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Are Only Children Worse off on Subjective Well-being? Evidence from China's One-Child Policy

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Are Only Children Worse Off on Subjective Well-being? Evidence from China's One-Child Policy

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Abstract

Family structure, particularly sib-ship structure, has a long-term effect on children's subjective well-being. This thesis examines the causal effect of growing up as an only child on subjective well-being, as measured by self-rated happiness, confidence, and depression. The thesis takes advantage of the exogenous fertility shock of China's One-Child Policy, which was implemented in 1979. Our results show that being an only child significantly decreases subjective well-being, but this result is mainly driven by rural boys. A tentative explanation for this pattern is provided based on the disparity of son preference in rural and urban China.

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I. Introduction

Sib-ship has a profound effect on children's subjective well-being. As an important aspect of family configuration, sib-ship has been demonstrated to be an important agent of children's socialization, personality and psychological development (Piaget, 1997, Polit, 1982, Dunn, 1998), which is associated with better subjective well-being. Only children, in contrast, have been historically portrayed as having undesirable personalities and social behaviors (Fenton, 1928, Brill, 1922). This stereotype is not restricted to Western countries (e.g., Thompson, 1974), but is also found in developing countries with low fertility rates (e.g., China since the 1980s), where the public perception is that only children are socially inept, selfish, anxious, dependent, and generally maladjusted (Polit, 1982; Terhune, 1974; Thompson, 1974). However, although the bad reputation of only children is widespread, the empirical reality of this stereotype is unclear. In this thesis, I examine the causal effect of being an only child on subjective well-being outcomes.

Sib-ship and Subjective Well-being

Several lines of psychological research have documented the effect of siblings (and sometimes family size) on socialization process and personality development. As some dimensions of personality are strong predictors of subjective well-being (SWB) (e.g., extraversion, neuroticism, and self-esteem, Diener, 1984), sib-ship could play an irreplaceable role in the development of subjective well-being. Figure 1 provides a theoretical map of the effect of sib-ship on an individual's subjective well-being. Figure 1 shows two channels through which being an only child can affect subjective well-being: (1) directly, through sibling deprivation, as only children lack interaction with siblings; and (2) indirectly, through parental practices, which could be affected by family size.

>> Figure 1 Here <<

Sib-ship provides individuals with a positive socialization context throughout their childhood and adolescence (Dunn, 1998). In early childhood, early sibling relationships provide a developmental context that can promote moral reasoning, conflict-resolution skills, and social understanding in very young children. Therefore, it is suggested that sib-ship is beneficial to children's social skills and psychological development, and thus leads to higher levels of subjective well-being.

In addition, the number of siblings in a family can indirectly affect children's subjective well-being outcomes by affecting their parents' behavior. According to the resource dilution theory (Blake, 1981), a larger number of children may not only dilute a family's substantial resources (financial and physical), but also parental practices such as attention, intervention, caretaking, etc. Therefore, parents of only children may not only invest more in their only child (Falbo, 1987; Falbo & Polit, 1986), they may also be more responsive to the child's needs; this may lead to a child with a greater sense of security, intellectual competence, self-esteem, and psychological confidence (Bowlby, 1969). Therefore, without suffering from resource dilution, only children could possess a higher level of subjective well-being. However, undiluted parental attention can also be detrimental. Specifically, an only child may receive too much parental attention, and high levels of parental expectations and pressure to succeed will result in more neuroticism, leading to a lower level of subjective well-being in later life.

Therefore, being an only child can have both positive and negative effects on an individual's subjective well-being. Previous studies of the overall effect of sibling size on subjective well-being outcomes are inconclusive. I explore the mechanisms through which being an only child affects subjective well-being in the specific context of China's One-Child policy (OCP).

Only Children in the China Context: The Little Emperors

Only children born after the introduction of China's One-Child Policy in 1979 are often called "Little Emperors," and are accused of being selfish, maladjusted, and spoiled (e.g., see Time, 1999). According to critics, one source of the problem is the "four-two-one" family structure that has become widespread in China since the OCP was implemented. Such a family consists of four grandparents, two parents, and one child, and the only child in the family is doted on by the parents and grandparents. In addition to the possible negative effects of such an environment on individual children, some people worry that due to the lack of team-spirit and risk-taking in only children, this family structure may have a negative effect on the future of China.

Studies of only children in the China context have produced mixed evidence. In a review of studies of only children by Chinese scholars, Feng (2002) summarized psychological, sociological, and demographic research. Most of the studies looked at the psychological traits

and behavioral patterns of only children by comparing them to non-only children; the outcomes are measured using psychological scales and parental or teachers' assessments. In terms of sampling, most previous studies are regional (within a city or province), and have children with a range of ages. However, although these studies have provided rich descriptive patterns, few have considered the endogeneity of being an only child. Specifically, only children and non-only children may have different unobserved family characteristics and parental preferences, thus the difference between the behavioral outcomes of the two groups may be confounded by those unobserved factors.

A very recent study by Cameron et al. (2013) contributed to this issue by conducting experiments, sampling those born just before and just after 1979 among urban residents in Beijing. To measure their behavioral outcomes, the researchers used economic games (e.g., the dictator game) and surveys of their personality traits to capture their behavioral outcomes. With the help of robustness checks that elicited a cohort effect, they concluded that only children born as a result of China's OCP are significantly less trusting, less trustworthy, more risk-averse, less competitive, more pessimistic, and less conscientious than non-only children; in general, they live up to their bad reputation as Little Emperors.

Contribution and Significance

Although it seems that the debate on Little Emperors has almost been closed, a careful examination of previous studies reveals important gaps in the literature. First and foremost, a nationally representative sample is clearly needed to assess the effect of the OCP on individual outcomes at a national level. In addition, as most studies focus on urban areas, the pattern in rural areas is still an open question. Third, the heterogeneity effect of being an only child is still under exploration.

Targeting these gaps, this thesis focuses on three key features of the issue. First, I use the recently released CFPS (China Family Panel Studies) data as a national representative sample that includes 25 provinces. Second, I exploit the quasi-natural experimental setting of China's OCP to resolve the endogeneity issue of family size, making use of both the temporal and spatial variation in the policy's implementation. Third, I examine the heterogeneity of this effect with respect to registration disparity (Hukou) and gender disparity for a better understanding of the Little Emperors phenomenon. Although I focus on China, this work also contributes to the larger literature on only children, therefore enriching the cross-country

understanding of this issue (Falbo, 1984).

The rest of this thesis is organized as follows. In Section II, I review the historical background of China's One-Child Policy. Then in Section III, I provide a description of our data and sample, and construct our major measurement of non-cognitive skills. Section IV discusses the identification strategy and Section V presents the empirical results. Finally, I present the conclusions in Section VI.

II. Background: China's One-Child Policy

China's family planning policy (FPP) started from the early 1960s, aiming at alleviating the pressure of its "burgeoning" population on social, economic, and environmental development. Currently, China has one of the most large-scale family planning policies in the world. FPP in China can be roughly divided into three stages (Yang, 2004, Wang, 2012): (1) 1963–1970, a period of mild and narrowly implemented family planning policy, during which the FPP was gradually shaped by establishing a population growth target, promoting late marriage, establishing family planning institutions, and introducing family planning technology; (2) 1971–1979, a period of strong and widely implemented planning policy, during which the "Later, longer, fewer" ("*Wan, Xi, Shao"*) campaign spread across the country, encouraging couples to marry later, have longer birth spacing, and fewer children; however, the policy was often not mandatory (e.g., see Freedman et al., 1988); and (3) 1979–present, the period of the well-known OCP, which restricts urban Han Chinese couples to only give birth to one child during their lifetime (Banister, 1987; Peng, 1991). The implementation of the FPP, especially the OCP, has led to significant changes in China's demographic structure.

>> Figure 2 here <<

Figure 2 illustrates the trend in China's Total Fertility Rate (TFR) from 1950 to 1990. Beginning in 1963, the TFR mildly decreased from 7.5 to 5.4. In the second period, when the FPP was implemented more widely, the TFR dramatically dropped from 5.5 to 2.7. In the OCP period, the TFR has fluctuated a bit, but has in general stayed at a low level, around 2. When examining the TFR trends in rural and urban China separately, we notice that the rural TFR is generally higher than the urban TFR, but the two groups converge during the 1959-1961 Great Famine and during the OCP period.

The OCP has both time and regional variation, among which an important one is the 1.5 Child Policy since the mid-1980s (Greenlaugh, 1986). This major modification was introduced because the original OCP resulted in a high sex selection and severe female infanticide in rural China, due to the strong preference for sons in these regions (Qian, 2009). Therefore, as early as 1982, local governments began to issue permits for a second child in rural areas.

In addition to the rural-urban dichotomy, the so-called *One-Child* Policy has also varied across provinces. For example, in Beijing, Tianjin, Shanghai, Chongqing, and Jiangsu the one-child limit is generally applied to both rural and urban Han residents, whereas 19 other provinces permit another child if the first child is a girl in rural areas (Guo et al., 2003). Table 1 presents the rough distribution pattern of different family planning policies across regions.

>> Table 1 Here <<

Table 1 illustrates the distribution of four types of family planning policy in three regions of China, which are defined according to economic performance and geographical location. Eastern China covers 11 municipalities and provinces, and is the most economically developed, industrialized, and marketized part of China; Middle China covers 7 provinces and has moderate economic development; and Western China covers one municipality (Chongqing) and 11 inland provinces, which constitute the least developed region of China. The distribution of the four family planning policies varies within regions: 42% of Eastern China is governed by the OCP and 53% has the 1.5-Child Policy; whereas 70% of Middle China is governed by the 1.5-Child policy, and nearly 27% of Western China is governed by the Two-Child or Three-Child policies.

There is also considerable variation in the intensity of policy implementation. Attane (2002) devised an indicator of family planning policy resistance (IFPPR). It is a rating scale based on indicators regularly published by the State Family Planning Commission and by the State Statistical Bureau that describe the marriage and reproductive behavior of couples, and it includes the following measures: (1) the ratio of lifetime fertility to date among women aged 25-29 according to the 1988 fertility survey to the mean completed fertility set by the SFPC (see Yin, 1995); (2) the proportion of marriages that occurred before the minimum age for marriage set by the Marriage Law; (3) the proportion of births that occurred before the

minimum age set for marriage; (4) the number of excess births over the plan; and (5) the proportion of women not practicing contraception, thereby breaking the law. As IFPPR is a period measure, we take IFPPR as an indicator of the overall policy intensity during the post-OCP period for different regions. Figure 3 displays the geographical distribution of IFPPR. The degree of resistance varies from 0 (least resistance) to 140 (greatest resistance).

>> Figure 3 here <<

Figure 4 shows the trends in the porportion of only children by Hukou and gender over time. It can be seen that the proportion of only children is very low in the early 1970s for all four groups, but it starts to rise in the late 1970s. In the 1980s, the proportion of families with only one child increases sharply, especially among urban residents. However, we should also note that this pattern may partly be due to the fact that the childbearing period for the younger cohort of women is still on-going. For the post-OCP period, the proportion of only children is the highest in the urban males subgroup, followed by the urban females subgroup. The proportion of rural boys who are only children fluctuates around 10%, whereas for rural girls this proportion is very close to zero. The disparity in these patterns illustrates the son-preference in China.

>> Figure 4 Here <<

III. Data

A. Data and Sample

Our data are from the first wave of Chinese Family Panel Studies (CFPS), conducted in 2010, covering 25 provinces in China.[2] The study is conducted by the Institute of Social Science Surveys (ISSS) at Peking University, and is one of the largest and most comprehensive national panel surveys in China. This survey is designed to examine Chinese social and economic changes through individual-, family-, and community-level data. The CFPS sampling method is PPS (probability proportional to size). The CFPS include basic information (gender, birth year and place, occupation, marital status, and education) of all family members, and is a powerful dataset for studying family configurations in China. Four

[2] Note that the CFPS do not cover the following provinces/areas: Xinjiang, Qinghai, Inner Mongolia, Ningxia, Hainan, Hong Kong SAR, Macau SAR, and Taiwan.

questionnaires constitute this survey: Community, Family, Adolescent, and Adult. Together, they cover social, economic, education, and health issues. In this thesis we focus on the Adult dataset of the 2010 CFPS; we use the family data to calculate individual's sib-ship structure, including the number of siblings, birth order, and the gender of each sibling.

We construct the sample from the Adult dataset, which includes individuals aged 16 and above. Specifically, we include in our sample all individuals born from 1970 to 1985, namely born before and after the One-Child Policy. The 1970 and 1985 cutoff is not arbitrarily chosen. This sample period covers the second and the third stage of China's Family Planning Policy. I do not include those born after 1985 because of the introduction of the 1.5 Child Policy (1.5PC) in the mid-1980s. Given the provincial variation in the 1.5PC implementation, we also exclude the four provinces that introduced 1.5PC before 1985.[3] These restrictions on the sample help us focus on a relatively homogenous and stable policy period. We also restrict the sample to individuals with zero to six siblings, dropping the top 1% observations that have 7 to 13 siblings. Therefore, our sample includes those born from 1970 to 1985 in both rural and urban areas in 24 provinces of China, who have six or fewer siblings.

B. Measurement of Subjective Well-being

Subjective well-being is often used by psychologists as an umbrella term for how we think and feel about our lives (see e.g., Diener et. al., 1999). Subjective well-being is a global concept that has been assessed using various indicators such as life satisfaction, morale, self-esteem, locus of control, and depression. In this thesis, I use three measures for subjective well-being: depression, self-rated happiness, and self-rated confidence in the future. Our happiness measurement captures individuals' overall well-being and our confidence measurement captures their optimism; in contrast, depression measures dysfunction or lack of well-being.

To assess depression, we use the CES-D (Center for Epidemiologic Studies Depression) scale, which considers the continuum of psychological distress (symptoms of depression and anxiety). The original version of CES-D has 20 questions. The CFPS include a six-question version of CES-D in the Q6 section of the adult questionnaire (see the questions in the appendix). Specifically, respondents are asked to rate the frequency of each symptom of

[3] The four excluded provinces are Yunnan (1984), Gansu (1982), Ningxia (1981), and Xinjiang (1981).

psychological distress using the following scale: 1 ("all of the time"), 2 ("most of the time"), 3 ("some of the time"), 4 ("rarely"), and 5 ("none of the time"). We conduct a factor analysis on those CES-D variables to generate a depression factor. Table 2 presents the results of the factor analysis. From Table 2, we notice that factor 1 has an eigenvalue larger than 1, and its factor loadings on all six questions are positive. Therefore, we take factor 1 as a depression factor. With respect to the reliability of the six-item CES-D scale, the Cronbach's alpha coefficient for the six items is 0.84, suggesting that the items have relatively high internal consistency.

>> Table 2 here <<

We also use happiness and confidence in the future as additional measures of subjective well-being. The self-rated happiness variable comes from question M302 in the questionnaire ("Are you happy?"), with answers ranging from 1 ("very unhappy") to 5 ("very happy"). Our confidence measure comes from question M303 in the questionnaire ("Are you confident about your future?"), with answers from 1 ("not confident at all") to 5 ("very confident").

C. Descriptive Statistics

Table 3 provides summary statistics of the key variables in the urban and rural subsamples by only-child status and registration type (Hukou) at three years old.[4] The four panels in Table 3 show individual characteristics, family characteristics (father and mother's education), contextual variables, and subjective well-being outcomes. In both the urban and rural subsamples, the proportion of only children who are male and Han is higher than the proportion who are female or from an ethnic minority. Among the four sub-groups, the rural sub-group has the highest proportion of males, 61%, revealing the strong preference for sons in rural areas. With respect to cohort distribution, only children are more common than non-only children in the younger cohort, reflecting the implementation of the OCP. In addition, only children have more years of schooling than non-only children in both urban and rural areas, and their parental education levels are higher than the parents of non-only children. The contextual variable, IFPPR, reflects the regional variation in the OCP. As shown in Table

[4] As Hukou type at birth is not available, we collect this information for three-year olds.

3, only children are more likely to have been born in regions with a higher intensity of policy implementation, for both rural and urban areas. Finally, with respect to the subjective well-being outcomes, the pattern is somewhat mixed. For the urban subsample, non-only children generally have better subjective well-being than only children, yet the difference is not statistically significant. In the rural subsample, however, non-only children have worse mental health scores, but are happier and have more confidence in the future. Although those statistics are informative, they do not necessarily indicate causal relationships, as there are cofounders associated with both only-child status and the subjective well-being measures.

>> Table 3 here <<

IV. Identification Strategy

A. Basic Specification

To investigate into the question whether being an only child negatively affects subjective well-being, we specify our basic regression model as follows:

$$SWB_{ijc} = \alpha + \beta Single_{ijc} + X_{ijc}\lambda + \varphi_j + \theta_c + \varepsilon_{ijc} \quad , \qquad (1)$$

where the dependent variables are the subjective well-being measures (depression, happiness, and confidence) and the key independent variable, $Single_{ijc}$, is a dummy variable indicating whether an individual i born in region c in year j is an only child. X_{ijc} is a set of control variables: age, gender, ethnicity, Hukou status at three years old, and parental education attainment. φ_j is a set of dummy variables for year of birth, and θ_c is a set of dummies for province of birth. To capture the non-linear age effect on subjective well-being, I also control the age squared term. In model (1) I focus on β, which is the effect of being an only child on subjective well-being outcomes.

B. Identification Strategy: Endogenous Dummy Variable Model

Although the results of equation (1) can be informative, the estimated effect of being an only

child is not necessary causal. In fact, being an only child can be endogenous to the estimate, as various unobserved household characteristics or parental preferences could correlate with both the number of births and well-being outcomes. In other words, the families that give birth to only one child and the ones with more children may be systematically different from each other. To deal with the endogeneity of being an only child, we use the instrumental variable (IV) approach to explore the temporal and regional variation in the OCP, which generates exogenous variation in fertility between families.

I start by defining the pre- and post-treatment group relative to the OCP. As the OCP was implemented in 1979, I assign individuals born before 1978 to the pre-treatment group and those born after 1979 to the post-treatment group. However, the simple division into pre-treatment group and post-treatment group may only capture a temporal trend or cohort effect rather than the effect of OCP. Therefore, I also use another difference, the regional variation in OCP implementation intensity, to eliminate the effects of a temporal trend.

Figure 3 presents the correlation between IFPPR and average sibling size by province during the post-OCP period. We can see that the OCP has been generally well implemented, especially in municipalities and the eastern provinces.

>> Figure 5 Here <<

To incorporate both temporal and regional variations in the OCP into my analysis, I alter the first-stage specification as follows:

$$Single_{ijc} = \alpha + \sum_{j=1979}^{1985} \beta_j (IFPPR_c \times Birth_j) + \gamma IFPPR_c + X_{ijc}\delta + \varphi_j + \theta_c + \varepsilon_{ijc}. \quad (3)$$

The dependent variable, $Single_{ijc}$, is a dummy variable indicating whether an individual i born in province c in year j is a singleton. Φ_j is a set of dummy variables for year of birth. $IFPPR_c$ captures the intensity of the implementation of the OCP across provinces. $IFPPR_c \times Birth_j$ is the interaction term between regional OCP intensity and a cohort, where j varies from 1979 to 1985. X_{ijc} encompasses the following set of control variables: age, age squared, gender, Hukou status, ethnicity, years of schooling, father's education, and mother's education. Θ_c is a set of dummies for the province of birth. v_{ijc} is the error term. Intuitively, a person born after

1979 in a province where the OCP is more intensively implemented is more likely to be a singleton. The interaction terms therefore capture the exogenous effect of OCP on fertility and can be the instrumental variables (IVs) for $Single_{ijc}$.

However, as the endogenous variable is Single, which is a dichotomous variable, the direct application of TSLS(Two Stage Least Square) to a non-linear model would suffer from the "forbidden regression" problem (Angrist & Pischke, 2008). Specifically, as only the OLS estimation of the first stage is guaranteed to produce residuals that are uncorrelated with fitted values and covariates, using OLS in the first stage with the non-linearity of *Single* may lead to biased estimates in finite samples. Following Heckman (1978), I use a three-step endogenous dummy variable model, where the three steps are: (1) estimate a binary response model of *Single* on the IVs and other control variables; (2) get the fitted probabilities of model (1) named as *phat*; and (3) use *phat* as the IV for single to estimate the coefficient of Single. This approach is more suitable for the binary nature of the endogenous variable, and the standard IV standard errors are still asymptotically valid (see Wooldridge, 2002). Therefore, instead of using an OLS specification, as given in equation (3), we use a Probit model in the first stage regression:

$$\Pr(Single_{ijc}=1 \mid x, ifppr, z)=\Phi(\alpha+\sum_{j=1979}^{1985}\beta_j(IFPPR_c\times Birth_j)+\gamma IFPPR_c+X_{ijc}\delta+\varphi_j+\theta_c+\varepsilon_{ijc}), \quad (4)$$

where $\Phi(\cdot)$ is the cumulative distribution function of the standard normal distribution, and z denotes all of our instrument variables, that is all of the interaction terms between IFPPR and birth year. As an individual born after 1979 in a province with high OCP policy intensity (i.e., with lower provincial IFPPR) is more likely to be an only child, the coefficients of these interaction terms should be negative.

V. Only Children's Subjective Well-being: Results

A. OLS Estimates

The results of the OLS analysis of the effects of being an only child on subjective well-being are presented in Table 4. All of the models in Table 4 control for age, age squared, gender, ethnicity, parental education attainment, birth year dummies, and province (at birth) dummies. The standard errors are clustered at the provincial level. For each dependent variable, we

conduct separate analyses with the full sample, the urban sample, and the rural sample.

Columns 1, 4, and 7 show that the effect of being an only child on depression, happiness, and confidence is generally negative, but these differences are statistically insignificant for depression and happiness, and only marginally significant for confidence. The pattern changes a bit when the rural and urban subsamples are analyzed separately. In the urban subsample, only children's mental health is 0.092 standard deviations lower than non-only children's, which is statistically significant at the 10% level, but there is no statistically significant difference between the two groups in the rural subsample. For happiness, the effect of being an only child is not statistically significant in either the urban or rural subsamples. Finally, the pattern for confidence is similar to that for depression. Being an only child can decrease confidence by 0.086, with statistical significance at the 15% level, in the urban subsample, but there is no significant difference in the rural subsample. Taken together, the OLS results indicate that the effect of being an only child on subjective well-being is only moderate, with some rural-urban differences. To investigate the gender disparity within this overall pattern, we further add the interaction terms of the only-child dummy and gender dummy to the regressions, with the results shown in Tables 4 and 5, respectively.

>> Table 4 Here <<

Table 5 illustrates the gender disparity in the effect of being an only child on subjective well-being in the rural and urban subsamples. Such an investigation helps us to explore the effect of son preference in rural China. The prevalence of son preference in China has been well documented, especially in rural areas. In the context of my research question, the severe son preference in rural areas results in only children who are boys being treated better than only children who are girls. In Table 5, I focus on the interaction term of the only-child dummy and gender dummy. From column 2, we observe that in rural China there is a statistically significant gender disparity in the effect of being an only child on depression, and that being an only child is a greater disadvantage for males than for females. In rural families, only children who are boys are less happy than only girls; this difference is marginally significant at the 15% significance level, holding other things equal. Finally, the pattern for confidence is similar to that for happiness; boys who are only children in rural areas are less confident than their female counterparts. The results for the urban subsample, shown in columns 1, 3, and 5, do not show such gender disparity. Together these results suggest that in

rural China male only children are more spoiled by their family (parents and even grandparents) than female only children. In fact, an only son in a rural family is especially cherished as he is considered to carry the lineage for the whole family.

>> Table 5 Here <<

However, although the above OLS results are informative, there may be unobserved confounders that correlate with both the incidence of being an only child and the only children's subjective well-being outcomes (e.g., unobserved family characteristics). In fact, previous psychological studies have shown that mothers of only children and mothers of non-only children are quite different in many ways (Lewis, 1972; Falbo, 1978). Lewis (1972) showed that mothers of only children are more independent, more likely to have come from nontraditional backgrounds, more highly educated, and more likely to have nontraditional marriages. In an investigation of married mothers of undergraduates, Falbo (1978) found that mothers of only children are less affiliative than others. Therefore, considering the potential endogeneity of being an only child, I adopt the two-stage least square (TSLS) approach to deal with the above issue.

B. IV Estimates

Table 6 presents the IV estimations of being an only child on subjective well-being using an endogenous dummy variable model. We first look at depression. In column 1, where the full sample is considered, the coefficient of the only-child dummy is -0.194, suggesting that being an only child can decrease mental health by 0.194 standard deviations. This magnitude is five-times larger than its OLS counterpart and has great practical significance, but it is not statistically significant even at the 15% significance level. For urban boys, this effect is larger but still insignificant. For urban girls, this effect is very large with a coefficient of -0.856, indicating that being an only girl in an urban area can significantly decrease mental health by 0.856 standard deviations. For rural boys, the coefficient is -0.3, which is both practically and statistically significant. Finally, for rural girls (column 5), the coefficient is close to 0 and statistically insignificant. Therefore, for depression as a subjective well-being measure, the urban girls who are only children and rural boys who are only children are most disadvantaged. Columns 6 to 10 present the results for happiness as a dependent variable. From column 6, we observe that the coefficient for the relationship between being an only

child and happiness is -0.264 in the full sample. For both urban boys and urban girls, this effect is negative, but not statistically significant. For rural boys, being an only child can decrease happiness by 0.419, which is also statistically significantly different from 0. Finally, this effect for rural girls is not significantly different from 0. The overall pattern is very similar to that of depression; rural boys are worse off than rural girls. Columns 11 to 15 present the results for confidence in the future. The overall effect of being an only child on confidence is -0.321 with statistical significance at the 5% level. When the full sample is divided by gender and region, I observe that this effect is only significant for rural boys; the coefficient of the only-child dummy is -0.498 in column 14. Again, this pattern is similar to the pattern for depression and happiness, in that rural boys are the most disadvantaged only children.

>> Table 6 Here <<

C. First Stage Results

Since there are three stages in the endogenous dummy variable model, I compile the results from first two stages in Table 7. Although I use a non-linear fitted value for the probability of being an only child instead of a set of IVs (interaction terms between IFPPR and birth year), intuitively the coefficient of *phat* should capture the effect of the OCP on the probability of being an only child. Therefore, the identification comes from both policy IVs and the non-linear functional form.

Panel A presents the results of the first stage using *phat* as an instrument for the only children dummy. Across all of the samples, phat positively affects the incidence of being an only child, with a high statistical significance. The last row of Panel A provides statistics for a Weak IV test, in which all of the statistics are larger than 10, which is the cutoff point suggested by Staiger and Stock (1997) when there is only one endogenous variable. Panel B of Table 7 presents the results from the Probit model (model 4). From this panel, we observe that the coefficients of the interaction terms between IFPPR and birth year dummies are basically negative across the sample. This pattern fits our conjecture about the IV, as a person born in a province with a larger IFPPR (and therefore with less policy intensity) in the post-1979 period is less likely to be an only child. To validate the performance of the set of interactions, we also provide the joint-F statistics in the bottom of Panel B. The joint-F statistics show that the

interactions perform better in the large sample, e.g., the full sample and the rural subsamples. In the urban subsamples, the interaction terms are not jointly significantly different from 0. However, as the identification source of *phat* comes both from the interaction terms and the functional form, and the performance of *phat* in the Weak IV test is satisfactory in the two urban subsamples, I do not consider this a threat to my identification strategy.

>> Table 7 Here <<

Overall, the direction of the effect from the IV estimates is quite similar to that identified by the OLS analysis, as can be seen by comparing Tables 4 and 6. However, in terms of magnitude, the differences between the OLS and IV analyses are more noticeable. We propose that the selection of the number of births by parents is the mechanism underlying this difference. Specifically, it is possible that parents that give birth to only one child may be more liberal, which may also increase the subjective well-being of their children. Therefore, the OLS estimates would underestimate (as this effect is negative) the effect of being an only child (rural or urban), resulting in the IV estimates being much larger than the OLS estimates.

Another important pattern seen in Table 6 is that the overall negative effect of being an only child is driven by rural boys. We tentatively suggest that the different degrees of son preference in urban and rural China drives this difference. Specifically, as son preference remains strong in rural China (e.g., Li & Lavely, 2003), an only boy in a rural family is very likely to be over-indulged and doted on by the whole family (parents, grandparents, and other relatives). As family is the first and foremost instrument of socialization for children, such a parent-child relationship may hamper the socialization process and the children's psychological and personality development. An only child who is a boy is likely to be "spoiled" and to be the Little Emperor in the family. Also, given that subjective well-being is rather stable across a person's life span (as is personality, e.g., see Diener et. al. 1999), the lack of sib-ship could lead to a lower level of resilience and subjective well-being in rural boys in the long term who are only children.

In contrast, in urban China, the son preference is not as prevalent and the gender disparity is not as clear as in the rural sample. The above results and the theoretical mechanisms that we discussed in Section I, suggest that for most urban children and girls in rural areas, the effects of sibling deprivation and a better parent-child relationship may counteract each other, so that the overall effect of being an only child is not significant. For rural boys, however, the

parent-child relationship is likely to be less successful, resulting in worse subjective well-being outcomes. However, discussing parental practices among rural and urban Chinese families is beyond the scope of this thesis, we hope that future studies can examine this issue.

VI. Discussion and Conclusions

In this thesis, I reevaluate the long-term effect of being an only child on individual subjective well-being using a nationally representative sample of rural and urban Chinese families. My measurements of subjective well-being consider depression, self-rated happiness, and confidence. To deal with the endogeneity of sibling size, I adopt the instrumental variable approach, and extract exogenous variation in sibling size based on the temporal and regional variations in the implementation of China's OCP. Given the binary nature of being an only child, I use a three-step endogenous dummy variable model to estimate the relationships.

The results show that overall being an only child can significantly decrease subjective well-being, which is consistent with previous studies that support the Little Emperors story. However, when dividing the national sample into four groups by registration status and gender, I find that the negative effects of being an only child are mainly confined to rural boys. The underlying explanation of this pattern may be the difference in son preference in rural and urban China. An only son in a rural family is greatly favored for cultural and economic reasons, so an only son is more likely to be doted on. However, an only daughter in a rural family may not be as strongly desired and thus is more likely to be treated the same whether or not she is an only child. In urban China, where the son preference is not as prevalent, the gender disparity is not visible.

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Appendix. The CES-D Questions in the CFPS Adult Questionnaire

Q6. The following are some descriptions of psychological states. Please choose the answer that reflects your situation in the past month:

Q601. I felt depressed.

Q602. I was bothered by things that don’t usually bother me.

Q603. My sleep was restless.

Q604. I felt hopeless about the future

Q605. I had trouble keeping my mind on what I was doing.

Q606. I could not get “going.”

(1) Most or all of the time

(2) Occasionally or a moderate amount of the time

(3) Nearly half of the time

(4) Some or a little of the time

(5) Rarely or none of the time

Figure 1: Theoretical Map of the Effect of Being an Only Child on Subjective Well-being

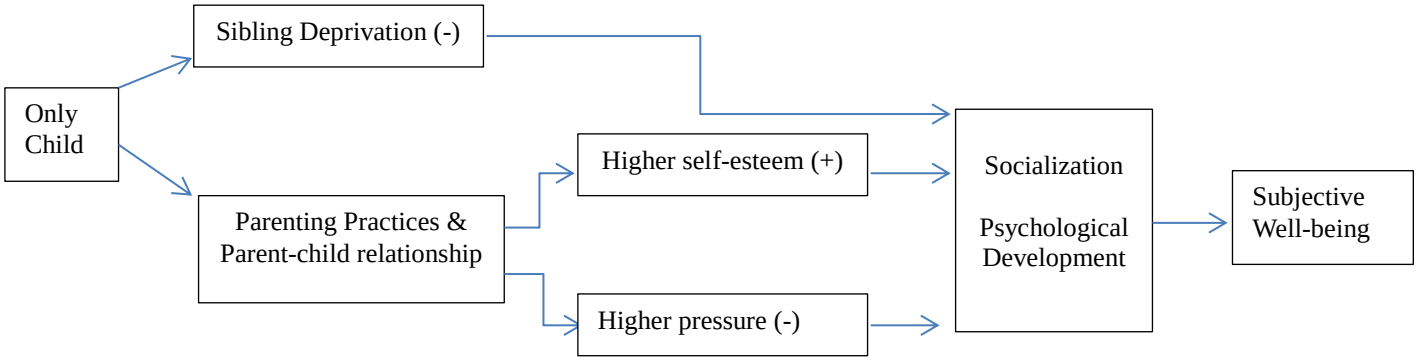
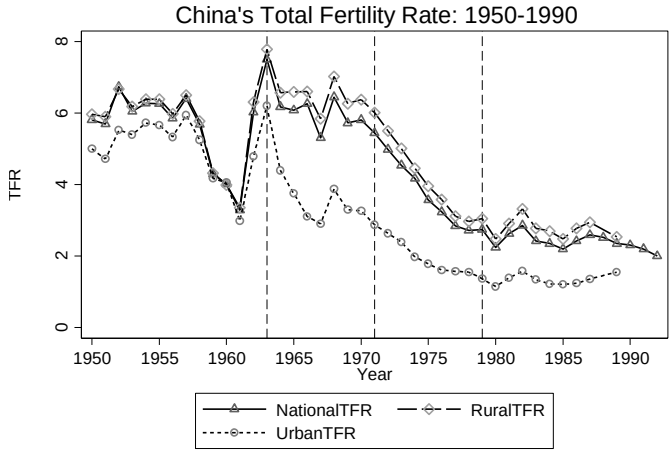
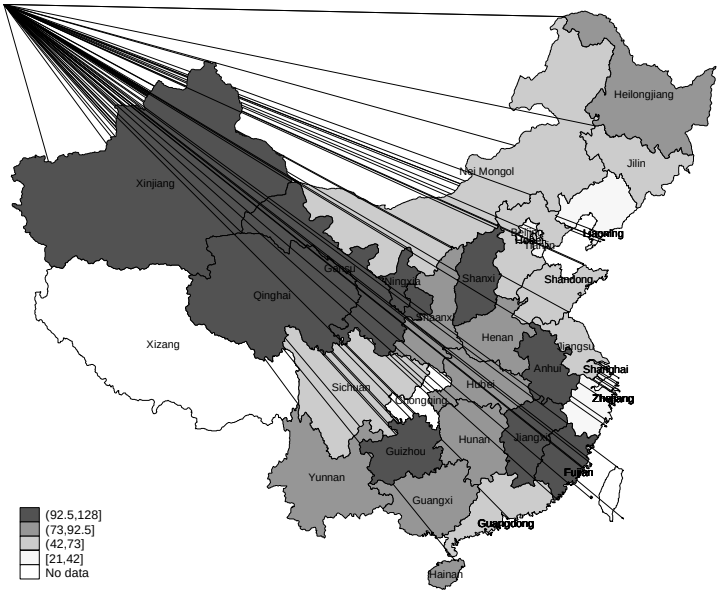


Figure 2: China's Total Fertility Rate: 1950-1990



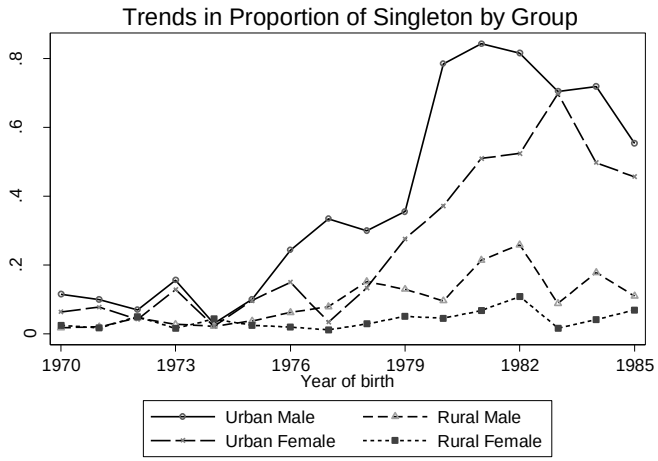
Source: Yao and Yin, 1994, Basic Data of China's Population, Table 3-7. Data for 1940 – 1949 and 1950 – 1981 are from "An Analysis of a National One-per-Thousand-Population Sample Survey on Fertility," special issue of Chinese academic periodical "Population and Economics", July 1983, p 48, and pp152 – 166. Data from 1982 to 1992 are from the Planning and Statistics Department of the State Family Planning Commission of China.

Figure 3: Indicator of Family Planning Policy Resistance (IFPPR)



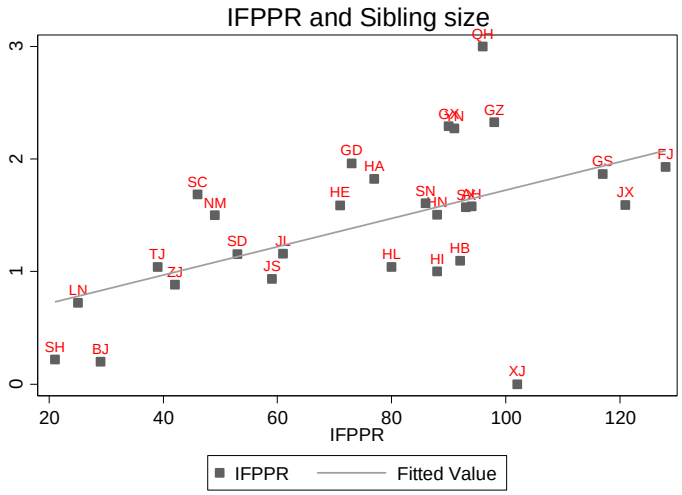
Source: Attane (2002).

Figure 4: Proportion of Only Children by Gender and Year of Birth



Note: Calculated with data from the CFPS 2010.

Figure 5: IFPPR and Sibling Size



Source: The IFPPR data are from Attane (2002). Sibling size is the average number of siblings by province during the post-1979 period.

Table 1: The Proportion of People Covered by Four Family Planning Policies in Three Regions of China (year=1990)[5] (%)

Region	1-Child	1.5-Child	2-Child	3-Child
Eastern China	42.0	53.4	4.3	0.3
Middle China	24.7	70.3	4.9	0.0
Western China	39.4	34.2	22.2	4.2
National	35.4	53.6	9.7	1.3

Source: Guo et al. (2003), Table 1.

[5] Eastern China includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; Middle China includes Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan; Western China includes Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shannxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia, and Guangxi.

Table 2: Factor Analysis of CES-D Variables

	Factor analysis/correlation (principal-component factors)					Factor loadings	
	Eigenvalue	*Difference*	*Proportion*	*Cumulative*		*Factor 1*	*Uniqueness*
Factor 1	3.32363	2.48509	0.5539	0.5539	qq601	0.7618	0.4197
Factor 2	0.83854	0.28936	0.1398	0.6937	qq602	0.744	0.4464
Factor 3	0.54917	0.07351	0.0915	0.7852	qq603	0.7581	0.4253
Factor 4	0.47566	0.06293	0.0793	0.8645	qq604	0.7443	0.446
Factor 5	0.41273	0.01247	0.0688	0.9333	qq605	0.7282	0.4697
Factor 6	0.40026	.	0.0667	1	qq606	0.7285	0.4692

Table 3: Descriptive Statistics of the Subsamples

	Urban Sample					Rural Sample				
	Only children		Non-only children		t-test	Only children		Non-only children		t-test
Individual Characteristics	Mean	N	Mean	N	p-value	Mean	N	Mean	N	p-value
Male	0.57	469	0.46	752	0	0.61	444	0.45	5417	0
Age	29.64	469	34.43	752	0	31.04	444	33.83	5417	0
Han Ethnicity	0.96	469	0.95	752	0.62	0.94	444	0.91	5417	0.01
Married	0.64	469	0.86	752	0	0.88	444	0.93	5417	0
Years of Schooling	13.48	469	11.71	752	0	9.24	444	7.76	5417	0
Family Characteristics										
Father's Education	10.18	394	8.97	528	0	6.29	342	5.57	3772	0
Mother's Education	9.49	410	7.06	601	0	4.7	341	3.17	4233	0
Contextual Variable										
IFPPR	49.76	461	66.35	750	0	51.92	442	71.73	5355	0
Subjective Well-being										
Depression	0.1	469	0.14	752	0.47	0.19	444	0.1	5417	0.03
Happiness	4.0173	463	4.0389	750	0.69	3.884	444	3.9752	5406	0.06
Confidence	3.8282	463	3.8618	751	0.57	3.8459	444	3.8806	5406	0.49

Table 4: Only Children's Subjective Well-being: OLS

	Dependent Variable								
	Depression			Happiness			Confidence		
	All	Urban	Rural	All	Urban	Rural	All	Urban	Rural
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(13)
Single	-0.048	-0.092*	-0.005	-0.012	0.050	-0.030	-0.088†	-0.086†	-0.066
	(0.277)	(0.080)	(0.930)	(0.806)	(0.474)	(0.660)	(0.108)	(0.150)	(0.330)
Male	0.046†	-0.035	0.064†	-0.055**	-0.100**	-0.039	0.133***	0.117†	0.144***
	(0.101)	(0.551)	(0.150)	(0.049)	(0.022)	(0.241)	(0.000)	(0.145)	(0.001)
Constant	-5.114	-7.969	-7.375	1.006	-26.843	1.149	15.467*	32.618	15.017*
	(0.569)	(0.446)	(0.439)	(0.847)	(0.418)	(0.836)	(0.066)	(0.258)	(0.090)
Observations	4,437	845	3,592	4,425	838	3,587	4,427	839	3,588
R-squared	0.033	0.069	0.041	0.093	0.127	0.094	0.055	0.070	0.066

Note: *** p<0.01, ** p<0.05, * p<0.1, †p<0.15. Standard errors are clustered at the provincial level. All of the regressions control for age, age squared, gender, ethnicity, Hukou status at three years old, parental educational attainment, birth year dummies, and provincial (at birth) dummies.

Table 5: Only Children's Subjective Well-being and Gender Disparity: OLS

	Dependent Variable					
	Depression		Happiness		Confidence	
	Urban	Rural	Urban	Rural	Urban	Rural
	(1)	(2)	(3)	(4)	(5)	(6)
Single	-0.059	0.181**	0.030	0.111	-0.087	0.034
	(0.376)	(0.013)	(0.692)	(0.324)	(0.358)	(0.510)
Male	-0.009	0.085*	-0.116**	-0.023	0.117†	0.155***
	(0.902)	(0.070)	(0.046)	(0.534)	(0.109)	(0.000)
Single×Male	-0.060	-0.277***	0.037	-0.210†	0.001	-0.149†
	(0.425)	(0.009)	(0.754)	(0.133)	(0.995)	(0.111)
Constant	-7.617	-6.977	-27.312	1.450	32.609	15.231*
	(0.466)	(0.466)	(0.413)	(0.793)	(0.257)	(0.084)
Observations	845	3,592	838	3,587	839	3,588
R-squared	0.069	0.043	0.127	0.095	0.070	0.067

Note: *** p<0.01, ** p<0.05, * p<0.1, †p<0.15. The standard errors are clustered at the provincial level. All of the regressions control for age, age squared, gender, ethnicity, Hukou status at three years old, parental education attainment, birth year dummies, and province (at birth) dummies.

Table 6: Only Children's Subjective Well-being: IV Results

	Dependent Variable														
	Depression					Happiness					Confidence				
	All	Urban Boys	Urban Girls	Rural Boys	Rural Girls	All	Urban Boys	Urban Girls	Rural Boys	Rural Girls	All	Urban Boys	Urban Girls	Rural Boys	Rural Girls
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Sample Mean	0.137	0.119	0.157	0.161	0.113	3.955	3.959	4.135	3.898	3.971	3.885	3.901	3.827	3.963	3.818
Single	-0.194	-0.346	-0.856**	-0.300†	-0.067	-0.264*	-0.333	-0.255	-0.419**	0.217	-0.321**	-0.436	-0.371	-0.498*	-0.234
	(0.156)	(0.338)	(0.011)	(0.118)	(0.752)	(0.090)	(0.470)	(0.572)	(0.021)	(0.583)	(0.043)	(0.413)	(0.416)	(0.072)	(0.322)
Constant	-2.166	18.074*	-9.660	-1.253	-4.309	4.011†	13.882	-5.919	7.096**	-1.486	5.039†	13.546	-14.739†	5.821	7.079
	(0.355)	(0.099)	(0.371)	(0.786)	(0.395)	(0.115)	(0.341)	(0.340)	(0.049)	(0.755)	(0.138)	(0.337)	(0.133)	(0.323)	(0.201)
Observations	4,286	435	383	1,663	1,542	4,274	430	381	1,663	1,538	4,276	431	381	1,663	1,539
RMSE	0.810	0.768	0.812	0.786	0.829	0.889	0.862	0.788	0.920	0.876	0.974	0.949	0.900	0.968	0.977

Note: *** p<0.01, ** p<0.05, * p<0.1, †p<0.15. The standard errors are clustered at the provincial level. All of the regressions control for age, age squared, gender, ethnicity, Hukou status at three years old, parental education attainment, birth year dummies and province (at birth) dummies.

Table 7: Only Children's Subjective Well-being: First Stage Results

	Panel A: OLS: Dependent Variable: Only-child dummy				
	All	Urban Boys	Urban Girls	Rural Boys	Rural Girls
phat	1.234***	1.098***	0.973***	1.109***	1.403***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)
Constant	-0.793	-1.889	-0.694	0.050	-0.792
	(0.436)	(0.711)	(0.924)	(0.973)	(0.638)
Weak IV test (F statistics)	502.015	15.5759	21.185	116.812	13.7886
Observations	4,286	435	383	1,663	1,542
R-squared	0.384	0.433	0.439	0.262	0.250
	Panel B: Probit: Dependent Variable: Only-child dummy				
	All	Urban Boys	Urban Girls	Rural Boys	Rural Girls
IFPPR×1979	-0.004	-0.009	-0.015	-0.017**	0.013†
	(0.272)	(0.444)	(0.189)	(0.021)	(0.148)
IFPPR×1980	-0.007*	-0.014	-0.005	-0.016*	0.003
	(0.066)	(0.286)	(0.652)	(0.061)	(0.654)
IFPPR×1981	-0.012***	-0.002	-0.015	-0.019***	-0.016*
	(0.003)	(0.889)	(0.202)	(0.008)	(0.090)
IFPPR×1982	-0.002	0.000	-0.009	-0.009	0.008
	(0.500)	(0.961)	(0.414)	(0.173)	(0.208)
IFPPR×1983	-0.013***	-0.028*	0.017	-0.027***	-0.015
	(0.003)	(0.088)	(0.267)	(0.005)	(0.202)
IFPPR×1984	-0.012***	-0.031*	-0.024	-0.010	-0.016*
	(0.006)	(0.085)	(0.184)	(0.207)	(0.100)
IFPPR×1985	-0.007†	0.010	0.005	-0.018**	-0.009
	(0.115)	(0.384)	(0.614)	(0.021)	(0.373)
Constant	20.315**	58.895**	30.460	10.557	7.591
	(0.021)	(0.013)	(0.966)	(0.449)	(0.949)
Joint F-test					
F-Statistics	20.81	8.23	7.29	20.21	12.84
p-value	0.0041	0.3126	0.3994	0.0051	0.0761
Observations	4,286	435	383	1,663	1,542

Note: *** p<0.01, ** p<0.05, * p<0.1, and †p<0.15. The standard errors are clustered at the provincial level. All of the regressions control for age, age squared, gender, ethnicity, Hukou status at three years old, parental education attainment, birth year dummies, and province (at birth) dummies.