variety of data sources and different model specifications including Instrumental Variable, the study finds that nursing homes in the CON states reduce their costs by lowering the quality of service

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CHAPTER I

THE IMPACT OF ADOLESCENCE EMPLOYMENT ON WELFARE PARTICIPATION LATER IN LIFE

1. Introduction

Previous research that investigated the impact of working during adolescence on future outcome has focused on the employment channel: after high school, adolescents start to work in the same companies where they held entry-level positions during their high school years (Mortimer, 2003). Therefore, adolescent work experience matters for adult employment. However, with the decline in industry jobs, the character of adolescent employment has changed. Retail and service jobs are now most common for high school students, and there is little expectation that these a s will convert into an adult career. Increasingly, there is a lack of overlap between high school employment and adult work. As a consequence, the employment channel of youth employment declines in importance. In fact, the future wage premia associated with working during the senior year of high school have declined dramatically over the past 20 years (Baum and Ruhm, 2014).

Studying two cohorts from the WWII and Babyboom generation, Aronson et al. (1996) find that the differences in the types of jobs held by adolescents between these two cohorts matter less than the psychological growth obtained through adolescent work. This

points toward a very different channel of adolescent work and adult labor market outcomes. What appears to matter for adolescents is not the experience gained in job-specific human capital, but exposure to an environment that is rather different from high school. Working allows them to gain self-confidence, self-sufficiency, discipline, motivation, accountability, interpersonal skills, and most of all, responsibility (Aronson et al., 1996).

I argue that the development of these psychological traits, rather than any job-specific skills, is the key outcome of working during adolescence. I further suggest that participation in welfare programs later in life is driven by the same psychological dimensions that connect working during early life with employment outcomes later in life. Therefore, I suggest that welfare participation later in life should be negatively related to working during adolescence. The various dimensions of psychological growth that Aronson et al. (1996) find are lower on average for people who are receiving welfare (Bruce and Waldman, 1991).

This study is the first to use welfare participation to test the hypothesis that work in adolescence is beneficial in developing decision making skills and discipline, which in turn lay the groundwork for accumulating human and social capital. The key hypothesis is that this capital will eventually work as a barrier to participation in welfare programs later in life. Previous research has estimated the impact of work during adolescence on samples that included only people who remained in high school through graduation. This study also includes subjects who did not graduate from high school. This should increase the representativeness of the sample as welfare recipients later in life include a disproportionate number of people who failed to graduate from high school.

Using data from the National Longitudinal Survey of Youth (NLSY) 1979 and a variety of different model specifications, including instrumental variables and Heckman selection models, the study finds a negative impact of early life work experience on the likelihood of participating in a welfare program later in life. In particular, working one extra full-time week per year for an average individual between the ages of 14 to 19 reduces both the probability of receiving welfare in the twenties by 2.6 percentage points (10.8%) and the welfare payment received in the twenties by 6.3% per year. Also, the probability of receiving welfare and welfare payment in their thirties is reduced by 4.7 percentage points (32%) and 6.5% per year, respectively.

This study has direct policy implications:[1] it suggests that moderate adolescence employment may be instrumental in accumulating social and human capital that can help to reduce welfare participation later in life.[2]

Section 2 briefly provides a literature review, while section 3 explains the data and discusses summary statistics, and section 4 presents the identification strategy and the problem of omitted variables. Section 5 interprets the regression estimates; section 6 checks for robustness of the baseline results. Finally, Section 7 provides the conclusions.

[1] Implementing new policies that promote early work for youth to accumulate human capital and work experience similar to the Career Education Incentive Act of 1977 or School-to-Work Opportunities Act in 1994 would be beneficial, worth the investment and, to some extent, a partial remedy to the problem of welfare.m

[2] The federal spending on welfare programs has reached $370 billion in FY 2014. This includes $60 billion on Earned Income Tax Credit (EITC), $21 billion on Child Tax Credit, $16 billion on Temporary Assistance for Needy Families (TANF), $54 billion on Supplemental Security Income (SSI), $70 billion on food stamps, currently known as (SNAP), and $47 billion on housing assistance.

2. Background

I assume that the take-up of welfare programs later in life is a useful indicator to estimate the impact of early-life employment on developing social and human capital. Central to this assumption is the fact that welfare enrollment is not automatic or by default. Applicants have to fill out long application forms and go through lengthy procedures of income verification, interviews and, in some cases, third-party verification. For some programs, applicants are required to attend a series of meetings before they are permitted to sign their application forms (Gabor et al., 2003). Currie (2004) documents the take-up of a variety of programs. Only 69% of households eligible for the Food Stamps Program participated in 1994, 75% for the WIC Program, 87% for the National School Lunch Program, 8.1% to 14% of those newly eligible for State Children's Health Insurance Program, and 15% for the Child Care Subsidy Program. Blank (2001) estimates Aid to Family with Dependent Children (AFDC) take-up rates among families with female heads over time. They range from 60% to 70% when she uses CPS data, 80% to 90% when she uses administrative data (reported participation was less than actual participation). Moffitt (2003) shows Temporary Assistance for Needy Families (TANF) participation rates over time for single mothers to be 40% and 50%-55% for poor single mothers.

Rational choice theory suggests that people will not take up welfare if the costs outweigh the benefits (Abell, 2003). The cost is increased by a person's sensitivity to stigma, a greater stock of responsibility, independence, self-esteem, and other positive psychological and personal aspects that may be boosted by early life employment. Blank and Ruggles (1996), Taylor (1999) show that participation in AFDC and the Food Stamps

Program increased with the size of the benefits people were eligible for, suggesting an existing role for transaction costs/stigma. WIC applicants reduce participation rates in response to the requirement of income documentation (Brien and Swann, 1997), requiring more frequent visits to the WIC office (Bitler, Currie, and Scholz, 2003), and restricting types of food (Chatterji et al., 2002). Self-selection also extends to housing assistance; Reeder (1985) finds that the poorest households are less likely than their relatively better-off counterparts to live in public housing.

One piece of evidence that the employment trajectory does not fully capture the multidimensional impact of early life work is the lack of consensus among researchers about the impact of early life employment on future outcomes. While some research concludes that it has a positive effect on future wages and job stability, other research concludes that it promotes pseudo-maturity, lack of adequate investment in human capital, and usage of alcohol and drugs that leave the individual with negative effects for his future income.

Low wages are correlated but not exogenously causing welfare participation. Page and Larner (1997) argue that movement in and out of a welfare program is determined more by changes in family structure than it is by fluctuations in income. They find that, in 1983, 45% of new recipients had recently divorced or separated and another 30% were unmarried new mothers. Only 15% of new recipients enrolled in AFDC because the family's earnings decreased. Conversely, families left AFDC when they married or when the youngest child turned 18. Well less than half left because they became employed. Furthermore, they report that in 1992, some 48% of households receiving AFDC were

headed by an unmarried adult; 23% had experienced a divorce or separation; 7% included two adults; and for 15% of the households, only the child was supported by AFDC (often living in a foster home). Events such as having an out-of-wedlock child, a divorce, or a separation are sensibly connected with poor decision-making rather than with changes in earnings or the employment status. Consequently, in 1992, around 90% of the adults who received AFDC could be traced to poor decision making. In essence, low wages do not necessitate welfare participation. For example, an individual making minimum wage would be less likely to qualify for a welfare program if he/she works two jobs or has fewer children. The benefits drawn from a welfare program are positively correlated with the number of children in the family (Fig. 1 and Fig. 2). Furthermore, mothers who show a sense of independence often work while raising their children. Aronson (1998) investigates young women's transitions from adolescence to adulthood; he argues that women who appreciate their independence, self- reliance, freedom, equality, and self-fulfillment are more likely to combine work with motherhood.

In the previous argument, I show that welfare participation encompasses all the psychological traits that are outcomes of working during adolescence and, at the same time, affect welfare participation through take-up and family structure. Receiving welfare seems to have extended roots in the early life of the welfare participants. Burtless (1997) argues that welfare recipients, on average, have relatively fewer skills that only allow them to hold poorly paid jobs with little training or promotion opportunities. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996 intended to increase the stock of skills needed for employment by increasing work exposure for welfare

participants.[3] States extended their attempts to reduce welfare receipts; some states imposed a Family Cap on welfare recipients. Many states reported a decline in welfare births after implementing the Cap.[4] However, Kearney (2004) finds no systematic effect of the family cap on fertility rates and suggests that women are not responding by having fewer additional births. Furthermore, Grogger and Bronars (2001) find no evidence that marginal benefits paid for the additional child increase fertility. Consequently, the cap only reduces the resources provided per child on welfare.

The intergenerational component has a strong presence in welfare participation. Using data from Norway's disability insurance (DI) system, Dahl et al. (2013) show that, when a parent is allowed DI, their adult child's participation over the next five years increases by six percentage points and by 12 percentage points after ten years. These findings show that welfare participation is persistent and prolonged across generations. Consequently, such persistence could be disrupted by fostering the value of work and promoting a sense of responsibility in young children rather than in adulthood—a hypothesis this study is to test.

[3] PRWORA was signed into law in 1996 by President Bill Clinton who promised to "end welfare as a way of life" in his presidential campaign. The new law required work in exchange for time-limited assistance that is a maximum of 60 months of benefits within one's lifetime. Single parents must participate for at least 20 (30 hours for two-parent families) hours per week the first year, increasing to at least 30 hours per week by FY 2000.

[4] Family Cap means that new births are fully or partially excluded from welfare benefits if the family has been receiving welfare. In the 1996 Act, states were granted to implement the Family Cap policy on its own discretion with no need to obtain waivers. After the Act of 1996, 22 states adopted the cap policy; 18 of them enacted complete exclusion for the new birth; 2 of them enacted partial exclusion and the other two implemented flat payments regardless of the family size.

The impact of adolescent work on educational attainment and employment outcomes has mixed results. Surprisingly, some research finds that the impact is negative on educational attainment yet positive on adult employment. Carr, Wright, and Brody (1996) find a positive impact on employment a decade later for working while in high school if the individual was able to obtain a bachelor's degree afterward. However, they find a negative impact on educational attainment for people who worked during high school. Greenberg, Steinberg, and Ruggiero (1982) consider 10th and 11th graders in southern California, and find a negative impact on educational achievement and more delinquency, yet a positive impact on knowledge of business. Research finds an improvement in academic achievement in response to working a moderate number of hours during high school (Turner, 1996), less than 20 work-hours per week (Steel, 1991; D'Amico and Baker, 1984; Schill, McCartin, and Meyer, 1985), and 1 to 10 work-hours per week for vocational high schoolers (Lillydahl, 1990). Stephenson (1981), using NLS for young men 1966-71 interviews, finds a positive impact for full-time employment during high school. Other research identifies a positive impact for working during high school on academic performance and future employment in the form of lower unemployment rates and higher wages (Meyer and Wise, 1983; Stern and Nakata, 1989). Baum and Ruhm (2014) find a positive impact for women on subsequent employment for the 5 to 11 years post high school graduation; afterward, the decline is dramatic.

Some research also shows evidence of a negative impact of early employment on educational attainment. Singh (1998), using NLSY data, finds a significant negative impact on standardized test scores for math, English, science, and social studies. He also finds an increase in the likelihood of getting lower grades, even if the high schooler works only a

part time job. In his study on 2000 high school students from upstate New York, Barone (1993) identifies a small negative effect on GPA. Other research finds that the income generated by high school work is spent on consumption rather than investment. Yeatts (1994), in his 1982 survey of high school seniors, finds that only 44% of respondents saved for college while 97% spent on consumption.

In addition to the impact of working in early life on educational attainment and future employment, there is also substantial literature on the impact of early life work on the development of human and social capital. Early-life part-time employment is crucial in developing responsible adolescents (Finch, Mortimer, and Ryu, 1994; Greenberger, 1988). Harven (1982) observes independence and self-recognition in working adolescents as a result of being able to gain privileges like staying out late for boys or putting up hair for girls. Moreover, even if the teenagers turn their paycheck over to their parents, they are still able to buy a new suit or a new dress. Frank (1999) finds that high school students appreciate their value with their ability to purchase luxury goods. Early life employment promotes autonomy and financial awareness for the adolescents and increases responsibility, maturity, and self-confidence (Mihalic & Elliott, 1997). Parents also support and approve their children to work during adolescence, as they believe that working fosters attributes such as independence, responsibility, and time management skills (Phillips and Sandstrom, 1990; Aronson et al., 1996). Surprisingly, parents who were of high socioeconomic status, white, and native-born tend to think their children should start work earlier (Phillips and Sandstrom, 1990). Adolescents in the Depression era, who contributed to their families through paid work, gained confidence and feelings of efficacy from being able to help at a time of crisis (Elder, 1974). Mortimer and Finch (1986), Mortimer (2003),

and Steel (1991) find that working during high school has a positive impact on self-reliance, self-image, time management skills, related control orientation, identity, perseverance, and confidence in being able to achieve their economic goals.

Some research shows a negative impact of early employment on social and human capital. It encourages consumptive behavior (Steinberg and Cauffman, 1995), promotes anti-adult values (Greenberger, 1988), and results in premature development (Bachman and Schulenberg, 1993). Adolescent work was also associated with risky behavior including early involvement in dating (Mihalic and Elliott, 1997), undesirable leisure activities including drinking, smoking, and drug use (Bachman and Schulenberg, 1993; Greenberger and Steinberg, 1988; Mihalic and Elliot, 1997), emotional distress leading to suicidal thoughts (Resnick et al., 1997), and illegal behavior such as theft if working more than 30 hours per week (Bachman and Schulenberg, 1993).

Socialization and developmental models explain the process through which individuals develop their personalities, beliefs, perceptions, intellectuality, and how they update their concepts in a smooth continuous process of development. Therefore, early life work is associated with the total development of students and promotes a transition from adolescence to adulthood (Holland & Andre, 1987). It also provides the opportunity to obtain social capital that is important for building networks and relationships for social support (Coleman, 1990).

This study extends the literature by identifying to what extent early-life work experience impacts future welfare participation. The results suggest that such an impact is implemented through socialization and psychological development that promotes self-

esteem, responsibility, sensitivity to stigma, and skills of judgment and decision making. I argue that getting moderate exposure to the work environment at a young age, specifically at ages of 17, 18 and 19, provides a real-world experience, and contributes to the accumulation of social and human capital. These skills improve decision making and reduce welfare participation.

3. Data

Data come from the National Longitudinal Survey of Youth (NLSY) 1979, a nationally representative sample of 12,686 young men and women between the ages of 14-22 years old when they were first surveyed in 1979. These individuals were surveyed on an annual basis until 1994 and biannually thereafter. The survey includes detailed questions on the educational attainment, high school test scores, Armed Forces Qualification Test (AFQT) and Armed Services Vocational Aptitude Battery (ASVAB) test scores, income and assets, number of children, alcohol and substance abuse, parental information, sexual activity, and marital and fertility histories. Additional labor force data includes hours worked, earnings, occupation, industry, benefits, and other specific job characteristics. In order to monitor the respondents from the age of 14 through 19, I limit the sample to include only the individuals that were 14 years old in 1979 (950 respondents) when they were first interviewed.

The key independent variable is the number of full-time weeks worked (40 hours) per year from age 14 to age 19. This variable is calculated by collecting the hours worked

for each individual from age 14 to 19, then computing the average by dividing the work-hours by the number of years (6 years), then dividing the quotient by 40 (40 hours per full-time work-week). The average full-time work-weeks per year from the age of 14 to 19 is 16.5 weeks per year. The NLSY data also includes the number of weeks an individual worked since the last interview regardless of the number of hours worked in the week, which I use in the robustness check. The average number of weeks an individual worked from the age of 14 to 19 was 23 weeks per the calendar year.

Welfare data is surveyed by asking the individual whether he/she or a spouse received income from food stamps, AFDC, SSI, TANF, rent subsidy, or any other public assistance. Data include the average amount of welfare received per the calendar year and the months they were received since the last interview. NLSY data on welfare participation is used to extract the key dependent variable, that is the total welfare received. Total welfare received consists of the amount of AFDC, Food Stamps, SSI or any other public assistance/welfare the individual received during the calendar year, not including unemployment compensation. For the sake of robustness, I use food stamps and AFDC instead of total welfare receipts to measure the effect on two of the main components that comprise total welfare receipts. To calculate the probability of welfare participation, I create a binary variable that equals one if the respondent receives any welfare assistance during the calendar year and zero otherwise. Welfare data are available only for 936 individuals out of the 950 individuals who were 14 years old in 1979. Of the 936 individuals, only 265 received welfare at least once in their twenties, while 152 individuals received welfare at least once in their thirties. There are 117 individuals who received welfare in their twenties and their thirties. After adding all the covariates and because of

missing values, the final sample is reduced to 531 respondents. Of those, 127 individuals received welfare in their twenties, and 118 respondents received welfare in their thirties.

There are more people in the sample that received welfare in their twenties (Fig. 3) than their thirties (Fig. 4). That could be partially explained by the passage of the PRWORA in 1996 when respondents in the sample were about to turn 30 years old, or by the economic boom in the late 1990's or a combination of both. Moreover, the probability of receiving welfare in the second half of their twenties was higher than in the first half (Fig. 3). Respondents who worked more hours in their early life received fewer welfare payments in their twenties (Fig. 5); this negative correlation holds, to a lesser extent, in their thirties (Fig. 6).

The diminishing marginal impact for early life employment is evident in the literature, e.g., D'Amico and Baker (1984), Turner (1994), Lillydahl (1990), Schill, McCartin, and Meyer (1985), and Steel (1991, Section II. Background). Welfare receipts decline with hours worked in adolescence before they start to increase after a certain amount of hours worked.

After adding all controls, the final sample consists of 531 people who were 14 years old in 1979, who were in their twenties during the period from 1985 to 1995 and in their thirties during the period from 1996 to 2006. More respondents received welfare in their twenties than in their thirties. Females received greater sums of welfare on average. Table 2 shows that 30% of the females and 18% of the males received welfare payments in their twenties with an average of $4,157 per year for females and $4,855 for males. Fewer

respondents received welfare in their thirties, 18% with an average receipt of $4,011per year and 11% with an average receipt of $3,705 for females and males, respectively

Figure 7 and Table 3 show that work-hours increased progressively with age. In every age group, the average male worked more hours and more weeks than the average female. A 19-year old male worked an average of 31 full-time weeks out of 32 total weeks whereas a 19-year old female worked an average of 25 full-time weeks out of 30 total weeks. The majority of the respondents who obtained high school degrees graduated when they were 18 years old. In the sample, 61% (274 respondents) of high school graduates obtained their degrees at or before they turned 19; more than half of those, 31% (167 respondents), graduated from high school at the age of 18. On average, an individual in the sample worked 16.5 full-time weeks per year between the ages of 14 and 19; a typical female worked 14.75 full-time weeks versus 18 full-time weeks per year for a male.

Table 4 shows the percentage of welfare participants and welfare payments by age group, gender, and early life full-time work-weeks. In general, males tend to work more hours than females; for all age groups, a higher percentage of males worked more than 20 full-time weeks while a higher percentage of females did not work (0 weeks). Females are more likely to receive welfare and on average, they receive greater welfare payments than their male counterparts. Table 4 presents some insight into the positive role that early life employment plays in reducing the likelihood of receiving welfare, and the payments of the receipts. Across age groups, an increase in the full-time work-weeks lowers the percentage of respondents who receive welfare. Furthermore, the level of payments is reduced significantly with the number of full-time work-weeks.

Table 5 shows summary statistics for some of the covariates. Females comprise 48% of the final sample. Ninety-four percent of the individuals in the sample obtained a high school degree, 38% associate degrees, 24% bachelor's degrees, and only 7% obtained a graduate degree. Approximately, the same percentage of females and males obtained a high school degree, yet more females than males attained associate's, bachelor's, and graduate degrees. Nine percent of the sample received welfare before the age 18. This applies to more females than males.

4. Methodology

I use a variety of different model specifications, including ordinary least square (OLS), probit, instrumental variables (IV), and Heckman selection models. The basic model controls for a wide set of covariates that represent demographics, personal characteristics, proxies for cognitive ability, and family background. The basic equation is:

$$y_{it} = \alpha h_i + \beta h_i^2 + \gamma x_{it} + \epsilon_{it}$$

Where y it is the outcome variable, welfare receipts for individual i at time t. Each t represents a calendar year from 1979 to 2012. The welfare payments received by respondents while being in their twenties, who were 14 years old in 1979, is estimated by tracking the payments received from 1986 (when he/she was 21 years old) to 1995. Welfare receipts in their thirties are monitored from 1996 to 2005. The key independent variable h is the average number of full-time work-weeks which an individual worked between the ages of 14 and 19. Respondents who were identified as 14 years old by 1979 were

interviewed in 1980; the number of hours they reported in 1980 represents the number of hours they worked at the age of 14. Likewise, the number of hours that they reported in 1981 to have worked since the last interview represents their worked hours when they were 15 years old, and so on. A variable hours squared is added to the regression to allow for a nonlinear impact of the early life work on welfare participation. A set of controls for demographics, personal characteristics, cognitive ability, and family background for individual i at time t is represented by x_{it} . The error term is ϵ_{it}. The coefficients of interest are α and β; the standard error for each parameter is reported separately. The probability value (P-value) for the hypothesis that both parameters α and β are jointly equal to zero is reported using an F-test or a likelihood ratio test.

Family and individual characteristics that we are unable to observe in the data could affect both early life employment and future welfare participation. A family fostering responsibility and self-dependence would positively affect their children's early life employment and welfare participation in the future, causing upward biasedness toward a greater effect for early life employment. A distaste for school or preference to work could also bias the results. An individual with a high tendency to work would be more likely to work when young and less likely to receive welfare in the future. An individual with distaste for both school and work is expected to work less when young and is more likely to receive welfare in the future, causing an upward bias. A behavior such as taking drugs in early life would cause a downward bias. An individual with such a behavior is expected to work less when he is young and is more likely to receive welfare when he is old due to health problems or disabilities. An individual with a family background of poverty is

expected to work more hours in his/her early life and also is more likely to receive welfare in the future; that would cause a downward biased result. I use a wide set of variables as controls in order to overcome the problem of endogeneity. These variables represent demographic characteristics, cognitive ability, various aspects of individual characteristics, and family background (Table 1). I also use instrumental variables and Heckman selection models to minimize the bias and to check the robustness of the results.

5. Estimation Results

The results in Table 6 show a negative effect of working between the ages of 14 to 19 on the welfare receipts when the same persons are in their twenties. The result is robust across a variety of specifications. The effect gets smaller as one moves from model (a) with no controls to the full model (e) where covariates for demographic, personal characteristics, cognitive ability, and family background are included. For the average individual who worked 16.5 full-time weeks per year between the ages of 14 and 19, the change in the welfare received for working one extra full-time week per year is a reduction of $22.3 (-42.99+2*0.627*16.5) in the twenties of the respondent's life. That is a reduction of 6.3% of the welfare receipts for an average individual who receives $353 of welfare per year in his/her twenties. The reduction in the average welfare received by people in their thirties is $13 per year; that is a reduction of 6.5% (13/198*100) of the welfare receipts for an average individual who receives $198 of welfare per year in his/her thirties. The impact is slightly greater for males, mainly because they work a greater number of hours (18 full-

time weeks vs. 14.8 for females). Working an excessive number of hours in early life would increase the welfare payments received in the future. More hours worked translate into a reduction in welfare receipts in the future until the number of full-time work-weeks reaches the threshold of 34 (42.99/ (2*0.6272)) full-time weeks per year. At this point, the average welfare receipts are minimized for persons in their twenties. Females work fewer hours on average; therefore, their welfare receipts start to increase at a lower threshold, 26 full-time work-weeks compared to 35 full-time work-weeks per year for males.

Working an extra full-time week per year between the ages of 14 and 19 reduces the average welfare payment received by people in their twenties, by $20 ($19 in their thirties) for females and by $22.80 for males. The impact is statistically insignificant for males in their thirties. This could be partially explained by the passage of the PRWORA in 1996 (when the respondents in the sample were about to turn 30 years old), by the economic boom in the late 1990's, or a combination of both. Investigating these issues is beyond the scope of this paper.

Working during the ages of 14, 15, and 16 renders statistically insignificant results; therefore, I only present the results of working during the ages of 17, 18, and 19 in Table 7 in addition to the results of working during sophomore, junior, and senior years of high school. Working during the ages of 17, 18, and 19 has a significant impact on the welfare receipts as the respondents reach their twenties, causing an average reduction of $11.3, $9, $7 per year, respectively. Due to diminishing marginal returns, working fewer full-time weeks at the age of 17 has a greater marginal impact. An average respondent worked 16, 22, and 28 full-time weeks at the ages of 17, 18, and 19, respectively. The effect of working

at the age of 17 is greater for males (a reduction of $13.6) and insignificant for females. Working one extra full-time week during the age of 18 reduces the welfare payment for females and males by $9 and $10.6, respectively. One extra full-time work-week during the age of 19 decreases the welfare receipts by an average of $17 for males in their twenties. The majority of high school graduates (167 individuals of the 531 respondents in the final sample) obtained their high school diploma at the age of 18; therefore, it is expected to find a significant effect for working during the senior year of high school. Table 7 shows that working during the senior year of high school will decrease the welfare receipts of respondents in their twenties by an average of $9.3 per year, and by $12.6 if one controls for the work-weeks in the sophomore and junior high school years. The effect is approximately the same for females ($9.1), yet statistically significant at a lower level of significance (10%). Breaking down the impact of worked hours by age or high school years provides no evidence of an effect for a particular age or high school year on the welfare receipts of respondents in their thirties (Table 7).

Table 8 shows results from probit regressions. The dependent variable is dichotomous; it equals 1 when the respondent receives a welfare payment in a specific year and zero otherwise. The results of the probability model in Table 8 are comparable to those of the OLS results in Tables 5 and 6. Working in early life reduces the likelihood of receiving welfare for respondents in their twenties. The impact is statistically significant across all specifications. For an average adolescent, working an extra full-time week per year in early life reduces the likelihood of receiving welfare by 2.6 (10.8%) and 4.7 (32%)

percentage points when they are in their twenties and thirties, respectively.[5] The impact is even higher for males, where it is 4.18 percentage points when they are in their twenties, while it is statistically insignificant for females. Working an extra full-time week per year in adolescence decreases the probability of participating in a welfare program by 5.6 and 4.1 percentage points for females and males in their thirties, respectively. Men are highly affected by working at the age of 19 years old. For males, working an extra week at the age of 17, 18, and 19 reduces the probability of welfare participation in their twenties by 2.1, 1.9, and 2.2, respectively. Out of the 531 respondents in the final sample, only 274 respondents obtained a high school degree at or before the age of 19; another 205 respondents obtained their high school degree after the age of 19 while they were already working. This reduces the variation and contributes to the insignificant results when estimating the impact of hours worked as a function of the years of high school on welfare participation.

6. Robustness Check

In order to Check the robustness of the results, I use a variety of different model specifications, including instrumental variables and Heckman selection models. Furthermore, I estimate the impact of working during adolescence on two of the most

[5] The final sample consists of 531 respondents. Out of those 531, 127 and 78 individuals received welfare in their twenties and thirties, respectively. That indicates that the probability of receiving welfare is 24% (127/531*100) for respondents in their twenties and 14.7% (78/531*100) in their thirties.

important components of welfare: food stamps and AFDC. I also employ the number of work-weeks during adolescence instead of the number of full-time work-weeks (Table 13).

6.1. Selection Bias

Not everyone qualified to receive welfare chooses to participate; therefore, welfare participation is not observed for all who are qualified. Individuals are heterogeneous in perceiving the costs and benefits of participating in a welfare program. Factors like sensitivity to stigma, responsibility, self-esteem, self-recognition, and other psychological and personality characteristics affect the decision of participating. Therefore, they may choose not to take-up benefits even if they are eligible. I use the Heckman selection model to treat the selection bias caused by welfare take-up and account for the unobserved participants, who opt not to participate despite being eligible. The selection is the choice of whether or not to receive welfare in their twenties. A probit regression is run first and includes the covariates that predict welfare participation. These three predictors are excluded from the second regression.

The three covariates predicting the probability of receiving welfare are: 1) Expected work in which individuals were asked in the first survey whether they want to work, marry, raise a family, or other by age 35. 2) Rosenberg score: individuals were to respond to specific types of questions about self-esteem in the 1980 survey, such as "I am a person of worth." Responses were scored from 0 to 34 and grouped into seven categories based on their scores. 3) Reason the person left school (Table 1 section 2-Individual Characteristics).

The inverse Mills ratio is calculated from the first probit regression and added as a covariate in the second OLS regression.[6] The dependent variable in the first regression is a binary variable indicating whether or not the respondent received welfare payments in a particular year. The coefficient on the inverse Mills ratio indicates the selection effect into welfare participation. A statistically significant positive value implies that the parameter estimates from the reduced-form models, which do not control for the endogenous selection, are upward biased.

Table 9 shows results of various regressions using OLS and the Heckman selection model. Food stamp payments and AFDC are used in addition to the total welfare payment for robustness. The AFDC program was replaced by TANF in the act of 1996; however, available data on AFDC made it possible to take a further look at the impact on various welfare components. The insignificant effect on AFDC is justified by the states' attempt to substitute the AFDC, which is only 50% funded by the federal government with the food stamp program that is fully funded by the federal government. The food stamp federal fully funded system was a disincentive for states to increase its AFDC contributions. Consequently, states imposed a lower income threshold to qualify for AFDC than food stamps.

[6] The inverse Mills ratio is $\varphi(p) / \Phi(p)$ where $\varphi(p)$ is the standard normal density function, and $\Phi(p)$ is the cumulative density function of the fitted values of the first probit regression. The Inverse Mill Ratio from the first regression was used as a covariate in the second regression. The IMR in the second probit regression rendered statistically significant coefficients (Tables 9 and 11), which indicates the presence of selection bias. The three variables that are used to predict the probabilities in the first model are excluded from the second model. For further information, see Heckman (2003) and Marchenko (2012).

The results of the Heckman selection model show a larger effect of working as an adolescent as the model accounts for those who choose not to participate due to stigma or other cost elements that outweigh the benefits. This agrees with the literature regarding the take-up argument. The effect of working one extra full-time week per year in early life on the average welfare payments of respondents in their twenties is a reduction in the receipts of welfare and food stamps by $22.3 and $5 per year, respectively. The Heckman selection model shows a larger effect than the OLS model; working an extra full-time week is associated with a reduction of $34.5, $12.8, and $14 for welfare, food stamps, and AFDC payments per year.

Working at the age of 18 has the largest reduction in both welfare receipts and food stamps. The impact on welfare receipts is a reduction of $12.5 using OLS, and $19.7 using the Heckman selection model; for food stamps receipts, the reduction is $2.3 using OLS, and $6.3 using the Heckman selection model. The effect of working at ages 17 and 19 is also statistically significant for welfare receipts, -$11 and -$10 using OLS, and -$15.5 for both ages using the Heckman model. Food stamp receipts are also affected by working during the ages of 17 and 19. Using the Heckman selection model indicates that one extra full-time week caused a reduction of the food stamp receipts by $5.1 and $5.8 for working at the ages of 17 and 19, respectively. The effect on AFDC is only statistically significant for the work at the age of 18, a reduction of $8 in the AFDC receipts per year using the Heckman model.

Using the Heckman selection model, the effect of working in the junior year of high school turns out to be much larger and highly significant on welfare (-$23.5) and food

stamps (-$21.5) receipts. Working in the senior year of high school is associated with a reduction of $10 in welfare receipts and $5 in food stamps. There is no evidence of a significant effect on AFDC for working during the years of high school. Also, neither of the two models shows significant evidence that working during the sophomore year of high school could affect welfare, food stamps, or AFDC receipts.

Table 11 presents the results from the Heckman selection model summarized in dollar terms. Using the Heckman selection model, the study accounts for subjects who were qualified yet chose not to participate in a welfare program. Expectedly, accounting for those who are qualified yet chose not to participate rendered higher effect. The model successfully predicts welfare participation through early life psychological characteristics, providing evidence that sensitivity to stigma and other psychological traits influence the take-up rate of welfare programs.

6.2. Instrumental Variables

In order to minimize the existing endogeneity between working in early life and welfare participation later in life, I use a large number of controls for individual characteristics and family background. However, to warrant against spurious results, I employ three instruments for the key explanatory variable. The instruments are highly correlated with the number of hours worked during adolescence and uncorrelated with the amount of welfare received in later life. The instrumental variables I used are 1) Expected work: individuals were asked in the first survey whether they want to work, marry, raise a family,

or other by age 35. Expected work is also used as a predictor in the Heckman selection model. 2) A binary variable: whether or not the mother lived in the same household as the respondent for every year from age 14 to 19. 3) The average number of weeks spent out of the labor force per year from age 14 to 19. The average number of weeks spent out of the labor force is an independent question put to the respondent and is not calculated using any worked time. Moreover, being out of the labor force does not include the time an individual spent seeking employment, which is a considerable amount of time during adolescence when the unemployment rate is high. Thus, I can assert that the instrument is independent. The instrumental variables pass both the relevancy and the exogeneity tests (Table 10), as well as the Sanderson-Windmeijer (SW) chi-squared test,[7] the LM test of exogeneity,[8] and the Sargan-Hansen test.[9]

Table 10 shows that the instrumental variables are significantly correlated with the hours worked in early life. Someone who has responded that he/she would prefer to marry or raise a family by age 35 worked less early in life. Surprisingly, adolescents who had their mothers living in the house worked more hours than their counterparts where the mothers were absent. That could be explained by the mother fostering responsibility and independence when she lives with her children. Expectedly, weeks spent out of the labor

[7] The Sanderson-Windmeijer (SW) first-stage chi-squared is a test of under-identification. The null hypothesis is that the excluded instruments are under-identified.

[8] LM test of whether the equation is identified, that the excluded instruments are "relevant", meaning correlated with the endogenous regressors. The test is essentially the test of the rank of a matrix under the null hypothesis that the equation is under-identified.

[9] The Sargan-Hansen test is a test of over-identifying restrictions. The joint null hypothesis is that the instruments are valid instruments, i.e., uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

force are negatively correlated with worked hours. The second part of Table 10 shows that the error term of the original model is uncorrelated with any of the instruments. The instruments are exogenous to welfare participation; a small F-statistic number suggests that the hypothesis of the instruments being jointly equal zero cannot be rejected.

Table 11 displays the results of OLS, Heckman, and IV'S models in detail, while Table 12 summarizes the results and presents them in dollar terms. The results in Tables 10 and 11 reveal that using the IV model renders an economically smaller, yet statistically significant, impact. The results for OLS are previously discussed in Table 6; working one extra full-time week per year in early life reduces welfare payments to respondents in their twenties by $22 by year, $20 for females, and $22.8 for males. The Heckman selection model yields larger coefficients as it accounts for subjects who were qualified yet did not participate in a welfare program. Using the Heckman selection model yields an insignificant impact for respondents in their thirties; however, working an extra full-time week in early life reduces the welfare payments by $34, $22, $39 per year for respondents in their twenties for the full sample and for females and males, respectively. Using the IV model yields smaller impacts for welfare received for respondents in their twenties and a relatively higher impact for respondents in their thirties; however, the results assert the negative association between working during adolescence and the welfare received in later life. The IV model renders comparable results to the OLS model, yet surprisingly the impact shifts to be significant for males in their thirties and insignificant for males in their twenties.

For robustness, I use the average number of work-weeks per year from the age of 14 to 19 as a key dependent variable instead of the average worked hours. Table 13 shows the impact of the number of work-weeks on the welfare payments received by respondents in their twenties and thirties regardless of the number of hours worked per week. The results are consistent with the findings in Table 6 where full-time work-weeks are used as the outcome variable. An average individual has a reduction in the average welfare received in his/her twenties by 15.8 (-37.23+2*0.7130*15) dollars per year for working one more week per year in his/her early life. The effect is highly significant for males in their twenties while it is insignificant for females. Working an extra week per year between the ages of 14 to 19 will reduce the likelihood for respondents of receiving welfare payments in their twenties by 2.5 percentage points. The effect is larger for males, - 4.3 percentage points. Working an extra week per year during early life will reduce the likelihood of receiving welfare payments for respondents in their thirties by 6.1 percentage points, which is mainly caused by a significant impact for females in their thirties. Table 14 summarizes the results of the OLS and probit models in terms of dollars, percentage points, and percentage change.

7. Conclusion

Using data from the National Longitudinal Survey of Youth (NLSY) 1979, and a variety of different model specifications, including instrumental variables and Heckman selection models, this study shows that working one extra full-time week per year for an average individual between the ages of 14 to 19 reduces both the probability of receiving welfare

by 2.6 percentage points (10.8%) in the individual's twenties and the welfare payments received in their twenties by 6.3% per year. Working one extra full-time week per year between the ages of 14 to 19 reduces the probability of receiving welfare by 4.7 percentage points (32%) when the individuals are in their thirties and the amount of welfare payments by 6.5% per year when they are in their thirties. Males are slightly more affected in their twenties than their female counterparts. Working an extra full-time week in their early life will reduce their welfare payments by 11% in their twenties compared with 3.9% for females. For males, working an extra full-time week early in life will reduce the likelihood of receiving welfare by 4.1 (22.4%) percentage points and 4.1 (35.6%) percentage points in their twenties and thirties, respectively. For females, there is no significant impact on the likelihood of receiving welfare in their twenties, yet the impact in their thirties is significant: a reduction of 5.6 (30.8%) percentage points. The impact is generated mainly from working at the ages of 17, 18, and 19, with the greatest impact coming from working at the age of 17.

This study provides evidence that work in adolescence increases the stock of human and social capital and develops psychological barriers that reduce the likelihood of participating in a welfare program and the amount of welfare receipt. Using the Heckman selection model, the study accounts for subjects who were qualified yet did not participate in a welfare program. The model successfully predicts welfare participation through early life psychological characteristics and provides evidence that sensitivity to stigma and other psychological traits influence the take-up rate of welfare programs. By looking at the full-time work-weeks reported based on the age of the respondent instead of high school completion, this study is able to include subjects who did not graduate from high school in

addition to high school graduates. This increases the representativeness of the sample and addresses a problem not taken into consideration in previous research.

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APPENDICES

APPENDIX A: TABLES

Table 1. Summary of the Covariates

Variables	Description
1-Demographics	
Gender	Male/Female
Ethnicity	Black/Hispanic/White
Region	West/South/Northcentral/Northeast
Age	The age of the respondent, 14 years old in 1979
U.S Born	Whether or not the respondent is born in the United States
U.S Citizen	Whether or not the respondent is a U.S citizen
Urban	Whether or not the respondent lives in an urban area
2-Individual Characteristics	
Rotter Scale	The respondents were asked questions in the first survey in 1979 to show their outlook towards life,their attitude towards work, and their determination towards achieving their goals. Respondents were asked questions such as what they think of the role of luck in their life or if they were able to make their plans work. Respondents are divided into four groups based on their score on the Rotter scale, 1 to 4, 5 to 9, 10 to 14, and 15 to 19.
Drug Usage	This variable represents the number of times the respondent used cocaine; it ranges from 0 to 7 times.
Reason Left School	Respondents were divided into 8 groups. The base group is respondents who left school for graduation. Other groups include those who left school for reasons of pregnancy or marriage, distaste for school or poor grades; home responsibility, choosing to work, or financial difficulty; military service; being expelled or suspended; the respondent considering school to be too dangerous; and other reasons.
Number of Spouses	This variable is the number of spouses/partners the respondent has ever had.
Married	This variable looks at whether or not the respondent is currently married.
Number of Children	This variable identifies the number of biological and adopted children in the household if any.
High School Club	This variable looks at whether or not the respondent participated in high school clubs.
Occupation Aspiration	In the first survey given in 1979, respondents were to choose what kind of work they would like to do at the age of 35. This variable includes 13 categories which represent different types of occupations which in turn control for a variety of personal characteristics. Categories include (I) professional, technical and kindred, (II) managers, officials and proprietors, (III) sales workers, (IV) clerical and kindred, (V) craftsmen, foremen and kindred, (VI) armed forces, (VII) operatives and kindred, (VIII) laborers except farm, (IX) farmers and farm managers, (X) farm laborers and foreman, (XI) service workers except private household, (XII) private household, and (XIII) none or don't want to work.

Table 1. Continued

Variables	Description
Rosenberg Score	Individuals were to respond to specific types of questions about self-esteem in the 1980 survey such as "I am a person of worth". Responses were scored from 0 to 34 and grouped into 7 categories.
Number of Children Expected	Respondents were asked about the number of children they would like to have in the future.
Highest Grade Expected	Respondents were asked the highest grade they expect to attain in the future.
Short Run Work Expectation	Respondents were asked whether or not they would like to work in the next five years.
	*The previous individual characteristics data was collected in the first and second interviews when the respondents were 14 and 15 years old, creating an opportunity to control for early life characteristics.
Age at the First Illegal Activity Conviction	The minimum age for the first conviction was 9 years old while the maximum was 23. I divided the variable into 3 categories: whether or not the respondent was first convicted at or under the age of 18, above the age of 18, and the base category where the respondent was never convicted.
3-Cognitive Ability	
Test Scores	Test scores for 20 various courses were collected from high school transcripts. I calculated the standardized scores for each course to reduce variation across schools and regions.
Education Attainment	Dummy variables equal 1 when the respondent obtained a degree, such as high school, associate's degree, bachelor's degree, and a master's degree and up.
Age of High School Graduation	The age an respondent graduated from high school is represented by five binary variables: a binary for each group of age 15, 16, 17, 18, and 19.
4-Family Background	
Welfare Background	This variable investigates whether or not the respondent received welfare payment when he/she was at or less than 18 years old. Using welfare background as a covariate controls for the parents' financial status as data on the parents' income is unavailable. Also welfare background is expected to impact welfare participation in the future.
Language Spoken at Home	This variable looks at if another language other than English was spoken at home. The data includes four categories Spanish, French, German, and others.
Library Card	A dummy variable equals one if at the age of 14 any of the household members have had a library card.
Mother's Highest Grade	This variable looks at the mother's highest grade completed.
Number of Siblings	This variable is the number of siblings the respondent has.

Table 2. Summary Statistics for Welfare Recipients in Their Twenties and Thirties for the Full Sample and Across Gender

			N	Mean	Min	Max
Twenties	Full Sample		531	352.7	0	60,000
				(1,807.27)		
		Female	252	511.91	0	60,000
				(2,052.00)		
		Male	279	207.8	0	29,988
				(1,536.26)		
	Received Welfare		127	4,349.64	34	60,000
				(4,789.75)		
		Female	76	4,156.59	35	60,000
				(4,372.86)		
		Male	51	4,855.15	34	29,988
				(5,730.37)		
Thirties	Full Sample		531	198.02	0	23,100
				(1,155.95)		
		Female	252	285.29	0	23,100
				(1,396.82)		
		Male	279	118.04	0	14,088
				(871.67)		
	Received Welfare		78	3,911.15	60	23,100
				(3,450.95)		
		Female	46	4,011.76	140	23,100
				(3,542.02)		
		Male	32	3,705.31	60	14,088
				(3,266.96)		

NOTE.—N is the number of individuals. Received welfare restricts the observations to those that welfare received per year is greater than zero. Data is truncated at 60,000.

Table 3. Full-Time Work-Weeks, Work-Weeks, and High School Degree as a Function of Age

Age	Full-Time Weeks		Work-Weeks		High School	
	Male	Female	Male	Female	At Age	Accum.
14	11.13 (12.18)	8.12 (9.92)	12.06 (14.24)	9.00 (6.71)	0	0
15	8.84 (12.40)	6.51 (10.57)	15.61 (18.30)	14.25 (19.17)	1	1
16	14.10 (16.06)	10.24 (12.40)	21.38 (20.07)	19.27 (20.50)	34	35
17	17.74 (18.80)	14.22 (15.09)	23.47 (20.69)	21.36 (19.58)	35	70
18	24.92 (21.24)	19.25 (19.15)	28.00 (20.06)	24.86 (20.70)	167	237
19	31.09 (24.27)	25.32 (21.74)	32.09 (20.90)	30.43 (21.50)	37	274

NOTE.—Full-time weeks is the number of full-time work-weeks (40 hours) during the year. Work-weeks are the number of worked weeks reported by the respondent regardless the amount of worked hours per week. High school is the number of respondents who obtained the high school degree at a specific age. The numbers in parentheses are the standard errors.

Table 4. Welfare Outcome by Age, Gender, and Early Life Full-Time Work-Weeks

Age	Full-Time Work-Weeks	Percentage of Respondents		Percentage of Respondents Received Welfare in the Twenties		Percentage of Respondents Received Welfare in the Thirties		Welfare Receipts in the Twenties		Welfare Receipts in the Thirties	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
14	0	18.62	26.92	32	39	17	27	483.69	789.69	394.87	631.77
Years	1-10	39.47	40.50	20	36	14	17	227.53	906.54	187.14	516.87
Old	11-20	21.86	18.33	16	30	11	16	109.30	431.71	196.06	322.47
	>20	20.04	14.25	26	30	14	13	229.41	620.78	267.79	175.67
15	0	37.25	46.83	26	38	16	26	330.50	870.69	255.11	633.88
Years	1-10	31.38	27.83	19	38	14	15	257.30	871.23	231.77	407.89
Old	11-20	17.61	14.03	17	21	11	10	112.68	436.63	219.10	276.21
	>20	13.77	11.31	26	32	12	8	185.45	293.01	258.33	85.13
16	0	24.90	33.48	33	40	19	24	560.39	875.62	368.79	607.86
Years	1-10	25.71	29.19	17	38	16	19	159.45	958.50	186.70	537.65
Old	11-20	22.47	15.16	23	21	10	7	117.67	386.76	247.42	283.14
	>20	26.92	22.17	19	33	11	18	152.97	502.61	185.74	265.37
17	0	21.46	28.28	37	54	23	31	617.50	1369.50	359.80	844.37
Years	1-10	22.27	21.04	21	39	12	20	207.14	799.47	190.41	448.14
Old	11-20	20.85	20.36	17	22	13	11	145.28	330.77	231.01	207.34
	>20	35.43	30.32	18	22	11	11	103.28	386.25	205.85	271.27
18	0	14.78	21.27	33	61	23	39	519.50	1741.64	621.70	1153.50
Years	1-10	17.81	21.04	34	37	17	18	368.91	835.93	226.90	407.41
Old	11-20	15.99	17.65	18	28	8	9	127.65	366.59	115.57	243.04
	>20	51.42	40.05	17	23	12	12	166.77	309.90	174.30	215.10
19	0	13.77	16.52	31	66	21	38	550.39	2104.69	433.24	1077.12
Years	1-10	10.93	13.57	24	37	15	22	156.89	723.18	338.47	678.26
Old	11-20	12.75	16.29	25	32	13	13	489.09	712.27	330.45	527.82
	>20	62.55	53.62	20	26	13	14	149.34	338.54	163.21	217.32

NOTE.—Welfare receipts are the average amount of welfare payments a respondent received per year in his/her twenties/ thirties.

Table 5. Summary Statistics

	Full Sample	Female	Male
Welfare When Under 18	0.0976	0.1722	0.0279
	(0.2968)	(0.3777)	(0.1647)
High School	0.9420	0.9432	0.9408
	(0.2338)	(0.2313)	(0.2359)
Associate Degree	0.3770	0.4179	0.3388
	(0.4847)	(0.4933)	(0.4734)
Bachelor Degree	0.2388	0.2578)	0.2210)
	(0.4264)	(0.4375)	(0.4150)
Graduate Degree	0.0675	0.0795	0.0563
	(0.2509)	(0.2706)	(0.2306)
Female	0.4829		
	(0.4998)		
Black	0.2344	0.2674	0.2035
	(0.4237)	(0.4428)	(0.4027)
Hispanic	0.1488	0.1352	0.1613
	(0.3559)	(0.3421)	(0.3679)
West	0.2116	0.1914	0.2304
	(0.4085	(0.3935)	(0.4212)
South	0.3489	0.3733	0.3260
	(0.4767)	(0.4838)	(0.4688)
Northcentral	0.3046	0.3059	0.3033
	(0.4603)	(0.4609)	(0.4598)
Northeast	0.1348	0.1291	0.1401
	(0.3416)	(0.3355)	(0.3471)
Urban	0.7670	0.7477	0.7851
	(0.4228)	(0.4344)	(0.4108)
U.S Born	0.9625	0.9807	0.9455
	(0.1899)	(0.1374)	(0.2269)
U.S Citizen	0.9667	0.9853	0.9493
	(0.1794)	(0.1203)	(0.2193)
Number of Children	0.5862	0.7624	0.4216
	(0.9153)	(0.9843)	(0.8122)
Number of Siblings	3.3350	3.5290	3.1530
	(2.4400)	(2.7870)	(2.0485)
Mother Highest Grade	11.2780	11.1020	11.4421
	(2.8990)	(3.0167)	(2.7763)
N	4087	1974	2113

Table 6. Regression Estimates of Full-Time Work-weeks (40hours) on Average Welfare Payment per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment per Year		(a)	(b)	(c)	(d)	(e)
Twenties						
Full Sample	*hours*	-68.3558	-58.6211	-44.2292	-45.0772	-42.9963
		(10.5749)	(10.4829)	(10.1244)	(12.9799)	(13.1585)
	$hours^2$	1.0280	0.9348	0.6293	0.6632	0.6272
		(0.2260)	(0.2212)	(0.2144)	(0.2773)	(0.2801)
	$p-value$	[0.0000]	[0.0000]	[0.0000]	[0.0001]	[0.0004]
	R^2	0.0291	0.0519	0.1729	0.1520	0.1494
Female	*hours*	-100.1209	-81.5963	-49.0231	-38.3641	-45.4919
		(21.5695)	(21.2898)	(19.5555)	(22.8187)	(22.6453)
	$hours^2$	1.6757	1.4237	0.9412	0.6916	0.8596
		(0.5548)	(0.5392)	(0.4952)	(0.5546)	(0.5475)
	$p-value$	[0.0000]	[0.0000]	[0.0178]	[0.1511]	[0.0848]
	R^2	0.0419	0.0808	0.2349	0.2092	0.1981
Male	*hours*	-36.3653	-36.8344	-43.1350	-55.0735	-46.7770
		(11.4530)	(11.2870)	(12.4672)	(17.6242)	(18.4823)
	$hours^2$	0.5553	0.5626	0.5809	0.7947	0.6642
		(0.2230)	(0.2181)	(0.2437)	(0.3545)	(0.3711)
	$p-value$	[0.0023]	[0.0018]	[0.0001]	[0.0009]	[0.0086]
	R^2	0.0095	0.0146	0.1014	0.1428	0.1583
Thirties						
Full Sample	*hours*	-50.6895	-41.9259	-39.1989	-28.1870	-29.0800
		(8.4111)	(8.2820)	(9.4026)	(11.1135)	(11.0279)
	$hours^2$	0.8729	0.7755	0.7728	0.4971	0.4819
		(0.1799)	(0.1749)	(0.1994)	(0.2372)	(0.2343)
	$p-value$	[0.0000]	[0.0000]	[0.0002]	[0.0301]	[0.0161]
	R^2	0.0193	0.0372	0.0931	0.0967	0.0967
Female	*hours*	-82.1335	-63.0385	-53.9839	-43.5918	-56.0253
		(17.9313)	(16.6806)	(19.9777)	(20.5263)	(21.5320)
	$hours^2$	1.5814	1.3028	1.1731	0.9915	1.2531
		(0.4610)	(0.4224)	(0.5070)	(0.5017)	(0.5245)
	$p-value$	[0.0000]	[0.0003]	[0.0208]	[0.1047]	[0.0333]
	R^2	0.0280	0.0613	0.1290	0.1455	0.1507
Male	*hours*	-26.1262	-24.4020	-29.4695	-14.0355	-7.6305
		(8.4133)	(8.5478)	(9.3878)	(10.4043)	(9.1285)
	$hours^2$	0.4761	0.4528	0.5657	0.1646	0.0239
		(0.1641)	(0.1654)	(0.1831)	(0.2074)	(0.1812)
	$p-value$	[0.0080]	[0.0168]	[0.0067]	[0.1590]	[0.1140]
	R^2	0.0086	0.0122	0.1001	0.2037	0.2230

NOTES.—Model (a) only includes the average full-time work-weeks that respondents worked per year. Model (b) includes demographics. Model (c) includes individual characteristics variables. Model (d) includes cognitive ability variables.Model (e) includes all the previous variables plus variables representing family background. $P-value$ is obtained by testing the hypothesis that *hours* and $hours^2$are jointly equal zero using F-test. N=531. The numbers in parentheses are the standard errors.

Table 7. Regression Estimates of Full-Time Work-Weeks by Age/High School Grade on Average Welfare Payments per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment per Year		17 Years Old	18 Years Old	19 Years Old	Sophomore	Junior	Senior	Senior-c
Twenties								
Full Sample	*hours*	-17.0948	-21.1772	-17.5412	-3.4258	-6.2540	-6.4340	-8.0609
		(7.5412)	(7.7840)	(5.5751)	(6.4834)	(8.1586)	(3.2144)	(4.0708)
	$hours^2$	0.1809	0.1984	0.1320	-0.0034	0.1505	0.0117	0.0187
		(0.1233)	(0.1237)	(0.0676)	(0.0856)	(0.1661)	(0.0188)	(0.0204)
	$p-value$	[0.0324]	[0.0005]	[0.0008]	[0.5898]	[0.6552]	[0.0399]	[0.0743]
	R^2	0.1438	0.1490	0.1479	0.1353	0.1253	0.1390	0.1330
Female	*hours*	-16.1356	-24.9743	-12.3196	-25.9908	-18.1346	-11.9323	-9.9514
		(15.3355)	(11.8877)	(8.6878)	(14.8026)	(18.3794)	(6.4890)	(8.3960)
	$hours^2$	0.1849	0.3070	0.1033	0.3085	0.4110	0.0281	0.0235
		(0.3209)	(0.2022)	(0.0998)	(0.2410)	(0.4180)	(0.0302)	(0.0349)
	$p-value$	[0.2854]	[0.0521]	[0.3228]	[0.1960]	[0.6043]	[0.0935]	[0.3757]
	R^2	0.1952	0.1995	0.1946	0.1972	0.1828	0.2027	0.1883
Male	*hours*	-20.8084	-20.8226	-25.4778	-1.0724	-0.6591	-4.0101	-6.3045
		(10.3385)	(11.3257)	(8.2400)	(5.2055)	(6.3680)	(4.2600)	(6.3377)
	$hours^2$	0.2028	0.2008	0.2298	-0.0124	0.0127	0.0367	0.0600
		(0.1534)	(0.1747)	(0.1027)	(0.0623)	(0.1217)	(0.0585)	(0.1079)
	$p-value$	[0.0638]	[0.0332]	[0.0024]	[0.7544]	[0.9944]	[0.5585]	[0.4293]
	R^2	0.1530	0.1542	0.1626	0.0709	0.0727	0.0735	0.0759
Thirties								
Full Sample	*hours*	-0.6053	-6.8676	-4.6863	-6.4996	-5.9929	-4.8590	-7.3447
		(6.2637)	(6.5540)	(4.6621)	(6.6822)	(8.6124)	(3.3370)	(4.2288)
	$hours^2$	-0.0327	0.0301	0.0098	0.0459	0.1434	0.0099	0.0185
		(0.1025)	(0.1039)	(0.0570)	(0.0874)	(0.1753)	(0.0196)	(0.0212)
	$p-value$	[0.6469]	[0.0722]	[0.1386]	[0.5400]	[0.7093]	[0.2006]	[0.1506]
	R^2	0.0907	0.0952	0.0932	0.0969	0.1039	0.1097	0.1087
Female	*hours*	3.2720	-11.6771	-5.7711	-25.8675	-12.1639	-5.0855	-6.4443
		(14.3569)	(11.3593)	(8.1688)	(14.0059)	(17.6600)	(6.1354)	(7.8534)
	$hours^2$	-0.0980	0.0905	0.0356	0.3551	0.2371	0.0103	0.0199
		(0.3017)	(0.1943)	(0.0942)	(0.2380)	(0.4055)	(0.0288)	(0.0329)
	$p-value$	[0.9256]	[0.2304]	[0.6732]	[0.1809]	[0.7811]	[0.5820]	[0.6956]
	R^2	0.1418	0.1460	0.1419	0.1695	0.1729	0.1849	0.1808
Male	*hours*	1.5915	-2.3020	-4.9327	4.8131	-2.5807	-1.2337	-1.1619
		(5.0773)	(5.6510)	(4.0493)	(4.8921)	(6.0710)	(4.1147)	(5.9935)
	$hours^2$	-0.0898	-0.0163	0.0214	-0.0880	0.0651	-0.0044	-0.0212
		(0.0750)	(0.0864)	(0.0507)	(0.0578)	(0.1157)	(0.0557)	(0.1018)
	$p-value$	[0.0890]	[0.1892]	[0.1032]	[0.2600]	[0.8308]	[0.6819]	[0.6383]
	R^2	0.2229	0.2221	0.2245	0.1366	0.1232	0.1359	0.1226

NOTE.—Worked hours are identified by age. OLS is a full model where demographic, individual characteristics, cognitive ability, and family background are included. Senior-c displays senior year's coefficient in a full model after controlling for hours worked in the sophomore and junior year.

Table 8. Probit Estimates of the Probability of Receiving Welfare in the Twenties/ Thirties in Response to the Number of Full-Time Work-Weeks Worked in Early Life

Probability of Receiving Welfare in the Twenties/ Thirties		Full-Time Work-Weeks 14 to 19 Years Old	Full-Time Work-Weeks 17 Years Old	Full-Time Work-Weeks 18 Years Old	Full-Time Work-Weeks 19 Years Old
Twenties					
Full Sample	*hours*	-0.0373	-0.0298	-0.0089	-0.0148
		(0.0215)	(0.0120)	(0.0142)	(0.0105)
	$hours^2$	0.0003	0.0003	-0.0001	0.0000
		(0.0005)	(0.0002)	(0.0003)	(0.0002)
	$p-value$	[0.0109]	[0.0258]	[0.0084]	[0.0038]
	dy/dx	-0.0262	-0.0188	-0.0136	-0.0140
Female	*hours*	-0.0155	-0.0225	0.0024	-0.0102
		(0.0397)	(0.0248)	(0.0229)	(0.0164)
	$hours^2$	0.0001	0.0002	-0.0002	0.0000
		(0.0011)	(0.0006)	(0.0004)	(0.0002)
	$p-value$	[0.6744]	[0.2988]	[0.4598]	[0.3841]
	dy/dx	-0.0125	-0.0163	-0.0071	-0.0101
Male	*hours*	-0.0441	-0.0253	-0.0279	-0.0252
		(0.0280)	(0.0152)	(0.0186)	(0.0159)
	$hours^2$	0.0001	0.0001	0.0002	0.0001
		(0.0006)	(0.0002)	(0.0003)	(0.0003)
	$p-value$	[0.0005]	[0.0330]	[0.0127]	[0.0002]
	dy/dx	-0.0418	-0.0209	-0.0190	-0.0218
Thirties					
Full Sample	*hours*	-0.1124	-0.0374	-0.0158	0.0041
		(0.0360)	(0.0218)	(0.0222)	(0.0205)
	$hours^2$	0.0020	0.0003	0.0000	-0.0002
		(0.0008)	(0.0004)	(0.0004)	(0.0003)
	$p-value$	[0.0037]	[0.0667]	[0.0870]	[0.3122]
	dy/dx	-0.0467	-0.0261	-0.0168	-0.0089
Female	*hours*	-0.1755	-0.0285	-0.0152	-0.0086
		(0.0575)	(0.0395)	(0.0366)	(0.0351)
	$hours^2$	0.0041	0.0003	-0.0001	0.0000
		(0.0013)	(0.0008)	(0.0007)	(0.0006)
	$p-value$	[0.0079]	[0.4717]	[0.2286]	[0.7397]
	dy/dx	-0.0559	-0.0208	-0.0214	-0.0099
Male	*hours*	-0.0152	0.0106	0.0207	0.0215
		(0.0506)	(0.0010)	(0.0318)	(0.0246)
	$hours^2$	-0.0007	-0.0001	-0.0003	-0.0005
		(0.0012)	(0.0002)	(0.0005)	(0.0004)
	$p-value$	[0.0437]	[0.2174]	[0.7797]	[0.1287]
	dy/dx	-0.0409	-0.0036	0.0028	-0.0155

NOTES.—The dependent variable is dichotomous. In the case of estimating the impact on the twenties, this variable equals 1 for each year the respondent received welfare and zero otherwise. In the case of estimating the impact on the thirties, this variable equals 1 for each year the respondent received welfare and zero otherwise. dy/dx is the marginal effect at the mean. Models are fully specified as in model (e) in Table 6.

Table 9. Regression Estimates of Full-Time Work-Weeks (40hours) by Age/ High School Grade on Welfare/Food Stamps/AFDC Payments per Year in the Twenties

Welfare Payment in the Twenties per Year		Welfare		Food Stamps		AFDC	
		OLS	Heckman Selection	OLS	Heckman Selection	OLS	Heckman Selection
14-19 Years Old	*hours*	-42.9***	-62.4***	-9.63**	-21.8***	-3.3845	-9.51**
		(13.1590)	(14.5890)	(3.8746)	(4.5836)	(8.4030)	(8.3854)
	$hours^2$	0.6272	0.8475	0.1425	0.2737	-0.0170	-0.1452
		(0.2801)	(0.2820)	(0.0825)	(0.0840)	(0.1784)	(0.2000)
	IMR		432.41**		240.4***		290.69**
			(177.3520)		(63.7261)		(141.6901)
Senior	*hours*	-6.43**	-4.4***	-2.35**	-3.4***	-4.1435	-1.2795
		(3.2144)	(3.3777)	(1.1182)	(1.1983)	(2.7269)	(4.6693)
	$hours^2$	0.0117	-0.1263	0.0054	-0.0406	0.0068	-0.0624
		(0.0188)	(0.0474)	(0.0065)	(0.0120)	(0.0159)	(0.0930)
	IMR		482.6***		275.7***		41.5527
			(153.3543)		(59.7067)		(71.9973)
Junior	*hours*	-6.2540	-18.976*	-2.9633	-19.5***	-1.6287	-4.5889
			(9.0950)	(2.7994)	(4.1881)	(6.9919)	(7.2345)
	$hours^2$	(8.1586)	0.4337	0.0403	0.3761	0.1109	0.1706
		0.1505	(0.1867)	(0.0570)	(0.0851)	(0.1423)	(0.1474)
	IMR	[0.6552]	524.4***		437.6***		23.6700
			(179.5260)		(82.3274)		(72.4975)
Sophomore	*hours*	-3.4258	-6.5461	-2.1583	-3.416*	-3.4959	-4.7624
		(6.4834)	(6.9155)	(2.2251)	(2.3948)	(5.5331)	(5.7449)
	$hours^2$	-0.0034	-0.0039	0.0111	0.0092	-0.0035	-0.0047
		(0.0856)	(0.0883)	(0.0294)	(0.0306)	(0.0730)	(0.0732)
	IMR		114.1031		49.4323		16.3275
			(101.6221)		(37.2034)		(73.7372)
19 Years Old	*hours*	-17.5***	-24.0***	-4.93**	-9.3***	-1.7676	-6.4609
		(5.5751)	(6.0898)	(2.1202)	(1.9097)	(4.5954)	(4.4902)
	$hours^2$	0.1320	0.1510	0.0488	0.0617	-0.0029	-0.0007
		(0.0676)	(0.0661)	(0.0318)	(0.0197)	(0.0689)	(0.0426)
	IMR		393.92**		230.9***		184.8928
			(178.2812)		(63.8305)		(135.5090)
18 Years Old	*hours*	-21.2***	-28.4***	-4.681*	-7.5***	-9.3736	-11.21**
		(7.7840)	(7.9781)	(2.9743)	(2.3955)	(6.4270)	(5.3080)
	$hours^2$	0.1984	0.1965	0.0537	0.0262	0.1129	0.0721
		(0.1237)	(0.1233)	(0.0518)	(0.0363)	(0.1120)	(0.0777)
	IMR		500.8***		246.1***		223.8787
			(186.9230)		(65.2282)		(135.0490)
17 Years Old	*hours*	-17.09**	-22.89**	-3.1004	-7.26**	-4.4553	-10.7026
		(7.5412)	(8.6510)	(2.6215)	(2.8464)	(5.6641)	(6.1889)
	$hours^2$	0.1809	0.2364	0.0320	0.0670	0.0452	0.0905
		(0.1233)	(0.1282)	(0.0460)	(0.0396)	(0.0992)	(0.0842)
	IMR		303.852*		147.36**		206.2648
			(173.3541)		(60.4510)		(137.4180)

NOTES.—* indicates that $p < 0.10$, ** $p < 0.05$, and that *** $p < 0.01$. Inverse Mill Ratio from the first regression was used as a covariate in the second regression in the Heckman selection model. IMR is the inverse Mills ratio coefficient resulted from the second regression. Models are fully specified, as in model (e) in Table 6, excluding the three predictor variables and including the inverse Mills ratio in the case of the Heckman selection model.

Table 10. Test the Validity of The IVs. Regression Estimates of Full-Time Work-Weeks on the IVs (First Stage Relevance Test) and the Residual of the Main Model on the IVs (Exogeneity Test)

		First Stage	Second Stage
Dependent Variable		Full-Time Work-Weeks	Residual of the Main Equation
Expected Work	Married/ Raising Family	-0.8758***	20.8040
		(0.2205)	(88.9344)
	Other	0.2345***	11.7971
		(0.3664)	(157.1391)
Mother Lives in the House		0.7219***	52.1638
		(0.2727)	(117.1025)
Weeks out of the Labor Force	*Weeks*	-1.1135***	-11.4185
		(0.0165)	(7.0464)
	$Weeks^2$	0.0098***	0.1897
		(0.0004)	(0.1686)
F-stat		4372.00	1.04

NOTES.—* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Expected work is a categorical covariates, the base group is that someone responded that he/she preferred to work at the age of 35. F-stat and P-value are reported as a joint statistical test for the instruments.

Table 11. Regression Estimates of Full-Time Work-Weeks on Welfare Payments per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment in the Twenties / Thirties per Year		OLS	Treatment Effect	IV
Twenties				
Full Sample	*hours*	-42.9***	-62.4***	-35.84**
		(13.1590)	(14.5987)	(14.6317)
	$hours^2$	0.6272	0.8475	0.6819
		(0.2801)	(0.2820)	(0.3353)
	R^2/IMR	0.1494	432.36**	
			(177.3508)	
Female	*hours*	-45.492*	-44.06**	-50.18**
		(22.6453)	(22.8989)	(25.9995)
	$hours^2$	0.8596	0.7390	1.0261
		(0.5475)	(0.5608)	(0.6665)
	R^2/IMR	0.1981	169.41 **	
			(131.5076)	
Male	*hours*	-46.8***	-61.9***	-23.8224
		(18.4823)	(17.0324)	(19.3572)
	$hours^2$	0.6642	0.6343	0.4380
		(0.3711)	(0.3224)	(0.4265)
	R^2/IMR	0.1583	395.2***	
			(133.4595)	
Thirties				
Full Sample	*hours*	-29.08**	-19.5643	-38.6***
		(11.0279)	(11.9187)	(15.8312)
	$hours^2$	0.4819	0.3280	0.7609
		(0.2343)	(0.2495)	(0.3534)
	IMR/R^2	0.0967	-102.79 **	
			(44.9666)	
Female	*hours*	-56.03**	-38.3418	-64.99**
		(21.5320)	(23.1197)	(30.3430)
	$hours^2$	1.2531	0.8853	1.4810
		(0.5245)	(0.5598)	(0.7668)
	R^2/IMR	0.1507	-94.18**	
			(48.8659)	
Male	*hours*	-7.6305	-6.0263	-12.1***
		(9.1285)	(4.6195)	(14.1391)
	$hours^2$	0.0239	0.1217	0.1337
		(0.1812)	(0.1623)	(0.2832)
	R^2/IMR	0.2230	-122.99**	
		-7.6305	(50.5753)	

NOTES.—IV variables include two categorical variables for 1) expected work and 2) Whether or not the mother lived in the household in the early life of the respondent for every year from the age of 14 to 19. The third variable is the number of weeks spent out of the labor force in the particular year.

Table 12. Estimates in Dollars of Full-Time Work-Weeks on Welfare Payments per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment in the Twenties / Thirties per Year	OLS	Treatment Effect	IV
Twenties			
Full sample	-$22.30***	-$34.47***	-$13.33**
Female	-$20.05*	-$22.19*	-$19.81*
Male	-$22.87***	-$39.12***	-$8.05
Thirties			
Full sample	-$13.18***	-$8.74	-$13.47***
Female	-$18.93***	-$12.14	-$21.15***
Male	-$6.77	-$1.65	-$7.27***

NOTES.—* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13. Regression Estimates of Work-Weeks on Average Welfare Payments per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment / Year		Work-Weeks from 14 to 19 Years Old	Work-Weeks 17 Years Old	Work-Weeks 18 Years Old	Work-Weeks 19 Years Old	Probability Estimates
Twenties						
Full Sample	*weeks*	-37.23**	-17.49**	-27.9***	-21.3***	-0.001**
		(18.7517)	(8.9423)	(10.0365)	(7.2131)	(0.0302)
	$weeks^2$	0.7130	0.2146	0.3499	0.1984	-0.0008
		(0.5394)	(0.1569)	(0.1750)	(0.1083)	(0.0009)
	$R^2 - dy/dx$	0.1460	0.1433	0.1504	0.1503	-0.0252
Female	*weeks*	-3.4266	-14.0654	-39.89**	-14.3386	0.0279
		(28.2688)	(15.6490)	(16.2313)	(9.8962)	(0.0486)
	$weeks^2$	-0.2058	0.1848	0.6210	0.1212	-0.0013
		(0.8188)	(0.2996)	(0.2855)	(0.1300)	(0.0015)
	$R^2 - dy/dx$	0.1973	0.1941	0.2039	0.1977	-0.0105
Male	*weeks*	-61.63**	-22.46**	-20.95**	-51.4***	-0.01***
		(26.8740)	(12.4517)	(13.8832)	(16.5858)	(0.0379)
	$weeks^2$	1.2897	0.2291	0.1996	0.7055	-0.0011
		(0.7660)	(0.2062)	(0.2408)	(0.2871)	(0.0012)
	$R^2 - dy/dx$	0.1580	0.1555	0.1567	0.1695	-0.0432
Thirties						
Full Sample	*weeks*	-29.542*	2.2771	-15.161*	-4.8078	-0.1***
		(15.8075)	(7.4678)	(8.4419)	(6.0389)	(0.0505)
	$weeks^2$	0.5993	-0.0714	0.1909	0.0208	0.0024
		(0.4524)	(0.1309)	(0.1470)	(0.0908)	(0.0016)
	$R^2 - dy/dx$	0.0959	0.0907	0.0967	0.0933	-0.0613
Female	*weeks*	-48.7614	-7.3106	-23.7272	-4.1828	-0.0089
		26.7521	14.6621	15.7413	9.3908	(0.0480)
	$weeks^2$	1.1515	0.1659	0.3274	0.0395	0.0200
		(0.7784)	(0.2815)	(0.2771)	(0.1234)	(0.0140)
	$R^2 - dy/dx$	0.1484	0.1428	0.1488	0.1435	-0.0312
Male	*weeks*	-13.9050	5.95**	-2.9344	-15.53**	-0.021*
		(13.6035)	(6.1209)	(6.9793)	(8.2816)	(0.0026)
	$weeks^2$	0.1836	-0.1778	-0.0192	0.2066	0.0011
		(0.3846)	(0.1009)	(0.1205)	(0.1441)	(0.0074)
	$R^2 - dy/dx$	0.2230	0.2270	0.2245	0.2293	-0.0178

NOTES.—* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. dy/dx is the marginal effect at the mean. Models are fully specified as in model (e) in Table 6.

Table 14. OLS/Probit Estimates of Full-Time Work-Weeks on Welfare Payments per Year in the Twenties/Thirties of the Respondent's Life

Welfare Payment/ Probability	Welfare Payment		Probability of Receiving Welfare	
	Payment	Percentage	Percentage Points	Percentage
Twenties				
Full Sample	-$22.30***	-6.3%	-2.6***	-10.8%
Female	-$20.05*	-3.9%	-1.25	-4.1%
Male	-$22.87***	-11.0%	-4.1***	-22.4%
Thirties				
Full Sample	-$13.18***	-6.5%	-4.7***	-32.0%
Female	-$18.93***	-6.6%	-5.6***	-30.8%
Male	-$6.77	-5.7%	-4.1**	-35.6%

NOTES.—* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

APPENDIX B: FIGURES

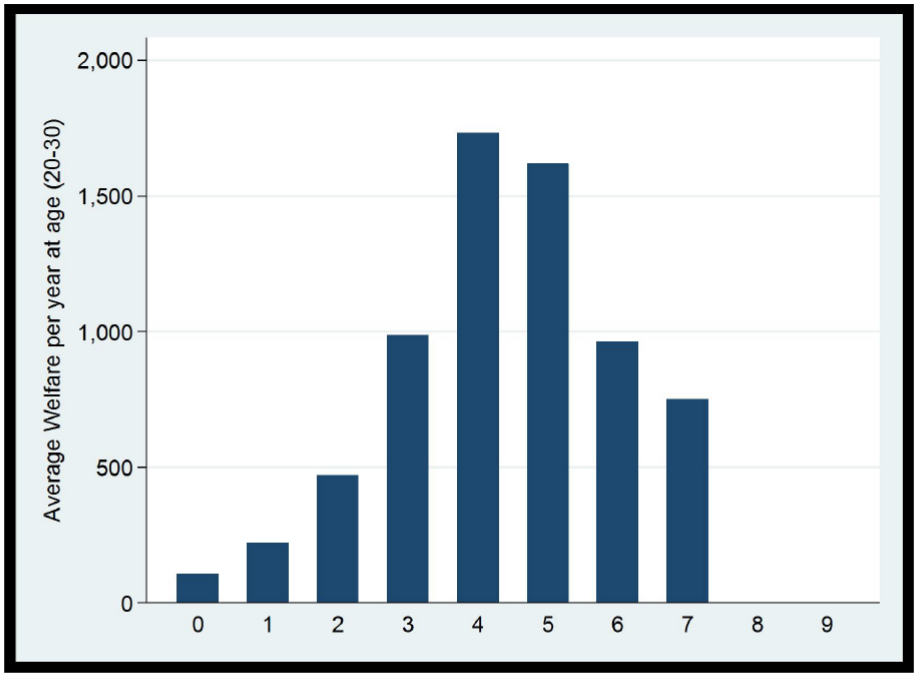

FIG. 1.—The Average Welfare Received per Year at Age 20 To 30 on the Number of Children.

Figure 1 shows the distribution of the average welfare amount received per year in the twenties by the number of children in the family. The amount of welfare receipts is positively correlated with the number of children in the family.

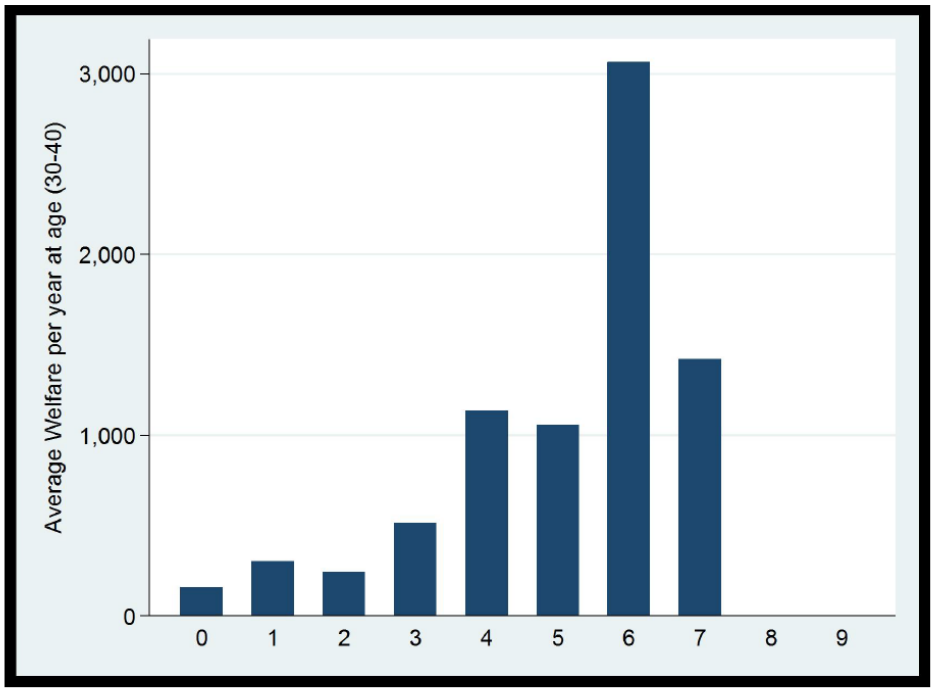

FIG. 2.—The Average Welfare Received per Year at Age 30 To 40 on the Number of Children.

Figure 2 shows the distribution of the average welfare amount received per year in the thirties by the number of children in the family. The amount of welfare receipts is positively correlated with the number of children in the family.

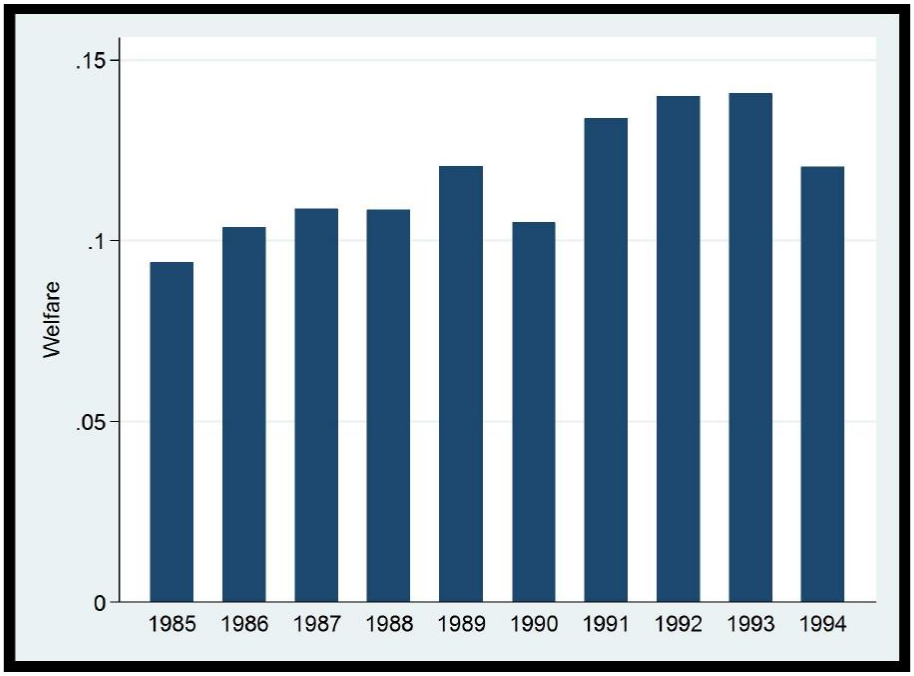

FIG. 3.—Probability of Receiving Welfare in the Twenties.

Figure 3 shows that more people in the sample received welfare in their twenties than in their thirties (Fig. 4). Figure 3 shows that the probability of receiving welfare in the second half of the twenties is higher than the first half.

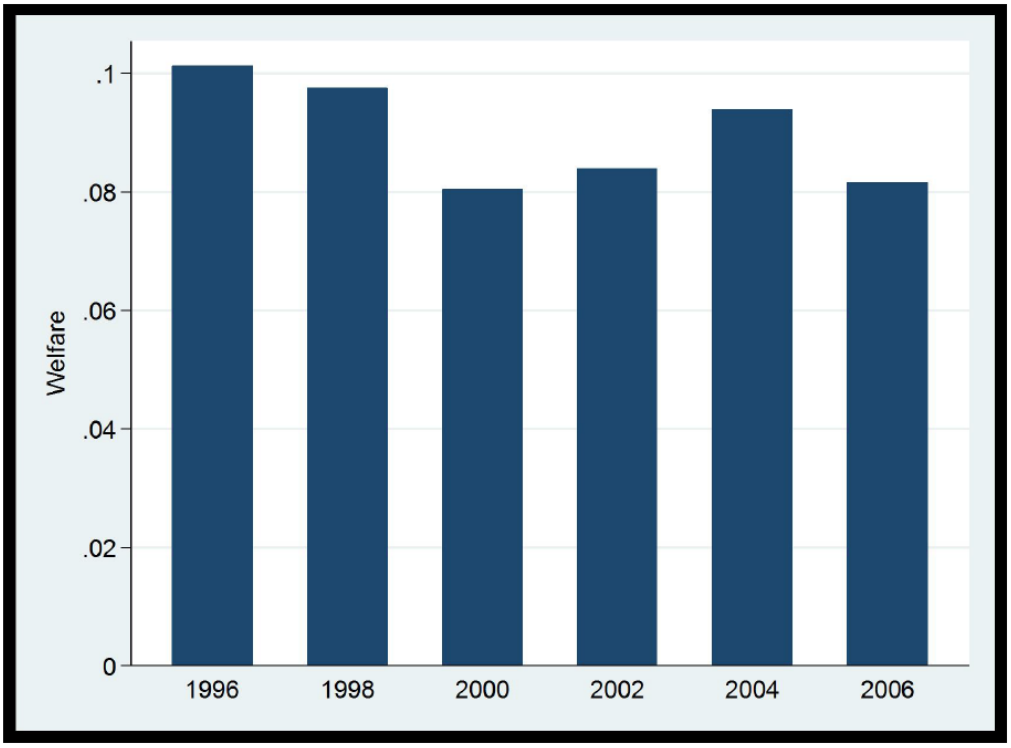

FIG. 4.—Probability of Receiving Welfare in the Thirties.

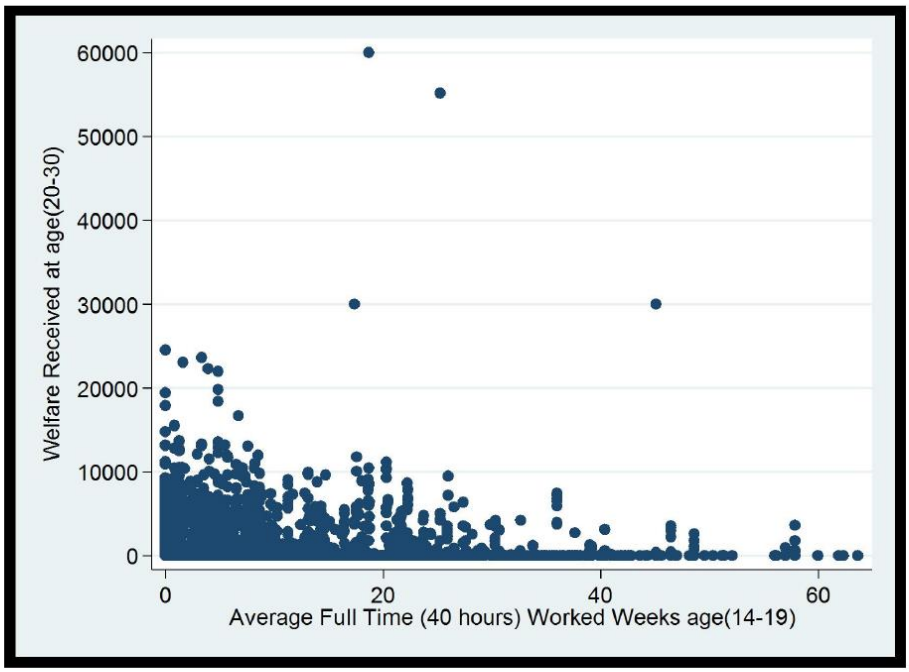

FIG. 5.—Welfare Received in the Twenties Against the Average Full-Time Work-Weeks in Early Life (Age 14-19).

Figure 5 shows respondents who worked more hours in their early life received less welfare payment in their twenties.

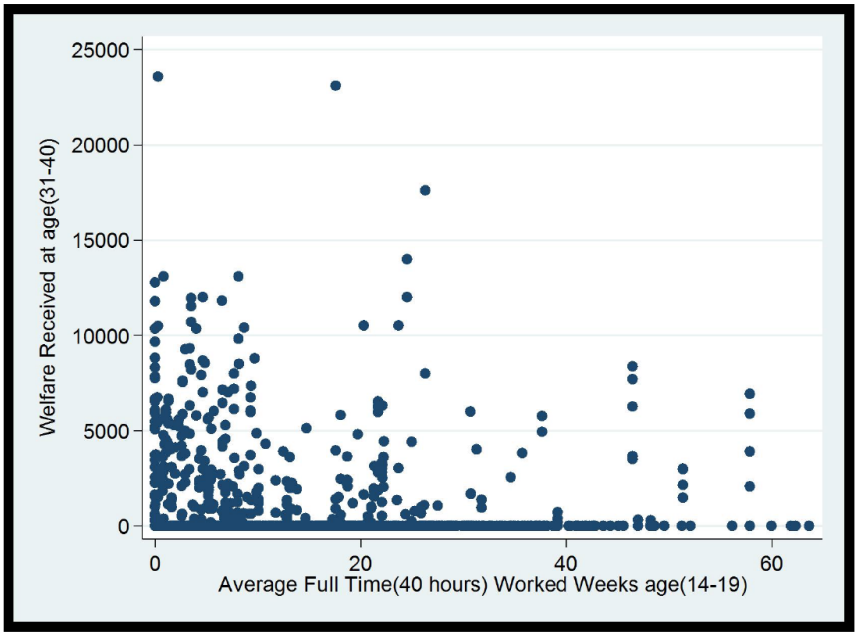

FIG. 6.—Welfare Received in the Thirties Against the Average Full-Time Work-Weeks in Early Life (Age 14-19).

Figure 6 shows respondents who worked more hours in their early life received less welfare payment in their thirties.

CHAPTER II

FERTILITY AND ECONOMIC INSECURITY: DOES INCOME VOLATILITY IMPACT THE DECISION TO RAISE AN ONLY CHILD?

1. Introduction

The fall in fertility rate in the United States (1.87) below the replacement rate (2.1) projects a demographic risk and an increasing social security deficit.[1] This decline in fertility in the last four decades in the United States is associated with an increase in the percentage of women with no children and women with one child by 50% and 80%, respectively. According to Pew Research Center, 18% of the women that are in the end of their childbearing years (between the ages of 40 to 44) have only one child. However, women usually desire more kids than they actually have. According to the General Social Survey 2006-2008, 40% of U.S. women nearing the end of their childbearing years have fewer children than what they had predicted.

Fertility has increasingly become an individual decision since the development and the spread of knowledge of contraceptives in the last century. Becker et al. (1999) articulate in their model that parents pursue their goal of maximizing their family utility by

[1] According to the Social Security Office of Retirement and Disability Policy (ORDP), in 2035, there will only be enough taxes to pay for 75 percent of scheduled benefits. The ORDP attributes this imbalance to the drop in the birth rate from 3 to 2 children per woman rather than increasing lifespans.

simultaneously choosing their number of children and their investment in the human capital of each child, taking into consideration factors such as female labor force participation, real wage, and adult and child mortality. Previous research gives attention to the negative impact of economic insecurity on the individual decision of family size. Bernardi et al. (2008) outline the insecurity hypothesis, which states that work-related economic uncertainty perceived by the individual stimulates postponement of long-term commitments, including parenthood. That was the case in East Germany (Conrad et al., 1996), Central and Eastern Europe (Ranjan, 1999), Russia (Perelli-Harris, 2006), and the 27 European countries (Hondroyiannis, 2010). Most recently, the decrease in fertility due to the great recession was brought about not only by economic hardship, but also by economic uncertainty (Schneider, 2015).

Despite the fact that the aggregate economy has been stabilizing in recent decades, income volatility has been rising on the level of households and firms. Rapid change in technology, the spread of globalization, the increase in the market behavior of creative destruction, the decline of unionization, a trend of cost cutting including pension reduction, and the increase of welfare reform have shifted economic risks from institutions, such as corporations and governments, to individuals. Outsourced jobs with payment for defined tasks have replaced full-time jobs which last until retirement and include health insurance and employer-supported pension. As a consequence, workers report rising perceived job insecurity (Schmidt, 1999), the standard deviation of transitory earnings almost doubled between the early 1970s and early 2000s (Gottschalk and Moffitt, 2006), and individual labor earnings have become more volatile (Dynarski and Gruber, 1997; Haider, 2001).

I argue that fluctuations in the family income generate uncertainties about present and future earnings and induce doubts about the future economic position. This creates economic insecurity, which will increase the likelihood of having a one-child family as responsible women will only choose to have children when they are able to support them in the current income situation and in the future.

Using longitudinal data from the Panel Study of Income Dynamics (PSID) that runs from 1968 to 2013, this study extends the literature by empirically examining the proposition that fertility is a function of economic uncertainty generated by individual-level factors such as individual income volatility. It sheds light on the economic factors behind the rise of only-child families and suggests the need for policies that reduce income volatility to stimulate fertility for families that tend to have one child. The study looks at actual fertility rather than desired fertility and utilizes the shift from having one child to two children as an indicator of the change in fertility. The shift from one to two children gives insight on the decision to have more children as the marginal loss in utility is expected to be higher for sacrificing the second child than the third or the fourth. Moreover, focusing on the shift from one to two children minimizes the unobservable characteristics that arise from including people who tend to have a higher number of children. Women that have one child and two children by the end of their child bearing period are of much interest regarding fertility as they comprise 18% and 35% of all women in the United States, respectively.

The study separates the impact of economic uncertainty represented by the absolute individual-income volatility from that of economic hardship represented by downward volatility. Absolute income volatility is calculated as the standard deviation of income,

while downward volatility is calculated as the frequency of negative income change. An increase of $1,000 in the income standard deviation is associated with a decrease of 26 percentage points in the probability of having the second child for mothers who are in the second quartile. These mothers are more likely to collect tax benefits when having the second child, which mitigates the loss in income. However, mothers in the lower and higher tail of income distribution are more likely to refrain from having their second child in response to negative income shocks if they already experience high absolute income changes. This is mostly attributed to a lower marginal tax benefit that the second child would bring for mothers in these income categories, as mothers in the lower tail already maximized their benefits while mothers in the higher tail are far from being eligible for such benefits.

Section 2 briefly provides a literature review. Section 3 discusses the data and summary statistics, and presents the identification strategy and the econometric model. Section 4 interprets the regression estimates, while section 5 checks for robustness of the baseline results. Finally, Section 6 provides the conclusions.

2. Background

The relationship between income and family size has been subject to research since Becker (1960), contradictory to what he hypothesized, found a negative impact of income on fertility. The implication that children are inferior goods was strongly opposed by researchers. In an attempt to explain this perplexing income-fertility relationship, Becker

(1960), Becker and Lewis (1973), and Willis (1974) suggest a trade-off between quality and quantity in the fertility decision. As income increases, parents tend to demand high-quality children, which in turn places pressure on quantity and reduces the number of children in the family. However, a positive income elasticity for the number of children would appear if child quality were to remain constant by being statistically controlled (Becker and Lewis, 1973). Borg (1989), working on a sample of 1,355 married women aged 15-49 in a cross-sectional survey across Korea (Korean Institute for Population and Health, 1977), finds a significant positive effect of income on the total family size when the reduced form model includes controls that represent the quality of children desired by the family, such as the expected cost of education and the wife's level of education and her labor force participation. Easterlin (1976) looks at the economic conditions relative to what the younger cohort experienced in their parents' household. He suggests that fertility responds positively to how the couple's level of affluence relates to their parents'.

Income is intricately associated with many factors that affect fertility; for example, education increases the tendency toward smaller families and the awareness of family planning methods. It is well known that rich families use contraception at earlier ages and with more frequency than poor families, yet it is ambiguous whether this is a result of lack of knowledge about contraceptives or a desire to have more kids. Becker (1960) finds a significant impact of contraceptive knowledge on the income-fertility relationship. As income increases, the knowledge about contraceptives increases which negatively affects the family size and allows the quality of children to rise. Nevertheless, Borg (1989) finds a negligible impact for the supply side (birth control, miscarriage, and child death) relative to the impact of the net price of a child.

Economic uncertainty is increasing on the individual level despite the increasing stability in the aggregate U.S economy. The great reduction in the volatility of the GDP growth rate in recent decades caused some authors to label the period from the mid-1980s to 2006 as "the great moderation." However, Americans are increasingly worried about their economic outlook. Gosselin (2008), using data from a survey conducted by the International Survey Research Corporation, documents that, despite the recession in 1982, only 12 % of the respondents were worried about being laid off, while that number surged to 46% in 1998 at the top of the business cycle and 35% in 2005. Skepticism about the outlook of the economy is associated with lower fertility. Van Giersbergen and de Beer (1997) estimate that a rise of 10 percentage points in the consumer confidence index is associated with a 1.5 % increase in total birth with a time lag of 2.25 years. More recently, Fokkema et al. (2008) estimate that with a two-year time lag, a rise of 10 percentage points in consumer confidence in the Netherlands is associated with an increase in the total fertility rate (TFR) of about 0.04 percentage points, of which half is attributable to first births and half to second births. It is a known fact that demand for durable goods positively associates with higher economic certainty and positive economic outlook; surprisingly, it is found that the demand for children is positively correlated with the demand for durables (Becker, 1960). This validates the hypothesis that fertility negatively correlates with economic uncertainty, a hypothesis that is tested in this study using the volatility in the family income as an indicator for economic uncertainty.

Economic insecurity rises in times of recession where waves of unemployment and high levels of mortgage foreclosure are perceived by individuals. Previous research focused on estimating the social consequences of recessions; one of these consequences

was the effect on fertility decisions. The impact of the recession on fertility oscillates between pro and counter-cyclical. While Butz and Ward (1979a and 1979b) suggest that fertility tends to be counter-cyclical in a prosperous economy as lower unemployment of women increases the opportunity cost of raising a child, other research indicates that fertility in the U.S remains pro-cyclical as the lower price of women's time fails to overtake the negative effects of unemployment on fertility (Macunovich, 1996). Recession inflated the cost of having a child due to increased economic hardship and uncertainty (Morgan et al., 2011). Most recently, the great recession in the U.S has had a substantial negative impact on fertility measured on the national level and to a lesser extent on the area level. On the national level, the general fertility rate (GFR) declined with the onset of the Great Recession (Livingston & Cohn, 2010; Morgan et al., 2011a); on the area level, Ananat et al. (2013) studying county-level mass layoffs and GFRs in North Carolina between 1990 and 2010, finds a negative effect on African-American teen birth rates yet no evidence of an impact on the fertility of white teens or on women in their early 20s. The case is not different in Europe as Goldstein et al. (2009) document a decline in the fertility rates across European countries following a relative rise from 1998 through 2008. The decline was sharp in Spain where unemployment surged to 20 percent; consequently, the period TFR dropped from 1.46 to 1.40 between 2008 and 2009 (INE 2010). In a survey conducted by the Pew Research Center, 21 percent of respondents aged 25–34 claimed they postponed marriage and 15 percent reported that they postponed having a child because of the 2008 recession (Wang and Morin, 2009).

Most importantly, individuals perceive a sense of insecurity that comes from worsening economic conditions even though they are not directly affected. Kravdal (2002),

using simulations, finds a reduction of 0.08 in the total fertility rate in response to rising unemployment during the recession of 1993 in Norway. Most significantly, the reduction in fertility was dominated by the aggregate effect rather than by individual experiences of unemployment. A comparable result is found by Hoem (2000), studying fertility rates during the recession of the early 1990s. He finds that the decline in the first-birth rate is more likely to be explained by variation in local employment levels, even when controlling for individual income and employment status.

This study extends the literature by estimating the impact of individual economic uncertainty on the decision of having children using individual-level factors, such as individual income volatility, rather than aggregate-level factors. The study also disentangles economic hardships and economic uncertainty by studying the impact of downward volatility in addition to the absolute volatility on the decision of having children.

3. Data and Methodology

Longitudinal data come from the Panel Study of Income Dynamics (PSID) that runs from 1968 to 2013. The first sample in 1968 consisted of roughly 5,000 households, of which the core sample (3,000) represents the U.S population as a whole, and the Census Bureau's SEO sample (2,000) represents the low-income families. The children of the original families and the families formed by those children have been followed. The survey was conducted on an annual basis until 1997 and biannually thereafter. PSID provides rich

information including data on education, income, religion, infertility, and population weights.

The key dependent variable is a binary that indicates whether or not the woman has the second child; it equals 0 when the woman has her first child and 1 when she has her second and last child. The shift from one to two children gives insight on the decision to have more children as the marginal loss in utility is expected to be higher for sacrificing the second child than the third or the fourth. Moreover, focusing on the shift from one to two children minimizes the unobservable characteristics that arise from including people who tend to have a higher number of children. Women that have one child and two children by the end of their child bearing period are of much interest regarding fertility as they comprise 18% and 35% of all women in the United States, respectively. In order to minimize the endogeneity that comes from adolescent pregnancy and the difficulties of having another child in the late thirties for some women, only women who have had their first child between the ages of 21 to 35 are included in the final sample. Women who have not been married or cohabitated for five years after having their first child are excluded from the sample to eliminate the bias that comes from women who could not have the second child due to the absence of a partner. Women are eliminated from the sample if the woman or the husband had ever tried to have a child but found it was not possible due to fertility problems.

The key independent variable is real income volatility that is calculated by combining the husband's/cohabitant's and wife's taxable income then deflating the family income to the 1982-84 dollar using the CPI index. PSID collects Head and Wife Taxable Income, which

is comprised of three main sources of income: Head/Wife Earnings, Head/Wife Income from Assets (including interest, dividends, trust funds, and rent), and Net Profit from Farm and/or Business.[11] PSID utilizes a variety of imputation techniques to reduce the missing values in the income data.

To examine the hypothesis that the volatility in real income negatively affects the probability of having the second child, I monitor the volatility in income starting from the year that the first child was born; however, the model controls for the income volatility that is generated by having the first child. The standard deviation of real income from the year preceding the year in which the first child was born in the year after the first child was born is calculated and included as a covariate in the model. The hypothesis is that the more volatile the real income after the first child, the lower the likelihood of having the second child.

Income volatility was measured as a transitory component of earning following the methodology that is traditionally used in the literature of econometric and policy analysis of volatility (Gottschalk, 1994), where the variance was calculated as the sum of the squared deviation of the logged income around the mean in a specific period of time. To provide a clearer interpretation, I use the standard deviation of the non-logged income as shown in the following equation:

[11] According to PSID terminology, a Head is designated as a husband in the family unit or a cohabitant with whom the woman has been living for at least one year.

$$\sqrt{\sum_{t=1}^{T_i}(y_{it} - y_i)^2/(t_i - 1)}$$

where y_{it} is Head and Wife taxable income in thousands of dollars for woman i at time t, and T is the number of years through which income volatility is calculated for woman i, and y_i is the average annual income for women i over T.

The second key variable of interest is downward volatility, which measures the frequency of income loss. Downward volatility is measured by calculating the number of times that income negatively changed by more than 5% between successive interviews divided by the number of years for the same period. The change in income between two adjacent years is calculated by dividing the difference in the non-deflated income between the current and the following year by the income of the current year $(inc_{t+1} - inc_t)/inc_t$. Therefore, the change of income in the period that precedes having the second child is excluded to avoid the negative change in income due to the delivery of the second child.

In addition to individual characteristics such as age and race (White, Black, Hispanic, and others), the reduced form equation includes a variety of background and socioeconomic factors that impact fertility. These factors are represented by the following variables: The ratio of the average wife's income to the average husband's income; this variable controls for the price of having a child and the opportunity cost of the mother's time. Family income; Table 1 shows a positive correlation between income volatility and the family income. The three components (Earnings, Assets including interest, dividends, trust funds, and rent, and Net Profit from farm and/or business) of the Head and Wife

taxable income suggest that a higher income fluctuation is associated with a higher level of income; therefore, it is crucial to control for the amount of income. It is reasonable to expect that greater earnings, returns on assets, and profit from farm/business are associated with higher fluctuation in income. The age at which the woman has her first child is also included in the equation. The level of education; this variable is the highest grade the woman has completed. It is a categorical variable where women were divided into three groups: the base group is women who did not finish high school, the second group is women who obtained their high school diploma and maybe some college, and the third group is women who have completed a bachelor's degree and/or beyond. Disability; whether or not the woman was disabled or required extra care, or whether or not there were any physical or nervous conditions that limited the kind/amount of work she could do. The frequency of going to church; a categorical variable that takes a value of zero if the respondent never goes to church, one if she goes to church once a month or occasionally, and two if she goes every week. Weights; which are based on the family-level weight calculated originally in 1968. Sample members born into the family at a specific year receive either the average of the Head's and spouse's weights or, in the event of a single Head, the child receives the Head's weight in that year. Marital status; women have to be married or cohabitant for five years after the first child to be included in the sample. Volatility in income that is generated in the response to having the first child. For example, a reduction in income due to maternity leave or working fewer hours during pregnancy. The standard deviation in Head and Wife taxable income for the year the first child was born and the years before and after is calculated and included as a covariate in the reduced

form equation. A quadratic term for age was added as a covariate since the relationship between fertility and age is not likely to be linear.

Table 1 shows summary statistics for some of the key variables such as the probability of having the second child, the duration between the first and second child, and the average number of children per woman based on: the percentiles of the standard deviation of taxable Head and wife income, mother's age when she had her first child, and level of education. The probability of having the second child and the duration between the first and the second child are negatively correlated with the mother's age at which she has her first child. The summary statistics show a positive correlation between the amount of income and income volatility. The lowest tail in the distribution of the income variance has the lowest average annual income per family; as income increases volatility rises. Table 1 shows that mothers tend to have a lower number of children as income volatility increases; however, at the higher tail of income distribution, mothers increase their number of children. This is consistent with Becker's suggestion that elasticity of quality is higher than that of quantity demanded for children. When income increases, parents tend to desire high-quality children, which will negatively impact the total number of children in the family; however, the data suggests that as income keeps increasing, parents eventually are able to afford increasing their number of children while maintaining the quality they previously desired. Parents with higher income are more educated and in a higher social status; hence, they are required to invest more in their children's human capital.

The average number of children per family is 2.1 at the lowest tail of income volatility where the average taxable Head and Wife income is $6,390 ($15,460 in today's dollar); as

income increases the number of children keeps falling at a decreasing rate (Table 2) and the likelihood of having the second child slightly decreases before it increases in the higher tail of income distribution (Table 1). Women who have their first child at/above the age of 23 starts to increase their number of children if the woman and her spouse make above $23,000 per year (1982-1984 dollar), which is about $55,000 in today's dollar (Tables 1&2).

The same pattern is likely to be realized with the level of education as educated mothers are more likely to have their first child at or above the age of 23. The data shows that educated mothers that have a bachelor's degree and beyond tend to increase their number of children when their family income reaches the threshold of $23,000 (1982-1984 dollar). Regardless of the age at which they have their first child and their level of education, women in the highest tail of income tend to have more children than their counterparts in every income quantile except the lowest tail of income. Women who make the least money have the highest number of children; this could be explained by the lower opportunity cost to raise a child and the lower quality desired for their children, as these mothers are more likely to be less educated and to fall in a lower social status. The positive correlation between income volatility/amount of income and level of education appears in Table 1. The percentage of women with less than high school education is high in the lower tail of income volatility distribution and decreases as income moves upward along the income quantiles; in contrast, women with a bachelor's degree and beyond are more concentrated in the higher income quantiles. Surprisingly, the highest tail of income volatility distribution, which also includes the highest level of income, mainly consists of

uneducated women and a very low percentage of women who have a bachelor's degree and beyond.

While Whites are more concentrated in the higher income quantiles, Blacks are more concentrated in the lower ones; Hispanics are uniformly distributed across all income quantiles. Table 1 does not suggest a relationship between the frequency of going to church and income volatility. Not surprisingly, women who delay having their first child are those who have a higher income (Table 1); this could be explained by a lengthier period of education or a desire to establish their career. Table 2 shows the percentage change in the number of children per woman when income variance or the amount of income moves across the quantiles. For example, an average woman has 15.7% fewer children when her income variance moves from the lower tail (10%) to the 25% quantile. Women tend to decrease their number of children when their income fluctuation increases until they are in the highest tail in the income variance distribution (>90%), where their accumulated wealth and high-income work as a buffer that reduces the impact of income shocks. In other words, those in lower income groups might feel the adverse effects of volatility more acutely than their higher income counterparts due to fewer buffering resources such as accumulated wealth.

A systematic increase in the per capita income in the United States, in addition to the rise in labor force participation for women through the second half of the last century, is anticipated to impact the fertility rate through an increase in contraceptive knowledge, a rise in the cost of children, and a decline in child mortality. Moreover, cyclical movements in macro variables such as the unemployment rate and the price level could also impact the

decision of fertility through income changes. However, those income variations in this case, reflect transitions between employed and unemployed status. Therefore, I use a year fixed effect structure to control for both the systematic change in income and the macro cyclical movements. The variation in the child care cost across states, in addition to other aspects of cost of living and time-invariant factors, could bias the results; hence, binary variables that represent states are included in a state fixed effect structure.

Children provide a utility with indifference curves shaped according to the relative preference for children (Becker, 1960). Therefore, in an attempt to limit the variation in the preference for children, the model includes variables unrelated to economic factors, such as age, race, and the frequency of going to church. The model also controls for factors that influence fertility such as the age of the mother when the first child was born, the wife's income relative to the husband's income, partial or full disability, marital status, and whether or not the wife or the husband have ever had any fertility problem. In addition to the previous variable, the model also controls for socioeconomic factors such as income and the level of education.

Using multivariate logistic regression, I estimate the probability of having the second child in response to income volatility for women who already have the first child. The logit model basic equation is:

$$y_{it} = s_i + x_{it} + \gamma_i + state_i + time_t + \varepsilon_{it}$$

where y_{it} is the outcome variable, a dichotomous coded zero if woman i has her first child at time t between the ages of 21 and 35, and one if woman i has her second child at time t. The key independent variable s_i is the standrad deviation of the income that is calculated

as the square root of the sum of the squared deviation of the income around the mean for woman i and her husband/cohabitant during the years between having their first child and having their second child (last child). The vector x_{it} is a vector of explanatory variables that represent socioeconomic factors, individual characteristics, and the opportunity cost of having a child such as wife and husband taxable income, the ratio of average wife income to average husband income, highest grade, and age at which the women have their first child. Income volatility generated by the incidence of having the first child is represented by the γ_i, which is the standard deviation of the Head and Wife taxable income in three specific years: the year before having the first child, the year of having the first child and the year after having the first child. Income in those years may shift upward if women return to work from a maternity leave or shift downward due to a voluntarily reduction in worked hours or leaving work for maternity causes. The model takes into account that certain unobserved state specific variables that are constant over time may influence the decision of whether or not to have children. Under this assumption, a state-specific constant term $state_i$ is added to the right hand side of the equation to allow the model to control for variations among the states. Using a time fixed effect structure, the model controls for the variations over time by adding the term $time_t$, which is individual invariant but varies over time, to capture time specific effects. Using the fixed effect model including state specific and time specific effects to estimate the equation should produce unbiased and consistent estimates of the coefficients. The error term is ε_{it}.

I also use the Cox proportional hazards model as this model makes it possible to use the duration between the first and the second child to estimate the impact of income

volatility on the risk of having the second child. Women are included in the sample when they have their first child; then they either survive if they maintain the status of one child or fail if they have the second child. The years of having the first child are considered the years of survival, while the failure is when the incidence of having the second child occurs. On average, women who have only two children waited 3.4 years after the first child to have the second child; the duration between the first and the second child ranges from one to seven years.

4. Estimation Results

Table 3 shows a negative correlation between income volatility and the probability of having the second child. The impact is higher on the mothers who are in the second quartile of the income distribution. An increase of $1,000 in the standard deviation of the Husband and Wife taxable income is associated with a decrease of 13 percentage points in the probability of having the second child. The impact is economically small and statistically insignificant for mothers who are in the lower and higher tails of income distribution. For mothers in the lower tail, the insignificant effect could be attributed to mitigated income volatility by welfare programs, which are more likely to be received by mothers in the lower income tail. Mothers in the higher tail are not affected by income volatility due to a buffer of assets and return on investments. The high impact for people who are in the second and third quartiles of income distribution emphasizes the proposition that children are a normal good. Moreover, it supports the suggestion of Becker and Lewis (1973) and

Willis (1974) that there is a trade-off between quality and quantity of children in the fertility decision. Mothers who are in the second quartile of the income distribution are more concerned about the quality of their children; however, they are more sensitive to income volatility due to the absence of capital buffering for mothers in the higher tail or welfare programs for mothers in the lower tail of income distribution. Therefore, they perceived income fluctuations as a threat that may reduce the quality of their children, a perception that led them to abstain from having their second child. Having controlled for the mothers' level of education, I am confident that this model excludes any bias that is caused by variation in the knowledge of contraceptives.

The positive impact of income volatility while having the first child on the probability of having the second child could be explained by the positive income elasticity of fertility decision. Women who make more income are expected to sacrifice more income while having the first child but also are expected to have the second child, as children are normal goods. The analyses are restricted to women who only have two children as the loss of income due to pregnancy and delivery could reasonably be overtaken by the high marginal utility of having the second child. Nevertheless, a higher wife's income failed to obliterate the significant impact of the opportunity cost of having a child in cases where the wife is making a higher income than the husband. One percent change in the wife-to-husband income ratio is associated with a decrease of one-percentage points in the probability of having the second child for mothers in the second quartile of the income distribution (Table 4). The impact is negligible and statistically insignificant for mothers in the third quartile, the lower tail, and the higher tail of income distribution. This emphasizes the significant impact of the opportunity cost of the mother's time on the

probability of having children and is comparable to the summary statistics in Tables 1 & 2, where women who make the least money have the highest number of children.

Women in the second quartile of the income distribution are the most effected by their income when they make the decision to have their second child. While they tend to have the second child with a higher family income, they are less likely to have the child if their income is well above their husbands' income. This is consistent with Becker's suggestion that elasticity of quality is higher than that of quantity demanded for children. Women who are making a high income and are married/cohabitant to husbands who are making comparable income are more likely to have the second child than those who are married to husbands that make significantly less income. This could be explained by mothers perceiving the change in income while having the child as a threat to their desired quality for their children; as a result, they decide not to have the second child. The positive impact of the mother's income concurrently with the negative impact of wife-to-husband income ratio on the probability of having the second child emphasizes what Becker and Lewis (1973), Willis (1974), and Borg (1989) suggested: that there is a significant positive effect of income on the total family size when the reduced form model includes controls that represent the quality of children desired by the family.

The age of the mother at which the first child was born has a significant impact on the decision of having another child. On average, a one-year increase in the age of the mother when she has her first child decreases the probability of having the second child by seven percentage points. The impact is significantly higher on the mothers in the third quartile and the higher tail of income distribution by -14.6 and -13.2 percentage points,

respectively. Mothers on the upper half of income distribution usually have a higher level of education, and they are more likely to consider their health during pregnancy and maternity when they make decisions regarding having more children. Moreover, due to a greater number of years of education, mothers in these upper-income quartiles have their first child at an older age where the marginal risk on health associated with pregnancy is higher than that of their counterparts who belong to lower income quartiles.

The impact of income on the probability of having the second child is economically and statistically insignificant. This could be explained by the high marginal utility outweighing the marginal cost of having the second child. This also shed lights on the insignificant impact of permanent income changes on fertility, in contrast with the transitory income changes which are more likely to be perceived as economic insecurity. Investigating these issues is beyond the scope of this paper.

A covariate that represents negative income changes is added to the model (Table 4) to control for downward income volatility. Stripping the economic hardship out of the economic insecurity rendered higher effect for mothers in the second income quartile, a relatively lower effect for mothers in the third quartile, and no effect for mothers in the lower and higher tails. Only mothers who are in the second quartile are significantly impacted by the absolute change in income, a decrease of 26 percentage points in the likelihood of having the second child in response to an increase of $1,000 in the standard deviation of income. The impact of downward volatility is insignificant for mothers in all quartiles of the income distribution except those who are in the second quartile (3.6 percentage points). Downward volatility is positively associated with the likelihood of

having the second child. This is explained by a decrease in the opportunity cost of having a child. The analysis shows that mothers in the second quartile are those who are impacted by the absolute and downward changes in income. They are intolerant to economic insecurity as well as economic hardship. While economic insecurity drives them to reduce fertility, economic hardship induces them to have the second child, most likely by reducing the opportunity cost of the mother's time.

The negative and significant coefficients of the interaction term for the mothers in the first and last income quartiles in Table 4 indicate that when absolute income volatility is high, an increase in the downward volatility is associated with mothers abstaining from having the second child. However, mothers that are in the second and third income quartiles are more likely to have their second child in response to an increase in the downward changes in income when they already experience a high absolute income volatility. This could be attributed to the small marginal benefit of having a second child for mothers that are in the lower and higher tail of the income distribution. In contrast, mothers who are in the second and third income quartiles are more likely to pay fewer income taxes and earn tax benefits such as a child tax credit if they have the second child.

Adding downward income volatility to the reduced form equation renders insignificant coefficients for the first and fourth quartile for absolute income volatility, income volatility during having the first child, wife-to-husband income ratio, and age at which the first child was born.

5. Robustness Check

For the sake of robustness, I use different model specifications such as linear probability model (LPM). Model (a) in Table 6 is a replica of the probit regression in Table 4 but in an LPM structure. I replace the dependent variable which is the binary response of whether or not the mother has had her first child with the number of total births (Table 6, models b & c). The LPM model (Table 6, model a) renders comparable estimates to what is in Table 3 & 4. An increase of $1,000 in the standard deviation of income is associated with a decrease of 1.5 percentage points in the probability of having the second child. Similar to the estimates in Table 3 & 4, while downward volatility is associated with an increase in the probability of having the second child, wife-to-husband income ratio is associated negatively with the probability of having the second child.

In Table 6, models b & c, where the binary variable of whether or not the mother has had her second child is replaced with the number of total births and the income standard deviation is calculated over the mother's lifetime, income volatility renders economically insignificant coefficients. Income was demeaned in model (c) by subtracting the average income for each age group from the mother's income. The absolute changes in the wife and husband taxable income over the mother's lifetime does not impact the total number of children in the family. Using total birth as a dependent variable that represents fertility allows the preference for children to bias the analysis by including mothers that have great number of children as well as mothers who have no children. Thus, the association between income volatility and the total number of birth in the family is expected to be negligible. Over the lifetime of an average mother, and in contrast with its positive association with

the probability of having the second child, downward income volatility is negatively associated with the number of total births. This indicates that over the average mother's lifetime, long-term commitment such as parenthood is more impacted by economic hardship, which negatively impacts the decision of fertility.

Mothers who were not married all the years since they have had their first Child are excluded from the sample in Table 7. The results are parallel to those in Tables 3 & 4. There is no effect on mothers who are in the lower and higher tails of income distribution. Mothers in the second quartile are the most impacted. A $1,000 increase in the income standard deviation is associated with a reduction of 46 percentage points in the likelihood having the second child for mothers in the second quartile of income distribution. Excluding mothers that have never been unmarried since having the first child shrank the sample significantly; however, the result is comparable to what was found previously yet with a higher magnitude. Mothers in the second quartile are those who are impacted by the absolute and downward changes in income. They are intolerant to economic insecurity as well as economic hardship, most likely due to a reduction in the opportunity cost of the mother’s time. The interaction term did not change in signs indicating no change in the previous analysis. Mothers that are in the second and third income quartiles are more likely to have their second child in response to an increase in the downward changes in income when they already experience a high absolute income volatility. The impact of the age at which the first child was born turned out to be statistically insignificant for mothers in every income quartile.

Using the duration between the first and the second child, I run survival analysis utilizing Cox Proportional Hazard model to estimate the impact of income volatility on the risk of having the second child. The mother survives as long as she keeps the status of having one child and fails when having the second child. The hazard model in Table 5 renders results that conform with those of the logit regression in Tables 3 & 4. While income volatility is found to negatively impact the probability of having the second child using the logit model, it reduces the risk of having the second child using the hazard model. An increase of $1,000 in the standard deviation of income after having the first child for women who had their first child between 21 and 35 years old is associated with 5.70% (1-.9530) lower hazard of having the second child. The effect is higher for women who are in the second and third quartiles at 19% and 16.3%, respectively. Downward volatility is found to increase the risk of having the second child, which is comparable to the positive impact on the likelihood of having the second child that is found using the logit model.

6. Conclusion

Using longitudinal data from the Panel Study of Income Dynamics (PSID) that runs from 1968 to 2013, and a variety of different model specifications, including logistic regression, linear probability, and Cox Proportional Hazard models, this study finds a significant positive impact for economic insecurity on the probability of having a one-child family for mothers who are in the second quartile of the income distribution after controlling for economic hardships. An increase of $1,000 in the standard deviation of income is

associated with a decrease of 26 percentage points in the probability of having the second child. There is no evidence that absolute income volatility affects mothers' decisions to have the second child for mothers in the upper half and the lower tail of the income distribution. The analysis finds evidence that mothers in the second income quartile are more likely to have the second child when they experience a decrease in the opportunity cost of their time. Negative income changes are associated with an increase of the probability of having the second child for mothers in the second income quartile. However, mothers in the lower and higher tail of the income distribution are more likely to refrain from having their child in response to negative income shocks if they already experience high absolute income changes. This could be attributed to the small marginal tax benefit of having a second child for mothers that are in the lower and higher tail of income distribution. In contrast, mothers who are in the second and third income quartiles are more likely to pay less income taxes and earn tax benefits such as a child tax credit if they have the second child. The analysis fails to find evidence that total births per mother is a function of economic uncertainty that is generated by individual-level factors such as absolute income volatility, yet it shows that economic hardships represented by negative income changes throughout the mother's life time is associated with a decrease in the number of total births. Nevertheless, investigating the impact of income changes on gross fertility is beyond the scope of this text and will remain a subject for future research.

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APPENDICES

APPENDIX A: TABLES

Table 1. Summary Statistics and Mean Fertility, Probability of Having the Second Child, and the Duration Between the First and Second Child in Reference to the Standard Deviation (in Percentile) of Husband and Wife Taxable Income, the Wife's Level of Education, and the Age at Which She Has Her First Child.

		10 %	25 %	50 %	75 %	90 %	>90 %
	Number of Children	2.10	1.77	1.58	1.50	1.42	1.81
		(2.55)	(2.11)	(1.81)	(1.62)	(1.50)	(2.14)
	Probability of Having the Second Child	0.43	0.48	0.54	0.55	0.63	0.49
	Duration	3.85	3.70	3.84	3.52	3.26	3.89
Number of Children and the Probability of Having the Second Child Based on the Mother's Age When the First Child was Born	18	3.76	3.34	3.10	2.77	2.85	3.30
	Probability	0.47	0.55	0.54	0.58	0.55	0.46
	Duration	4.98	4.22	4.70	5.39	5.75	4.63
	18-20	3.44	3.00	2.78	2.74	2.70	3.05
	Probability	0.47	0.47	0.62	0.60	0.64	0.50
	Duration	3.55	4.23	4.10	3.76	4.91	3.76
	20-23	3.00	2.85	2.60	2.60	2.53	2.84
	Probability	0.45	0.49	0.57	0.62	0.63	0.52
	Duration	3.43	3.30	3.89	3.71	4.21	3.81
	23-27	3.03	2.57	2.36	2.29	2.45	2.70
	Probability	0.42	0.47	0.54	0.56	0.68	0.52
	Duration	3.95	3.51	3.79	3.45	3.31	3.96
	27-31	2.41	2.17	2.05	2.04	2.17	2.53
	Probability	0.41	0.46	0.47	0.53	0.68	0.52
	Duration	3.22	3.37	3.06	2.84	2.66	3.54
	>31	2.12	1.91	1.72	1.70	1.83	1.98
	Probability	0.23	0.29	0.34	0.36	0.53	0.40
	Duration	2.89	3.12	2.61	2.31	2.31	3.65
Number of Children and the Probability of Having the Second Child Based on the Level of Education	Less than High School	2.19	1.77	1.59	1.42	1.18	1.78
	Probability	0.40	0.47	0.54	0.56	0.52	0.43
	Duration	4.79	3.36	4.21	3.95	2.77	4.17
	High School	2.06	1.80	1.63	1.59	1.52	1.79
	Probability	0.48	0.54	0.57	0.57	0.61	0.53
	Duration	3.72	4.10	3.92	3.50	3.52	4.05
	Bachelor and Beyond	2.06	1.79	1.61	1.52	1.54	1.98
	Probability	0.40	0.51	0.57	0.60	0.71	0.46
	Duration	5.1	4.36	3.66	3.21	3.04	4.24
Distribution of Women Based on the Level of Education	Less than High School	0.36	0.31	0.26	0.20	0.15	0.43
	High School	0.54	0.58	0.63	0.61	0.51	0.50
	Bachelor and Beyond	0.10	0.11	0.11	0.19	0.34	0.07
	Average Family Income (in Thousands) per Year	6.39	10.87	15.92	22.95	48.19	2242.41
		(8.54)	(7.85)	(8.35)	(9.62)	(94.18)	(510.99)
Race	White	0.41	0.34	0.47	0.62	0.79	0.59
	Black	0.46	0.59	0.47	0.34	0.16	0.01
	Hispanic	0.02	0.02	0.02	0.01	0.01	0.02
	Others	0.11	0.05	0.04	0.03	0.04	0.38
	Church	1.14	1.12	1.09	1.08	1.24	1.23
		(0.74)	(0.72)	(0.74)	(0.73)	(0.75)	(1.53)
	Mother's Age When the First Child was Born	22.12	22.00	23.00	24.31	26.42	23.32
		(5.24)	(4.77)	(5.02)	(5.33)	(5.49)	(5.13)

NOTES.— The numbers in parentheses are the standard errors. Duration is in years. The data includes 38,017 women.

Table 2. Percentage Change in Fertility in Response to Change in Income/Income Volatility

Variance of Income		10%-25%	25%-50%	50%-75%	75%-90%	90%->90%
Income Interval (in Thousands)		6.4-10.9	10.9-16	16-23	23-48	48-2242
Percentage Change in the Number of Children	Full Sample	-15.71%	-10.73%	-5.06%	-5.33%	27.46%
Perecntage Change in the Number of Children Based on the Mother's Age When the First Child was Born	18	-11.17%	-7.19%	-10.65%	2.89%	15.79%
	18-20	-12.79%	-7.33%	-1.44%	-1.46%	12.96%
	20-23	-5.00%	-8.77%	0.00%	-2.69%	12.25%
	23-27	-15.18%	-8.17%	-2.97%	6.99%	10.20%
	27-31	-9.96%	-5.53%	-0.49%	6.37%	16.59%
	>31	-9.91%	-9.95%	-1.16%	7.65%	8.20%
Number of Children Based on the Level of Education	Less than High School	-19.18%	-10.17%	-10.69%	-16.90%	50.85%
	High School	-12.62%	-9.44%	-2.45%	-4.40%	17.76%
	Bachelor and Beyond	-13.11%	-10.06%	-5.59%	1.32%	28.57%

NOTES.—Income is husband's/cohabitant's and wife's taxable income deflated to 1982-84 dollar using the CPI index.

Table 3. Logit Estimates of the Probability of Having the Second Child in Reference to the Standard Deviation of Head and Wife Taxable Income

Probability of Having The Second Child	Full Sample	25 percent	50 percent	75 percent	100 percent
Income Volatility	-.0094***	-.0001	-.1295***	-.0071***	-.0005
	(.0011)	(.0000)	(.0542)	(.0022)	(.0300)
Income Volatility While Having the First Child	.0046***	-.0001*	.0440**	.0032***	-.0030
	(.0006)	(.0001)	(.0220)	(.0010)	(.0250)
Wife to Husband Income Ratio	-.0002***	.0020*	-.0072***	-.0002***	-.0040
	(.0000)	(.0020)	(.0030)	(.0001)	(.0210)
Age at Which the First Child Was Born	-.0186***	-.0001*	-.4954***	-.0151***	-.0060
	(.0023)	(.0001)	(.2065)	(.0046)	(.0046)
Husband and Wife Taxable Income	.0001***	-.0050	.0003	.0030	.0112
	(.0000)	(.0310)	(.0021)	(.0110)	(.0324)
N	14,307	3,576	3,576	3,576	3,576

NOTES.—* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The reported coefficients represent marginal effects. Income volatility while having the first child is measured as the standard deviation of the year before having the first child, the year of having the first child, and the year after having the first child.

Table 4. Logit Estimates of the Probability of Having the Second Child in Reference to the Standard Deviation of Head and Wife Taxable Income

Probability of Having the Second Child	Full Sample	25 percent	50 percent	75 percent	100 percent
Income Volatility	-.0190***	-.0001	-.2642***	-.0067***	-.0002
	(.0019)	(.0004)	(.0213)	(.0016)	(.0006)
Downward Volatility	.0007***	.0001*	.0366***	.0004***	.0006
	(.0001)	(.0001)	(.0035)	(.0001)	(.0020)
Income Volatility * Downward Volatility	-.0007***	-.0412***	.0329***	.0143***	-.0067***
	(.0002)	(.0165)	(.0027)	(.0016)	(.0009)
Income Volatility While Having the First Child	.0079***	-.0009	.1712***	.0040***	.0001
	(.0008)	(.0007)	(.0283)	(.0010)	(.0002)
Wife to Husband Income Ratio	-.0004***	.0001	-.0113***	-.0002***	-.0020
	(.0001)	(.0000)	(.0010)	(.0001)	(.0100)
Age at Which the First Child Was Born	-.0426***	-.0004	-.7119***	-.0124***	-.0003
	(.0042)	(.0003)	(.0369)	(.0029)	(.0012)
Husband and Wife Taxable Income	.0004***	-.0200	.0014	.0050	.0300
	(.0001)	(.0500)	(.0032)	(.0400)	(.2000)
N	14,307	3,576	3,576	3,576	3,576

NOTES.— The coefficients reported for the interaction term are the logit coefficients.

Table 5. Cox Proportional Hazard

Hazard (Risk) of Having The Second Child	Full Sample	25 percent	50 percent	75 percent	100 percent
Income Volatility	.9530**	.8491***	.8108***	.8369***	.9770
	(.0201)	(.0533)	(.0229)	(.0154)	(.0180)
Downward Volatility	1.3937**	5.8390***	3.9769***	2.1496***	1.2173
	(.2330)	(3.7890)	(1.3845)	(.4878)	(.2815)
Income Volatility While Having the First Child	1.027***	1.1067**	1.0287	1.0323***	1.0097
	(.0076)	(.0512)	(.0201)	(.0120)	(.0090)
Wife to Husband Income Ratio	.9866	.7951	.9976	.8191**	.8665
	(.0350)	(.2870)	(.0033)	(.0763)	(.2018)
Mother's Age at Which the First Child Was Born	1.0008	.9521	.9767	.9504***	1.0047
	(.0092)	(.0438)	(.0199)	(.0154)	.0133
Husband and Wife Taxable Income	1.0004***	1.0156	1.0164***	1.0117***	1.0003***
	(.0000)	(.0130)	(.0029)	(.0015)	(.0000)

Table 6. Linear Probability Estimates for the Probability of Having the Second Child and Regression Estimates Using the Number of Total Birth as the Dependent Variable.

	Probability of Having the Second Child	Total Births	
	(a)	(b)	(c)
Income Volatility	-.0154***	.0000***	-.0007***
	(.0010)	(.0000)	(.0002)
Downward Volatility	.1108***	-.0731***	-.0498**
	(.0323)	(.0238)	(.0240)
Income Volatility While Having the First Child	.0067***		
	(.0014)		
Wife to Husband Income Ratio	-.0002	-.0020	-.0001
	(.0017)	(.0110)	(.0005)
Mother's Age at Which the First Child Was Born	-.0206***	-.0074***	-.0066***
	(.0027)	(.0006)	(.0006)
Husband and Wife Taxable Income	.0006***	.0004***	.0009***
	(.0001)	(.0000)	(.0000)
N	25,182	42,616	40,145

NOTES.—Model (a) is a replica of the probit regression in Table 4 using Linear Probability Model (LPM). Model (b) has the standard deviation of income over the woman's life time as the independent variable. Model (c) has the standard deviation of the demeaned income as the independent variable.

Table 7. Logit Estimates of the Probability of Having the Second Child in Reference to the Standard Deviation of Head and Wife Taxable Income

Probability of Having the Second Child	Full Sample	25 percent	50 percent	75 percent	100 percent
Income Volatility	-.2579***	-.0005	-.4583***	-.0068	-.0019
	(.0086)	(.0005)	(.0256)	(.0198)	(.0119)
Downward Volatility	.0103***	.0001	.0364***	.0004	.0005
	.0012	(.0010)	(.0027)	(.0010)	(.0006)
Income Volatility * Downward Volatility	-.0003	-.1216***	.0212***	.0141***	-.0018
	(.0004)	(.0257)	(.0021)	(.0038)	(.0014)
Income Volatility While Having the First Child	0.1339***	-.0012	.1963***	.0052	.0008
	(.0054)	(.0011)	(.0157)	(.0159)	(.0055)
Wife to Husband Income Ratio	-.0153***	.0002	-.0136***	-.0001	-.0073
	(.0008)	(.0010)	(.0013)	(.0003)	(.0014)
Age at Which the First Child Was Born	-.6202***	-.0015	-1.0312	-.0131	-.0070
	(.0227)	(.0014)	(.0570)	(.0378)	(.0279)
Husband and Wife Taxable Income	.0037***	-.0003	-.0057**	-.0001	.0009
	.0006	(.0021)	(.0028)	(.0003)	(.0012)
N	8,695	2,173	2,173	2,173	2,173

NOTES.—Mothers who were not married all the years since they had their first child are excluded from the sample.

CHAPTER III

THE EFFECT OF REGULATIONS ON QUALITY: THE CASE OF CERTIFICATE-OF-NEED LAWS IN THE NURSING HOME INDUSTRY

1. Introduction

In the past twenty-five years, the increasing cost of nursing home care has been a concern for all municipalities as well as states' legislators. Nursing homes have contributed to a growing Medicaid expenditure of post-acute care.[1] Furthermore, the cost of long-term care remained to grow overwhelmingly, capturing an enormous size of Medicaid expenditures.[2] Despite the increasing cost, the nursing home industry has begun to be considered an alternative housing for seniors, and long-term care option for older Americans (Hawes, Phillips, Rose, Holan, & Sherman, 2003).Thus, legislators are faced with escalating pressure to increase the capacity of nursing homes and other health services (Kitchener, Ng, Miller, & Harrington, 2005; Miller, Harrington, & Goldstein, 2002). However, the

[1] As an example, the share of total Medicare spending on skilled nursing facility care increased from one percent to three percent, and the share of total Medicare spending on home health care increased from two percent to three percent.

[2] Between 1994 and 2009, the average expenditure for long-term care has doubled for most analysis (Chandra, Dalton, & Holmes, 2013)

increasing cost of nursing home care caused many states to implement Certificate of Need (CON) laws in the late 1980s.

The introduction of the quality issue was brought to scholar's attention through cases of abuse, mistreatment, and an overall "lack of concern" in the care of nursing home residents. Vladeck (1980) established the first study that displayed the clear distinction of the framework of quality measures in the nursing home industry. In which it captures the problems of quality occurring throughout the industry (Vladeck, 1980). He implied that the types of establishments, types of nurses, safety compliances, and many other variables need to be controlled for to measure the effectiveness of the CON policy, an implication that we include in our analysis.

The hypothesis of our study is that lower supply of the certified beds in nursing homes leads to excess demand, in which it decreases the level of quality of care. Nyman (1989) finds that nursing homes in counties with a tighter bed supply regulation have lower approval rate of expansions and more Medicaid violations than those counties with a surplus bed supply. Our analysis shows that CON policy makers are forced to the trade-off between the sizes of the industry and the quality of the service. The primary motive of this paper is to examine the effect of the presence of CON policy, and what are the factors that might play a major role in the trade-off between quality and cost. The dominant type of ownership in the industry of long-term care is mainly for-profit nursing homes. Therefore, we only include the for-profit nursing homes in our analysis. Another reason for restricting our analysis to for-profit nursing homes exclusively, is to eliminate the concern of inefficiencies occurring from the usage of labor hours as indicators of the measurements

of quality. To elaborate, more labor hours worked may not necessarily represent a higher level of quality, especially in the non-profit nursing homes, it might relate to a lower number of qualified and well-trained nurses leading to inefficiencies and higher rates of dissatisfaction. We find that nursing homes in CON states tend to be less motivated to behave in higher standards to accommodate all patients well served.

This study is structured as follows: Section II presents some background in regards to the establishment of the certificate of need regulation, while Section III provides a detailed literature review examining the quality in the nursing homes industry. Section IV outlines the methodology and variables incorporated in our study. Section V discusses the data and summary statistics. Section VI presents the estimated results. Section VII displays our analysis of the robustness check and two-stage least squares. Section VIII covers the conclusion.

2. Background of the Certificate-of-Need Law

This paper investigates the impact of Certificate of Need (CON) on the quality of care in the nursing home care. The CON regulation is mainly driven by the cost control factor, which leads nursing homes to behave according to the constraints imposed on the market by the state legislators. CON attempts to control nursing home costs by limiting the supply of beds with capacity limitations and entry barriers. This law was mainly intended to manage the growth of nursing homes and expansion of services to control costs. States without the certificate of need tend to be a bit more relaxed on their restrictions of a new

market entrant or the development of an existing facility. Conceivably, CON restrictions limits the number of nursing homes providers, which may not be sufficient to hold enough capacity to meet excess demand by the senior citizens. CON regulations were also meant to prevent harming the public interest through overbuilding of additional healthcare facilities, which might surpass the current supply. Regulators were of the opinion that such over-investment in capital expenditures at any nursing home facility could lead to price inflation, which comes as a result of very low occupancy rates.[3]

The CON regulations allow enough number of firms that meet the actual capacity of the market or the necessary demand, based on their targeted population (i.e. the population over the age of 65 years old). Therefore, the approval of new requests for new nursing homes or improvements of an existing facility will primarily depend on the need of the proposed market in relation to the demographics of that county in a given state. Planning agencies determine the number of firms and beds necessary in a specific market through an evaluation of the existing facilities and resources, once they arrive at a fair judgment of the actual supply needed. Whenever the state planning agency finds a matching need, the approval can be granted to begin the requested project.

[3] For these facilities to meet their fixed costs, they would need to raise their prices, which would negatively affect the consumers of healthcare.

3. Literature Review

Besides the federal policy alterations, many states reacted to the increasing cost of long-term care by regulating the number of nursing home and services. Many states hold a strict cost reduction approach toward all health care providers (Hillman et al., 1999). The most significant primary law that is mainly driven by cost-control strategy is the certificate-of-need (CON) program, which necessitates the approval of the state regulatory officials for either the establishment of a new health facility or the growth of an existing service provider whether it is physical structural expansion or increasing their scope of services.[4] However, the development of the nursing home industry has overlapped with the intense changes in the market for nursing home care (Bishop, 1999).

Conceivably, the most commonly accepted example for measuring health care quality was established by Donabedian (1988). Three different classifications of quality standards were defined: structure of nursing homes, the process of the services, and clinical outcomes (Donabedian, 1988).[5] Some examples of this sort of measurement incorporate the physical features of the facility, classifications of the nurses, and the managerial staffing at a given facility (Spector & Takada, 1991). The second measurement looks at the assessment of the process, which measures the natures and magnitudes of services offered to patients in compliance with the accepted principles of proper care for particular

[4] The idea of enforcing a supply control is founded on Roemer's Law, following the belief that utilization and supply are positively correlated, meaning when utilization rises, supply increases, regardless of the actual population's need (Roemer, 1961; Wiener, Stevenson, & Goldenson, 1999).

[5] This outline was initially established for the analysis of medical care service and has been broadly used in the studies on nursing homes. Structural assessment explores the characteristics of the location in which the care is being provided.

conditions. According to Donabedian (1988), his three-part approach to quality measurement does not depend on one aspect "a good structure increases the likelihood of proper process, and suitable process enhances the probability of a good outcome" (Donabedian, 1988). Staff-to-resident ratios and costs are two examples of variables that have been used as predictors of quality. Higher staff-to-resident ratios are often considered as an indicator of higher quality in some studies (Birnbaum, Bishop, Lee, & Jensen, 1981; Nyman, 1988a), and used as a predictor of lower mortality rates in another (Linn, Gurel, & Linn, 1977). Likewise, expenditures on nursing home care are used as indicators of higher quality, i.e. higher costs imply a premium quality. As a result, no agreement exists on a comprehensive set of the measures of quality that can be used as a substitute for structure or process measures of care in the nursing homes (Shaughnessy & Kramer, 1990).

Currently, the literature does not include a clear investigation of the differences in quality between those states without CON policies and other states that have implemented the CON policy. In one study that examines the impact of competition on nursing home quality, the occurrence of statewide policy results in a lower level of quality of care (Zinn, 1994). A cost-control policy is viewed as a barrier to entry, a suppressant to competition; and provides no incentive to provide higher quality. Using data from the 1987 Medicare and Medicaid Automated Certification Survey (MMAC) and the method of two-stage least squares (2SLS) Zinn (1994) argues that the restrictions imposed on nursing home construction lead to lower RN staffing and a higher percentage of residents physically underserved, thus implying lower quality while controlling for market concentration, demographics, and Medicaid policies as well as resident and facility characteristics

(Aaronson, Zinn, & Rosko, 1994). Using 1983 data from Wisconsin, OLS was utilized to estimate the relationship between excess demand and nursing home expenditures (Nyman, 1988a). In this study, nursing home costs serve as a proxy for quality. Utilizing the same data set and employing OLS as well as 2SLS, Nyman (1989) finds that nursing homes in counties with a tighter bed supply regulation have lower growth approval rates and more Medicaid violations than those counties without restrictions where there is a surplus in the bed supply (Nyman, 1989). To account for the same endogeneity issue but using 1980 New York state-level data, two studies estimate a reduced-form equation of the effect of a change in reimbursement rate on quality (P. Gertler, 1985; P. J. Gertler, 1989; P. J. Gertler & Waldman, 1992). However, those studies have not used any direct or proxy measures for CON. Additionally, New York applied a cost-plus method to project the states' reimbursement rates. The utilized data were from a time when New York was under CON regulation and was facing some excess demand conditions. Gretler (1989) used three input measures of quality: hundreds of hours of nursing labor, hundreds of hours of other labor hours, and a supply quantity index (P. Gertler, 1989). Both types of working hours are adjusted for efficiency variations across the nursing homes to exclude the concern that a nursing home spending more labor hours on care may not necessarily mean the home is of higher quality; perhaps the nursing home is simply more inefficient. While controlling for residents, facilities, economic condition, demographics, and market characteristics, the results show that an increase in the Medicaid reimbursement rate enhances accessibility for Medicaid residents; but lowers quality. Similarly, Gretler and Waldman presented the same result using total Medicaid expenditures as the measure of quality (P. J. Gertler & Waldman, 1992). Cohen and Spencer (1996), used the 1987 Institutional Population

Component of the National Medical Expenditure Survey to assess the effect of the Medicaid reimbursement rate on quality (Cohen & Spector, 1996). The effect of the Medicaid reimbursement rate on staff intensity is estimated, then the effect of staff intensity on resident outcomes is examined to see if the intensity of staff working hours results in better outcomes. Quality was distinguished using three proxies by three structural measures adjusted for case-mix: registered nurses (RNs) per 100 residents, licensed practical nurses (LPNs) per 100 residents, and total nursing staff per 100 residents. Then three outcome measures are estimated: mortality, the presence of a pressure sore, and a change in functional status. Other explanatory variables consist of the county-level number of empty beds per 1,000 individuals aged 75 and over. Those variables were used as a measure of market tightness to represent excess demand. The statewide average level of Medicaid reimbursement rates and a vector of facility characteristics, a vector of supply and demand factors, and several policy variables were also incorporated.

Some studies used health outcome measures as proxies for quality (Grabowski, 2001b; Grabowski & Hirth, 2003; Zhang & Grabowski, 2004). The structural measures used the number of RNs and professional and non-professional staffing levels and qualifications (Grabowski, 2001b). The process measures observe the rates of drug inaccuracy incidents, the level of physical mobility limitations, the usage of catheters and feeding tubes, and the number of nursing home deficiency citations (Grabowski, 2001a, 2001b). Using 1995-96 data on all U.S. Medicaid-certified nursing homes, Grabowski's results show that an increase in the Medicaid reimbursement rate leads to a significant, but a small increase in nursing home quality. Additionally, replicating Gertler's reduced form

model using all U.S. nursing homes in 1981 and nursing homes in the state of New York between 1995 and 1996 period, the OLS results show a relationship between reimbursement rates and quality. An increase in the Medicaid reimbursement rate improves quality. These results are different from the results obtained by Nyman (1989). Grabowski (2001a, 2001b) relates this to the fact that occupancy rates of nursing homes, an unobserved measure of excess demand, have been changing over the period between the earlier studies and his studies. Using several waves of the National Nursing Home Survey (NNHS) to track the decline in national occupancy rate, which was dropping from 92.9 percent in 1977, 91.8 percent in 1985, to 87.4 percent in 1995 (Strahan, 1997). This variation in the size of the market, may signify a change in the occurrence of excess demand conditions, which might serve as an explanation to the variations in the results between earlier Nyman studies (Nyman, 1985, 1988a, 1988b, 1988c, 1989; Nyman, Bricker, & Link, 1990) and Grabowski's.

4. Data and Methodology

In this cross-sectional study, we have used the average of a triangulation of data sources covering three years including 2012, 2013 and 2014. The total number of counties in the contiguous states is 3144 counties, however, in this study, we have only included the contiguous states within the mainland only. For the same corresponding years, the source of the county-level demographic data of all contiguous states is extracted from the American Community Survey, which is surveyed by the United States Census Bureau and monitored by the United States Federal Statistical System. While the political party

affiliation is a state-level data that is collected from Pew Research Center. The Second source of data that relates to the reimbursement rates based on the Federal Medical Assistance Percentages (FMAP) for the fiscal years of 2012, 2013, and 2014. The Department of health determines the amount of fund available for states' medical insurances using the FMAP. Those rates were extracted from the Office of the Assisted Secretary for Planning and Evaluation, which is under the supervision of the U.S. Department of Health and Human Services. The third official source of nursing homes dataset is provided by the Centers for Medicaid and Medicare services, which is known as the Nursing home Compare website, which includes more than 15,000 certified nursing homes nationwide. This source contains all deficiencies reported by inspection teams as a result of non-compliance with the state requirements. It also includes the cycle of the additional inspections, penalties, ownership type, counts of fines, the total dollar amount of fines, payment denials, providers' characteristics (number of beds per nursing home and number of residents per nursing home), staff rating and number of hours worked by staff, and health and fire safety.

The economic theory suggests a positive correlation between quality and demand in case of high elasticity. Chiswick (1975) finds a high price elasticity of the demand for nursing homes (-2.2) (Chiswick, 1975). Therefore, in this analysis, we include the variables that affect demand as well as the quality of nursing home service.

The basic model controls for a wide set of covariates that accounts for health factors, economic factors, state policy factor, socio-demographic factors, and other related quality factors as the essential measures of quality. The basic equation is:

$$y_i = a + CON_i + s_i + h_i + c_i + p_i + \varepsilon_i$$

Where y_i is the outcome variable, quality measurements for nursing home i. The key independent variable CON is a binary variable that equals one if the state i is implementing the Certificate-of-Need law and zero otherwise. Socio-demographic factors are represented by the vector s, health factors are included in the vector h, and economic factors are represented by the vector c while p represents the state policies variations. The error term is represented by the last term ε_i.

4.1. Economic Factors

We have included the natural log of the mean retirement income. Distinctively, individuals with higher retirement income may have the greater financial capability to be admitted to a private service provider. Consequently, this type of self-funded entrees may replace Medicaid patients by private patients, which may have a positive impact on the quality. Another vital factor is the natural log of the mean family income. Chiswick (1975) suggests that the demand for the nursing home is positively associated with the higher income (Chiswick, 1975), while Headen (1990) finds a shred of evidence that population with higher income seek to have a service that is more convenient and the demand increases for in-home service (Headen, 1990). Chiswick (1975) stated that an analysis of the substitution between institutional and non-institutional care is also needed (Chiswick, 1975).

The higher unemployment rates may reduce the demand for nursing homes and affect the quality of the service provided. Moreover, higher unemployment rates reduce the

ability to pay for the services offered by a health care provider. Therefore, young unemployed adults tend to be available for the family to provide the needed care to elders within their families. On the other side of the argument, higher unemployment rates may attract job seekers to participate in the labor force at a lower cost to the health care providers and may improve the quality of the service.

The natural log of the median property value for each county is also included as a variable under the economic factors. Furthermore, the property value may affect the entry of new service providers and influence the expansion an existing the facilities. Higher property values are expected to deter new entrants and reduce the competition, which in return reduce the level of quality. On the other side, higher property value indicates a higher level of income and a greater demand for a higher quality service.

4.2. Health Factors

One of the most prompting factors is occupancy rate. Occupancy rate is calculated by dividing the number of residents in certified bed by the number of bed available in each nursing home. Feasibly, a higher occupancy rate indicates greater demand and that may allure the provider to reduce the cost to attract more patients. A reduction in the cost will leave a negative impact on quality.

The percentage of individuals with health insurance indicates a healthier population and that may reduce the demand for nursing homes in the short-run by serving healthier lifestyle solutions for the elders and delay the need for long-term care. Though healthy

individuals are expected to live longer, the need for a nursing home service persists in the long-run.

4.3. State Policies

Reimbursement rates vary from state to another. Medicaid reimbursement rates may increase the supply of nursing homes by attracting new entrants or expanding the existing service providers as long as the reimbursement rate is above the marginal cost of the service (Nyman, 1985). Medicaid reimbursement rates may be used by states legislators to increase the number of bed vacancies. Yet, it increases the opportunity cost of attracting private patients due to the increase in the reimbursement rate. An effect that is expected to be negatively correlated with quality of the care provided.

4.4. Sociodemographic Factors

The number of the population over 85 years old can positively affect the demand for nursing home service as they increase the demand for long-term service (Scanlon, 1980). The percentage of the population over eighty-five is calculated by dividing the number of the population over 85 by the average population and multiplied by a hundred. Other significant variables that we have incorporated are the natural log of the average population in each county and racial background, which is the population of white, black, and others. Nevertheless, minority tend to serve their elderly at home due to sociocultural variations (Murtaugh, Kemper, & Spillman, 1990).

In the case of women participating in the labor force, Chiswick (1975) finds a positive association between women participating in the labor force and the demand for nursing homes, since unemployed women are more likely to provide the in-home service to their own family elderlies and reduce the need for a nursing home service (Chiswick, 1975). A covariate that represents disability is also included in the reduced form equation. It is calculated as the percentage of the disabled individuals within the county in the averaged population. States that have more disabled individuals may increase the demand for nursing home and reduce the quality of the service (Greene & Ondrich, 1990).

4.5. Quality Measurements

Other research used changes in the residents' health to measure the quality of care such as unplanned weight gains or losses, incontinence, and bedsores. We suggest that changes in the residents' health could be affected by other factors, which bias the results. Almost 40 to 50 percent of all nursing homes' admissions are comprised of short stay, which does not allow sufficient time for those changes in the residents' health to be observed. Another limitation for reporting assessment is the lack of consumers' utility for public reporting. Research outside the nursing home industry indicates that condensing complex medical information in a way that is comprehensible to nonprofessional audiences is not easy (Hibbard, Sofaer, & Jewett, 1996).

4.5.1. Health Survey Scores

This includes the total weighted health survey score, which is performed by healthcare professionals such as registered nurses, dieticians, and social workers. This survey examines the cleanliness of a facility, the appropriateness of staffing; and the satisfaction rate of the sample of residents at each and every nursing home. The survey scores are shared with consumers as a tool to assist them in the evaluation of their future nursing home. The methodology of the scoring depends on meeting the requirements within the period of 9 to 15 months.

The total weighted score is based on the date of the surveys, meaning that the most recent survey counts heavier than the oldest surveys. In our analysis, we are controlling for three years, in which the survey score of 2014 is multiplied by one, the score of 2013 is multiplied by 2/3, and the oldest survey score of 2012 is multiplied by 1/3. Finally, the sum of all weighted survey scores yields to the total weighted survey score where it needs to be multiplied by three to generate the overall score of the facility.

4.5.2. Nurses Working Hours

The Centers for Medicare and Medicaid use the payrolls submitted by the participating nursing homes. However, they do not rely solely on the payroll reported hours submitted by nursing homes. For that, the Centers for Medicare and Medicaid classify the working hours into three types, in which they differ on the basis of calculations. The reported working hours are included on the submitted payrolls, which are reported by the nursing

home. The expected working hours are based on the estimated average minutes for each nursing category produced by the CMS.

The basic rule of estimating the total expected working hours begins with the multiplication of minutes of each nurse type by the number of residents in the nursing facility, leading to the total of expected working hours for each nurse category. The state average of working hours is the mean of the all reported hours submitted to CMS for every state. The last factor is the adjusting rate, which is incorporated in the below equation to confirm that the mean of adjusted working hours is equal to the mean of reported working hours.[6]

The adjusted working hours per resident per day for each nursing category is calculated using the following formula:

*Adjusted Working Hours= (Reported Working Hours / Expected Working Hours) * State Average Working Hours * Adjusting Rate*

4.5.3. Health Inspections

All certified nursing homes must meet over a hundred regulatory standards intended to protect residents. Examples of these measures include: Appropriate management of medications, the safety of residents from physical and mental abuse, and the nature of food

[6] In our analysis we include the rating of the staffing and nurses, which captures the differences of the level of care by the residents' level of severity. For instance, a nursing home that hosts residents with a higher level of chronic disease is expected to have staffing and nurses with higher skills to match the needs of those residents.

storing and preparation. The health inspection team is composed of qualified inspectors, including at least one registered nurse. There are routine annual inspections, but additional inspections may be performed more than once depending on the outcomes of the annual investigations.

The supervisory standards are the main guidelines for the inspection team to follow while examining many characteristics of the daily practice at the nursing home including the level of care given to residents, the procedures of care, the interactions between staff and residents; and the overall atmosphere of the nursing home. The inspector's team will also evaluate the residents' medical records, interview a sample of residents including family members, and examines the qualifications of the nurses and the managerial staff.

Respectively, a nursing home that provides services to people with Medicare or Medicaid is obligated to make the scores of its last inspection accessible for the public use. These inspectors evaluate the nursing home to confirm meeting the minimum requirements. If a nursing home does not have any deficiencies, it means that it has only convened the minimum standards at the time of the inspection. However, Inspections do not identify nursing homes that give outstanding care.

4.5.4. Health Complaints

We are using the average of health deficiencies in addition to the average of health complaints; and the natural log of the total dollar amount of fines resulting from non-compliance. Some of those complaints are self-reported due to the lack of proper care of

residents, especially those residents with chronic diseases such as arthritis; asthma, fatigue and mobility impairment. Overall, health complaints projected little health-related quality of life. For instance, women had lower health-related quality of life than men and potentially higher degree of self-reported health complaints. (Borglin, Jakobsson, Edberg, & Hallberg, 2005). Several health claims are amenable for their prediction of low qualities of service; and for the strong impact on nursing home care. In most cases, nurses can assist in the early detection of health complaints that negatively affect the quality of life by applying more preventive work as well as a higher degree of comprehensive and systematic assessments. It also seems important to consider that older woman's and men's needs for high quality of life may always differ.

The Complaint Unit falls under the state's department of health. This unit offers an efficient way of processing complaints received from the primary contact, beginning with the intake of a complaint to the investigation until claim closing. The investigation team strives to warrant a safe environment and a high quality of care provided to those recipients of care by certifying the providers of services and nursing home facilities. It guarantees that long-term care providers continuously meet Medicare/Medicaid and state requirements. Complaint investigation remains anonymous, and the identity of the resident is never disclosed. The definition of "improper care" involves any complaints resulting from inaccurately prescribed drugs or wrongfully planned medication at a nursing home, and any inappropriate treatments offered to residents. It also includes early discharging of a resident from a hospital to the nursing home after performing a needed surgery, or inadequate discharging procedure.

Summary statistics in Table 1 shows that the implementation of CON has limited the supply of nursing home. Consequently, the patient to bed ratio appeared greater in CON states. Table 1 indicates that CON states have a relatively higher occupancy rate, 81% compared to 79% in non-CON states. The number of population is substantially smaller in the CON states; nevertheless, there are more health insured individuals in the CON states. The percentage of health-insured individuals is 3.5 percentage points higher in CON states. The overall economic conditions in the CON states are relatively lower than of the non-CON states. Furthermore, retirement and family incomes are also comparatively smaller in the CON state. Retirement income in the CON states is less by 6%, while household income is less by 5.6% than the non-CON states. Another significant discrepancy emerged from the property values in the CON states, which tend to be substantially lower by 24% than the non-CON states, while the unemployment rate is only higher by 0.3 percentage points in the CON states.

Table 1 shows that aged and disabled population are relatively higher in the CON state, which may explain the attempt to control the cost of the nursing homes by these states through the implementation of the CON laws. The proportion of the disabled population over the age of 65 and 85 years old indicated higher percentages in the CON states by 1.9, 1.7, and 0.3 percentage points, respectively. A higher proportion of African-Americans and a lower percentage of minorities live in the CON states, which conforms to the relatively lower income levels and higher rates of unemployment in the CON states.

Tables 2 shows that quality measurements tend to be lower in the CON states. While the weighted health survey score is considerably lower in the CON states.

Nevertheless, due to more regulation, the CON states scored a marginally higher health inspection rating and a smaller number of complaints. Although the number of complaints was less in the CON states, the total amount of fines was significantly higher, that reflects the lower level of compliance with the regulation. At a lower level of quality the nursing home industry is prone to ongoing higher amounts of fines.

5. Estimation Results

The first column, model (a) in Table 3 and 4 represents the regression with only the socioeconomic factors included in the reduced form equation. Socioeconomic factors include the percentages of the population over eighty-five, the natural log of average population in each county, race, and percentages of the disabled individuals to the average population. The second column, model (b) includes the economic factor such as the natural log of the mean retirement income, natural log of the mean family income, a county level unemployment rate, and the natural log of the median property value for each county. The third column, model (c) includes policies factors such as reimbursement rate. The fourth column, model (d) includes health factors such as occupancy rate and percentage of the population with health insurance.

The Results in Table 3 show a significant reduction in the quality measurements in the for-profit nursing homes located in the CON states. Being in a CON state negatively affects the health survey score. Total weighted health survey score is reduced by 10 points in CON states. The impact is statistically significant under 1% level of significance. The analysis displayed in (Table 3) provides evidence that nursing homes in the CON states

control the cost by reducing the quality of service. The analysis provides evidence that nursing homes in CON states substituted the expensive labor hours provided by Licensed Practical Nurses (LPNs) with cheaper labor hours provided by Certified Nursing Assistants (CNAs). An average for-profit nursing home in a CON state reduces the daily worked hours per resident of Licensed Practical Nurse by .033 hour (approx. 2 minutes) and increases the daily worked hours per resident of Certified Nurse Assistant by .1 hour (6 minutes). The average nursing home has 90 residents, with means that an average for-profit nursing home in a CON state reduces the expensive hours worked by LPNs by 3 hours. There is no evidence that being in a CON state affected the hours worked by Registered Nurses (RNs) as the effect turns to be statistically insignificant after adding the economic factors (Table 3, model (b)).

Staff rating showed a trivial increase of .1 points for a nursing home situated in a CON state, which cannot be considered as a quantifiable improvement in the quality of services provided. There is also a slight improvement in the rate of health inspections and health deficiencies. Governments' inspection teams rate nursing homes based on an annual inspection and responsible for additional investigations of any filed complaints and reporting them as deficiencies, if claims were found valid. The improvements in the health inspection ratings and health deficiencies are economically insignificant. An Average nursing home in CON states has a higher health-inspection rate by a trivial .09 points and a lower health deficiencies rate by .18 incidents. This slight improvement could be explained by the ability of the for-profit nursing homes in CON states to meet the minimum standard that satisfies the requirement of passing the inspection. Yet, they failed to satisfy

their residents since the trade-off between quality and cost appears to deteriorate residents' survey and reduces the hours of Licensed Practical Nurses.

Table 4 presents a list of covariates that we assume they may impact the quality of service in the for-profit nursing homes in addition to all other types of ownerships located in the CON and Non-CON states. These covariates are reimbursement rate, occupancy rate, disability rate, percentage of population over 85, and the percentage of women participating in the labor force.

Table 4 dictates that the reimbursement rate is positively associated with the quality of care in the CON states, while there is no evidence of a correlation between the reimbursement rate and quality of care in the non-CON states. This could be due to the size of a greater market share of the Medicaid patients in the CON states, which allows a greater impact of the reimbursement rate on the quality of care. The effect is higher on the for-profit nursing home compared to all other types of ownership.

As expected, the occupancy rate is negatively impacting the quality of service of the nursing home industry as a whole, including all types of ownerships, whether it is located at a CON or a non-CON state. On the contrary, the percentage of disability shows no effect on the quality measurements. As for the percentage of population over 85, which reduced the quality of service of the nursing homes located in the CON and non-CON states, which also impacted all types of ownerships of nursing homes. This reduction is primarily caused by the population over the age of 85 years old, which lead to the higher demand for services at a heavily regulated state and understaffed nursing homes. Therefore, effects seemed higher in the CON states, where the expansion of services is limited, and the supply of nursing homes is restricted.

The percentage of women in the labor force is negatively associated with the quality of care of nursing homes in the CON states. A decrease in the quality may be caused by higher demand, which provides evidence of a positive correlation between the percentage of women in the labor force and the demand for nursing home care.

6. Robustness Check

The analysis in Table 5 is a replica of Table 3 analysis, yet without excluding the other types of nursing homes that are non-profit and governmental. The results are consistent with the findings in Table 3. Being in a CON state leads to a reduction of 5.6 points (column d) in the health survey score for all types of nursing homes, compared to a reduction of 10 points for the for-profit nursing home. The decline in the hours worked by the LPNs is similar to the decrease in LPNs worked hours in for-profit nursing homes. An average nursing home in a CON state reduces the daily worked hours per resident of Licensed Practical Nurse by .032 hour (approx. 2 minutes) and increase the daily worked hours per resident of Certified Nurse Assistant by .12 hour (7.2 minutes). The slight improvement in health inspection rating and health deficiencies turned to be statistically insignificant when the non-profit and governmental nursing homes were included in the analysis. The number of fines is not affected by whether the nursing home is being in CON state or non-CON state. The last column of Table 5 is a replica of the analysis of the full model (Column d) but after excluding the for-profit nursing homes from the sample. The results came comparable to the analysis for the full sample; however, non-profit nursing homes did not reduce the hours worked by LPN, as reducing the cost is not a priority for non-profit organizations where the profit is not the main drive.

6.1. Two-Stage Least Squares

There was a concern that state decision regarding implementing CON is not independent of the quality of nursing homes care, which may bias the results. Two-Stage Least Squares (2SLS) regression is used to check the robustness of the results. Republican affiliation is used as an instrumental variable for the CON states. Party affiliation by state data for the year of 2014 is collected from Pew Research Center. The instrumental variable passed both the relevancy and the exogeneity tests. The coefficient of the Republican Party affiliation is economically and statistically significant when it serves as an explanatory variable for the implementation of the CON law ($F = 48$), which indicates that the IV is not weak and has desirable asymptotic properties; thus, IV estimates are unbiased. An increase of 1 percentage point of the Republican affiliation of the state leads to an increase of .5 percentage point of the likelihood of implementing the CON (p-value $< .05$). The instrument is uncorrelated with the residual of the main equation (p-value > 0.1), which makes it exogenous to the outcome variables. Table 6 displays the results of the Instrumental Variable (IV) model for the for-profit nursing homes and all other types of nursing homes. The IV model renders comparable results to the OLS model. We also conducted a Hausman test for exogeneity, which showed that the CON results were not biased. Thus, the CON variable could be treated as exogenous.

7. Conclusion

In this paper, we presented an unconventional approach to analyzing nursing homes quality of service under either the presence of an antitrust law or the absence of such regulation. The estimated model enables us to answer some of the questions that previous studies cannot tackle. In particular, the model enables us to identify which outcome variable; quality measurements for nursing home quantify the extent of rationing. We also examined the relationship between the law and service outcomes and quality of care. Compared with previous studies, our reduced-form model controls of the providers' characteristics including the high occupancy rates, which is a more common phenomenon in the CON counties. However, it is not clear if the lack of CON represented by the capacity and nursing home growth constraints would necessarily improve social welfare because providing extra nursing home care can dramatically increase Medicaid expenditures. In particular, our study assumes that nursing home quality to be endogenous in the short run due to health inspections and deficiencies. Although we believe this assumption is reasonable for our research purpose, which is to develop an empirical framework to quantify the extent of rationing at a given point of time, it is certainly a limitation if one is interested in understanding the long run equilibrium.

We find evidence that the implementation of CON reduced the quality of nursing home care by a significant reduction in the patients' satisfaction and a reduction in the LPN worked hours. An average nursing home in a CON state has a reduction of 10 points in the health survey score and a reduction in the LPN worked hours by 3 hours per day compared to a nursing home that is located in a non-CON state.

Lin (2012) has taken an important step towards this research direction by developing a dynamic oligopoly structural model. However, such a model is very computationally intensive. In the future, a significant research topic is to combine our quality model with a dynamic oligopoly supply side model of quality choice, to study the long term impact of government regulations.

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APPENDICES

APPENDIX A: TABLES

Table 1. Summary Statistics for Some of the Important Covariates

	With CON	Without CON
Occupancy Rate	81%	79%
	(17.27)	(18.68)
Population	485,000	1,740,358
	(836,335)	(2,920,548)
Retirement Income	22,054	23,490
	(4,559)	(4,478)
Family Income	79,100	83,840
	(21,589)	(18,639)
Health Insured	87%	83.6%
	(4.66)	(5.80)
Unemployment Rate	6%	5.7%
	(1.49)	(1.57)
Disability	13.6%	11.7%
	(4.77)	(3.84)
Property Value	170,500	223,677
	(96,157)	(148,647)
Reimbursement Rate	60%	56%
	(7.38)	(6.04)
Population Over 65	15%	13.3%
	(5.17)	(4.86)
Population Over 85	2%	1.7%
	(0.34)	(0.38)
White	75.7%	75%
	(8.88)	(9.60)
Black	15%	7.7%
	(8.66)	(3.25)
Minority	9.3%	17.5%
	(5.05)	(10.15)
Women in Labor Force	58.5%	58.7%
	(3.05)	(2.59)

NOTES.— CON represents states with CON/moratoria. The numbers in parentheses are the standard errors.

Table 2. Summary Statistics for the Quality Measurements (Outcome Variables)

	With CON	Without CON
Health Survey Score	51.61	81.35
	(65.09)	(84.26)
RN	0.53	0.53
	(0.23)	(0.26)
CNA	2.39	2.42
	(0.56)	(0.63)
LPN	1.06	1.08
	(0.41)	(0.45)
Nurse	3.84	3.88
	(0.74)	(0.83)
RN Rating	3.26	3.21
	(1.18)	(2.27)
Staffing Rating	3.04	3.02
	(1.09)	(1.19)
Health Inspection Rating	2.72	2.63
	(1.28)	(1.27)
Health Complaints	1.81	2.43
	(2.49)	(3.29)
Total Amount of Fines	10,281	6,702
	(47,892)	(26,506)

NOTES.— RN is adjusted RN staffing hours per resident per day. CNA is adjusted CNA staffing hours per resident per day. LPN is adjusted LPN staffing hours per resident per day. Nurse is adjusted total nurse staffing hours per resident per day. RN rating is RN staffing rating.

Table 3. Regression Estimates of the Certificate of Need (CON) on the Quality Measurements Variables

CON	(a)	(b)	(c)	(d)
Health Survey	-13.7236***	-9.4685***	-9.8494***	-9.9346***
	(2.2470)	(2.2688)	(2.2735)	(2.2814)
RN	.0250***	.0016	-.0013	-.0076
	(.0073)	(.0073)	(.0073)	(.0073)
CNA	.1053***	.0956***	.0892***	.1033***
	(.0177)	(.0179)	(.0180)	(.0180)
LPN	-.0381***	-.0246**	-.0233*	-.0329**
	(.0128)	(.0130)	(.0131)	(.0131)
RN Rating	.1752***	.0432	.0250	-.0116
	(.0361)	(.0360)	(.0359)	(.0360)
Staff Rating	.2483***	.1459***	.1255***	.1070***
	(.0344)	(.0345)	(.0344)	(.0345)
Health.Insp Rating	.1051***	.0751*	.0797*	.0942**
	(.0402)	(.0409)	(.0409)	(.0411)
Health Deficiencies	-.2131**	-.1163	-.1455*	-.1797**
	(.0872)	(.0881)	(.0882)	(.0885)
Fines	.0524.	.1030	.0810	.0194
	(.0966)	(.0997)	(.0996)	(.1014)

NOTES.—Model (a) only includes the socioeconomic factors. Model (b) includes the economic factors. Model (c) includes state policies variables while Model (d) includes health factors.

Table 4. Reported Coefficients for Some of the Covariates

	CON States			Non-CON States		
	For-Profit Nursing Homes					
	Health Survey	LPN	CNA	Health Survey	LPN	CNA
Reimbursement Rate	.9705***	-.0009	.0123***	1.6358***	.0014	-.0044
	(.2481)	(.0015)	(.0021)	(.5951)	(.0030)	(.0042)
Occupancy Rates	-.4024***	-.0019***	-.0018***	-.4214***	-.0040***	-.0013
	(.0537)	(.0003)	(.0004)	(.1008)	(.0006)	(.0008)
Disability	.1654	.0013	-.0001	.6886	-.0032	-.0059
	(.2299)	(.0014)	(.0019)	(.5878)	(.0029)	(.0042)
Over 85	-15.8027***	-.0423*	.4540***	-.8494	-.1101**	-.1912***
	(3.6964)	(.0228)	(.0306)	(8.4303)	(.0432)	(.0604)
Women in Labor Force	-.3315	-.0317***	-.0260***	5.2862***	.0034	-.0074
	(.5029)	(.0031)	(.0042)	(1.3651)	(.0070)	(.0098)
	All Types of Nursing Homes					
Reimbursement Rate	1.0002***	.0012	.0102***	.5642	-.0019	-.0055*
	(.1831)	(.0015)	(.0020)	(.3535)	(.0021)	(.0029)
Occupancy Rates	-.3885***	-.0025***	-.0029***	-.3685***	-.0027***	.0015***
	(.0413)	(.0003)	(.0005)	(.0641)	(.0004)	(.0006)
Disability	.0946	-.0005	.0003	.2369	-.0027	-.0052*
	(.1393)	(.0011)	(.0015)	(.3215)	(.0019)	(.0027)
Over 85	-13.6926***	-.0423*	.3157***	-10.9694**	-.1306***	-.1233***
	(2.7442)	(.0219)	(.0305)	(5.255)	(.0315)	(.0439)
Women in Labor Force	-.2749	-.0290***	-.0171***	2.3467***	-.0036	-.0031
	(.3721)	(.0029)	(.0041)	(.8082)	(.0048)	(.0067)

Table 5. Regression Estimates of the Certificate of Need (CON) on the Quality Measurements Variables for all Types/Non-Profit of Nursing Homes

CON	(a)	(b)	(c)	(d)	Only Non-Profit
Health Survey	-7.8373***	-5.0418***	-5.2271***	-5.5782***	-4.1054**
	(1.4649)	(1.4775)	(1.4803)	(1.4841)	(1.9244)
RN	.0201***	.0015	-.0012	-.0083	.0120
	(.0063)	(.0063)	(.0063)	(.0063)	(.0108)
CNA	.1245***	.1154***	.1082***	.1196***	.2037***
	(.0146)	(.0149)	(.0149)	(.0149)	(.0246)
LPN	-.0369***	-.0197*	-.0195*	-.0317***	-.0142
	(.0104)	(.0105)	(.0106)	(.0105)	(.0176)
RN Rating	.0731***	-.0176	-.0353	-.0635**	-.0316
	(.0249)	(.0248)	(0248)	(.0249)	(.0348)
Staff Rating	.1547***	.0883***	.0693***	.0557**	.1337***
	(.0243)	(.0245)	(.0244)	(.0246)	(.0346)
Health.Insp Rating	.0357	.0064	.0086	.0261	.0315
	(.0279)	(.0283)	(.0284)	(.0285)	(.0402)
Health Deficiencies	-.0155	.0430	.0255	-.0178	.0236
	(.0562)	(.0567)	(.0568)	(.0569)	(.0713)
Fines	-.0274	.0034	.0006	-.0512	-.1238
	(.0722)	(.0736)	(.0735)	(.0753)	(.1151)

Table 6. Two-Stage Least Squares Estimates for For-Profit and all Types of Nursing Homes

CON	For-Profit Nursing Home	All Types Nursing Home
Health Survey	-19.6992***	-14.8774***
	(4.1250)	(4.7405)
RN	-.0104	-.0093
	(.0133)	(.0203)
CNA	.3123***	.2622***
	(.0326)	(.0271)
LPN	-.0877***	-.1011***
	(.0206)	(.0265)
RN Rating	.1551	-.0932**
	(.1285)	(.0445)
Staff Rating	.2069**	.0735*
	(.0999)	(.0456)
Health.Insp Rating	.4875***	.1021
	(.1195)	(.1284)
Health Deficiencies	.3731	-.0335
	(.2543)	(.0638)
Fines	.0602	-.1150
	(.3736)	(.2652)