

RESEARCH ARTICLE

Fertility and Family Labor Supply: Evidence from the United States

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Abstract: This paper investigates the impact of the abortion law changes on family labor supply in the United States in the early 1970s. It attempts to answer the key question: do the law changes affect labor supply of fertile women and their parents who co-reside with them? Following the works of Chiappori, Fortin, and Lacroix (2002) and Oreffice (2007), I propose a collective labor supply model for households in which a fertile daughter resides with her parents. In empirical section, using data from the March Current Population Survey and Panel Study of Income Dynamics, I find a significantly positive influence of the law on fertile women's capacity to work and a negative influence on their mothers in mother-daughter family scenario. It can be explained that the availability of the birth control allows the daughters more time to work for earning and provides their mothers fewer opportunities to financially support their newborn grandchildren. The paper uses the Heckman selection bias correction technique to correct the bias due to missing data on working behaviors of the family members. The novelty of this paper includes the investigation of the effect on working behaviors of people rather than spouses in an extended family.

Keywords: Abortion reform, labor supply, fertility, bargaining, children, fertile women

Economists are concerned about the influence of abortion legalization on individual and household labor supply for decades. The legalization directly enhances women's labor market opportunities by increasing their possibility of birth control. Labor force participation (LFP) of both the wife and husband are usually investigated because women are more likely to spend more time on childcare while the men will provide more labor supply in response to a presence of the new born child as to Becker's (1985) theory. Also, the legalization may alter the returns to the specialization within marriage, and, thus, the return to market versus non-market labor (Stevenson, 2007). The abortion law may affect not only the working behavior of the

husband but also of other members of the family where a woman co-resides. This may happen through a change of returns to specialization within the co-residence or a shift of household bargaining power. In the United States, around 10% of women aged from 25 to 34 lived with their parents in 2011 (Census Bureau, 2011). Kreider (2007) found that 67% of young women living at their parents' home have at least one child. Mutchler and Baker (2009) indicated that 4.4 million children (i.e., 6.1% of all children) in the United States were raised in households with the presence of their grandparent in 2000. About 2.4 million grandparents living with their grandchildren provide most of the childcare responsibilities. According to Mutchler

and Baker, an important reason for the presence of grandmothers in three-generation families is financial assistance (contributing both directly, income or assets, and indirectly, educational and employment opportunities for young mothers).

This paper investigates the impact of state laws on abortion in the early 1970s on the labor supply of members within the family (young woman and her parents) using data of the March Current Population Survey (CPS) and the Panel Study of Income Dynamics (PSID). The relationship between the laws and working behaviors of people in extended families is not well examined before, as to my knowledge. I focus mostly on families in which a daughter lives with her parents (and maybe other family members) but only the daughter and one of her parent are the main workers. The other parent may be absent or present but does not work.

These families are classified into two groups: (i) mother-daughter family group – a daughter resides with her mother while her father is absent or does not work and (ii) father-daughter family group – a daughter lives with her father while her mother absent or does not work. The reason for this selection is that a family in which a mother plays the role of housewife or one parent is in retirement is a well-known phenomenon in the early 1970s in the United States.

In this paper, I applied the Heckman selection bias correction technique to examine the changes in LFP of the family members in association with the abortion law. It follows the work of Oreffice (2007). This technique allows the correction of the bias due to missing data on working behaviors of the family members. My estimates suggest that the abortion law significantly contributes to the increase in working daughters and a decrease in working mothers in mother-daughter families. The paper also analyzes the impact of the abortion legalization on the different marital status and religious groups. The novelty of this study includes the investigation of the effect on LFP of people rather than spouses in an extended family.

Literature Review

Abortion laws became valid in the 1820s in the United States, forbidding pregnancy termination after the fourth month of pregnancy. Under the pressure

from physicians, the American Medical Association, and legislators, most abortions had been illegal by 1900 (Lewis, 2017; Coaste, Companioni, and Bethune, 2007).

Abortion issues came back to debate in 1967. The first 12 states allowed abortions in specific situations (e.g., to protect the mother's physical health, women involved in rape and incest, or if the fetus was deformed). In late 1969, California legalized abortion as prohibiting this activity infringed on a woman's constitutional rights. In 1970, Alaska, Hawaii, New York, and Washington lifted the abortion restrictions for all circumstances. Finally, the Supreme Court, in 1973, stated that most existing state abortion laws are unconstitutional. It is also called *Roe v. Wade* (1973)

In theoretical literature, a seminal work relating to the issue is Chiappori et al. (2002). Chiappori et al. proposed a collective model to investigate the influence of divorce legislation on household labor supply. Blundell, Chiappori, and Meghir (2005) extended Chiappori et al.'s (2002) work to introduce children as home production into a collective labor supply framework. Other notable models based on the works of Chiappori et al. are those dealing with problems such as many consumption goods, fixed labor supply, housework, non-participation, and time use (Chiappori, 2011; Donni, 2007; Klaveren, Praag, & Brink, 2009; Cherchye, Rock, & Vermeulen, 2012).

Previous empirical literature provides much evidence on the impact of family laws on labor market outcomes of both men and women. Chiappori et al. (2002) used sex ratio and divorce laws as "distribution factors" to indicate a significant influence of the laws on female working behavior. Lefebvre and Merrigan (2008) pointed out that childcare subsidy reforms have positive effects on the labor behaviors of women with young children. Gray (1998) stated that without considering marital property laws, unilateral divorce laws do not give any consequence on married women's labor supply. Stevenson (2007) revisited the relationship between divorce reform and female labor supply for both married and unmarried women and found that the effect of unilateral divorce does not change regarding property division, and women's labor supply strongly increases in unilateral divorce states more than in non-repeal states, regardless of their marital status.

Also related to this study is literature on oral contraception and labor supply. Goldin and Katz (2002) indicated that the diffusion of oral contraception increases women's human capital accumulation. Bailey (2006) reported that the pills help reduce the incidence of birth-giving before 22 by around 14%. This paper also benefits from the literature on the relationship between other legislative change and labor supply, such as Manacorda (2006). Manacorda used state-level child labor laws in 1920 as proxies to circumvent the endogeneity problem while exploring the effects of child labor laws on the labor supply of members in the extended family. His study showed that eligibility to work leads to an increase in probability to work rather than attend school among children of low-income families. It also exerts a positive spillover effect of working among siblings. However, it does not result in a significant effect on parents' LFP.

This paper has a close relationship with the works of Angrist and Evans (2000), Oreffice (2007, 2011) and Kalist (2004). Angrist and Evans (2000) indicated that abortion legalization results in an increase of schooling and employment rates among black women. Kalist (2004) examined the impact of the abortion legality before *Roe v. Wade* (1973) on female LFP using data from the March Current Population Survey (MCPS). He pointed out that the law exerts a positive influence on the participation rates of women, especially those who are black and single. Oreffice (2007) argued that while many studies focus on substitution effects that cause a decrease in fertility, a shift in a spouse's fertility decision rights may lead to an income effect by changing the balance of power within the household, and thus redistributing the household resource allocation. She proposed a model of collective household behavior in order to show that an increase in women's bargaining power because of the laws is followed by a decrease in women's and an increase in their husbands' labor supply. In her work in 2011, Oreffice indicated that both homosexual and heterosexual couples exhibit a significant response to bargaining power shifts, as computed by age and non-labor income differences between partners. Among cohabiting couples, a relatively young or rich partner gains more power and reduces labor supply while the opposite is true for his or her partner. Nguyen, Van, and Phan (2018) also found that positive influence of child custody law reforms on married women's labor

supply and a negative influence on their husbands' in the United States.

Theoretical Methods

Many previous studies have recognized the role of abortion legalization in enhancing women's labor market options by increasing their opportunities to birth control. The theory of household collective labor supply provides another interpretation for the operation of the abortion legality. For spousal labor supply, since married women have an outside option of divorce, the legalization should improve their bargaining power to the extent that it is creating more opportunities outside of marriage (Oreffice, 2007). The co-residency of daughters and their parents is similar to Oreffice's argument because daughters have the option of living apart from their parents, and abortion legality can change their bargaining power so that it changes their opportunities for leaving their parents' home.

This paper extends the works of Chiappori et al. (2002) using a collective labor supply model to set up a theoretical framework for the problem. This model consists of a minimal assumption that the outcomes of intra-household resource allocation are Pareto efficient. Unlike the cooperative bargaining models, there are no household games or mechanisms to be specified. Consider a household with two primary decision makers (workers), a young woman and a parent. There may be other people in the household but they should not be in the labor force. This restriction is similar to that of Oreffice (2007). (A model of three-or-more-decision makers household is beyond the scope of this study). Each decision maker has a utility function on consumption and leisure. Chiappori et al. (2002) assumed that these functions are strictly quasi-concave, increasing, and continuously differentiable. Preferences are egoistic so that each individual's utility does not depend on the other's consumption and leisure. Let h^i and C^i denote individual i 's labor supply and consumption ($i = d, p$), Y non-labor income, w_i wage rate of individual i , and z distribution factor. Standard literature in collective labor supply assumes that h^d and h^p are functions of wages w_d, w_p , non-labor income Y , and the distribution factor z . The functions $h^d(w_d, w_p, Y, z)$, $h^p(w_d, w_p, Y, z)$ are supposed to be twice continuously differentiable.

The optimal allocation of labor supplies is given by:

$$\begin{aligned} & \text{Max}_{h^i, C^i} U^i(1 - h^i, C^i) \\ & \text{s.t.} \\ & w_i h^i + \varphi^i(Y, z) \geq C^i \end{aligned} \quad (1)$$

where each decision maker faces a symmetric problem. The sharing rule φ^d and φ^p denote the daughter's non-labor income and her parent's respectively, where $p = m$ or f , (representing for mother or father respectively). Both φ^d and φ^p depend on w_d , w_p , Y , and z . The total non-labor earnings $Y = \varphi^d + \varphi^p$ so that the greater the daughter's bargaining power, the larger her share of non-labor income and the lower her parent's. The labor supply equations of the parent and the daughter are as follows:

$$h^p = h^p(w_p, \varphi^p(w_d, w_p, Y, z)) \quad (2)$$

$$h^d = h^d(w_d, Y - \varphi^p(w_d, w_p, Y, z)) \quad (3)$$

If leisure is a normal good, the derivatives of each labor supply equation with respect to the second term are negative. It means a distribution factor that favors the parent's decision power decreases the parent's labor supply and increases the daughter's labor supply. In this study, abortion legality plays the role of distribution factor z . An example of the theoretical prediction is that when a daughter gives birth, the mother is involved more in the labor market to financially support her daughter, and the daughter reduces her work in order to rear the child. Thus, the availability of the birth control reduces the mother's labor supply and increases the daughter's. The empirical works will indicate the direction the daughter and her parent respond to such a factor.

Empirical Results

Two datasets, the March Current Population Survey (March CPS) and the Panel Study of Income Dynamics (PSID), are used in this paper. Both datasets are needed because I am interested in both the large sample size and the role of other factors such as marital status and religious preference that no dataset alone can serve. The study follows previous literature (e.g., Angrist &

Evans, (2000), considering abortion legality in five states (California, New York, Washington, Alaska, and Hawaii) in 1970. Though Washington DC is treated as an "early legalizer" in some studies (e.g. Joyce, 2004; Kalist, 2004), the paper does not include the district into the repeal areas group in 1970. Similar to Donohue, Grogger, and Levitt (2009), the study uses the waves from 1970 to 1975 of both CPS and PSID. All incomes are inflated to 1975's dollars using the CPI Inflation Calculator of the Bureau of Labor Statistics.

I examined the effect of abortion legality in the 1970s on the labor supply of family members. I focused on families in which fertile women live with their parents. Only women in their fertile age (from 15 to 43 years old) are considered as directly affected by the laws. To avoid the direct effect of the abortion legalization on mothers, only mid-aged mothers (over 45 years old) are included in the mother-daughter samples. The upper bound of age for both parents is 65, the threshold for normal retirement age. CPS provides data neither on individual's weeks worked, nor on annual working hours before 1976. Therefore, the interval of weeks worked is used to analyze. I investigated two main groups of families: the mother-daughter and the father-daughter families. In the first group, mother and her fertile daughter are the main decision-makers and in the second group, father and his daughter are assumed to be responsible for most household decisions. To focus on the impact of the legislation change on the two primary labor suppliers in the family, I ruled out households where both spouses participate in the labor market in the survey year. The other parent in each group (father in the first and mother in the second respectively) and the daughter's husband may be present in the household but they should not work (i.e., zero labor income).

Most mothers in the first group are head or wife of the head of household while most fathers in the second group are head of household. Households in which the daughter or the parent does not work are also included in the samples. Following Oreffice (2007), I used Heckman Maximum Likelihood Estimation (MLE) to correct the possible selection bias toward working people.

The sample of selection bias happens when the dependent variable is only observed for a restricted, nonrandom sample. Selection bias problem can drive to erroneous conclusions and poor policy. An example of selection bias is when the determinants of wage offers

need to be estimated, but only the wage information of those who work can be observed. As workers are not picked randomly from the population, the estimation of the determinants of wages only from workers group can lead to bias. Heckman (1979) offered some means to correct the bias problem such as the Heckman two-step correction and Heckman MLE.

Predicted wages are used to estimate the wages of non-working daughters or parents in order to tackle endogenous problems involving in their observed wages. The standard human capital approach proposed by Donni (2007) is applied to predict the wages. This approach assumes that an individual's wage depends on one's characteristics but not on the characteristics of the other members of the family. The fitted values will then replace the observed wages in labor supply regressions. I found that the Wald tests on labor supply regressions do not reject the validity of the setting used. In addition, all labor supply regressions used robust standard errors clustered by the state in order to recognize the correlation among observations within states.

From statistic summary, I found that the mean of the daughters' income is \$4,725 while that of the mothers is nearly double. The mean of household's total income is \$14,567, more than twice of the mean of the mothers' labor earnings. Majority of the daughters in the sample are below 24 years old while 55% of their mothers are in the age interval from 45 to 54. Eighty-three percent of the daughters selected are white and another 16% are black. The most common family size is 2–3 members, accounting for more than 70% of the sample. Around 90% young women in the sample attained at least some high school levels. One-quarter of them takes some classes in college or some graduate levels. However, this fact may not reflect their last educational attainment because a significant number of them are still very young (below 24) and they may continue their study after the survey. Of the selected daughters, 53% fully take part in the labor force while 80% of their mothers do so. Forty-four percent of observations are made in repeal states or drawn from the surveys beyond 1973. The majority of the daughters are still single (85%) and nearly half of them reside with both parents (46%). Most of these daughters have no child. The size of the father-daughter sample is larger than the size of the mother-daughter sample as I did not set a restriction on the fathers' age while in the mother-daughter sample, mothers should be over the fertile

age so that the abortion legality does not directly affect them. The mean of household income in this sample is \$21,993. Nearly half of the selected fathers end their education at high school. However, the percentage of men who spend more than six years in college is around four times greater than that of women in the mother-daughter sample (5.6% vs. 1.14% for father-daughter and mother-daughter samples respectively). The proportion of fathers involved in the labor force is very high, 92%. The rate of father-daughter households locating in affected areas almost equals to those in the mother-daughter sample. More than 92% of households in the sample has a wife.

Since *people who work* were not *selected randomly* from the *population*, *estimating the determinants of wages* from this subpopulation *may introduce bias*.

Table 1 exhibits results of the Heckman estimation on the effect of abortion legality on unmarried women's (i.e., those who are never married, divorced, widowed, separated, or have husband absent) and their mother's LFP in mother-daughter families using PSID data. The labor supply equations are as the follows:

$$H^d = h^d(\ln w^d, \ln w^p, y, X, \text{Abortion}) + \varepsilon^d \quad (4)$$

$$H^p = h^p(\ln w^d, \ln w^p, y, X, \text{Abortion}) + \varepsilon^p$$

where the dependent variables H^d and H^p denote annual working hours of the daughter and her parent respectively. Abortion is a dummy variable for whether abortion is legalized; $\ln w^d$, $\ln w^p$ denote their log hourly wages, y non-labor income, and X explanatory variables. The abortion variable equals to 1 for residents who live in the five repeal states during the period 1971–1973 or for all residents after 1973, following the Supreme Court's ruling on *Roe v. Wade* (1973), 0 otherwise. My identification strategy consists of estimating the coefficients of this variable. Household non-labor income is computed by the annual total household income minus the daughter's and her mother's labor income (wage and salary). Year-specific and state-specific dummies are also controlled to avoid understated standard errors as noted in Bertrand, Duflo, and Mullainathan (2004).

The estimations show that the mother's labor supply negatively responds to the abortion laws change while that of the daughter is positively affected. The impact of the legalization on both women is significant. The

Table 1

Unmarried Fertile Daughters and Mothers (PSID data)
Dependent Variable: Annual Working Hours

	Fertile daughter	Mother
Abortion	185.0*(94.32)	-192.7*(110.5)
Log wage of daughter	2560 (2485)	4818 (4234)
Log wage of mother	1133 (2323)	2970 (3240)
Age of daughter	176.4***(50.56)	-101.5 (87.95)
Age of mother	-147.8 (191.5)	-242.8 (370.2)
Education of daughter	57.27 (36.25)	7.480 (45.38)
Education of mother	-215.4 (213.9)	-238.8 (329.4)
Number of grandchildren	Yes	Yes
Household non-labor income	Yes	Yes
Year fixed effects	Yes	Yes
State fixed effects	Yes	Yes
Sample size	485	485

*The table also controls the household non-labor squared, age squared of the daughter, age squared of the mother (father), year fixed effects and state fixed effects, and state economic variables. 1st number: Elasticity, in parentheses: Standard error: *: Significant at P = 10%. **: Significant at P = 5%. ***: Significant at P=1%.*

Table 2

Unmarried Fertile Daughters and Mothers (CPS data)
Dependent Variable: Week Worked Interval

	Fertile daughter	Mother
Abortion	0.217*(0.130)	-0.396***(0.125)
Log wage of daughter	-0.835**(0.423)	0.092(0.331)
Log wage of mother	-1.744 (1.487)	1.462 (1.781)
Age of daughter	-0.458(0.369)	0.207 (0.351)
Age of mother	0.425(2.378)	-0.026*(2.363)
Education of daughter	-0.012***(0.004)	0.008**(0.003)
Education of mother	0.015 (0.014)	-0.008 (0.017)
Number of grandchildren	Yes	Yes
Household non-labor income	Yes	Yes
Year fixed effects	Yes	Yes
State fixed effects	Yes	Yes
Sample size	3652	3652

*The table also controls for household non-labor squared, age squared of daughter, age squared of mother (father), year fixed effects and state fixed effects, and state economic variables. 1st number: Elasticity, in parentheses: Standard error: *: Significant at P = 10%. **: Significant at P = 5%. ***: Significant at P=1%.*

point estimates of the abortion variables shows that the annual hours worked by fertile daughters increase by about 185 hours per year ($P_value < 10\%$) and their mothers' fell by 193 hours per year ($P_value < 10\%$). These findings are consistent with those predicted in the theoretical section. Comparing with those in Oreffice (2007), I found that the magnitude of my findings based on PSID data is reasonable though the sample selection is different (For example, Oreffice found that wife's labor supply decreases by 105 hours per year with $P_value = 0.05$; and among couples living in high abortion access area, wife's labor supply falls 247 hours per year with $P_value = 0.01$). I do not know any literature dealing with a similar topic (i.e., the impact of abortion legality on the working behavior of members in the extended family, in which daughters co-reside with their parents). Therefore, I could not make a more accurate comparison.

Table 2 presents the estimation results of the CPS mother-daughter sample. CPS does not provide detail information on hourly wage rates or annual working hours of the household member before 1976 so that only logarithms of annual income wages are included in the estimating equations. The variable Number of Grand Children represents a number of the daughter's offspring. The dependent variables are the interval of the week worked of primary labor suppliers, the mother, and the daughter. I can use an ordered probit model to estimate the coefficients for abortion dummy. However, as Heckman MLE selection bias correction model does not support an ordered probit version and I still want to benefit from the Heckman's theory, a Heckman MLE is used instead. The findings are similar to those in Table 1: the abortion legality exerts a negative impact on the mother and a positive impact on the daughter who lives together in the same house (Checking robustness with an ordered probit model, I found the same signs of influence). These findings are consistent with those in samples based on PSID although the dependent variables are different. In the PSID's samples, the left-hand side of the estimating equations is the annual working hours. The smaller size and panel data nature of the PSID samples cause the noises in the estimations.

Tables 3 and 4 report the estimating results for the impact of the legalization on the families in which the father and a daughter are the main labor suppliers for PSID and CPS samples respectively. The size of these samples is greater than that of the mother-daughter

sample because I set a restriction on mothers' age, including only mid-aged mothers into the second sample to avoid the direct effect of abortion legality on fertile mothers. Only fathers in the PSID sample significantly respond to the law change while those in the CPS sample do not. In addition, the sign of the impact changes from negative to positive for daughters when I changed the considered period from 1970–1975 to 1970–1976 and for fathers when I extended the considered period to 1970–1976. Note that the sign of the impact of the legality on the mother-daughter samples do not change when I did a similar robustness check. Hence, the results are so insignificant and unstable that I cannot go to a conclusion about the impact on these family groups. These groups, therefore, will be removed from future estimations.

That a family law reform exerts a positive influence on the labor supply of young women is consistent with the findings of some previous literature. Angrist and Evans (2000), using measures of exposure to abortion reform as instrument variables, showed that black women benefit from the abortion legality as the policy lead to an increase in their schooling and employment rate in the United States. They argued that a decrease in teen and out-of-wedlock childbearing play a mediating role in the influence mechanism of the policy. Kalist (2004) provided a similar conclusion that the law prior to *Roe v. Wade* (1973) causes an increase in female LFP, especially for the single black women. Stevenson (2007) pointed out that unilateral divorce laws in the U.S. raise labor supply of both married and unmarried women regardless of the underlying property laws. For married women, the explanation for the phenomenon is that the laws change the value of marriage and, thus, shifts the household bargaining balance. They also affect the returns to specialization in household production by reducing the time invested in marriage and increasing the time invested in the labor market. The laws also lower marriage rates in the repeal states and, thus, cause an incentive to invest in market skills among unmarried women. Using data from the National Survey of America, Blau and Tekin (2007) emphasized the crucial role of child care subsidies in the U.S. in increasing the employment rate of single mothers. The absence of welfare participation effect reveals that these mothers “gain economic self-sufficiency through work” (p. 21), thanks to the policies. Berger and Black (1992), Meyers, Heintze, and Wolf (2002), Gelbach (2002) are some who evidence of the positive effect of

the subsidies on mothers' employment. Cardia and Ng (2003) introduced an overlapping generation model, which allowed the transfers of both time and money, and provided evidence for the positive relationship between time of grandparenting and maternal labor supply and capital accumulation. I am interested in the consistent responses of unmarried women in various studies because most of the daughters in our samples are single or with an absentee husband.

Very few pieces of literature mention the relationship between grandchild care and LFP of grandparents. Among such literature is Zamarro (2011). Zamarro (2011) pointed out a negative and significant effect of LFP on the probability of grandchild caregiving among older women. It is an important finding because the recent tendencies to make longer the working life among grandparents affect grandchild care provision and the labor supply of young mothers. There is

Table 3

Unmarried Fertile Daughters and Fathers (PSID data)
Dependent Variable: Annual Working Hours

	Fertile daughter	Father
Abortion	-6.444 (140.5)	-978.5***(217.5)
Log wage of daughter	-431.5 (760.7)	-291.4(1448)
Log wage of father	909.3*(492.0)	713.0(1143)
Age of daughter	109.1 (87.52)	73.47 (155.8)
Age of father	237.7***(60.73)	413.1 (220.4)
Education of daughter	-15.86 (116.8)	114.2 (213.2)
Education of father	-43.10 (32.86)	45.80 (60.33)
Sample size	802	802

Table 4

Unmarried Fertile Daughters and Fathers (CPS data)
Dependent Variable: Week Working Interval

	Fertile daughter	Father
Abortion	0.146(0.093)	-0.042 (0.036)
Log wage of daughter	1.384***(0.378)	0.309*(0.158)
Log wage of father	-1.022(0.428)	-0.076(0.233)
Age of daughter	0.459***(0.100)	-0.076 (0.055)
Age of father	-0.148*(0.083)	0.189**(0.074)
Education of daughter	-0.014***(0.002)	0.004***(0.001)
Education of father	0.006*(0.003)	0.001 (0.002)
Sample size	5308	5308

All tables also control the number of grandchildren, household non-labor income, year and state fixed effects, household non-labor squared, age squared of the daughter, age squared of the mother (father), year fixed effects and state fixed effects, and state economic variables. 1st number: Elasticity, in parentheses: Standard error.

*: Significant at $P = 10\%$. **: Significant at $P = 5\%$. ***: Significant at $P = 1\%$.

almost no literature on the influence of family laws on grandfathers' labor supply. Nevertheless, I am not surprised about the differential findings on households in two groups as grandma and grandpa are sharply different in childcare involvement in reality.

Robustness

Table 5 reports the estimation results for different marital status groups for robustness checking. I considered a sub-sample in which all fertile daughters are included regardless of their marital status, a sub-sample of unmarried daughters, and a sub-sample in which the fathers are absent. Families with unmarried daughters are crucial because it accounts for more than 98% of families in the CPS samples. As very few young couples in which the husbands do not work co-reside with the wife's parents, I will not examine these cases. The second column of Table 5 recalls the coefficients of abortion dummy in Table 2, just for reference. The estimations indicate that the impact of the legality is even stronger for households in which the daughter is still single or married but the husband is absent (the magnitude of the dummy coefficient is greater). The influence of the legalization on the two sub-samples, the mothers with and without their husband, is reasserted for the sign of effects for both mothers and daughters.

Religious preference and contraceptives use may affect the relationship between the abortion legality and family labor supply. According to bargaining theory, some religion such as Catholicism has a high level of anti-abortion spirit so that households in

which members possess these religious preferences may not be influenced by the law changes. PSID provides data on the religious preference of head of household only during the period 1970–1975. Hence, in this paper, I treated the head's religious preference as a representative religion of all family members. Following Oreffice (2007), I divide PSID's mother-daughter sample into two groups: (i) Anti-abortion sample, in which the head's religious preference is Catholic and (ii) Non anti-abortion sample, for the non-Catholic head of the household. After that, I replicated the regressions in Tables 1 for the two subsamples. The findings are consistent with those in Table 1: mothers respond negatively and their daughters respond positively to the legality. For the anti-abortion group, Heckman MLE regressions cannot be converged and when using OLS instead, the estimated results show insignificance. Thus, robustness check confirms predictions of the bargaining theory. Due to the limitation in data of contraceptives use during the period 1970–1975, I cannot verify the effect of birth control use on the association between abortion laws and family labor supply.

To make a comparison, I next estimated the law change effects on single fertile women who live alone. The coefficient of legalization dummy is negative, though insignificant. The demand and supply marriage models provide an interpretation to this result: abortion legality raised the expected gains of single women in marriage, driving to a reduction of their labor supply. Some of them expect a positive bargaining power effect from a planned marriage in the future (Oreffice, 2007).

Table 5

Abortion Legality and Different Family Types – Mother-Daughter Sample (CPS Data)

	All fertile daughters (regardless marital status)	Unmarried daughters	Father absent
Daughter	0.214*(0.130)	0.217*(0.130)	0.462*(0.280)
Mother	-0.374***(0.127)	-0.396***(0.125)	-0.229**(0.111)
Sample size	3665	3652	1965

All tables control the household non-labor squared, age squared of the daughter, age squared of the mother, family size, year fixed effects and state fixed effects, and state economic variables. 1st number: Elasticity, in parentheses: Standard error.

*: Significant at $P = 10\%$. **: Significant at $P = 5\%$. ***: Significant at $P = 1\%$.

Alternative explanations

This paper uses the shift in household bargaining power as an explanation for evidence of the link between the abortion legality and family labor supply. However, people may explain the results in some other ways. I will argue that these explanations do not work for this study.

a) Local market conditions toward women.

People may argue that the decrease in labor supply of middle-aged women is not due to the bargaining power effect, but instead to unfavorable conditions of the labor market toward mature women. The oil shock in 1973 terribly affected the labor market, and middle-aged women may be the most vulnerable group. However, it is not a plausible interpretation of my findings. My regressions included individual's wage, state economic variables, and year and state fixed effects, which help to pick up labor market opportunities. In addition, this argument cannot explain why young daughters should increase their labor supply while other young women do not. Another interpretation is that abortion legality may affect young women through an increase in long-term wages and opportunities. However, an increase in daughters' wages leads to a positive substitution effect without influencing middle-aged women's hours worked.

b) Availability of other birth control methods and welfare programs. Oreffice (2007) suggested that major female contraceptives such as IUD, diaphragm, and pill can lead to the same influence on labor supply as abortion legality. However, the usage of these contraceptives widely happened a decade preceding the period of investigation. Welfare programs favoring women may also cause a negative impact on their labor supply. Nevertheless, only low-income households are eligible for these programs while my findings hold for all levels of income and even hold when removing the poorest quarter of the household. Moreover, arguments based on welfare programs cannot explain the increase in daughters' labor supply.

Conclusion

Basing on the collective models of labor supply of Chiappori et al. (2002) and Oreffice (2007), the paper used Heckman bias corrected selection sample

technique to estimate the link between the abortion legality and the changes in LFP of fertile daughters and their parents in two types of household: mother-daughter and father-daughter families. It also analyzed the impact of the law changes by different marital status and religious group. CPS's and PSID's data indicated that the daughters' labor supply positively relates to the law changes while their mothers respond negatively. An explanation for the results is that the availability of the birth control allows the women more time to work and provides their mothers with fewer opportunities to financially support their newborn grandchildren. The difficulty in accessing location measure below state levels of both datasets prevents me from more detailed analyses, especially for the cases when daughters and their parents do not live together. However, the findings of this paper are notable and will contribute to the empirical literature on family economics and labor economics. Further examinations on the influence of the legality on labor supply according to demographic and household variables such as race, cohort, and household composition may be needed for future research.

Acknowledgements

I thank the editor, Gerald Marschke, Illoong Kwon, Michael Sattinger, Zhongwen Liang, SUNY Albany workshop participants, and various referees for valuable comments and supports.

Funding source

The author received no specific funding for this work.

Conflict of interest

None.

Ethical clearance

I confirm that the paper is original unpublished work, not submitted or to be submitted for consideration elsewhere. All procedures performed in studies involving human participants were in accordance with the ethical standards in academic research.

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