



PSC Research Reports

Report 14-825

August 2014

Zheng Mu and Yu Xie

Motherhood Penalty and
Fatherhood Premium? Fertility
Effects on Parents in China

Motherhood Penalty and Fatherhood Premium?

Fertility Effects on Parents in China

Zheng Mu *

Center for Social Research, Peking University, Beijing, China 100191

Yu Xie

Population Studies Center, Institute for Social Research, 426 Thompson St
University of Michigan, Ann Arbor, MI 48106-1248, USA

Population Studies Center Research Report 14-825

August 2014

Acknowledgements: An early version of this paper was presented at the 2012 International Sociological Association Research Committee 28 on Social Stratification and Mobility spring meeting in Hong Kong and the 2014 Population Association of America annual meeting in Boston, MA. We are grateful to conference participants, members of Quantitative Methodology Program at the University of Michigan, as well as Jennifer Barber, Mary Corcoran, Baochang Gu, Qing Lai, Arland Thornton, Yuying Tong, Xiaogang Wu, and Xiang Zhou for their comments and advice. We also thank N.E. Barr and Cindy Glovinsky for their editorial help.

* Corresponding author. zhengmu@umich.edu Phone: 86-18510765001

Abstract

“Motherhood penalty” and “fatherhood premium” refer to gender-specific hypotheses about the effects of fertility on parents’ labor force outcomes. While past research using observational data has found evidence consistent with the motherhood penalty and fatherhood premium hypotheses, these empirical findings remain inconclusive due to the potential threat of selection biases. China’s one-child policy and its regional variation in exemptions to the policy when a first child is a girl enables us to use the gender of the first child as a powerful instrumental variable (IV) in identifying the gendered fertility effects. Based on the IV approach, this paper examines the gender-specific fertility effects on parents’ time use, income, and subjective well-being, using data from the nationally-representative 2010 China Family Panel Studies. Results show that having more children makes fathers spend significantly more time at work and less time taking care of other family members. Mothers, on the other hand, report better subjective well-being with more children. Regarding specific subjective outcomes, fathers gain self-confidence in both career and the future, and mothers are happier, more satisfied with life and report higher social relationship quality. In sum, we find premiums for both fathers and mothers and penalty for neither. We interpret the positive effects of parenthood within the context of China’s highly restrictive one-child family planning policy. However, the gendered distribution of the fertility effects reveals within-household gender-role specialization.

1. INTRODUCTION

Social scientists have long been interested in the relationship between fertility and employment outcomes (Angrist and Evans 1998; Goldin 1995; Gough and Noonan 2013). In theory, given the constraint of a person's total time, it seems that childbearing should have negative consequences for labor force outcomes (e.g., Budig and England 2001; Glauber 2007; Goldin 1995; Gronau 1988; Korenman and Neumark 1992). However, it has been hypothesized that the effects of fertility on employment are highly gendered among married couples – negative for mothers but positive for fathers – in that, once they have children, women tend to shift more of their time from paid work to childrearing activities, while men tend to direct greater effort toward bread-winning activities (Becker 1981, 1985; Glauber 2007, 2008; Killewald and Gough 2013). The hypothesized negative effect of fertility on mothers' labor force outcomes is called “motherhood penalty” (Angrist and Evans 1998; Glauber 2008; Harkness and Waldfogel 2003; Hochschild and Machung 1989; Joshi and Newell 1989; Lundberg and Rose 2000; Neumark and Korenman 1994; Noonan 2001; Waldfogel 1997, 1998a, 1998b), while the hypothesized positive effect for fathers is called the “fatherhood premium” (Killewald 2013; Loh 1996; Lundberg and Rose 2000). Past research using survey data, mostly in the U.S., has yielded empirical evidence consistent with these two hypotheses.

Assigning causality to the observed gendered associations between fertility and labor force outcomes from survey data remains controversial, however. Individuals may recognize and account for fertility effects in making child-bearing decisions, making fertility endogenous rather than exogenous (Angrist and Evans 1998; Goldin 1995; Gough and Noonan 2013; Schultz 1981). In other words, those who choose to have children may differ from those who do not in observed and unobserved characteristics, such as career motivation, family values, and sense of responsibility – characteristics that relate to both childbearing and labor market outcomes (Budig and England 2001; Gough and Noonan 2013).

Although the effects of fertility on parents' labor force outcomes are very important for both the social science and public policy literatures, they should not be the sole focus in understanding the consequences of fertility for parents. Parenthood is a major part of the family as a social institution and as such could profoundly impact parents in more domains than

economic ones. Specifically, fertility may change parents' life styles and perspectives so that having children is associated with improved subjective well-being, that is, the "subjective premium" (Aassve, Goisis, and Sironi 2011; Baranowska and Matysiak 2011; Billari and Kohler 2009; Hoffman and Hoffman 1973; Kohler, Behrman, and Skytthe 2005; Waite and Gallagher 2000; Margolis and Myrskylä 2011). However, empirical evaluation of the subjective premium hypothesis is also fraught with methodological difficulties stemming from potential endogeneity. That is, those who derive more subjective rewards from childbearing are also more likely to become parents.

In this paper, we capitalize on regional variation in implementation of the one-child policy in contemporary rural China and use the gender of the first child as an instrumental variable (IV) to identify the causal effects of fertility on parents' time use, labor force, and psychological outcomes. For this task, we analyze the newly available data from a 2010 nationally representative survey – the China Family Panel Studies (CFPS) – matched regionally by differential local implementation of the one-child policy.

The choice of China as our study site is motivated by high theoretical interest as well as methodological convenience. In the last three decades, China's economy has grown steeply (Xie 2011). During this period, women's socioeconomic status has improved tremendously, and the traditional Chinese family, with patriarchy at its core, has significantly eroded (Xie 2013). In particular, gender-oriented within-household specialization has been weakened (Bian, Logan, and Shu 2000; Whyte and Parish 1984; Wolf 1984; Yu and Xie 2011; Zuo and Bian 2001). Fertility has also been very low due to the Chinese government's one-child policy. It is possible that the effects of fertility on parents do not differ between fathers and mothers. China's differential implementation of the one-child policy has also enabled the use of an IV approach. So far, whether and how fertility affects Chinese parents' labor force and subjective outcomes remain unknown and beg empirical examinations.

Our analyses address two related research questions: (1) does having more than one child influence the parents' time use, income, and subjective well-being in China? (2) If yes, how are the effects different for fathers and mothers?

2. THEORETICAL ISSUES AND RESEARCH SETTING

2.1 Motherhood penalty and fatherhood premium

The model of within-household specialization posits that couples pursue a joint strategy in which they divide labor to maximize household-level well-being (Becker 1981, 1985). The division of labor, typically with husband specializing in the labor market and wife specializing in home production, is based on the comparative advantages of the spouses in each realm. Traditional socialization is highly gendered, encouraging men to develop skills for the labor market and women to become capable housewives (Becker 1981, 1985), and the labor market seems to support this specialization as well given that employed women have historically earned less than employed men (Bianchi 1994; Blau 2012; Corcoran and Courant 1987; Oppenheimer 1997; Smock, Manning, and Gupta 1999). Within-household specialization serves as the main causal explanation for women's "motherhood penalty" and men's "fatherhood premium" concerning the effects of childbearing on labor market outcomes (Budig and England 2001; Glauber 2008; Gough and Noonan 2013; Killewald and Gough 2013; Noonan and Corcoran 2004; Waldfogel 1997). Its causative impact may emanate from three possible mechanisms.

First, gendered investment in and accumulation of human capital in the labor market predicts differential effects of fertility for mothers and fathers. When women specialize by assuming the primary childrearing role, they spend less time in the labor force, accumulating less employment experience and ultimately suffering lower wages (Becker 1981, 1985; Polachek 1985). Men with children, on the other hand, may be motivated more by their specialized provider role to accumulate greater human capital in the labor market.

Second, within-household specialization may affect the amount of effort men and women are able or willing to put into their work, and thus the type of employment they choose. Women who assume primary childrearing responsibilities may have less energy and time for labor market activities than women without children (Becker 1981, 1985). Fathers, on the other hand, may put even more effort into their careers in their roles as bread-earners than do their childless counterparts (Becker 1981, 1985). Moreover, some mothers may "institutionalize" this division of household work by choosing more flexible and accommodating jobs, which usually offer lower compensation. This tradeoff between job flexibility and compensation, called the "compensating differential," supplements other explanations of mothers' labor force disadvantage (England 1992; Filer 1985).

Finally, these gendered differences in accumulation of marketable human capital and in choice of demanding jobs may signal the labor market that mothers tend to be less productive employees than either fathers or women with fewer/no childrearing responsibilities. Employers may practice statistical discrimination against mothers, paying them less than non-mothers or fathers for the same types of jobs or assigning them to lower-paying jobs (Arrow 1972, 1973; Becker 1957; Phelps 1972). Fathers, however, do not suffer parallel employment discrimination (Arrow 1972, 1973; Becker 1957; Phelps 1972).

While these mechanisms may indeed link fertility to mothers' labor market disadvantage, demonstrating causality remains elusive. Some research indicates that observed fertility effects may result from selection bias (Angrist and Evans 1998; Budig and England 2001; Gough and Noonan 2013; Jacobsen, Pearce, and Rosenbloom 1999; Korenman and Neumark 1992; Lundberg and Rose 2000; Miller 2011; Waldfogel 1997). Individuals who decide to become parents may differ from non-parents in characteristics that relate to labor market outcomes, such as career aspirations, work commitment, family values and sense of responsibility (Budig and England 2001; Gough and Noonan 2013). Also, individuals may make decisions about their fertility behaviors based on their labor market and financial situations (Angrist and Evans 1998; Gough and Noonan 2013). For example, when the labor market condition for a woman of childbearing age becomes unfavorable, she may be more inclined to take up the role of homemaker and mother. Conversely, men may become more motivated to have children if they achieve employment and financial success. In short, a potential endogeneity threat suggests that causality may operate in the other direction: from labor market outcomes to fertility decisions.

Most studies addressing selection bias have either directly controlled for possible differences between parents and non-parents or have exploited a longitudinal dataset structure with fixed-effects models, which eliminates between-individual variation that stays stable over time (Becker 1985; Blank 1990; Budig and England 2001; Gough and Noonan 2013; Hill 1979; Korenman and Neumark 1992; Lundberg and Rose 2000; Waldfogel 1997). However, in the former method, identifying all relevant observed differences between parents and non-parents, or between parents with more and fewer children, is a difficult empirical task; studies using the method are still subject to the criticism that additional relevant factors remain unobserved and thus uncontrolled. In the latter method, the researcher needs to assume that potential confounders threatening causal inference are fixed over time. An alternative method for dealing with potential

selection bias in establishing causality is the instrumental variable (IV) approach (Angrist and Evans 1998), which requires the use of a predicting variable that is exogenous to the outcome variable. This condition can be satisfied only in natural experiments or through rigorous treatment designs (e.g., Angrist and Evans 1998; Jacobsen et al. 1999; Miller 2011).

Finally, most studies of fertility effects have focused on employment and financial outcomes (Angrist and Evans 1998; Budig and England 2001; Glauber 2007, 2008; Hill 1979; Killewald 2013; Killewald and Gough 2013; Waldfogel 1997). However, as childbearing and childrearing are such important life course events, they influence well-being in a broader sense, especially regarding subjective outcomes (Waite and Gallagher 2000). Recently, more and more researchers in family studies have paid attention to the fertility effects on subjective outcomes, and most of them find subjective premiums (Aassve, Goisis and Sironi 2012; Baranowska and Matysiak 2011; Billari and Kohler 2009; Hoffman and Hoffman 1973; Hoffman, Thornton, and Manis 1978; Kohler et al. 2005; Kravdal 2013; Margolis and Myrskylä 2011; Waite and Gallagher 2000). In Hoffman et al.'s (1978) work, they divide the subjective fertility premiums into nine major categories: primary group ties and affection, stimulation and fun, expansion of the self, adult status and social identity, achievement and creativity, morality, economic utility, power and influence, and social comparison. This categorization reveals the potential mechanisms that link the parents' fertility behaviors to their subjective well-being.

2.2 The Chinese context

In recent decades, Chinese society has been undergoing dramatic social changes (Hauser and Xie 2005; Xie and Hannum 1996; Xie et al. 2013). Two of the most salient are women's improved social status (Hannum 2005; Treiman 2013; Wu and Song 2010; Wu and Zhang 2010; Zhang, Hannum, and Wang 2008) and the evolution of China's one-child policy (Greenhalgh 2008; Gu et al. 2007; Guo, Liu, and Song 2001). These two changes make China an ideal research setting in which to examine fertility effects from both theoretical and methodological perspectives.

Theoretically, the Communist Revolution and the government's enthusiastic promotion of gender equality should have significantly improved women's social status (Lavelly et al. 1990). During the decades following the 1949 Revolution, Communist ideology regarding gender equality was zealously promoted, highlighting women's parity with men (Meisner 1999; Parish 1981; Whyte 2010; Yu and Xie 2013) and popularizing the slogan "women hold up half the sky"

(Mauer-Fazio, Rawski, and Zhang 1999). In the spheres of politics and work life, the Chinese constitution guarantees women equal rights with those of men in all respects and specifically endorses the policy of “same-work, same-pay” (Mauer-Fazio et al. 1999; Zuo and Bian 2001). In the sphere of family life, in 1950, China instituted the Marriage Law, which formally legalized free-choice marriages and explicitly protected wives’ rights and interests, making them equal to those of husbands (China Administration Council 1950: Item 5; Zuo and Bian 2001). These ideological and policy changes have significantly enhanced women’s social standing and economic status in contemporary China (Hannum 2005; Lavelly et al. 1990; Song 2009; Zhang et al. 2008). Women’s educational attainment has gradually caught up with that of men (Treiman 2013; Wu and Song 2010: Table 2; Wu and Zhang 2010), the gender gap in income and labor force participation has declined, and women have started to assume premium positions that had previously been dominated by men (Meng 1993; Parish and Busse 1998). Home life has not been immune to these shifts, with household gender inequality and within-household specialization declining dramatically since the Revolution (Bian et al. 2000; Whyte and Parish 1984; Wolf 1984; Yu and Xie 2011; Zuo and Bian 2001). These circumstances may have changed the mechanisms by which the “motherhood penalty” and the “fatherhood premium” are thought to operate.

Regarding the outcomes being studied, China’s policy background may make the link between fertility behaviors and subjective well-being especially pertinent to outcomes other than employment status and financial resources. China began its nation-wide family planning program as early as 1973. At the beginning, the policy was simply a general promotion of “later, sparser, and fewer” (“*wan, xi, shao*”) fertility behavior. In 1980, however, the policy was formalized into a restriction allowing all couples to have only one child. Later, as an adjustment to China’s pronatal culture and traditional preference for male heirs, the government amended its family planning policy to allow some couples to have a second child under certain specified conditions, the major one of which is that the couple’s first-born child is a girl (Peng 1997). This version of the policy has been applied since 1988 (Guo et al. 2001; Peng 1997). Since China’s family planning policy was mandatorily implemented, the realized fertility level may not reflect individuals’ real preferences regarding family size. This constraint on individuals’ capability to realize their preferences is believed to negatively influence their subjective well-being (Eibach and Mock 2011; Margolis and Myrskylä 2011; Nelson et al. 2013; Wang, Jing, and Zhang 2013;

White and Dolan 2009). Therefore, compared to those who can have only one child, those individuals who are able to have more children may have realized their preferences to a larger extent and thus may have better subjective well-being.

Methodologically, regional variations in the implementation of China's one-child policy based on gender of the first-born child affords us the opportunity to study fertility effects under these new circumstances regarding the gender power structure within the household. Essentially, we have an ideal natural experiment in which to implement the IV strategy in order to identify the causal effects of fertility on mothers and fathers. As aforementioned, the "one-child policy" in China, initiated around 1980, officially restricted married couples to having one child (Greenhalgh 2008; Guo et al. 2001). However, this initial version of the policy was eventually deemed too drastic and inflexible, ignoring the potential heterogeneities in fertility intentions and behaviors across regions and, in particular, across the urban-rural divide (Guo et al. 2001). For example, Chinese society has historically maintained a patriarchal and patrilineal family system, which values larger family size and favors sons over daughters (Thornton and Lin 1994; Xu, Ji, and Tung 2000; Whyte 2003). These traditional family values have been more strongly maintained in rural areas than in urban ones (Guo et al. 2001). Accordingly, in 1988, the one-child policy was tailored to accommodate these contextual specificities (Guo et al. 2001). The most salient adjustment was that in specified areas of China – primarily rural – the policy was flexible according to the gender of the first-born child: if the first child was a girl, the parents were allowed to have a second (Gu et al. 2007; Guo et al. 2001).¹ Therefore, in these areas parents whose first child is a girl are substantially more likely to have one or more additional children.² Since gender at birth is virtually random, especially when having a girl as the first child does not prevent parents from having a second child,³ whether the first-born child is a girl or a boy is an excellent IV for additional childbearing among parents with at least one child, and allows us to evaluate the causal effect of fertility free from potential selection biases in traditional regression analyses with observational data.

¹ For details of the policy, please refer to Appendix Table 1.

² This is supported by the results in Table 1.

³ For discussion on the validity of this assumption, see the "Conclusions and discussion" section.

3. DATA AND METHODS

This study uses the instrumental variable (IV) approach to examining the gender-specific effects of fertility on parents' time use, income, and subjective well-being. Our data source is a 2010 sample from the nationally representative China Family Panel Studies (CFPS). The CFPS covers a wide range of information on individuals' social and economic activities, family backgrounds, and subjective outcomes. Specifically, we use the adult sample for the parents' information and derive the children's, the spouses', and the grandparents' information by linking family members within a sampled household.

3.1 Analytical Sample

First, based on the adult sample and the linked information from family members, we restrict the adult sample to those with children. Then, to secure the basic validity of the analysis, we keep only those who have eligible values for all the independent variables, including the endogenous variables, the instrumental variable, and the control variables. To maximize the relevance and comparability of the outcome variables across individuals, we further restrict the sample to those aged 20 to 50, the prime working ages, and to those who have not yet retired.

Then, regarding childbearing behavior, we restrict the sample to those parents whose first child is aged 18 or younger, an age range when children require intensive parental care. Restricting our analyses to the parents of children in this age range also ensures that the respondents' childbearing outcomes occurred during the time of the exemption policy, which started in 1988. To maximally ensure that the focal couples are the biological parents of the children, we further restrict our study to couples in their first marriages.

Finally, to make the exemption policy relevant, we include respondents who live in provinces where a second child is allowed if the first child is a girl, have rural residential registration status, and are ethnic majority Han. Ethnic restriction is necessary because minorities living in rural areas are generally allowed to have at least two children (China State Ethnic Affairs Commission 1999). To handle missing values, we carried out single imputations with the independent variables as listed in "Section 3.3 Variables." These restriction and imputation procedures leave us with an analytic sample of 1,124 fathers and 868 mothers.

In Appendix Table 1 we show that several other conditions besides the gender of the first child also may trigger the exemption policy. However, we apply no additional sample restrictions given our lack of relevant information on these other potential conditions. As a robustness check, we experimented with different versions of sample restrictions using all the relevant information from the CFPS dataset, and the results (not shown) remained highly consistent.

3.2 Instrumental Variable (IV) approach

The instrumental variable (IV) approach is among the most powerful methods for dealing with the selection bias issue in establishing causality. An IV affects the endogenous explanatory variable while not affecting the outcome variable other than through its effect on the key explanatory variable. We can estimate the causal effect by the indirect least squares estimator (ILS). Let us denote the parental outcome by Y , having more than one child by X , and having a female first child by Z . The reduced-form, linear model gives us the total influence of having a girl first on Y :

$$Y_i = \Pi_0 + \Pi_1 Z_i + v_i, \text{ where } \Pi_1 = \frac{\partial Y}{\partial Z} \quad (1)$$

We are interested in this reduced form model insofar as it gives us statistical leverage to estimate a different parameter of interest – the coefficient indicating the fertility effect on Y in the following structural equation:

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i, \text{ where } \beta_1 = \frac{\partial Y}{\partial X} \quad (2)$$

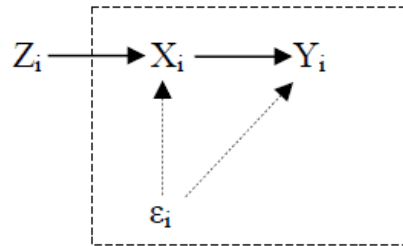
Combining equations (1) and (2) gives the following relationship:

$$\Pi_1 = \left(\frac{\partial X}{\partial Z}\right) * \left(\frac{\partial Y}{\partial X}\right) = \left(\frac{\partial X}{\partial Z}\right) * \beta_1 \quad (3)$$

When the fertility decision is endogenous – that is, when X is endogenous to Y - we cannot directly estimate β_1 in (2). For example, it is possible that family-oriented parents may tend both to have more children and to earn more than do less family-oriented parents, so that selection bias threatens the estimations of causal effects. In this analysis, we instead estimate the fertility effect indirectly using an IV.

Figure 1 shows the mechanisms for the IV approach versus the structural model (2) (in box). The structural model depicts the potential for some unobserved characteristics in the residual ε to have an impact on both X and Y . As above, ε could be one's family orientation, which may affect both the likelihood of having multiple children (X) and the amount of the potential outcome (Y), resulting in a selection bias in the observed relationship between X and Y . On the other hand, given its nearly random occurrence, the instrumental variable "gender of the first child" (Z) is exogenous to Y but highly predictive of the probability of having more than one child. If having more than one child (X) has a causal impact on Y , Z also covaries with Y . Therefore, if we observe a significant association between gender of the first child (Z) and Y , we can indirectly estimate the causal effect of having more than one child (X) on Y under the two-fold assumption that Z serves as a valid IV: (1) Z affects X ; (2) Z affects Y only indirectly through X . Assumption (2) is called the "exclusion restriction."

Figure 1. Illustration of the IV Mechanisms



Specifically, we can obtain the first component in (3) by estimating the following model (also called the first-stage model in a two-stage least squares estimation):

$$X_i = \theta_0 + \theta_1 Z_i + u_i, \text{ where } \theta_1 = \frac{\partial X}{\partial Z} \quad (4)$$

The IV estimate is then given by the ratio of the reduced form estimate in (1) to the coefficient from (4):

$$\beta_1 = \frac{\partial Y}{\partial X} = \frac{\Pi_1}{\theta_1} \quad (5)$$

Based on this estimation procedure, and assuming that gender of the first child is randomly assigned, we can then purge X of the selection bias and obtain an estimate of the causal effect of fertility on parental outcomes. Allowing for heterogeneous treatment effects, we may also interpret β_1 as a local average treatment effect (LATE), specific to the instrument, Z (Angrist, Imbens, and Rubin 1996). In this case, β_1 estimates the average effect of X on Y for individuals whose fertility has been influenced by the gender of their first child. To be more concrete, since Π_1 only captures the amount of treatment effect for those whose fertility has been affected by the gender of their first birth, we need to attribute the overall reduced-form estimate to the proportion affected, θ_1 , so as to obtain the LATE for the group being affected by the IV.

3.3 Variables

Instrumental variable

Gender of the first child. This binary variable, coded 0=male and 1=female, is randomly assigned and highly correlated with the tendency to have more children among those affected by the exemption policy.

Endogenous independent variables

Fertility level. We use two measures of fertility level. *Having more than one child* is a binary variable coded 0= having one child and 1=having more than one child. *Number of children* is a continuous variable for total number of children.

Outcome variables

We capture three domains of outcome variables. We use two *time use variables*: hours worked per month in 2009 and hours taking care of family members in prior month. To make the measure of labor force participation more reliable, this is calculated as hours worked per day multiplied by days worked per month in 2009. Given its variability across individuals, we use its logged form in our analyses. For the second time use variable, we total for the prior month the

average daily hours taking care of family members both during weekdays and over the weekend. To make the family care variable comparable in scale to the labor force participation variable, we then multiply the weekly estimate by four and take its natural logarithm in the analysis. The *income variable* is measured as personal income in the prior month. Since income varies greatly across individuals in the sample, we use its logged form in the analysis. The *subjective well-being variables* are measured in six areas on a scale from 1 to 5 – with a larger number indicating greater well-being. The six self-rated areas are: happiness, life satisfaction, self-confidence in career, self-confidence in the future, self-rated quality of social relationships, and self-rated social ability. In addition, we compute a composite scale, the average of the six self-ratings, to indicate overall subjective well-being.

Control variables

To control for the observed heterogeneity that may influence both the independent and dependent variables, we include a rich set of *control variables* that capture: work in an agricultural industry (binary; 0=no), migrant status (0=no), education (continuous; in years), age (years), age at first birth (years), age gap between the oldest and youngest child (years), living with the youngest child (0=no), living with spouse (0=no), and living with the child(ren)'s grandfather (0=no) or grandmother (0=no).

4. RESULTS

4.1 Validity of the instrumental variable

Table 1 shows differences in means, by gender of the first-born child, for the two endogenous fertility variables and the outcome variables, separately for fathers (Table 1a) and mothers (Table 1b). The differences in means for the fertility variables comprise the θ_1 in Equation (5), indicating the strength of the association between the instrumental variable and the endogenous fertility variables.

Table 1-a. Difference in Means for Fertility (Denominator) and Outcome Variables (Numerator), **Father Sample**

Variables	Gender of the First Child				Difference in (Female Minus Male)	
	Male (N=566)		Female (N=558)		Mean	s.e.
	Mean	s.d.	Mean	s.d.		
<i>Fertility Variables</i>						
More than one child (ref.=one child)	0.49	0.50	0.70	0.46	0.21 ***	0.03
Number of children	1.55	0.61	1.91	0.79	0.36 ***	0.04
<i>Outcome Variables</i>						
Time Use Outcomes						
Logged hours worked per month in 2009	5.18	0.82	5.29	0.54	0.11 **	0.04
Logged hours taking care of family members last month	-0.21	4.01	-0.33	4.00	-0.12	0.24
Income Outcome						
Logged personal income last month	4.09	5.43	4.44	5.22	0.35	0.32
Subjective Outcome						
Overall subjective scale	3.79	0.66	3.83	0.66	0.05	0.04

Note: 2010 CFPS. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 1-b. Difference in Means for Fertility (Denominator) and Outcome Variables (Numerator), **Mother Sample**

Variables	Gender of the First Child				Difference in (Male Minus Female)	
	Male (N=437)		Female (N=431)		Mean	s.e.
	Mean	s.d.	Mean	s.d.		
<i>Fertility Variables</i>						
More than one child (ref.=one child)	0.51	0.50	0.73	0.45	0.22 ***	0.03
Number of children	1.56	0.59	1.94	0.80	0.39 ***	0.05
<i>Outcome Variables</i>						
Time Use Outcomes						
Logged hours worked per month in 2009	5.04	0.86	5.00	0.94	-0.04	0.06
Logged hours taking care of family members last month	1.06	3.97	1.21	3.94	0.16	0.27
Income Outcome						
Logged personal income last month	1.37	5.79	0.94	5.74	-0.43	0.39
Subjective Outcome						
Overall subjective scale	3.77	0.62	3.86	0.65	0.09 *	0.04

Note: 2010 CFPS. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

As shown for the father sample (1-a), about half of all fathers whose first child was a boy went on to have a second child; whereas about 70% of fathers whose first child was a girl had a second child. Thus, the number of children in boy-first families tends to be smaller than that in girl-first families – 1.55 children versus 1.91, respectively, in the father sample. The mother sample (1-b) shows similar patterns in fertility by gender of first-born child, with 51% of boy-first mothers having a second child compared to 73% of girl-first mothers, and boy-first mothers having fewer children on average – 1.56 compared to 1.94 for girl-first mothers. Moreover,

among both fathers and mothers and for both the endogenous fertility variables, θ_1 remains significantly positive. These results confirm the validity of gender of the first child as an instrument for the two fertility variables.

The differences in means for the outcome variables in Table 1 comprise the Π_1 component in Equation (5), the reduced form parameter. For fathers, the directions of our estimates are consistent with household specialization – that is, having a girl as the first child has a positive reduced-form relationship with working hours, personal income, and subjective well-being, and a negative association with hours caring for family members. However, only the positive association with working hours is statistically significant, with girl-first fathers working around 12% ($\exp(0.11)-1$) more hours of boy-first fathers.

For mothers, the estimates are also consistent with the specialization theory in that girl-first mothers tend to work less, spend more time caring for family, earn less, and have better subjective well-being than boy-first mothers. However, only the subjective well-being association is statistically significant, with girl-first mothers enjoying a 0.09 point well-being premium over boy-first mothers on a scale from 1 to 5.

Note that the reduced-form estimates need to be adjusted by the magnitude of effects on fertility behaviors, that is, the proportion affected, to derive the LATE for the subpopulation being affected by the IV. To do that, we take the ratio of estimates in the two panels in Table 1, and the end product is called the Wald estimates. Since Wald estimates are similar to the indirect least square (ILS) estimates, both in interpretations and estimate magnitudes, we present the former only in Appendix Table 3.

Table 2 shows results comparable to those in Table 1, except that they are estimated with control variables. As can be seen for the Stage 1 fertility variables, θ_1 remains significantly positive for all the combinations of fertility variables and parent gender, again supporting the validity of the instrument. The magnitude of the estimates is also very similar in Tables 1 and 2. For Stage 2 outcome variables, girl-first fathers work 12% ($\exp(0.11)-1$) more hours per month, spend significantly 37% ($1-\exp(-0.46)$) fewer hours caring for family members, and enjoy a marginally significant bonus of 0.07 point in subjective well-being. Mothers, on the other hand,

remain unaffected by fertility in terms of time use and income, but enjoy a well-being premium of 0.12 point on a scale from 1 to 5.

Table 2. OLS Estimates of Fertility (Denominator) and Outcome (Numerator) Equations

Dependent Variables	Gender of the First Child (ref.=male)	
	Father (N=1,124)	Mother (N=868)
<i>Denominator: Fertility Variables</i>		
More than one child (ref.=one child)	0.12 *** (0.02)	0.11 *** (0.02)
Number of children	0.23 *** (0.03)	0.24 *** (0.03)
<i>Numerator: Outcome Variables</i>		
Time Use Outcomes		
Logged hours worked per month in 2009	0.11 ** (0.04)	-0.01 (0.06)
Logged hours taking care of family members last month	-0.46 * (0.23)	-0.38 (0.24)
Income Outcome		
Logged personal income last month	0.37 (0.28)	-0.22 (0.30)
Subjective Outcome		
Overall subjective scale	0.07 † (0.04)	0.12 ** (0.04)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

To further establish the validity of the ILS IV estimates, we conducted a balance check of the control variables across values of the instrumental variable. As can be seen in Appendix Table 2, for almost all cases the mean of the control variables does not differ significantly (at $\alpha=0.05$) by gender of the first child. This check shows that the IV is not only exogenous to the outcome variables, but is also highly exogenous to other independent variables included in the full model, which further demonstrates the unbiased nature of the ILS IV estimates.

4.2 Fatherhood premium?

Table 3-a presents fertility effects for fathers using ILS estimation and compares these to OLS estimates. As can be predicted by the results already presented in Table 2, ILS estimates indicate that fathers with more children tend to work more hours, spend fewer hours taking care of family members, and report marginally higher subjective well-being than do fathers with fewer children. Specifically, fathers with more than one child work around 2.56 times of hours as worked by one-child fathers, and fathers in general work about 62% more hours with each additional child. They also spend about 98% less time than one-child fathers spend caring for family members, and around 86% less time for each additional child. Moreover, with each additional child, their overall subjective well-being increased by 0.29 point on a 1-to-5 scale. However, coefficients for both time spent with family members and overall subjective well-being are marginally significant. Moreover, coefficients for logged personal income, using both more than one child and number of children, though insignificant, are both positive.

The results are consistent with the household specialization theory, with the exception of no significant result for the logged personal income, which could be due to the vagueness of income for rural residents.

For almost all the significant ILS results in Table 3-a, the OLS counterparts are in the same directions, though with lower significance and much smaller magnitudes. For example, while we see a positive fertility effect on working hours in both sets of estimates, the ILS estimate is as high as 0.94, while the OLS estimate is only 0.002. For fertility effect on income, the ILS estimates are positive, in accordance with the specialization theory, while the OLS estimates are negative, running counter to it.

Table 3-a. OLS and ILS Estimates of Outcome Models, **Father Sample**

Dependent variables	Father (N=1,124)			
	Time Use Outcomes		Income Outcome	Subjective Outcome
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	0.002 (0.06)	-0.16 (0.36)	-0.37 (0.44)	-0.01 (0.06)
ILS	0.94 * (0.38)	-3.87 † (2.03)	3.09 (2.46)	0.57 (0.34)
Number of children				
OLS	0.02 (0.04)	0.05 (0.23)	-0.19 (0.28)	0.03 (0.04)
ILS	0.48 * (0.19)	-1.97 † (1.02)	1.57 (1.24)	0.29 † (0.17)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 3-b. OLS and ILS Estimates of Outcome Models, **Mother Sample**

Dependent variables	Mother (N=868)			
	Time Use Outcomes		Income Outcome	Subjective Outcome
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	0.09 (0.09)	0.16 (0.39)	-0.41 (0.48)	-0.03 (0.07)
ILS	-0.11 (0.50)	-3.37 (2.17)	-1.96 (2.71)	1.02 * (0.42)
Number of children				
OLS	0.06 (0.06)	0.03 (0.24)	0.05 (0.30)	0.02 (0.04)
ILS	-0.05 (0.23)	-1.58 (0.99)	-0.92 (1.27)	0.48 * (0.18)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 4.2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4-a. OLS and ILS Estimates of Subjective Outcome Models, Father Sample							
Dependent variables	Father (N=1,124)						
	General		Confidence		Social		
	Self-rated happiness	Life satisfaction	Self-confidence in career	Self-confidence in the future	Self-rated quality of social relationship	Self-rated social ability	
Estimation methods							
More than one child							
OLS	-0.04 (0.09)	0.01 (0.09)	-0.003 (0.10)	-0.02 (0.10)	0.02 (0.08)	-0.02 (0.08)	
ILS	0.03 (0.52)	0.06 (0.50)	1.30 * (0.57)	1.08 * (0.54)	0.46 (0.42)	0.48 (0.42)	
Number of children							
OLS	0.05 (0.06)	0.05 (0.06)	0.04 (0.06)	0.02 (0.06)	0.02 (0.05)	-0.03 (0.05)	
ILS	0.01 (0.27)	0.03 (0.25)	0.66 * (0.28)	0.55 * (0.27)	0.24 (0.21)	0.24 (0.21)	

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. The six subjective scales range from 1 to 5. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4-b. OLS and ILS Estimates of Subjective Outcome Models, Mother Sample							
Dependent variables	Mother (N=868)						
	General		Confidence		Social		
	Self-rated happiness	Life satisfaction	Self-confidence in career	Self-confidence in the future	Self-rated quality of social relationship	Self-rated social ability	
Estimation methods							
More than one child							
OLS	0.05 (0.11)	-0.09 (0.11)	-0.11 (0.11)	0.03 (0.11)	-0.02 (0.09)	-0.01 (0.09)	
ILS	1.30 * (0.61)	1.35 * (0.65)	0.77 (0.64)	1.04 (0.64)	0.89 † (0.49)	0.75 (0.49)	
Number of children							
OLS	0.04 (0.06)	-0.05 (0.07)	0.04 (0.07)	0.04 (0.07)	0.03 (0.05)	0.04 (0.05)	
ILS	0.61 * (0.28)	0.63 * (0.29)	0.36 (0.29)	0.49 (0.07)	0.42 † (0.22)	0.35 (0.23)	

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. The six subjective scales range from 1 to 5. Larger numbers indicate more positive ratings. All models are estimated with control variables described in Appendix Table 2. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Table 4-a shows the item-specific fertility effects on the six subjective well-being outcomes for fathers. Fertility was positively related to the two self-confidence variables related to careers and the future. Specifically, fathers with more than one child are more confident in their careers by 1.30 points, with a 0.66-point bump for each additional child, and more

confident in the future by 1.08 points, with a 0.55-point rise per additional child. These components of well-being, which reflect fathers' sense of their role in their families' current and future well-being, are supportive of the fatherhood premium in time use, in that the higher self-confidence of fathers with more children may emanate from their more highly developed career orientation. We found no other significant subjective well-being results based on either the ILS or the OLS estimations.

4.3 Motherhood penalty?

Table 3-b presents the fertility effects by ILS and OLS estimation for mothers. Consistent with the estimated Π_1 and θ_1 shown in Table 2, we found that mothers with more children tend to experience significantly greater overall subjective well-being, reporting a premium of 1.02 points when having more than one child, with an increase of 0.48 point for each additional child. However, we found no significant fertility effects for either the pair of time use outcomes or the logged personal income last month, with all three pairs of coefficients negative. While the negative coefficients for working hours and income are intuitive, the negative coefficients for hours taking care of other family members could be due to the vagueness of this measure. These ILS results do not directly speak to household specialization, although the fertility-wellbeing association suggests that greater involvement in childrearing is satisfying to mothers.

The OLS counterparts for fertility effects on subjective well-being are either in the opposite directions or insignificantly in the same directions. For example, when having more than one child, the fertility effect is insignificantly -0.03 based on OLS estimates, while the ILS is a significant 1.02; with each additional child, while the OLS estimates is insignificant and as small as 0.02, the ILS estimate is significant and is 0.48. Note that the fertility effects on time spent working and caring for family members, though insignificant in both the ILS and the OLS results, are all in opposite directions for the two approaches.

Table 4-b presents details of the link between fertility and the six subjective well-being outcomes for mothers. We found that, with more children, mothers tend to be happier and more satisfied with life, with premiums of 1.30 and 1.35 points, respectively, in self-rated happiness and in life satisfaction with more than one child, and with premiums of 0.61 and 0.63 with each

additional child. They also report marginally significant premiums in self-rated quality of social relationships: 0.89 with more than one child and 0.42 with each additional child. For mothers, unlike for fathers, we found no significance in the effects of fertility for either of the two self-confidence variables. This gender difference is suggestive of household specialization. Mothers, who relative to fathers bear a disproportionate responsibility for family care, may be more likely to reap premiums in happiness and life satisfaction from the childrearing process, while fathers, who relative to mothers bear more obligations to materially provide for the family, may find that additional children engender a stronger sense of confidence about their careers and their futures.

5. CONCLUSIONS AND DISCUSSION

This analysis contributes theoretically and methodologically to research on “motherhood penalty” and “fatherhood premium” in labor force outcomes and related research on subjective well-being. Using a nationally representative dataset from the 2010 CFPS, we examine these topics for contemporary China, which has been buffeted by rapid and tremendous social changes – one of which is weakened norms concerning the gendered division of household labor (Bian et al. 2000; Whyte and Parish 1984; Wolf 1984; Yu and Xie 2011; Zuo and Bian 2001). This analysis provides new evidence concerning the causal and gender-specific effects of fertility on parents’ time use, income, and subjective well-being by exploiting the differential implementations of the “one-child policy” as an IV in estimations.

While we find no fertility effects on income, we find significant effects on both time use and subjective well-being outcomes. With more children, fathers tend to work more hours, spend less time taking care of family members, and report greater subjective well-being. Having more children does not seem to affect mothers objectively in terms of either time use or income, but does lead to significantly better subjective well-being. Among the components of subjective well-being, fathers with more children show greater self-confidence concerning both their careers and the future, while mothers with higher fertility report both better overall subjective well-being and better social relationships.

In short, our IV estimations of the causal effects of fertility show premiums for both fathers and mothers and penalties for neither – findings that do not directly support the theory of

gendered household specialization. However, some of the differential effects of fertility on specific domains for mothers versus fathers are consistent with household specialization. Specifically, compared to mothers, fathers work longer hours and care for family fewer hours in response to having more children, which seems a clear indication that fertility leads to greater specialization in household activities. Compared to fathers, mothers are more likely to reap premiums in happiness, life satisfaction, and social relationships from greater fertility, which suggests that mothers derive relatively greater satisfaction from childrearing than do fathers. And finally, the finding that higher fertility yields greater career and future confidence for fathers while not for mothers may reflect a tendency for fathers to strengthen their engagement with the labor market in response to a growing family.

We are aware of the limitations of this paper. First and foremost, the gender of the first child as a valid IV may be challenged. For example, it may affect the outcomes we examine directly rather than only through affecting fertility, thus violating the exclusion restriction. It may also be questioned whether gender of the first child is randomly assigned, given the increasing prevalence of sex-selective abortions (Chu 2001). Research suggests that in China this approach to sex-selection is significantly more prevalent for second or higher parity births than for first (Gu et al. 2007). This may be especially true for our analytic sample, in which most parents were allowed to have a second child if their first child was a girl, reducing their motivation to use sex-selective abortion for the first. The sample distribution itself also suggests randomness in first child gender since, for fathers and mothers respectively, 49.64% and 49.65% of their first children were girls. Second, since the analyses are conducted on a rural sample where farming is typically family based, the income outcome variables may be a poor measure for labor force outcomes. This might be the reason that we do not detect a positive effect of fertility on fathers' income even while fertility lengthens fathers' working hours. Finally, due to the long list of restrictions, we are left with a relatively small sample size for selected rural areas for our analyses.

To recapitulate, using an innovative method for contemporary rural China, our paper shows overall positive effects of additional fertility for parental outcomes, especially subjective well-being. We interpret this conclusion within the context of China's highly restrictive one-

child family planning policy, which limits parents to having only one child under usual circumstances. Our research suggests that parents would do better if the one-child policy were abolished – i.e., if parents were allowed to have more children. Of course, this highly restrictive policy background is a unique setting and is unlikely to continue over the long term even in China (Zhai, Zhang, and Jin 2014). However, this unique setting in China affords us the methodological opportunity to study the true causal effects of fertility on parents. We do not wish to generalize our findings to other settings but welcome further research with alternative research designs to address similar issues in other social contexts.

References

- Aassve, Arnstein, Alice Goisis, and Maria Sironi. 2011. "Happiness and Childbearing across Europe." *Social Indicator Research* 108: 65-86.
- Angrist, Joshua D., and William N. Evans. 1998. "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size." *American Economic Review* 88: 450-77.
- Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. 1996. "Identification of Causal Effects Using Instrumental Variables." *Journal of the American Statistical Association* 91: 444-455.
- Arrow, Kenneth J. 1972. "Models of Job Discrimination." Pp. 83-102 in *Racial Discrimination in Economic Life*, edited by A.H. Pascal. Lexington, MA: D.C. Heath.
- . 1973. "The Theory of Discrimination." Pp. 3-33 in *Discrimination in Labor Markets*, edited by Orley Ashenfelter and Albert Rees. Princeton, N.J.: Princeton University Press.
- Baranowska, Anna, and Anna Matysiak. 2011. "Does Parenthood Increase Happiness? Evidence for Poland." *Vienna Yearbook of population research* 9: 307-325.
- Becker, Gary S. 1957. *The Economics of Discrimination*. Chicago: University of Chicago Press.
- . 1981. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.
- . 1985. "Human Capital, Effort, and the Sexual Division of Labor." *Journal of Labor Economics* 3: S33-58.
- Bian, Yanjie, John R. Logan, and Xiaoling Shu. 2000. "Wage and Job Inequalities in the Working Careers of Men and Women in Tianjin." Pp., 111-133 in *Re-drawing Boundaries: Work, Households, and Gender in China*, edited by B. Entwisle and G. E. Henderson. Berkeley: University of California Press.
- Bianchi, Suzanne M. 1994. "Changing Economic Roles of Men and Women." Pp. 107-154 in *State of the Union: Social Trends*, edited by R. Farley. New York: Russell Sage.
- Billari, Francesco C., and Hans-Peter Kohler. 2009. "Fertility and Happiness in the XXI Century: Institutions, Preferences and Their Interactions," paper presented in *XXVI IUSSP International Population Conference*, Marrakesh, Morocco.
- Blank, Rebecca. 1990. "Are Part-time Jobs Bad Jobs?" Pp. 123-155 in *A Future of Lousy Jobs? The Changing Structure of U.S. Wages*, edited by G. Burtless. Washington, DC: Brookings Institution.
- Blau, Francine D. 2012. *Gender, Inequality, and Wages*, edited by A. Gielen and K. F. Zimmermann. Oxford, UK: Oxford University Press.
- Budig, Michelle J. and Paula England. 2001. "The Wage Penalty for Motherhood." *American Sociological Review* 66: 204-225.
- China Administration Council. 1950. "Marriage Law of People's Republic of China." *People's Republic of China Laws and Regulations: Item 5*.
- China State Ethnic Affairs Commission. 1999. *White Paper of Policies on China's Ethnic Minorities and the Practice* (zhong guo de shao shu min zu zheng ce ji qi shi jian bai pi shu).
- Chu, Junhong. 2001. "Prenatal Sex Determination and Sex-selective Abortion in Rural Central China." *Population and Development Review* 27, 259-281.
- Corcoran, Mary E. and Paul N. Courant. 1987. "Sex-Role Socialization and Occupational Segregation: An Exploratory Investigation." *Journal of Post Keynesian Economics* 9: 330-346.
- Eibach, Richard P., and Steven E. Mock. 2011. "Idealizing Parenthood to Rationalize Parental Investments." *Psychological Science* 22: 203-208.
- England, Paula. 1992. *Comparable Worth: Theories and Evidence*. Hawthorne, NY: Aldine de Gruyter.
- Filer, Randall. 1985. "Male-Female Wage Differences: The Importance of Compensating Differentials." *Industrial and Labor Relations Review* 38:426-37.
- Glauber, Rebecca. 2007. "Marriage and the Motherhood Wage Penalty among African Americans, Hispanics, and Whites." *Journal of Marriage and Family* 69: 951-961.
- . 2008. "Race and Gender in Families and at Work: The Fatherhood Wage Premium." *Gender&Society* 22: 8-30.

- Goldin, Claudia. 1995. "Career and Family: College Women Look to the Past." National Bureau of Economic Research (Cambridge, MA) Working Paper No. 5188.
- Gough, Margaret, and Mary Noonan. 2013. "A Review of the Motherhood Wage Penalty in the United States." *Sociology Compass* 7: 328-342.
- Greenhalgh, Susan. 2008. *Just One Child: Science and Policy in Deng's China*. Berkeley and Log Angeles, California: University of California Press.
- Gronau, Reuben. 1988. "Sex-Related Wage Differentials and Women's Interrupted Careers – The Chicken or the Egg." *Journal of Labor Economics* 6: 277-301.
- Gu, Baochang, Wang Feng, Guo Zhigang, and Zhang Erli. 2007. "China's Local and National Fertility Policies at the End of the Twentieth Century." *Population and Development Review* 33: 129-147.
- Guo, Zhigang, Jintang Liu, and Jian Song. 2001. "China's Family Planning Policy and Family Structure in Future (Wo guo xian xing sheng yu zheng ce yu wei lai de jia ting jie gou)." (in Chinese) *Chinese Journal of Population Science (Zhong guo ren kou ke xue)*.
- Hannum, Emily. 2005. "Market Transition, Educational Disparities, and Family Strategies in Rural China: New Evidence on Gender Stratification and Development." *Demography* 42: 275-299.
- Harkness, Susan and Jane Waldfogel. 2003. "The Family Gap in Pay: Evidence from Seven Industrialized Countries." *Research in Labor Economics* 22: 369-413.
- Hauser, Seth and Yu Xie. 2005. "Temporal and Regional Variation in Earnings Inequality: Urban China in Transition between 1988-1995." *Social Science Research* 34: 44-79.
- Hill, Martha. 1979. "The Wage Effects of Marital Status and Children." *Journal of Human Resources* 14: 579-594.
- Hochschild, Arlie, and Anne Machung. 1989. *The Second Shift: Working Parents and the Revolution at Home*. New York, Viking Penguin.
- Hoffman, Lois W., and Martin L. Hoffman. 1973. "The Value of Children to Parents." In J.T. Fawcett Eds. *Psychological Perspectives on Population*, New York: Basic Books.
- Hoffman, Lois W., Arland Thornton, and Jean D. Manis. 1978. "The Value of Children to Parents in the United States." *Journal of Population* 1: 91-131.
- Jacobsen, Joyce, James Wishart Pearce III, and Joshua Rosenbloom. 1999. "The Effects of Child-Bearing on Married Women's Labor Supply and Earnings: Using Twin Births as a Natural Experiment." *Journal of Human Resources* 34: 449-474.
- Joshi, Heather and Marie-Louise Newell. 1989. *Pay Differentials and Parenthood: Analysis of Men and Women Born in 1946*. Coventry, England: University of Warwick Institute for Employment Research.
- Killewald, Alexandra. 2013. "A Reconsideration of the Fatherhood Premium: Marriage, Residence, Biology, and the Wages of Fathers." *American Sociological Review* 78: 96-116.
- Killewald, Alexandra, and Margaret Gough. 2013. "Does Specialization Explain Marriage Penalties and Premiums?" *American Sociological Review* 78: 477-502.
- Kohler, Hans-Peter, Jere R. Behrman, and Axel Skytthe. 2005. "Partner+children=happiness? The Effect of Partnership and Fertility on Well-being." *Population and Development Review* 31: 407-445.
- Korenman, Sanders, and David Neumark. 1992. "Marriage, Motherhood, and Wages." *Journal of Human Resources* 27: 233-55.
- Kravdal, Øystein. 2013. "Reflections on the Search for Fertility Effects on Happiness." Working Paper 10/2013, Department of Economics, University of Oslo.
- Lavelly, William, Zhenyu Xiao, Bohua Li, and Ronald Freedman. 1990. "The Rise in Female Education in China: National and Regional Patterns." *The China Quarterly* 121: 61-93.
- Loh, Eng Seng. 1996. "Productivity Differences and the Marriage Premium for White Males." *Journal of Human Resources* 31: 566-589.
- Lundberg, Shelly, and Elaina Rose. 2000. "Parenthood and the Earnings of Married Men and Women." *Labor Economics* 7: 689-710.
- Margolis, Rachel, and Mikko Myrskylä. 2011. "A Global Perspective on Happiness and Fertility." *Population and Development Review* 37: 29-56.

- Maurer-Fazio, Margaret, Thomas G. Rawski, and Wei Zhang. 1999. "Inequality in the Rewards for Holding up Half the Sky: Gender Wage Gaps in China's Urban Labour Market, 1988-1994." *The China Journal* 41: 55-88.
- Meisner, Maurice. 1999. *Mao's China and after: a History of the People's Republic*. New York, NY: Free Press.
- Meng, Xin. 1993. "Determination and Discrimination: Female Wages in China's Rural TVP Industries." *Economics Division Working Papers* 93/1: 20-22.
- Miller, Amalia R. 2011. "The Effects of Motherhood Timing on Career Path." *Journal of Population Economics* 24: 1071-1100.
- Nelson, S. Katherine, Kostadin Kushlev, Tammy English, Elizabeth W. Dunn, and Sonja Lyubomirsky. 2013. "In Defense of Parenthood: Children Are Associated with More Joy than Misery." *Psychological Science* 24: 3-10.
- Neumark, David and Sanders Korenman. 1994. "Sources of Bias in Women's Wage Equations: Results Using Sibling Data." *Journal of Human Resources* 29: 379-405.
- Noonan, Mary. 2001. "The Impact of Domestic Work on Men's and Women's Wages." *Journal of Marriage and Family* 63(4): 1134-1145.
- Noonan, Mary and Mary Corcoran. 2004. "The Mommy Track and Partnership: Temporary Delay or Dead End?" *Annals of the American Academy of Sociology and Political Science* 596: 130-150.
- Oppenheimer, Valerie K. 1997. "Women's Employment and the Gain to Marriage: The Specialization and Trading Model." *Annual Review of Sociology* 23: 431-53.
- Parish, William. 1981. "Egalitarianism in Chinese Society." *Problems of Communism* 29: 37-53.
- Parish, William L., and Sarah Busse. 1998. "Gender and Work." Pp. 14 in *Market Transition in Urban China: The Changing Social Contract*, edited by Wenfang Tang and William L. Parish. Cambridge: Cambridge University Press.
- Peng, Peiyun. 1997. Pp. 488-489 in *China Family Planning Encyclopedia (Zhong Guo Ji Hua Sheng Yu Quan Shu)*. China Population Press (Zhong Guo Ren Kou Chu Ban She).
- Phelps, Edmund S. 1972. "The Statistical Theory of Racism and Sexism." *American Economic Review* 62: 659-661.
- Polachek, Solomon. 1985. "Occupational Segregation: A Defense of Human Capital Predictions," and "Reply to England." *Journal of Human Resources* 20: 437-440, 444.
- Schultz, Paul T. 1981. *Economics of Population*. Reading, MA: Addison-Wesley.
- Smock, Pamela J., Wendy D. Manning, and Sanjiv Gupta. 1999. "The Effect of Marriage and Divorce on Women's Economic Well-Being." *American Sociological Review* 64:794-812.
- Song, Lijun. 2009. "The Effect of the Cultural Revolution on Educational Homogamy in Urban China." *Social Forces* 88, 257-270.
- Thornton, Arland and Hui-Sheng Lin. 1994. *Social Change and the Family in Taiwan*. Chicago, IL: University of Chicago Press.
- Treiman, Donald J. 2013. "Trends in Educational Attainment in China." *Chinese Sociological Review* 45: 3-25.
- Waite, Linda J. and Maggie Gallagher. 2000. *The Case for Marriage: Why Married People Are Happier, Healthier, and Better Off Financially*. New York: Broadway Books.
- Waldfogel, Jane. 1997. "The Effects of Children on Women's Wages." *American Sociological Review* 62: 209-217.
- . 1998a. "The Family Gap for Young Women in the United States and Britain: Can Maternity Leave Make a Difference?" *Journal of Labor Economics* 16: 505-545.
- . 1998b. "Understanding the 'Family Gap' in Pay for Women with Children." *Journal of Economic Perspectives* 12: 137-156.
- Wang, Wei, Hongqiao Jing, and Peng Zhang. 2013. "Has China's Family Planning Policy Lowered Individuals' Level of Happiness?" ("Ji hua sheng yu zheng ce jiang di le ju min de xing fu gan ma?") *Population Research ("Ren kou yan jiu")* 37: 102-112.

- White Mathew P., and Paul Dolan. 2009. "Accounting for the Richness of Daily Activities." *Psychological Science* 20: 1000-1008.
- Whyte, Martin K. 2003. *China's Revolutions and Intergenerational Relations*. Ann Arbor, MI: Center for Chinese Studies, University of Michigan.
- . 2010. *Myth of the Social Volcano: Perceptions of Inequality and Distributive Injustice in Contemporary China*. Stanford, CA: Stanford University Press.
- Whyte, Martin K., and William L. Parish. 1984. *Urban Life in Contemporary China*. Chicago: University of Chicago Press.
- Wolf, Margery. 1984. "Marriage, Family, and the State in Contemporary China." *Pacific Affairs* 57: 213-236.
- Wu, Xiaogang, and Xi Song. 2010. "Gender Inequality in Education and Employment: China's Urban Labor Markets in Transition, 1982-2005." Paper presented at annual meeting of the Population Association of America, Dallas, TX.
- Wu, Xiaogang, and Zhuoni Zhang. 2010. "Changes in Educational Inequality in China, 1990-2005: Evidence from the Population Census Data." *Research in Sociology of Education* 17: 123-152.
- Xie, Yu. 2011. "Evidence-Based Research on China: A Historical Imperative." *Chinese Sociological Review* 44: 14-25.
- Xie, Yu. 2013. "Gender and Family in Contemporary China." *PSC Research Report No. 13-808*.
- Xie, Yu and Emily Hannum. 1996. "Regional Variation in Earnings Inequality in Reform-Era Urban China." *American Journal of Sociology* 101: 950-992.
- Xie, Yu, Xiaobo Zhang, Jianxin Li, Xuejun Yu, and Qiang Ren. 2013. *Wellbeing Development Report of China 2013 (Zhong guo min sheng fa zhan bao gao 2013)*. (in Chinese) Beijing, China: Peking University Press.
- Xu, Xiaohe, Jianjun Ji, and Yuk-Ying Tung. 2000. "Social and Political Assortative Mating in Urban China." *Journal of Family Issues* 21: 47-77.
- Yu, Jia and Yu Xie. 2011. "The Varying Display of 'Gender Display.'" *Chinese Sociological Review* 44: 5-30.
- Yu, Jia and Xie Yu. 2013. "Social Change and Trends in Determinants of Entry to First Marriage (She hui bian qian yu chu hun ying xiang yin su de bian hua)." (in Chinese) *Sociological Research* (She Hui Xue Yan Jiu).
- Zhai, Zhenwu, Xianling Zhang, and Yongai Jin. 2014. "Demographic Consequences of an Immediate Transition to a Universal Two-child Policy (Li ji quan mian fang kai er tai zheng ce de ren kou xue hou guo fen xi)." (in Chinese) *Population Research* (Ren kou yan jiu).
- Zhang, Yuping, Emily Hannum, and Meiyan Wang. 2008. "Gender-Based Employment and Income Differences in Urban China: Considering the Contributions of Marriage and Parenthood." *Social Forces* 86: 1529-1560.
- Zuo, Jiping, and Yanjie Bian. 2001. "Gendered Resources, Division of Housework, and Perceived Fairness – A Case in Urban China." *Journal of Marriage and Family* 63: 1122-1133.

APPENDIX

Appendix Table 1. Exemptions Policy to Have a Second Child with One Girl	
Condition	Province
The parents live in mountain area, rural residents, one girl only	Beijing; Tianjin; Shanxi; Inner Mongol; Jilin; Heilongjiang; Zhejiang; Anhui; Fujian; Jiangxi; Henan; Hubei; Hunan; Guangdong; Chongqing; Guizhou; Shanxi; Gansu.
The parents work in mining industry and directly work in mines, one girl only	Hebei; Jiangsu; Zhengjiang; Anhui; Shandong; Henan.
Mother rural, one girl only	Guangxi.
Mother rural, one girl only and with rural registration	Liaoning; Shandong.
Mother rural, one girl only, father living with his parents-in-law, mother without brothers	Jiangsu.
Mother rural, one girl only, father without brothers and with only one sister	Jiangsu.
Mother rural, one girl only, spouse living in coastal farming areas	Jiangsu.
Mother rural, one girl only, one of the spouse in marine fishing	Jiangsu.
Both parents rural, one of the spouse having non-heritable physical disability, one girl only	Jiangsu.
One of the parents works as contract worker in farming industry, one girl only	Jilin.
One of the parents works in marine fishing industry, one girl only	Shandong.
One of the parents has non-heritable physical disability, one girl only	Shandong.

Source: Population and Family Planning Commission of Shanxi website.
<http://www.srk.gov.cn/Article.jsp?ArticleID=4623>

Appendix Table 2. Differences in Means for Control Variables		
Variables	Difference in means by gender of the first child (ref.=male)	
	Father (N=1,124)	Mother (N=868)
Agriculture	-0.015 (0.029)	0.020 (0.033)
Migrant	0.017 (0.018)	0.001 (0.021)
Age	0.438 (0.353)	-0.225 (0.385)
Age at first birth	0.508 ** (0.195)	0.043 (0.205)
Illiterate or semi illiterate	0.041 * (0.020)	0.029 (0.030)
Primary	-0.058 * (0.027)	-0.002 (0.032)
Junior middle	0.023 (0.030)	-0.028 (0.031)
Senior middle	-0.007 (0.018)	0.003 (0.017)
Associate college or above	0.002 (0.010)	-0.002 (0.011)
Age gap between the oldest child and the youngest child	1.250 *** (0.209)	1.390 *** (0.240)
Youngest child coresidence	0.007 (0.008)	0.002 (0.011)
Spouse coresidence	0.004 (0.004)	0.002 (0.009)
Grandfather coresidence	-0.024 (0.028)	-0.020 (0.013)
Grandmother coresidence	-0.001 (0.029)	-0.013 (0.014)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Province of the respondent's residential registration is also controlled for as a set of dummy variables to single out the regional fixed effect. P-value of Pearson's Chi-square test for association between gender of the first child and province of residential registration is 0.513 for fathers, and 0.764 for mothers. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Appendix Table 3-a. OLS and Wald Estimates of Outcome Models, **Father Sample**

Dependent variables	Father (N=1,124)			
	Time Use Outcomes		Income Outcome	Subjective Outcome
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	-0.07 (0.04)	-0.09 (0.24)	-1.26 *** (0.32)	-0.08 * (0.04)
Wald	0.53 * (0.21)	-0.55 (1.11)	1.63 (1.52)	0.22 (0.19)
Number of children				
OLS	-0.04 (0.03)	0.01 (0.16)	-0.75 ** (0.22)	-0.05 † (0.03)
Wald	0.31 * (0.12)	-0.33 (0.66)	0.97 (0.90)	0.13 (0.11)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated without any control variables. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.

Appendix Table 3-b. OLS and Wald Estimates of Outcome Models, **Mother Sample**

Dependent variables	Mother (N=868)			
	Time Use Outcomes		Income Outcome	Subjective Outcome
	Logged hours worked per month in 2009	Logged hours taking care of family members last month	Logged personal income last month	Overall subjective scale
Estimation methods				
More than one child				
OLS	-0.07 (0.06)	0.70 * (0.27)	-2.39 *** (0.39)	-0.18 *** (0.04)
Wald	-0.18 (0.28)	0.71 (1.23)	-1.97 (1.76)	0.40 † (0.21)
Number of children				
OLS	-0.04 (0.04)	0.47 * (0.18)	-1.34 *** (0.27)	-0.11 *** (0.03)
Wald	-0.10 (0.16)	0.40 (0.69)	-1.10 (0.99)	0.22 † (0.12)

Note: 2010 CFPS. Standard errors are reported in the parentheses. The sample is restricted to rural registration, Han ethnicity, eligible provinces with rural registration exemption and eligible cases for all the variables. Overall subjective scale is the average of six subjective scales ranging from 1 to 5 on overall happiness, life satisfaction, self-confidence in career, self-confidence in the future, quality of social relationship, and social ability. Larger numbers indicate more positive ratings. All models are estimated without any control variables. †p<0.10; *p<0.05; **p<0.01; ***p<0.001.



PSC Research Reports

The **Population Studies Center** (PSC) at the University of Michigan is one of the oldest population centers in the United States. Established in 1961 with a grant from the Ford Foundation, the Center has a rich history as the main workplace for an interdisciplinary community of scholars in the field of population studies.

Currently PSC is one of five centers within the University of Michigan's Institute for Social Research. The Center receives core funding from both the Eunice Kennedy Shriver National Institute of Child Health and Human Development (R24) and the National Institute on Aging (P30).

PSC Research Reports are **prepublication working papers** that report on current demographic research conducted by PSC-affiliated researchers. These papers are written for timely dissemination and are often later submitted for publication in scholarly journals.

The **PSC Research Report Series** was initiated in 1981.

Copyrights for all Reports are held by the authors. Readers may quote from this work (except as limited by authors) if they properly acknowledge the authors and the PSC Series and do not alter the original work.

Population Studies Center
University of Michigan
Institute for Social Research
PO Box 1248, Ann Arbor, MI 48106-1248 USA
www.psc.isr.umich.edu