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The Effects of the One-Child Policy on Household Financial Decisions

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Abstract

The Chinese One-Child Policy, enacted in 1979, was an attempt to decrease the population growth rate following a period of massive social and political confusion and uncertainty. While the policy was beneficial to curbing the population growth in China, it also introduced unintentional consequences, including sex imbalance, and other demographic differences. The goal of this paper is to examine the economic behavior and financial decisions of son-families and daughter-families across different provinces and regions of China, which have varying levels of sex imbalance, as a result of a cultural preference for sons. These financial decisions include the household saving rate, household savings in the form of bank deposits, and the decision of home ownership. This paper will examine why households in different areas of the country have different behavior in household saving rates, household bank deposits, and determination of home ownership. These financial decisions are likely to be driven by, among other factors, income, the gender of child, and the age of child.

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The Effects of the One-Child Policy on Financial Decisions

By: Sylvia Xu

1. Introduction

The Chinese One-Child Policy, enacted in 1979, was an attempt to decrease the population growth rate following a period of massive social and political confusion and uncertainty. While the policy was beneficial to curbing the population growth in China, it also introduced unintentional consequences, including sex imbalance, and other demographic differences. In the decades since the implementation of the One-Child Policy, the ratio of boys relative to girls in China has steadily increased from the natural human variation in sex ratio of 105:100 as high as 137 men to 100 women in some areas of the country in 2005 (Wei and Zhang, 2011).

Recent studies have been conducted to examine the different effects of the One-Child Policy. Wei and Zhang (2011) examined the relationship between the local sex ratio and household saving rates of both families with daughters and families with sons using a sample from the Chinese Household Income Project (CHIP) of 2002 and census data from 1990. In both rural and urban households, the authors found that an increase in the sex ratio caused an increase in household savings in son-families but no statistically significant effect in daughter-families. In this paper, I hope to expand the findings of this relationship between sex imbalance and household savings by examining the longer-term effects of the One-Child Policy using census data from 2010. In the 36 years that the policy has been implemented, it has been both relaxed and tightened. For example, the Liaoning province added five exceptions and removed one between the years 1979 and 1997 (Scharping, 2003). In this paper, I use more recent survey and census data from 2010, which will allow me to examine the saving behavior of households with

children of a completely different cohort than that of Wei and Zhang (2010). I hypothesize that families with sons will increase their saving to distinguish themselves in the marriage market. Additionally, parents, regardless of the gender of their child, will increase saving in anticipation of a decrease in future generational transfers, due to fewer children to care for them.

The goal of this paper is to examine the financial decisions of son-families and daughter-families across different provinces and regions of China, which have varying levels of sex imbalance, as a result of a cultural preference for sons. This paper will examine why households in different areas of the country have different behavior in household savings and financial planning. These financial decisions include the household saving rate, household savings in the form of bank deposits, and the decision of home ownership and are likely to be driven by, among other factors, income, gender of child, and the age of child.

The motivation for this paper stems from recent attention China's family planning policy has received. As of November 15, 2013, China formally eased the family planning policy. Families with one parent who is an only child can have two children (Hatton, 2013). China's most affluent province, Zhejiang, became the first province to enact the new policy in January 2014 (Blanchard and Martina, 2014). On October 29, 2015, the Communist Party of China announced following the Fifth Plenary Session of the 18th Communist Party of China Central Committee that all couples would be allowed to have two children. (Xinhua, 2015). While it is difficult to anticipate the effect of this new policy, I hope that this paper will shed light on how the easing of the policy may impact future family financial decisions.

1.1 One-Child Policy

In a movement called the Great Leap Forward (1958 – 1961) and the Cultural Revolution following (1966 – 1976), Mao Zedong, the Chairman of the Communist Party of China, led many measures to establish China among the world's leaders. Among these, Mao encouraged families to have as many children as possible and outlawed abortion in order to boost the workforce, hoping to further empower the country (Cultural Revolution, 2015). Chairman Mao was famously quoted saying, "Of all the things in the world, people are the most precious" (Kane, 1987). In 1970, the Chinese population was growing at a rate of 2.76% and was approaching one billion at the end of the decade (The World Bank). By 1982, the population would have grown to 1.4 billion by the end of the century at the observed birth rate (Settles, 2013).

By the time of Mao's death in 1976, the new leader Deng Xiaoping turned to the serious issue of curbing the country's rapid population growth. His administration encouraged families to have no more than two children through official propaganda, known as the "Two is Enough" policy (Eberstein, 2010). By the turn of the decade, the Central Committee of the Communist Party issued a letter restricting each family to one child, which is known as the "One-Child Policy." The official goal in the 1980s was to achieve zero population growth and curtail the population to 1.2 billion by 2000 (Ching and Penny, 1999).

Although the Chinese central government enacted and initiated the One-Child Policy, local governments implemented the policy. The State Family Planning Bureau, an entity separate from the Ministry of Public Health (which initiated the policy), set overall targets on the intended annual fertility rate, which resulted in alternate relaxations and tightenings of the policy, according to the annual population projections (Hesketh and Zhu, 1997). Therefore, the local

policies varied not only between provinces, regions, ethnic groups but also often between years (Scharping, 2003).

In addition to formal policies, compliance with the policy was also encouraged through government and media propaganda. For example, a popular commercial during the 1990s reminded parents that "with two children, you can afford a 14 inch TV, with one child, you can afford a 21 inch TV" (Hesketh and Zhu, 1997). Those who pledged to comply with the policy were awarded with the "Certificate of Honor For Single-Child Parents" which gave them access to incentives (Li and Santana Cooney, 1993). These benefits included paid pregnancy leave for up to three years, a 5-10% salary increase and preferential access to housing, schools, and health services (Ching and Penny, 1999). In rural areas, single-child families were given a tax deduction and the ability to obtain larger pieces of land. Alternatively, there were several methods, still controversial to this day, that were used to ensure that families would only have one child. In cities, parents who violated this policy were demoted or became ineligible for a promotion if they worked in the government sector. These families often suffered a 10-15% decrease in wages, lasting up to 14 years. The government sometimes even used coercion of sterilization and forced abortion. In rural provinces, parents with more than one child most often saw a one-time fine, which constituted a large proportion of their annual salary (Liao, 2013).

In certain situations, a second child was permitted. Similar to the implementation of the One-Child Policy, rules for a second child varied between provinces and regions and were determined by local governments (Liao, 2013). For example, in urban areas, if a first child is disabled or a spouse worked overseas, parents could request permission for a second child. In rural areas, a couple could have a second child if the first was a girl and the parents had difficulty maintaining the land. Additionally, in 1981, families in Shanghai could apply for a second-child

permit if the first child was disabled or had died, there was a pregnancy after "long years of childless marriage and a subsequent adoption", or if the parents were in a second marriage where one spouse did not previously have children (Scharping, 2003). Families from certain ethnic groups were allowed additional exceptions. The Xinjiang province allowed minority women to have up to four children, while rural Tibetan families never had any restrictions on the number of children a family could have (Li, Zhang, and Zhu, 2005).

As a result of these harsh methods, China was successful in reducing the population growth from 11.6% in 1979 to 5.9% in 2005 despite harsh world criticism regarding human rights (Settles, 2013). The main criticism of the policy however is the sex discrimination that developed. Although there are births in China that are likely to go unreported, a newborn daughter is twice as likely to not be registered and hidden than a newborn son (Ching and Penny, 1999).

1.2 Cultural Preference for Sons

One of the biggest social effects of the Chinese One-Child Policy of 1979 is the high sex ratio imbalance that still exists today. Influenced by Confucianism, China is a traditionally patrilineal society in which inheritance and assets are passed down through the male's bloodline. The son supports not only his children and his elders, but more importantly, carries the family name. Traditionally, women keep their maiden name while their children take their father's last name. Culturally, women are "married out" such that they join their new husband to be the caretakers of his parents, while the bride's parents are left to care for themselves. Thus, there is still a strong preference for sons among families. Currently, there are 120 males for every 100 females in China, with some areas as high as 130 to 100 (McKenzie, 2012). Especially in the era

of improving prenatal technology, this existence of sex imbalance across the country is almost strictly a result of selective abortions, although female infanticide and abandonment also do exist.

1.3 Marriage rituals and the marriage market in China

China has developed a strong set of traditions and culture, many of which are imbedded in every day life, including interactions, education, and, of course, marriage. Marriage rituals in China have been in place since 400 B.C. and even today, very little is different among *traditional* Chinese marriages.

These pre-marriage rituals are found in the Book of Rites, Book of Etiquette and Ceremonial and the Bai Hu Tong, which are known as the Three Rites. They are a collection of texts, written during the Zhou Dynasty as a model for social, cultural and ceremonial rites (Sarmento, 2007). Among these is the "Three Letters Six Etiquette," a well-known set of traditions. These rites are a series of elaborate proceedings that a groom's family must follow in order to wed their son.

Today, traditional marriages are still common in rural areas, despite introductions of newer trends and customs. The expenses for rural marriages have been increasing since late 1970's when decollectivization of agriculture occurred and rural China experienced rapid growth. In the 1970s, the three most popular wedding gifts were a wristwatch, a bicycle, and a sewing machine. By the 1990s, the three gifts were referred to as the "gold gifts," namely, necklaces, bracelets and earrings. Today, the three most popular gifts are a house, a car, and bank notes (Jiang et al., 2015). In more urban parts of the country, although the rituals are not

followed in their entirety, some traditions still exist, especially the giving of lavish gifts, as a nod to China's long cultural history.

Due to a shortage of women, men have much less bargaining power in the marriage market, as women have more suitors to choose from. This is confirmed in a paper by Du, Wang, and Zhang (2015), who show that there exists a positive relationship between an increase in sex imbalance, and the existence of economic gaps between a male and his family's wealth and a female and her family's wealth. Additionally, the authors' results suggest that an increase in the sex ratio increases the likelihood that a woman will "marry up", possibly as a result of having more bargaining power. Thus, while these women search for a potential future life partner, an increasingly competitive marriage market allows them to put more emphasis on gaining as many financial benefits as possible from marriage (Jiang et al., 2015).

According to reports from 2011, many women would not even consider a man if he did not have his own house (McKenzie, 2012). The modern day "bride price" (e.g., all of the expenses related to a marriage proposal, such as housing, transportation, and other signs of financial stability) and wedding expenses are dozens of times greater than the average annual salary of parents who depend on agriculture for income (Jiang et al., 2014). Indeed, the ratio of men to women is still widening today, as is the increasingly competitive marriage market. Studies have found that by 2020, under the former One-Child Policy, the number of unmarried men to unmarried women would have been 150 to 100 and by 2045, the ratio would be nearly 200 to 100 (Jiang et al., 2014).

Over the past 50 years, China has seen massive changes in its social structure and by association, its marriage market. The shortage of women ultimately contributes to a man's disadvantage and adds to a woman's own social advantage. More studies are required to better

understand what social changes (i.e. behavior in the marriage market) have affected son-families and daughter-families as a result of the One-Child Policy as we enter an era in which China has begun to ease its strict family planning policies.

2. Literature Review

2.1 Impacts and Consequences of the One-Child Policy

A number of studies have examined the One-Child Policy and its related effects. Hesketh and Zhu (1997) present the various consequences and impacts of the One-Child Policy on Chinese families. The One-Child Policy certainly proved to the world that China was capable of controlling its population. Clearly, a decrease in population growth benefitted the whole world in diminishing natural resources per capita. However, this policy also benefitted people at an individual level. Children now had all of their parental investment placed onto solely themselves, while mothers no longer experienced the burden of raising more than one child. Having one child also allowed mothers to more easily work outside the home to acquire skills and training towards a career.

In addition to these benefits, Hesketh and Zhu also discuss the negative implications of the policy. They highlight three different issues that arose as a result of the One-Child Policy. First, it resulted in an excess of boys and drastic increase in the number of unreported female births. A second issue that arose was that of supporting the elderly. Culturally, children are responsible for their elders and with the One-Child Policy the responsibility to care for parents fell among fewer people. Finally, the authors mention the psychological consequences on only

children, informally known as the “little emperor syndrome” although they admit that there is little evidence to show causation.

Adding to this discussion on the One-Child Policy, Settles, et al. (2013) find that the most important consequence of the One-Child Policy is its accidental promotion of sex discrimination among newborns. The sex ratio of newborn boys to girls rose from 108.8 (for every 100 girls) in 1985 to 119 in 2005. Abandonment, sex-selected abortion, female infanticide, and unreported female births were all causes of the unbalanced sex ratio especially due to China’s access to ultrasound technology in the 1980’s.

The authors also discuss the various implications of the policy, such as the socialization of an only child and his or her behavior differences with children who have siblings. Most relevant to this paper, however, is the authors’ discussion of how the One-Child Policy changed expectations and perceptions of marriage. They suggest that given a family’s preference for a son, daughters who are more educated and economically well off may be more selective in their search for a husband. This is due to higher expectations in finding a husband to match their own characteristics. Parents are also likely to be more selective in who their daughter marries due to the resources (monetary and otherwise) dedicated to her education. However, given how limited the number of females are in the marriage market, education for women may further allow the daughter more opportunity for personal choice as opposed to family pressure.

More generally, this preference for sons among Chinese families caused a distortion in the country’s sex ratio. Eberstein (2010) attempts to demonstrate the unintended consequences of this sexual preference and how the One-Child Policy exacerbated the issue. Prior to the One-Child Policy, fertility levels were high, averaging nearly 6 children per women, according to the World Bank. Having a daughter was not problematic as mothers could have more children in

order to ensure having at least one surviving son. However, as the Chinese government began curbing the number of children (even prior to the One-Child Policy) with propaganda and the "Two is Enough" policy, the sex ratio began to climb as fertility began to decline (Eberstein, 2010).

Eberstein first uses the China census to determine if there are fertility patterns in sex among all families who have more than one child. He divides all families with multiple children into different groups based on the sex combination of their children in order to see what percentage of families have another child. For example, the census data shows that families in the 3rd parity (those with two existing children) exhibit strong patterns to support that the current sex of their children strongly affects the likelihood that families will have another child. Of families with two boys or one girl and one boy, 18% and 16% of families will have a third child, respectively, while in families with two girls, 46% will have a third child.

The author presents further evidence of son-preference by examining the duration between births. His key assumption is that one will expect a longer period between the birth of the first and second child if the second child is male. This is due to the fact that mothers who use ultrasound technology will require more time to get pregnant again following the abortion of her expected daughter. Therefore, a subsequent male birth is expected to be around 30 weeks later than a child born on the first attempt as an ultrasound can detect the sex of a fetus at roughly 20 weeks into the pregnancy (Eberstein, 2010). Between the years 1990 and 2000, Eberstein finds that the interval between children when the second child is male (which he refers to as the birth interval before male) is 2.91 years, and the difference between that and the birth interval before female is small, but statistically significant at 1%. By 2000, in families with one existing

daughter, there is a one and a half month difference between the interval before a son and the interval before a daughter.

An interesting finding is that while son-preference is certainly strong, Eberstein finds that the data show parents who have sons will also use sex-selection to ensure the birth of a daughter. In the 2000 census, there is a 61% chance of having a daughter when families already have two sons. Previous authors have also seen in field-work that in one rural village of China, villagers refer to a second son as a "heavy burden" due to the high costs of buying him a new house at the time of his marriage, costs that could use up to 10 years of annual income (Greenhalgh, 1994).

Finally, Eberstein examines the direct cause of the One-Child Policy on sex-preference in families. He divides the families into different categories of fertility limits, with those in certain provinces or of certain minorities holding more lenient policies on childbearing. The 2000 census data show that mothers with stricter policies are 3 percentage points more likely to have a son following a daughter compared to those facing fewer fertility limits. He also conducts an analysis of the fraction of male births at a 5-year birth cohort on fertility fines in China and finds that five years before 2000, there is a positive and highly statistically significant correlation between the fraction of male births and the rise in childbearing fines.

Li and Santana Cooney (1993) examine whether families, namely mothers, complied with the One-Child Policy through four different measured events: 1) one-child certificate acceptance; 2) the use of contraceptives; 3) the occurrence of a pregnancy after the first live birth; and 4) the likelihood of an abortion of those who are pregnant. Li and Santana Cooney use a household survey, the Two-Per-Thousand Household Fertility Survey, which was conducted during the summer of 1988, roughly ten years following the implementation of the policy. Their study focuses on a population living in the Hebei province, an area of the country that was still

promoting the One-Child Policy during the time of the study. They found that of 8020 women surveyed, 61% resided in rural areas, 22% in towns, and 17% in cities. Only 22% accepted the one-child certificate and given both the positive rewards and negative punishments underlying the certificate, this statistic is indicative of a family's intentions of having additional children. Less than half of women (48%) used contraceptives, despite the 1980 Marriage Law and more than 60% of families conceived a second child.

The authors find that having a baby girl first has a negative impact on the probability a mother will comply with the One-Child Policy. Being a female farmer also has a negative effect, while women with higher levels of education and women who used contraceptives prior to the birth have a positive effect on compliance with the family planning policy. Most importantly, Li and Santana Cooney find that the preference for sons is not only present in families with women in more urbanized areas, of higher education, and of non-farmer occupations, but also across varying levels of government control, as measured by household registration, which is closely correlated to job placements, house allocations, and food rations.

2.2 The One-Child Policy and Its Effects on the Labor and Marriage Markets

In addition to literature on the consequences of the One-Child Policy, a number of authors have drawn relationships between the One-Child Policy and its effects on different social markets. Liao (2013) provides an analysis on how the policy affected heterogeneous workers (both skilled and unskilled). His model assumes three different periods in an individual's life, each lasting 25 years. They are childhood, young adulthood, and old adulthood, where the model assumes the agent dies after 75 years. Additionally, Liao includes survival probabilities in his model, for both children and young adults. He assumes that only young adults work and make

decisions, whereas children depend on the young adult for decisions such as consumption, level of education and assets.

Similarly, there are skilled workers and unskilled workers (all young adults) in the model. Skilled workers spend their time raising children, teaching and working, while unskilled workers only raise their children and work. Both types of workers can have both types of children. Liao then uses his model to determine an equilibrium, which takes into account productivity, physical capital, opportunity cost of time spent to raise a child, and educational costs to raise a child. He finds that the relative cost of raising a skilled child is higher for an unskilled parent than a skilled parent. Additionally, a parent will either send all of their children to school or none of their children to school. Therefore, the only equilibrium that does not tend to zero is the situation where a skilled parent will only have skilled children and an unskilled young adult is indifferent between having skilled children and unskilled children. It is important to note that in this paper, Liao ignores marriage and assumes that families only change through births and deaths.

Liao then takes calibrated data from 1977 and 2005 to measure the change in various factors during the One-Child Policy. The One-Child Policy was enacted in 1979, thus data from 1977 serve as a good baseline for fertility rates and family planning behavior prior to the policy. Unsurprisingly, the number of children each individual has decreases by over 50% from 1977 to 2005. Skilled parents who have skilled children see the highest decline of fertility of 56% while unskilled parents who have unskilled children see a decrease of 50%. Liao explains that due to a decrease in the supply of workers, both the unskilled wage and skilled wage increase; however, the unskilled wage does not increase as much as the skilled wage. Thus, the skill premium increases as a result of the One-Child Policy and unskilled workers have lower costs of raising a child relative to a skilled worker. Finally, the ratio of skilled workers to total workers increases

from 10.4% to 18.9%. The explanation is threefold: first, the increase in the skill premium provides incentives for education. Second, Liao finds that the percentage of unskilled workers having skilled children increases from 2.8% to 7.3% between 1977 and 2005. Lastly, the implementation of the policy causes skilled workers to spend less time raising their children, adding more labor to the production sector.

Next, I turn to studies done specifically linking the effects of the One-Child Policy on marriage market behavior. Anderson and Leo (2013) use a matrix matching model as well as a constrained optimization model to examine the effects of the One-Child Policy on potential spousal matching patterns in the marriage market. In addition to the family planning policy, the Economic Reforms of 1979 were introduced during the same year, which involved the decollectivization of agriculture and a well-documented increase in the national average family income. Thus, the goal of this paper was to examine these two potentially confounding policies in order to determine their net effect on marital matching.

Using a density matrix of suitable matches, the authors are able to model the overlap of suitable matches between two differing populations. An individual's attribute ranges within the matrix. The use of a matrix model allows them to measure how matching varied and changed between populations and time. In the model, there are two periods for which an agent lives, representing childhood and adulthood. Marriage is dependent on the attribute type of each individual (that ranges within the density matrix). The authors also refer to positive assortative matching, and negative assortative matching. Assortative matching refers to a situation where individuals choose to marry only those with similar attributes to their own.

The authors then apply this model using a classic budget constraint optimization in order to calculate the optimal level of investment as well as the optimal number of children. They then

restrict the number of children to one, to model the One-Child Policy, in order to examine its effects on marital matching. They find that when the number of children is fixed below a couple's optimal level, then for all men, the lower bound of their attribute matching rises and the upper bound of their attribute matching falls. In other words, there now exists a smaller window of appropriate marital matches for all men, regardless of their personal attributes. Additionally, they find that the effect of an increase in income depends on an individual's preferences and attributes and most importantly, how it affects an individual's potential utility from staying single. Thus, an increase of average income has an ambiguous effect on marriage rates.

Next, the authors turn to an empirical analysis. Using data from six urban provinces, Anderson and Leo divide the sample into three age cohorts: couples with husbands born in the 1940's, couples with husbands born in the 1950's, and couples with husbands born in the 1960's. Ideally, each cohort will represent families pre-policy, during the policy and post-the policy, respectively. They assume that all children following the first are "accidents" using a Poisson model. That is, if the model is rejected, then the subsequent children after the first were not accidents, but rather a choice by the parents. They find that for the 1940's cohort, the model is rejected at the 1% level across all six provinces. In the 1950's cohort, the model is rejected by half of the provinces, while only one province rejected the model in the 1960's cohort (all at the 1% level). Interestingly, when specifying the sex of the first child, all six provinces rejected the model in the 1960's cohort if the first child was female. However, the authors acknowledge that this is not enough to suggest that the One-Child Policy exacerbated son-preference and sex selection in China according to the model.

Finally, Anderson and Leo test their matching hypothesis using data from these six urban provinces. In their sample, the attribute they use for individuals is education attainment. They

find within the 1960's cohort, the increases in PAM are among those of higher education attainment. Additionally, they find a significantly higher overlap by cohort and province within the 1960's cohort, suggesting that to a certain degree, these matching patterns are indeed a cause of the OCP rather than the Economic reforms.

Adding to this discussion on marital matching, Du, Wang, and Zhang (2015), attempt to examine the link between an increase in sex imbalance and the trend of female hypergamy (where a woman marries a man of higher income or social status than of her or her family). One of the key assumptions the authors make is that people choose to "marry up." They assume this vertical preference for both men and women in their model. However, in Chinese culture, a family is viewed as stronger when the groom is "higher" than the bride in terms of income, family background, personal character, etc. Thus, the Du, Wang, and Zhang find that their model suggests females end up more likely to "marry up" than males even though both parties have vertical preferences.

The authors test their hypothesized relationship by examining the effects of an increase in sex ratio on the economic gap (the gap between parents' income and individual income at the time of the marriage) as well as the social gap (the social standing). Here, the social gap is measured by a family's "hukou" registration, a family's residential permit. The results show that an increase in the sex ratio has a positive effect on parents' wealth gap and individual income gap at the time of the marriage, both effects being statistically significant. A woman will factor whether or not a male and his parents' financial conditions are stable and high in her marriage decisions. In other words, an increase in the sex ratio increases the likelihood that a woman will marry up, thus showing an increase in her bargaining power. The authors note that "hukou" status is not statistically significant in this regression. A possible explanation is that economic

liberalization in the 1970's increased heterogeneity in the society, making "hukou" status not as important in marriage decisions.

Additionally, the authors conduct a regression analysis using an interaction term of sex ratio and decade dummy variables in order to examine the effects of the rising sex ratio over time (from 1950s until 2000s). They find that the effects of sex imbalance and both the individual and parents' wealth gap are positive and statistically significant in only the 1980s and 1990s. By the 2000s, only the parents' wealth gap remains significant. Du, Wang, and Zhang speculate that this might be due to a housing market boom in the 2000's. Property values increased drastically during that time, making it nearly impossible for males to purchase without financial support from their parents. Thus, a male's family wealth might have become more important as a result of this increase in living cost.

2.3 The Relationship Between Sex Imbalance and Household Savings

Most specific to my paper, there have been a number of studies that have examined the impact of the One-Child Policy on household savings. Choukhmane, Coeurdacier, and Jin (2013) discovered that in urban areas of China, nearly 60% of the increase in household savings could be attributed to the One-Child Policy. Fewer children meant lower educational and living costs for the parents but at the same time, meant a decreased expectation in family and monetary support from their children once parents became elderly and required additional care. Urban areas, during the implementation of the One-Child Policy, were easier to control due to the higher exposure to state-owned enterprises and proximity to central governments. Peasants and rural areas were more difficult to control, as families needed more hands in the fields, and with their limited pensions, needed children to care for them at old age (Ching and Penny, 1999). In

this paper, I also hope to explore the relationship between the effects of the family-planning policy and household saving behavior, beyond only urban areas of the country.

Another study examines the hypothesis that an increase in the sex ratio (men to women) increases household savings across provinces, in both rural and urban areas of China. Using a household census conducted in 2005 and 2007 in 26 villages in Guzhou Province by the International Food Policy Research Institute, Wei and Zhang (2011) constructed a time series analysis on average household saving (of those with pending marriages) two years before the wedding, the year of the wedding, and four years after the wedding. The purpose was to track the saving behavior of a "typical" household that experienced the cost of a wedding during the timeline. The data show that for both the bride's and the groom's family, there was an increase in saving right before the wedding with a significant drop shortly after. Post-wedding saving tended to be much lower than pre-wedding savings, which suggests that the increase household savings was motivated by wedding expenses. I also note that families of a groom have a saving curve that is higher in nominal value than a bride-families' savings curve.

A key assumption the authors make is that sons from wealthier families (or those with more savings) are regarded more highly in the marriage market. Wei and Zhang use data from the China Household Income Project of 2002 (CHIP). For simplicity, they assume that households with more than three members registered *and* those where the head of household is 50-60 years old, have an unmarried child, aged roughly 25-35 years, living with them. Additionally, they use the data to assign the value of a family's house as the general measurement of household wealth. Doing so, their findings show that families with sons (henceforth referred to as son-families) with higher relative wealth have a much less likely

chance of having an unmarried son living with them. Alternatively, the data show the probability of having an unmarried daughter in daughter-families is not statistically different from zero.

The authors provide three types of evidence to support their hypothesis. First, they use household-level data from the CHIP, which includes data from 122 rural counties and 70 cities in China to test the relationship between the savings rate of households with both daughters and sons and the *local* sex ratio. Household savings is defined as log (per capita disposable income/per capita living expenditure), modeled from Chamon and Prasad (2010). Second, Wei and Zhang use panel data across provinces, controlling for both location fixed effects and year fixed effects. They use the 2000 population census to infer the sex ratios for children ages 7-21 seven years later, since they should be nearly identical. Finally, the authors use a two-stage Instrumental Variables regression to test the effects of an instrumental variable on the household savings rate. They use the monetary penalties incurred by families who have multiple children as an instrumental variable for the sex ratio in order to better refine the correlations between sex imbalance and the change in household savings.

A basic regression is conducted separately for both rural and urban households, of local sex ratio, per capital income, child age and household head age on household-level savings. Wei and Zhang find that there is a small, but statistically significant increase on household savings for son-families while the predicted impact for daughter-families is not statistically different from zero. They control for families who make below a certain level of income (2000 Yuan) as well as remove outliers by omitting the top 5% and bottom 5% of saving values (to account for families who may have won the lottery or those who needed to pay a large medical bill). These robustness checks further support their hypothesis with statistically significant impacts in son-families but not so for daughter families. In urban families, using a more inclusive data set, Wei and Zhang

control for income uncertainty through additional proxies such as age brackets, income security and various regressions to again find a positive relationship between sex imbalance and household savings. The authors then regress the sex ratio on house size and value to find that the price of a housing unit (holding size constant) increases as the sex ratio increases. Having housing prior to a marriage as a male is an indication of a family's financial stability and thus the authors attempt to connect how housing prices might change as a result of the One-Child Policy.

Through a panel regression, Wei and Zhang find that their hypothesized relationship is still positive, and statistically different from zero among son-families. They conduct two other regressions: one that examines families that work for state-owned or government jobs, which is assumed to be an indication of job security. The other is to test whether parents start savings for a child's marriage at an early age. Both regressions reaffirm that the relationship between savings and sex ratio is positive and robust. Finally, the authors conduct a two-stage Instrumental Variables Regression, using previous financial penalties of family planning as the IV instrument. For families who violate the One-Child Policy, the government imposes certain fines or related penalties (confiscation of property, loss of a government job, etc.) to prevent them from doing so again. The general assumption is that an increase in financial penalties would increase the sex imbalance in China, as households would be more cautious and selective in giving birth to a child, especially if families strongly prefer sons to daughters. They use these fines as an instrumental variable to remove other possible correlations between the sex ratio and household savings. The results from this estimation also confirm the hypothesis. In fact, it is estimated that 60% of the actual increase in savings rate from 1990 to 2007 can be explained by the change in sex ratio.

Wei and Zhang find a correlation between the sex ratio imbalance and household-level savings. The implications of the study are as follows: The combination of having a son and the scarcity of women in the local marriage market encourages son-families to raise their savings rate. There is pressure to increase financial stability in order to afford amenities such as a house or a car. Alternatively, daughter-families have two effects working in different directions: son-families have driven up the cost of living, through housing, utilities, food, and transportation. Thus, daughter-families must also attempt to match that level of savings. Additionally, daughter-families fear that a lack of savings could negatively impact their daughter's bargaining power after marriage and thus continue to save. Conversely, brides may choose to take advantage of their future husbands' increased savings and therefore decrease savings. In this paper, I use a similar method to test the relationship between sex imbalance and household savings. I use household survey data from 2010, which allows me to examine the saving behavior of households from a later period.

Finally, I examine a paper regarding the determinants of the rising household savings rate in China. Horioka and Wan (2007) use panel data from 1996 to 2004 on household savings to conduct a panel analysis on the determinants of household savings. Following Kraay (2000) and Modigliani and Cao (2004), the authors attempt to use newer household saving data and a more cleanly defined household saving rate to obtain estimation results on rural households, urban households, and a pooled sample of both. The explanatory variables they use include the income growth rate, three dependency ratios (all with respect to the base age, 15-64), a one-year lag on the savings rate, the real interest rate, the rate of change of the consumer price index, and a dummy variable for rural households. Using GMM, which has been applied to dynamic models using panel data by previous authors, Horioka and Wan find that there is a positive significance

between the household saving and lagged savings rate, income growth rate, and real interest rate. The significance of the dependency ratios is varied between their rural, urban and pooled samples. The authors conclude that their results provide mixed support for the life cycle hypothesis (Modigliani and Cao, 2004) but suggest that the savings rate in China will continue to remain high in the short and medium run.

Using these previous findings as a base, I also examine the effects of the One-Child Policy through regional variation in the sex ratio on various financial decisions in 2010 including the household saving rate, household savings in the form of bank deposits, and the decision of home ownership.

3. Data

3.1 Organizational Structure of China

The division of China is in accordance with the International Organization of Standardization (ISO). As stated by ISO's most recent publication in 1998, China is subdivided into 22 provinces (known as "sheng"), with an additional five autonomous regions ("zizhiqu") and four municipalities under direct control of the central government ("shi"). Therefore, China has a total of 31 subdivisions not including its three "special" autonomous regions: Hong Kong, Macau, and Taiwan (to which China claims sovereignty). Over 90% of the population in China and 97% of the population in Taiwan, are known as "Han Chinese," with history stemming from the Han Dynasty. "Non-Han Chinese" make up the minority regions, for which the One-Child Policy is relaxed and sometimes does not apply. These non-Han populations reside in the five autonomous regions and have additional exceptions to central government control. A municipality, on the other hand, is the highest classification for cities and is equal in rank to a

province with respect to political, economical and jurisdictional rights. A municipality is dissimilar from a city, in its usual sense, in that it includes an urban area but also contains rural areas with much smaller cities, towns, and villages.

Finer than these main divisions, China is divided into prefectures ("diqu") or administrative subdivisions under the province-level division. Areas are also labeled as prefecture-level cities, which are almost as large as prefectures and given the same rank as prefectures. Like municipalities, prefecture-level cities are also not "cities" in a usual sense but include nearby cities, towns, and villages, over up to 100 kilometers. There are 17 prefectures and 283 prefecture-level cities in China. Each prefecture includes its own government and administrative unit.

The third level of division below provinces and prefectures are counties ("xian") and county-level cities. Note that a county is actually the second level of division after a municipality. This level is often translated into what we think of as districts.

3.2 Data set Collection

The data used in my study come from two sources. I use household-level data from a non-governmental survey, the China Family Panel Studies (CFPS), independently run by the Peking University in China. The goal of the survey is to conduct and collect information at an individual, household, and community level across multiple years in order to monitor the social and economic changes of China. The baseline survey was conducted in 2010, which is the survey used in my data set. A follow-up survey was conducted in 2012 and the future goals were to continue to survey the sample annually.

During the survey, nearly 15,000 households and over 40,000 individuals were interviewed. The sample covers 25 provinces (excluding Hong Kong, Macao, Taiwan, Xinjiang, Qinghai, Inner Mongolia, Ningxia, and Hainan). These minority regions were largely exempt from the One-Child Policy and thus are not included in the sample. The communities interviewed are made up of 55.4% rural households and 45.6% urban households, which the Peking University believes is a good representation of 95% of the population in China. All interviews were conducted in person by trained CFPS interviewers. The data set is broken up into three distinct data sets by individual, household and community level survey questions. The head of household is responsible for answering household related questions while a single individual with a strong knowledge of the community is elected to answer community relevant questions.

The second source from which I obtain data is the National Bureau of Statistics, China 2010. Using the 2010 Census Data, I constructed a sex ratio variable, which is defined as [(total men aged 5-19/total women aged 5-19)*100]. While the variation of the sex ratio is at a provincial level, there is further regional difference in the data set. The 2010 Census publishes the population data as an aggregate total by age cohorts and province, but also divides the aggregate total by urban population, town population, and rural population, whose sum equals the aggregate total. Therefore I was able to construct the sex ratio variable for the cohort of ages 5-19 in 2010 using the urban, town, and rural populations to create an urban, town, and rural sex ratio for each province. Table 1 shows the average sex ratio of the population aged 5 to 19 in 2010 by province.

Table 1 reveals that there exists a significant variation *across* provinces as well as in regional areas *within* provinces. In the urban areas of Shanxi, the sex ratio is only 101.4, while

rural and town regions of Jiangxi have a sex ratio of over 125. The minimum and maximum values of the sex ratio in the urban sample is 101.4 and 118.5, with a standard deviation of 0.03. In the town and rural samples, the smallest values are 107.1 and 106.5, respectively while the largest values are 125.4 and 125.2, respectively. The town sample has a standard deviation of 0.04 and the rural sample has a standard deviation of 0.03.

All the relevant individual and community related data used either a PID (each respondent's personal ID) or a CID (community ID) to be merged onto the family level dataset.

Table 1
Sex Ratio by Province in 2010 for age cohort of 5-19

	Sex Ratio		
	Urban	Town	Rural
Beijing	112.26	107.77	112.07
Tianjin	113.98	102.46	117.40
Hebei	104.20	109.19	112.58
Shanxi	101.40	108.34	107.70
Liaoning	107.27	108.69	111.69
Jilin	106.35	107.82	109.50
Heilongjiang	107.08	107.07	106.50
Shanghai	109.27	113.18	110.93
Jiangsu	110.10	118.99	116.65
Zhejiang	109.47	112.52	111.49
Anhui	114.72	117.43	116.66
Fujian	114.20	116.21	117.23
Jiangxi	118.52	125.43	125.17
Shandong	110.45	114.00	114.18
Henan	112.44	119.55	121.90
Hubei	116.11	120.55	121.15
Hunan	108.21	117.50	118.37
Guangdong	116.46	117.87	114.87
Guangxi	116.41	115.95	116.62
Chongqing	104.56	107.87	111.40
Sichuan	102.36	107.64	111.03
Guizhou	109.68	112.92	112.32
Yunnan	103.10	107.68	113.37
Shaanxi	110.34	116.24	117.43
Ganxu	108.27	115.64	109.52
Total	110.53	114.26	114.78

In addition, the CPFS survey categorizes each community as an urban community, town community, rural community, or "other" community. Only 5.8% of all households were labeled "other"; these households were removed from the dataset. For every household in the survey, each was assigned a value of 1, 2, or 3 *by the interviewer*, designating the region type: city, town, or rural. Using this information, I was able to match on the corresponding regional sex ratio given the province and the region type. Out of the total 31 provinces, the CFPS excludes six regions; therefore the sex ratio variable was merged for only 26 provinces in the final dataset.

The sample of households was also divided into two subsamples, rural households and urban households using a dummy variable where the variable is equal to 1 for urban households and equal to 1 otherwise. It is important to note that this subdivision of urban and rural is separate to the specified region type. The specified region types, city, town and rural, are used to match the sex ratio variable into the dataset and is at the *household* level; however, the urban dummy variable is at the *community* level and is coded according to the Census Bureau. The dummy is assigned a value of 1 if the community is defined as an urban area and a value of 0 otherwise.

4. Sex Ratio and Household Savings

4.1 Model

In order to make a meaningful comparison between similar families, I restricted the sample of households to only those with three members: two parents and one child. Following Wei and Zhang (2011), I will refer to these families as 3-member nuclear families and further distinguish them as son-families (families with a son) and daughter-families (families with a daughter). In addition, I also restrict the sample by age. I only include in my sample children

below the age of 20, as captured by my age cohort dummy variables. The assumption is that by restricting the sample to only children younger than 20, they will be unmarried and thus decisions on household saving will most accurately be reflective of the family's child. I also restrict the sample to mothers who are less than 40 to further ensure comparability among the sample as Wei and Zhang do.

The saving rate is assumed to be a function of the regional sex ratio, income, a vector of age cohort dummy variables and a vector of characteristics relating to the head of household. I define sr_j as the saving rate, where j is indexed from $1 < j < 10$, to represent 10 different measures of the saving rate, which is explained in the following section.

4.2 Construction of Saving Rates

Following Wei and Zhang (2011), the saving rate is defined as log(income/expenditure). In the CFPS survey, there are several questions regarding both income and expenditure and therefore, several different measures of the saving rate. Annual family income is reported five different ways: (1) Salary income; (2) Total family income; (3) Unadjusted total family income; (4) Adjusted total family income; and (5) Adjusted net family income. According to the CFPS documentation, many families (especially in the rural sample) receive income for agricultural production but also consume a large proportion of the families' production output. Thus, "net family income" refers to income not including the cost of agricultural production while "total family income" includes the value of agricultural production. In addition, when omitting the value of the agricultural production, which the family consumes themselves, the survey is expected to underestimate the actual income generated by agricultural production. Therefore,

adjustments are made by using other survey information regarding production and current market prices to infer an adjusted actual income.

Annual family expenditure is also calculated several ways. The survey asks each family to list total expenditure on *monthly* expenses (such as food, transportation, communication, etc.) as well as total expenditure on special *annual* expenses (such as marriage/funerals, medical care, electricity, etc.). Using the information provided by each family, a total expenditure variable was generated by the CFPS team. However, the individual expenses, which make up total expenditure, do not capture full family consumption as it includes investment expenses such as mortgages, purchasing or building a home, commercial insurance, and land-use expenses, which would drastically cause an overestimation of household consumption. Therefore, I generated a measure of expenditure which include the following:

Monthly	**Annually**
Food, daily used necessities, communication, transportation, housing rent (and family-member support)	Electricity, medical care, clothing, education, leisure activities, misc. goods and services, and expenses on marriages and funerals

I include two separate measures of expenditure, one that includes family-member support (exp_{broad}) and one that does not (exp_{narrow}). Note that the expenditure variable is annual, so each monthly expenditure estimate was adjusted accordingly.

With five measures of income and two measures of expenditure, I generated 10 separate saving rates each of which is expressed as log(income/expenditure). The table below helps illustrate the construction of each saving rate:

Table 2
Saving Measures

	Income variable	Expenditure variable
sr_1	Salary income	exp_{narrow}
sr_2	Total family income	exp_{narrow}
sr_3	Unadjusted total family income	exp_{narrow}
sr_4	Adjusted total family income	exp_{narrow}
sr_5	Adjusted net family income	exp_{narrow}
sr_6	Salary income	exp_{broad}
sr_7	Total family income	exp_{broad}
sr_8	Unadjusted total family income	exp_{broad}
sr_9	Adjusted total family income	exp_{broad}
sr_{10}	Adjusted net family income	exp_{broad}

For each measure of my saving rate, I estimated sets of 10 regressions in order to capture the effect of my controls on the saving rates. Note that the regressions involving variables sr_6-sr_{10} are essentially a robustness check for the regressions using variables sr_1-sr_5 with a broader definition of family expenditure.

Note that a family does not necessarily need to know if there exists an increase in the sex ratio in order to change their financial decision-making behavior. Instead, they might observe in their community an excess of sons, which would cause them to change saving behavior, in order to make their son more attractive. In addition to the sex ratio variable, I include a number of control variables. I include the log of income and the square of the log of income to examine whether there is a non-linear relationship between the saving rate and the log of income. I also use three different age cohort dummy variables in order to determine if there is a specific age bracket that explains the change in savings behavior. I assign dummy variables to all families for those with children aged 0-4, 5-9, 10-14, and 15-19. In my regression I omit the age cohort with children aged 0-4 and thus my results will be relative to that group. Finally, I include a vector of household head control variables in order to capture if the age, gender, health or education of the head of household might further affect a change in saving behavior. I expect a positive

relationship between the age of the head of household and the sex ratio variable as we might expect older parents to be more fiscally responsible. In addition, I hypothesize that families where the head of household is female will save more than families with a male head, as these families might feel pressured to be as financially stable as other families in a culture where the head of household is predominately male. Note that I assign a value of 1 to families where the head of household is male and assign a 0 otherwise. I also anticipate a positive relationship between the head of household health variable and the household saving rate. Specifically, I examine if poor health affects household saving behavior. In a survey question, the respondent's health is given a value between 1 and 7, with 1 being poor health and 7 being excellent health. Therefore, I assign a value of 1 to families where the head of household has a health variable value that is 3 or lower and I assign a value of 0 otherwise. I predict that having poor health will have a positive relationship with the household saving variable as families anticipate higher costs for healthcare. Finally, I use head of household education as a control variable to estimate the effect of education on the decision to save. Education is another dummy variable where the value is 1 if the highest level of education achieved by the head of household is college or beyond. I expect families where the head of household is more educated to have a higher saving rate than those who are less educated.

I will now examine the effects of changes in the sex ratio variable and the above control variables on household saving rates in rural areas and urban areas. My hypothesis is that families in rural areas, who experience a less stringent version of the One-Child Policy, will be less sensitive to changes in the regional sex ratio on their household saving. Additionally, I expect son-families to increase their saving rates given an increase in the sex ratio.

4.3 Rural Households

The regression results for the rural households are included in Table 3, which uses sr_2 as the dependent variable where sr_2 equals log(total family income/exp_{narrow}). I also use sr_7 as a robustness check, which uses the broad definition of expenditure.[1] The results of equation (3.1) represent the estimated effects of the control variables on the saving rate for rural son families. The regional sex ratio is positive but not statistically significant. The log of income for rural son-families has both a linear and quadratic relationship with household savings. The estimated coefficient on the log of income and the square of the log of income variables indicate that the relationship between the saving rate and the log of income is non-linear. Specifically, rural son-families increase their household saving given an increase in income at a decreasing rate.

The age cohorts for equation (3.1) show interesting results. A rural family with a son aged 5-9 do not have a statistically significant difference in saving than families with sons aged 0-4 while having a son aged 15-19 is predicted to decrease their savings by 37.6% more than families with a son aged 0-4.[2] I now turn to a number of controls for the head of household. The results show that a one-year increase in the head of household age increases savings by 3.84% in rural son-families, which is statistically different from zero. Surprisingly, families where the household head is female saves on average 21.65% more than son-families. This result is also highly statistically significant. Equation (3.2) shows the similar relationship for daughter-families between the household saving rate and the sex ratio variable. Note that an increase in the regional sex ratio yields a higher increase in household saving in daughter-families than that of

[1] The results I obtained using the other definitions of household saving are similar to those reported below, although the statistical significance of age cohorts often varied depending on the specification of

[2] The saving rate is a log function and the age cohorts are dummy variables, thus the interpretation of the coefficient is: $100(e^{-0.471}-1)$. All of the coefficients of subsequent dummy variables are interpreted the same way.

son-families; however, this result is not statistically different from zero. We also see a similar non-linear relationship between the household saving rate, log of income and the squared of the log of income. Again, there is not a statistically significant difference in saving between families with daughters aged 0-4 and 5-9, although daughter-families with children aged 10-14 are predicted to save 29.67% less than families with daughters in the youngest age cohort.

Table 3
Rural Household Savings for Three-Person Nuclear Households Using *savings2*

	Base Regression		**Broad Expenditure**		**Remove Top and Bottom 5% Savers**	
	(3.1) Son	(3.2) Daughter	(3.3) Son	(3.4) Daughter	(3.5) Son	(3.6) Daughter
Regional Sex Ratio	0.839	2.079	0.941	2.239*	0.829	2.227*
	(0.819)	(1.298)	(0.814)	(1.277)	(0.611)	(1.134)
Log(income)	1.335***	1.041***	1.328***	1.036***	0.161	3.292***
	(0.119)	(0.141)	(0.118)	(0.139)	(0.384)	(0.761)
Squared of log(income)	-0.0364***	-0.0158*	-0.0363***	-0.0157*	0.0143	-0.148***
	(0.00704)	(0.00947)	(0.00700)	(0.00932)	(0.0197)	(0.0419)
Child aged 5-9	0.0497	-0.0960	0.0485	-0.0928	0.126*	0.155
	(0.103)	(0.132)	(0.103)	(0.130)	(0.0764)	(0.121)
Child aged 10-14	-0.106	-0.352*	-0.0828	-0.337*	0.215**	-0.0503
	(0.115)	(0.181)	(0.114)	(0.179)	(0.0872)	(0.162)
Child aged 15-19	-0.471***	-0.231	-0.447***	-0.258	-0.00892	0.0684
	(0.135)	(0.244)	(0.134)	(0.240)	(0.102)	(0.221)
Household head age	0.0384***	0.0227*	0.0371***	0.0228*	0.00703	0.000827
	(0.00807)	(0.0136)	(0.00802)	(0.0133)	(0.00619)	(0.0122)
Household head gender (male = 1)	-0.196**	-0.244*	-0.216**	-0.243*	-0.209***	-0.160
	(0.0947)	(0.126)	(0.0942)	(0.124)	(0.0717)	(0.111)
Household head sick? (yes = 1)	0.153	0.121	0.174	0.0537	0.139	0.0901
	(0.139)	(0.222)	(0.139)	(0.219)	(0.102)	(0.191)
Household head educated? (yes =1)	-0.195	-0.286	-0.224	-0.263	-0.0591	-0.268
	(0.229)	(0.347)	(0.227)	(0.341)	(0.162)	(0.353)
Constant	-11.27***	-11.28***	-11.32***	-11.45***	-3.812*	-20.36***
	(1.078)	(1.484)	(1.072)	(1.459)	(1.962)	(3.691)
Observations	618	284	618	284	556	256
R-squared	0.521	0.655	0.522	0.661	0.324	0.413
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Finally, we observe that families with daughters aged 15-19 save less than the omitted cohort, but the result is not statistically different from zero.

Equations (3.3) and (3.4) include the results when the saving rate is defined using the broader estimate of annual family expenditure, which includes family-member support. In equations (3.5) and (3.6), I remove families in the top 5% and bottom 5% of saving rates in order to remove potential outliers in the sample, while using the sr_2 variable as the dependent variable. All results still follow the similar pattern of the base regression. Interestingly, the broad definition of expenditure causes the coefficient on the sex ratio in daughter families to become positive and statistically significant. Equation (3.4) predicts that a one percent increase in the sex ratio increases the household saving rate by 8.38%.[3] Similarly, using the subsample that includes mothers under the age of 45, equation (3.5) predicts a one percent increase in the regional sex ratio variable results in an 8.27% increase in the household saving rate. This may be due to the location of these rural daughter-families, who have incentive to increase their savings in order to migrate into urban areas for marriage.

In an alternate regression, I pool the families into all three-child nuclear families and include an interaction term between the regional sex ratio and a dummy variable for families with sons. The results follow the same pattern as Table 3, where the sex ratio is positive but not statistically significant for all families. The interaction term does not provide further evidence or information to support a strong relationship between household savings and the sex ratio variable. I omit the table to save space.

[3] The sex ratio variable ranges from 1.06 to 1.27 and thus a one-unit increase from 1.06 to 2.06 reflects a 100% increase. Therefore, the correct interpretation of this coefficient is a 1% increase results in a $(e^{2.24}-1)$% increase in the household saving rate.

Table 4
Robustness Check for Rural Household Savings – Mothers < 45

	Base Regression		**Broad Expenditure**	
	(4.1) Son	(4.2) Daughter	(4.3) Son	(4.4) Daughter
Regional Sex Ratio	1.135	2.815**	1.245*	2.938***
	(0.697)	(1.088)	(0.694)	(1.076)
Log(income)	1.344***	1.127***	1.330***	1.122***
	(0.112)	(0.130)	(0.111)	(0.128)
Squared of log(income)	-0.0367***	-0.0244***	-0.0358***	-0.0243***
	(0.00646)	(0.00833)	(0.00644)	(0.00824)
Child aged 5-9	0.0791	-0.0334	0.0726	-0.0308
	(0.0961)	(0.124)	(0.0957)	(0.123)
Child aged 10-14	-0.0324	-0.0804	-0.0208	-0.0730
	(0.104)	(0.157)	(0.103)	(0.155)
Child aged 15-19	-0.404***	-0.0533	-0.406***	-0.0624
	(0.116)	(0.179)	(0.116)	(0.177)
Household head age	0.0309***	0.00564	0.0309***	0.00593
	(0.00675)	(0.0108)	(0.00673)	(0.0107)
Household head gender (male = 1)	-0.183**	-0.102	-0.208***	-0.102
	(0.0759)	(0.107)	(0.0755)	(0.106)
Household head sick? (yes = 1)	0.181	0.334	0.210*	0.276
	(0.114)	(0.204)	(0.114)	(0.202)
Household head educated? (yes =1)	-0.238	0.0637	-0.268	0.0200
	(0.192)	(0.293)	(0.191)	(0.290)
Constant	-11.47***	-11.80***	-11.56***	-11.94***
	(0.950)	(1.289)	(0.946)	(1.275)
Observations	796	388	796	388
R-squared	0.525	0.606	0.528	0.609
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

In Table 4, I include an additional robustness check to include mothers who are younger than 45. It is important to note, just as Wei and Zhang (2010) do, that increasing the age of the mother could potentially introduce into the sample families who are not true three-member nuclear families, in which one child is old enough to move out of the household and thus the family is accidentally labeled as a three-member family. Interestingly, using the broad definition of expenditure, the regional sex ratio coefficient is both positive and statistically significant. In

addition, a one year increase in the age of the household head is predicted to increase rural household saving rates in son-families by 3.09%. Together, these two results suggests that, all else equal, the model predicts that rural families with older parents tend to increase savings more given a change in the regional sex ratio. This is the first specification in which I have been able to produce results similar to that of Wei and Zhang's.

4.4 Urban Households

The regression results for the urban households are included in Table 5, which also uses sr_2 as the dependent variable, defined as log(total family income/exp_{narrow}). Again, sr_7 is used as a robustness check, which includes a broader definition of the expenditure variable. Equations (5.1) and (5.2) report the association between household savings in urban areas and the regional sex ratio along with other control variables. Similar to rural households, son-families have a positive but not statistically significant coefficient; however, now daughter-families have a negative, although statistically insignificant coefficient. We again observe that, income has both a linear and quadratic relationship with household savings. The results show that having a son aged 5-9 increases savings by 10.63% more than families with a son aged 0-4 while having a daughter of the same age increases savings by 11.74% relative to daughter-families with children in the youngest age cohort. Interestingly, having a child, regardless of the sex, between the ages of 10 and 14 increases savings by 12.30% more than children aged 0-4. In general, the head of household controls are not statistically different from zero. However, the results show that families where the head of household is educated actually save 20.78% less than uneducated household heads and their respective families.

Equations (5.3) and (5.4) use the broad definition of expenditure to construct the saving rate function. The results have a similar pattern to the base regression, although only the age cohort 5-9 for daughters is statistically significant. In equations (5.5) and (5.6), I remove the top and bottom 5% of savers for within son families and daughter families, separately. This yields another interesting result, where a one percent increase in the sex ratio is predicted to decrease household savings for daughter-families in urban areas by 0.608%.

Table 5
Urban Household Savings for Three-Person Nuclear Households

	Base Regression		**Broad Expenditure**		**Remove Top and Bottom 5% Savers**	
	(5.1) Son	(5.2) Daughter	(5.3) Son	(5.4) Daughter	(5.5) Son	(5.6) Daughter
Regional Sex Ratio	0.0765	-0.0455	0.240	-0.174	0.0260	-0.937**
	(0.451)	(0.516)	(0.458)	(0.542)	(0.332)	(0.405)
Log(income)	2.061***	2.804***	2.060***	2.973***	1.634***	1.205***
	(0.136)	(0.314)	(0.138)	(0.329)	(0.385)	(0.337)
Squared of log(income)	-0.0724***	-0.114***	-0.0727***	-0.122***	-0.0625***	-0.0452***
	(0.00699)	(0.0152)	(0.00708)	(0.0159)	(0.0184)	(0.0160)
Child aged 5-9	0.101*	0.111*	0.0843	0.113*	0.0618	0.0913**
	(0.0589)	(0.0590)	(0.0597)	(0.0619)	(0.0430)	(0.0459)
Child aged 10-14	0.116*	0.116*	0.106	0.107	0.0401	0.113**
	(0.0666)	(0.0695)	(0.0675)	(0.0729)	(0.0500)	(0.0543)
Child aged 15-19	-0.00280	0.0481	0.00400	0.0193	-0.0632	-0.144*
	(0.0908)	(0.0951)	(0.0920)	(0.0997)	(0.0682)	(0.0757)
Household head age	-0.00446	-0.00597	-0.00425	-0.00736	0.00322	-0.00364
	(0.00597)	(0.00607)	(0.00605)	(0.00636)	(0.00454)	(0.00476)
Household head gender (male = 1)	0.0627	0.0146	0.0531	0.0428	0.0368	-0.00772
	(0.0446)	(0.0468)	(0.0453)	(0.0490)	(0.0335)	(0.0370)
Household head sick? (yes = 1)	0.125	0.0778	0.143	0.126	0.258***	0.400***
	(0.121)	(0.144)	(0.123)	(0.151)	(0.0893)	(0.114)
Household head educated? (yes =1)	-0.233***	-0.128***	-0.237***	-0.124**	-0.0411	-0.0657*
	(0.0482)	(0.0484)	(0.0489)	(0.0508)	(0.0364)	(0.0370)
Constant	-13.34***	-16.37***	-13.52***	-17.15***	-10.18***	-6.304***
	(0.899)	(1.763)	(0.912)	(1.848)	(2.069)	(1.884)
Observations	894	754	894	754	802	682
R-squared	0.551	0.341	0.540	0.332	0.257	0.220

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Similar to rural households, I pool the families into all three-child nuclear families and include an interaction term between the regional sex ratio and a dummy variable for families with sons. Again, the interaction variable is positive but not statistically significant and thus I do not report the table in order to save space.

Finally, I report an additional robustness check which includes mothers who are younger than 45 (as opposed to 40, in Table 5). Equations (6.1) and (6.2) use a base regression with sr_2 as the dependent variable while equations (6.3) and (6.4) use the broad definition of expenditure. I conduct both regressions as a robustness check. Now, we see positive and statistically significant results for son-families in equations (6.1) and (6.3). This result implies that, urban son families with mothers less than 45 years old will increase their saving rate by 0.881% and 1.28%, respectively, given a one percent increase in the sex ratio. In addition, having a son between the ages of 10-14 is predicted to increase household saving by 12.86% and a daughter in the same cohort is predicted to increase saving by 12.41%. These positive and statistically significant results show that all else held equal, when including families with mothers who are 45 or younger (as opposed to 40 or younger), there is a significant sensitivity in household saving rate to the regional sex ratio. This might suggest that women are having children later in life or that older parents are more willing to increase their saving rate due to sex ratio variation in urban households.

Table 6
Robustness Check for Urban Household Savings – Mothers < 45

	Base Regression		**Broad Expenditure**	
	(6.1)	(6.2)	(6.3)	(6.4)
	Son	Daughter	Son	Daughter
Regional Sex Ratio	0.632*	-0.0977	0.823**	-0.184
	(0.375)	(0.433)	(0.380)	(0.454)
Log(income)	2.154***	2.255***	2.154***	2.325***
	(0.125)	(0.264)	(0.126)	(0.277)
Squared of log(income)	-0.0761***	-0.0866***	-0.0764***	-0.0900***
	(0.00636)	(0.0128)	(0.00644)	(0.0135)
Child aged 5-9	0.0936*	0.102*	0.0785	0.0999*
	(0.0559)	(0.0576)	(0.0566)	(0.0604)
Child aged 10-14	0.121**	0.117*	0.114*	0.104
	(0.0609)	(0.0648)	(0.0617)	(0.0680)
Child aged 15-19	0.0261	0.151*	0.0247	0.131
	(0.0715)	(0.0788)	(0.0723)	(0.0826)
Household head age	-0.00348	-0.00815	-0.00403	-0.00875*
	(0.00461)	(0.00501)	(0.00467)	(0.00526)
Household head gender (male = 1)	0.0396	-0.0109	0.0309	0.0133
	(0.0375)	(0.0398)	(0.0380)	(0.0417)
Household head sick? (yes = 1)	-0.0108	0.215**	0.0114	0.268**
	(0.101)	(0.109)	(0.103)	(0.114)
Household head educated? (yes =1)	-0.225***	-0.0949**	-0.233***	-0.0949**
	(0.0417)	(0.0434)	(0.0422)	(0.0456)
Constant	-14.54***	-13.53***	-14.73***	-13.82***
	(0.780)	(1.462)	(0.789)	(1.534)
Observations	1,212	1,034	1,212	1,034
R-squared	0.559	0.355	0.549	0.336
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

4.5 Summary of Results

The results in this section demonstrate one of many specifications. They mimic the additional results from all other measures of the household saving rate based on the income and expenditure variable chosen. Thus far, I have not been able to estimate a result consistent with that of Wei and Zhang's; with the exception to Table 6, all coefficients for the sex ratio are not

statistically different from zero. Therefore, according to my results, there is not a strong relationship between the sex ratio and the household saving rate.

However, the results show a significant variation in household saving rate determinants among son-families and daughter-families in different areas of the country. Having a son near marriage age (aged 15-19) in a rural area is predicted to decrease the household saving rate while the results predict that an increase in the sex ratio increases the household saving rate in rural daughter-families. Additionally, Urban daughter-families have a positive relationship between if the head of household is sick and the household saving rate while no statistically significant relationship exists in son-families.

5. Sex Ratio and Household Deposits

The level and rate of saving may vary monthly or annually if income or expenditure were to change. Therefore, another measure of household financial decision-making that is worthwhile to investigate is the level of bank deposits held by households. "Deposits" is defined in the CPFS questionnaire as money that is saved in a bank or other organizations that pays interest. That is, deposits represent funds set aside as a form of saving and the accumulation of an extremely liquid asset. While household saving (as explained in Section 4) represents the portion of income not consumed by households, deposits is instead one measure of savings. Following Wei and Zhang, I examine this relationship. The authors examine the deposit behavior at the provincial level; however, using the CFPS survey, I am able to estimate the results at a household level.

I expect households with higher saving rate to also have a higher level of bank savings. Note the differences between the saving rate, defined as the difference in log of income and log of expenditure, and deposits, the value of deposits that is being saved in the bank. By the very

nature of the variables, a greater difference between income and expenditure, or unspent income, should imply that households will also accumulate more bank deposits.

I include in this section two extensions relating to the propensity to save. I examine a regression to explore the relationship between the log of deposits and the sex ratio. In addition, I examine a logit regression using a dummy variable, deposits, as the dependent variable. In the CFPS, there exists a question that asks, "Did your family save last year?" I use this dummy variable in my model, where the variable is assigned a value of 1 if the household saved money in the bank during the last year and a value of 0 otherwise. I am interested in examining what factors influence whether or not a household saved for deposits in the previous year. By dividing my sample into four subsamples by son or daughter and urban or rural, I will also investigate whether or not these variables have an effect on the willingness to have deposits.

5.1 Model

Using survey data on household deposits, I examine how deposits are affected by changes in the regional sex ratio as well as a number of other control variables. The goal is to examine how changes in the sex ratio might affect whether families choose to save money. Again, I divide the sample into rural and urban households in order to examine the effects of the sex ratio on different types of households in order to draw a truer comparison. Wei and Zhang (2011) use bank deposits per capita to observe effects of the One-Child Policy on active savings. The authors regress a linear and quadratic income term, the proportions of the young and old, as well as province fixed effects.

Table 7
Summary Statistics on the Log of Household Bank Deposits

Family Type	Obs	Mean	Std.	Min	Max
Rural:					
Son	236	8.842838	1.707498	1.609438	12.61154
Daughter	98	8.870946	1.137294	6.214608	11.51293
Urban:					
Son	486	9.48532	1.604286	0	12.89922
Daughter	428	9.422318	1.545165	1.609438	13.81551

Table 7 shows the average bank deposits based on the specification of different types of families. Note that number of observations is significantly lower than that of household saving rates. We see that there exists a regional difference in deposits as well as a slight difference between son-families and daughter-families in the same region. In my model, log(income) and $\log(\text{income})^2$ are included in order to capture the possibility of a non-linear effect on deposits. I use three age cohort dummy variables; children aged 5-9, 10-14, and 15-19 to observe if having a child in a specific age range affects the deposit decision. In addition, I also include a vector of variables specific to the head of household. These are the age, gender, a health dummy variable, and an education dummy variable. The health dummy variable is equal to one if the respondent is assigned a health value of less than four out of a scale from one (being poor health) to seven (being excellent health). The education dummy variable is assigned a value of one if the highest level of education of the head of household is higher than High School and zero otherwise. I report the results of rural households in Table 8 and urban households in Table 9. [4]

In equation (8.1), we see that the regional sex ratio for three-person nuclear families with sons is negative and not statistically significant. In other words, there is not a direct causation between an increase in the sex ratio on the bank deposits of urban son-families. The sign of the

[4] Using the five specifications of income from Section 4, I conducted similar regression analyses using each of the definitions. The results I obtained are generally consistent with those reported in Tables 8 and 9.

coefficients for income and its quadratic specification show that the change in income given a change in bank deposits increases at a decreasing rate. Note that both income variables are statistically significant at the 10% level. None of the age cohorts in equation (7.1) is statistically significant, which implies that, having a child aged 5-19 does not change bank deposit behavior and is not statistically different than families with a son aged 0-4 (the omitted age cohort). Finally, I examine a vector of controls regarding the head of household, none of which is statistically significant. I conclude that these factors do not affect bank deposit decisions within urban son-families.

Equation (8.2) reports this base regression for daughter-families. The coefficient of the sex ratio variable is positive but statistically insignificant. Interestingly, equation (8.2) shows that the quadratic specification of income now predicts a negative relationship between household deposits and income. This negative relationship is non-linear, implying that there is an offsetting, positive effect on household deposits for families of higher income. In addition to the income variables, families with daughters between the ages of 5-19 are found to have more deposits than otherwise identical families with daughters between the ages 0-4. An urban family with a daughter aged 15-19 is predicted to increase their deposits by 123% more than families with a daughter in the youngest age cohort.

In equations (8.3) and (8.4), I remove the families in the top and bottom 5% of deposits in order to account for outliers. Surprisingly, the coefficient for the sex ratio variable in equation (8.3) is now negative and statistically significant at the 10% level. This implies that given an increase in the sex ratio, rural son-families are predicted to decrease their level of bank deposits by 0.958%.

Table 8
Rural Household Deposits for Three-Person Nuclear Households

	Base Regression		**Top and Bottom 5%**		**Mothers < 45**	
	(8.1)	(8.2)	(8.3)	(8.4)	(8.5)	(8.6)
	Son	Daughter	Son	Daughter	Son	Daughter
Regional Sex Ratio	-2.052	1.005	-3.179*	0.884	-4.645*	1.029
	(2.945)	(2.746)	(1.875)	(2.409)	(2.775)	(2.376)
Log(income)	6.337*	-6.620***	4.349*	-4.413*	6.869**	-5.646**
	(3.315)	(2.458)	(2.406)	(2.281)	(3.287)	(2.304)
Squared of log(income)	-0.277*	0.350***	-0.181	0.239**	-0.295*	0.304***
	(0.158)	(0.123)	(0.116)	(0.114)	(0.157)	(0.115)
Child aged 5-9	0.0949	0.872***	0.0593	0.671***	0.168	0.793***
	(0.412)	(0.245)	(0.244)	(0.225)	(0.431)	(0.237)
Child aged 10-14	-0.432	0.744*	0.105	0.597*	-0.313	0.719**
	(0.488)	(0.382)	(0.295)	(0.332)	(0.497)	(0.337)
Child aged 15-19	-0.0854	2.035***	-0.0766	0.824	-0.0753	0.849**
	(0.592)	(0.589)	(0.358)	(0.664)	(0.590)	(0.364)
Household head age	-0.00871	-0.0582*	0.00382	-0.0556*	-0.0195	-0.0300
	(0.0374)	(0.0338)	(0.0229)	(0.0300)	(0.0347)	(0.0247)
Household head gender (male = 1)	0.269	-0.377	-0.215	0.0116	-0.0542	-0.250
	(0.350)	(0.325)	(0.214)	(0.289)	(0.319)	(0.289)
Household head sick? (yes = 1)	-0.317	1.017	-1.054***	0.779	-0.611	1.162
	(0.631)	(0.730)	(0.375)	(0.626)	(0.613)	(0.707)
Household head educated? (yes =1)	0.779	1.125*	0.568	0.390	0.603	1.069*
	(0.782)	(0.658)	(0.461)	(0.842)	(0.668)	(0.636)
Constant	-24.32	40.22***	-12.76	29.21**	-24.38	34.08***
	(17.03)	(12.96)	(12.23)	(11.82)	(16.87)	(11.95)
Observations	232	92	210	82	298	122
R-squared	0.093	0.370	0.213	0.250	0.102	0.291

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In rural regions, gift giving is still in practice and thus a possible explanation for a decrease in bank deposits is that the money is now allocated towards spending in order to distinguish sons in rural communities. The results for equation (8.3) also suggest that if the head of household in an urban son-family is not healthy, the model predicts the family will decrease deposits. Equations (8.5) and (8.6) report an additional robustness check by adding to the sample mothers between the ages of 40 and 45. This further supports the results described above.

Table 9 is similar to Table 8 but reports the results for only urban households. In equation (9.1), the sex ratio is again positive but not statistically difference from zero. In addition, we see that the log of income variable is also not statistically significant while squared log of income is positive and highly statistically significant.

Table 9
Urban Household Deposits for Three-Person Nuclear Households

	Base Regression		**Top and Bottom 5%**		**Mothers < 45**	
	(9.1) Son	(9.2) Daughter	(9.3) Son	(9.4) Daughter	(9.5) Son	(9.6) Daughter
Regional Sex Ratio	0.156	0.306	-0.374	0.272	-0.792	-0.374
	(1.386)	(1.633)	(0.912)	(1.213)	(1.331)	(1.557)
Log(income)	-0.574	-1.271	-0.584	-1.874	-0.718*	-1.702
	(0.351)	(1.394)	(1.081)	(1.284)	(0.366)	(1.238)
Squared of log(income)	0.0710***	0.106	0.0626	0.132**	0.0767***	0.127**
	(0.0182)	(0.0648)	(0.0512)	(0.0608)	(0.0188)	(0.0582)
Child aged 5-9	0.0743	0.0721	-0.00527	0.132	0.0925	0.125
	(0.192)	(0.185)	(0.127)	(0.141)	(0.204)	(0.202)
Child aged 10-14	0.407*	0.367*	0.0397	0.252	0.503**	0.318
	(0.220)	(0.221)	(0.145)	(0.165)	(0.228)	(0.233)
Child aged 15-19	-0.257	-0.605*	0.212	-0.155	0.439	0.0866
	(0.307)	(0.327)	(0.204)	(0.246)	(0.268)	(0.295)
Household head age	0.0123	-0.000393	0.00424	0.000721	-0.0154	-0.0209
	(0.0185)	(0.0201)	(0.0121)	(0.0155)	(0.0166)	(0.0188)
Household head gender (male = 1)	-0.206	0.0351	-0.147	-0.115	-0.0715	0.196
	(0.142)	(0.145)	(0.0934)	(0.109)	(0.133)	(0.139)
Household head sick? (yes = 1)	-1.073***	-0.233	-0.517*	-0.226	-0.867**	-0.0887
	(0.398)	(0.424)	(0.269)	(0.310)	(0.395)	(0.346)
Household head educated? (yes =1)	0.105	0.180	0.0200	0.0484	0.147	0.210
	(0.145)	(0.147)	(0.0952)	(0.111)	(0.140)	(0.144)
Constant	6.931***	10.39	9.100	14.04**	9.625***	13.81**
	(2.570)	(7.655)	(5.981)	(6.941)	(2.547)	(6.704)
Observations	478	418	432	388	640	556
R-squared	0.282	0.314	0.304	0.328	0.228	0.259

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We also see in equation (9.1) that having a son aged 10-14 increases deposits by 50.2% more than son-families with children aged 0-4 while having an unhealthy head of household decreases deposits by 65.8% compared to families with a healthy head of household. Equation (9.2) reports the findings for daughter-families in urban areas. The results also show that having a daughter aged 10-14 increases deposits by 44.34% but having an even older daughter, between 15-19 is actually predicted to decrease deposits by 45.39%, both relative to families with daughters between 0 and 4 years of age.

Finally, I pool the families into all three-child nuclear rural families and include an interaction term between the regional sex ratio and a dummy variable for families with sons. I conduct the same regression for urban families. The results follow the same pattern as Tables 8 and 9, where the sex ratio is not statistically different from zero for both equations. The interaction term does not provide further evidence or information to support a strong relationship between household deposits and the sex ratio variable. I omit the table to save space.

5.2 Additional Analysis

Section 5 examines the relationships between the value household bank deposits, the regional sex ratio, and a number of control variables. Now, I turn to an examination of factors that cause families to make the decision to save deposits or not save deposits. Table 10 reports the results for both the urban sample and rural sample, where the dependent variable is the dummy variable whose value is equal to 1 if the family answered "yes" to "did your Family save last year [in the form of bank deposits]?" and 0 otherwise.

In general, these findings support the results found in Section 5. We note that Table 10 reports results from a logit regression, and thus the interpretation of the coefficients will be

different at each value. Note that the log odds are defined log $(\frac{p}{1-p})$ where odds are defined as the ratio of success to failure (in this case, the ratio of the probability a family saves over the probability that a family does not save). The log odds take the log of that fraction and thus bound the result from 0 to 1. Since we are using a logit regression, the marginal impact of changing a given variable is not constant. Thus, we must calculate the marginal impact of a 1-unit change in our control variables on the log odds of deposits. I report this in Table 10.

Table 10
Marginal Effects on Decision to Save or Not Save

	Urban Households		**Rural Households**	
	(10.1)	(10.2)	(10.3)	(10.4)
	Son	Daughter	Son	Daughter
Regional Sex Ratio	-0.169	-0.682	0.801*	0.320
	(0.395)	(0.442)	(0.482)	(0.754)
Log(income)	-0.580***	0.318	-0.0537	-1.650***
	(0.168)	(0.357)	(0.391)	(0.473)
Squared of log(income)	0.0392***	-0.00647	0.0132	0.0918***
	(0.00868)	(0.0173)	(0.0197)	(0.0250)
Child aged 5-9*	0.120**	0.131***	-0.0616	0.122
	(0.0488)	(0.0453)	(0.0608)	(0.0783)
Child aged 10-14*	0.150***	0.120**	-0.0482	-0.0173
	(0.0546)	(0.0540)	(0.0689)	(0.104)
Child aged 15-19*	0.165***	-0.0227	-0.162**	0.0270
	(0.0606)	(0.0813)	0.0701	(0.0140)
Household head age	-0.0163***	-0.00785	0.00325	-0.00945
	(0.0054)	(0.00521)	(0.00509)	(0.00748)
Household head gender*	-0.0428	0.0277	0.161***	0.0430
	(0.0386)	(0.0410)	(0.0491)	(0.0675)
Household head sick?*	0.0873	-0.0693	-0.148*	-0.0840
	(0.0852)	(0.124)	(0.0772)	(0.122)
Household head educated?*	0.123***	0.0773*	-0.0437	0.0216
	(0.0420)	(0.0409)	(0.125)	(0.220)
(*) dy/dx is for discrete change of dummy variable from 0 to 1				

In equation (10.1), the sex ratio variable is negative and statistically insignificant. We see that holding all else equal, a 1% increase in income leads to a 0.58 percentage point decrease in the proportion of households to save; however, we see that there is strong statistical significance in non-linear log of income variable suggesting a similar story where families with higher income are predicted to decrease their deposits less than families with lower income. All three age-cohort variables in equation (10.1) are positive and statistically significant.

The coefficient for urban-families with a son aged 5-9 indicates that holding all else fixed, we will see a 12.7 percentage point increase in the odds that the family will save in the form of bank deposits compared to urban families with a son aged 0-4.[5] A similar interpretation holds for the age-cohorts 10-14 and 15-19; there is a 16.2 and 17.9 percentage point increase in the odds that these families will have savings, respectively, with respect to families with urban son-families with children in the youngest age-cohort. Finally, I turn to the head of household control variables. We see that a one-unit increase in the age of the household head is predicted to decrease the log odds by 0.0163 and thus there is an expected 1.62 percentage point decrease in the odds that a family saved last year. Finally, equation (10.1) shows that a family where the head of household is educated will increase the odds of that family having deposits in the last year by 13.1 percentage points.

Equation (10.2) reports the same logit regression for urban daughter-families. Again, the coefficient on the regional sex ratio is negative and statistically insignificant. In addition, coefficients on the age-cohorts for daughters 5-9 and 10-14 are positive and statistically significant. This translates to a 14.0 and 12.7 percentage point increase in the odds that the

[5] When we calculate the interpretation of the coefficient in a logit regression, we convert expected change in log odds into the change in odds using the same transformation: $100(e^{-120}-1)$

daughter-family saved last year for the respective age cohorts 5-9 and 10-14, with the omitted age-cohort being daughter families with children aged 0-4.

Equations (10.3) and (10.4) examine the log odds that the mean rural family will save last year. Equation (10.3) shows that the regional sex ratio variable is positive and statistically significant. The results indicate that a one-unit increase in the regional sex ratio is predicted to increase the log odds by 0.801, and thus a 1.23% increase in the odds that a rural son-family saved last year. Equation (10.4) supports previous observations that rural daughter families exhibit a negative quadratic relationship between deposits and income.

My findings with regard to deposits show that there is indeed a difference in behavior between the household saving rate and household deposit behavior. In fact, there lies a disparity in the saving behavior of son-families and daughter-families. The results show that household income takes on new non-linear relationships with deposits than they did with household savings; rural-daughter families have a negative and quadratic relationship between income and deposits while urban-son families no longer have a linear relationship between income and the financial decision of actively saving money.

6. Sex Ratio and Home Ownership

6.1 Model

A final variable of household financial decision-making that I examine is home ownership. It is important to note that in most Chinese contexts, home ownership refers to owning the right to live on a land and a 50-70 year lease, as the government lawfully owns the land. The decision to own a home is substantially different than that of saving behavior, which I examined in Sections 4 and 5. Home ownership is a form of long-term investment and, in the

context of the marriage market, a sign of wealth and eligibility. Wei and Zhang were able to find a strong relationship between the marriage likelihood of a son and a family's material wealth, using home ownership as a proxy for wealth in urban households. They find that son-families were less likely to have an unmarried son when the family owned a home, which helps confirm that higher level of wealth makes a man more marriageable (Wei and Zhang, 2010).

Thus, I examine the effects of changes in the sex ratio variable on the decision to own a home using a logit model and also include variables using the same base specification as in previous sections. Here, I am particularly interested in which variables are strong determinants of whether or not a household owns a home. I include an additional variable, the migration ratio, which is measured as the ratio of the number of people who are currently living in an area other than the one they are registered to have come from to the total population in each province. Following the same method as the sex ratio matching, I used the subpopulation data for urban, town, and rural population to generate this migration ratio variable. I expect this variable to have a negative relationship with home ownership as in areas of high migration it might be less likely that a family will settle down and buy a home.

6.2 Rural Households

I report the results of the logit model on home ownership using the rural family subsample. We keep in mind that the logit model does not report a constant marginal impact on home ownership, and thus I report the marginal effects of home ownership in Table 11.

In equation (11.1), the coefficient of the regional sex ratio variable is negative and statistically significant, which suggests that areas of high sex imbalance in rural regions are less likely to own a home. In addition, equation (11.1) shows that there is no longer a statistically

significant relationship between income and the likelihood of owning a home. All three age cohorts are not statistically different from zero. I also note that the dummy variable for head of household health is omitted as in all 36 observations predicted the success of home ownership perfectly. That is to say, all families where the head of household had a health rating of three or lower (with seven being excellent health) owned a home. This is a particularly interesting result as this implies that in rural son-families, the health of the head of household is a strong determinant in the decision of home ownership. Finally, we see that the migration ratio variable is negative and highly statistically significant. A 1% increase in the migration ratio decreases the likelihood that a family will own a home by -0.550 percentage points. This confirms my hypothesis that individuals who perceive a high level of migration around them are less likely to settle down themselves and purchase a home as they may not expect to stay in their current area long enough to invest in a home.

In equation (11.2) the coefficient of the sex ratio variable is again not statistically significant. We see, however, that the age cohort for daughters between the ages of 10 and 14 is positive and statistically different from zero. Having a daughter aged 10-14 increases the likelihood of owning a home by 14.1 percentage points compared to rural families with daughters aged 0-4. Additionally, a family where the head of household is male (where the dummy variable takes on a value of one) is 7.58 percentage points less likely to own a home than a family where the head of household is female. Note that the head of household education dummy variable is omitted from the model due to perfect success prediction. All six observations where the rural daughter-family has an educated head of household owned a home. Finally, the migration ratio variable is also negative and statistically significant, further supporting the previous conclusion.

Table 11
Marginal Effects of Home Ownership in Three-Personal Nuclear Rural Households

	Base Regression		**Mothers < 45**	
	(11.1) Son	(11.2) Daughter	(11.3) Son	(11.4) Daughter
Regional Sex Ratio	-0.705** (0.355)	-0.544 (0.484)	-0.729** (0.285)	-0.637* (0.348)
Log(income)	-0.177 (0.167)	-0.0709 (0.198)	-0.292* (0.174)	-0.184 (0.173)
Squared of log(income)	0.0118 (0.00895)	0.00232 (0.112)	0.0176* (0.00918)	0.00946 (0.00952)
Child aged 5-9*	0.0345 (0.0398)	-0.0163 (0.0460)	0.0233 (0.341)	-0.0363 (0.0417)
Child aged 10-14*	0.0635 (0.426)	0.132*** (0.413)	0.0366 (0.0372)	0.0334 (0.409)
Child aged 15-19*	0.0244) (0.0520)	0.0580 (0.0591)	0.0480 (0.0433)	0.0629 (0.0468)
Household head age	-0.000817 (0.00326)	0.00220 (0.00449)	0.00194 (0.00271)	0.00562* (0.00323)
Household head gender*	0.0639 (0.0501)	-0.0788** (0.0366)	0.0473 (0.0381)	-0.0720*** (0.0260)
Household head sick?*	--	-0.0121 (0.881)	--	0.00668 (0.0616)
Household head educated?*	-0.112 (0.126)	--	-0.0685 (0.0956)	--
Migration Ratio	-0.798*** (0.137)	-0.319* (0.116)	-0.698*** (0.110)	-0.196 (0.114)
(*) dy/dx is for discrete change of dummy variable from 0 to 1				

Equations (11.3) and (11.4) report results using a broader specification. This robustness check includes mothers between the ages of 40 and 45. These results generally support the previous findings.

6.3 Urban Households

Table 12 reports the results for the logit model and the marginal effects table on home ownership using a subsample of urban households. Equation (12.1) shows that there also exists a negative relationship between the regional sex variable and the likelihood that a family will own a home. This implies that the result we found where areas of high sex imbalance are less likely to

own a home also applies to urban son-families. The income variable is now negative, non-linear and statistically significant which suggests that families of higher income have this offsetting effect on the relationship of income and likelihood of home ownership. None of the age cohort variables is statistically different from zero. Of the head of household control variables, the results for equation (12.1) suggest that having a head of household who is of poor health and educated will increase the likelihood that the family owns a house by 17.2% and 24.6%, respectively. Finally, the migration ratio variable is negative and statistically different from zero, translating into a -0.456 percentage point decrease in the likelihood to own a home given a 1% increase in the migration ratio.

Table 12

Marginal Effects of Home Ownership in Three-Personal Nuclear Urban Households

	Base Regression		**Mothers < 45**	
	(12.1) Son	(12.2) Daughter	(12.3) Son	(12.4) Daughter
Regional Sex Ratio	-0.565* (0.331)	0.150 (0.391)	-0.403 (0.284)	0.335 (0.321)
Log(income)	-0.0708** (0.0336)	0.179 (0.240)	-0.0698** (0.0325)	0.339* (0.198)
Squared of log(income)	0.00668*** (0.00234)	-0.00582 (0.0119)	0.00630** (0.00214)	-0.138 (0.00982)
Child aged 5-9*	0.0396 (0.0393)	-0.0272 (0.0467)	0.0347 (0.0373)	-.0218 (0.391)
Child aged 10-14*	0.0711 (0.0436)	-0.0899 (0.0600)	0.0494 (0.0405)	0.00489 (0.466)
Child aged 15-19*	0.0367 (0.0562)	0.0826 (0.0710)	0.0750* (0.0445)	0.0868* (0.0517)
Household head age	0.00404 (0.00427)	0.0189*** (0.00489)	0.00237 (0.00330)	0.00754** (0.00369)
Household head gender*	-0.0496 (0.0304)	-0.0215 (0.0344)	-0.0530** (0.0261)	0.00452 (0.0293)
Household head sick?*	0.159*** (0.0463)	-0.0993 (0.121)	0.169*** (0.0405)	-0.0308 (0.847)
Household head educated?*	0.220*** (0.0269)	0.0244 (0.0366)	0.191*** (0.0238)	0.0656** (0.0300)
Migration Ratio	-0.608*** (0.101)	-0.380*** (0.114)	-0.619*** (0.0859)	-0.407*** (0.09467)

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Equation (12.2) reports the results for urban-daughter families. The sex ratio is not statistically different from zero, nor is the income variables and the age cohort variables. A one-unit increase in the head of household age will increase the likelihood of owning a home by 1.91% in urban daughter-families.

In equations (12.3) and (12.4), I report a robustness check, in which I include in the sample mothers between the ages of 40 and 45. These results largely support conclusions drawn from equations (12.1) and (12.2).

These findings suggest that the decision of home ownership is considerably different than the household saving behaviors. An interesting result drawn from these tables is that income is much less a factor in home ownership than in the household saving rate and household bank deposits. Additionally, the age cohorts were largely not statistically different from zero and thus I conclude that the age of the child is also not a strong determinant of home ownership. According to my results, what do become important factors in the decision to own a home are the head of household control variables along with the regional migration ratio variable. Having a head of household with poor health or an educated head of household in *both* rural and urban son-families increases the likelihood that the family will own a home. In addition, we see for the first time a consistently negative relationship between the regional sex ratio variable and the financial decision-making variable, which in this case is the decision of home ownership. We note that home ownership refers to the surveyed family and whether or not they own a home. Thus, this negative relationship between the sex ratio and the likelihood to own in a home in rural son-families could imply that *a family* that owns a home is no longer a sign of wealth for a son who is looking to marry.

7. Conclusions

In this paper, I conducted an empirical analysis of the determinants of three measures of financial decisions: the household saving rate, household savings in the form of bank deposits, and home ownership, using household survey data and Chinese census data, both from 2010. I have examined a variety of different financial decision equations. To summarize my findings, for the most part, I was unable to obtain an effect of the sex ratio on these financial decision variables that is consistent with that of Wei and Zhang's, who find that there is a strong and positive relationship between the regional sex ratio and the household saving rate and deposits per capita. Additionally, this analysis further supports the results of Du, Wang, and Zhang (2015) who found no effects of sex imbalance in their 2000s cohort using an interaction term between the sex ratio and decade dummy variables. Alternatively, this analysis has allowed me to explore these decisions. I was able to find strong evidence that suggests there exists very different behavior in financial decision-making between both rural and urban families as well as between son-families and daughter-families.

In rural households, the relationship between household bank deposits and income is completely reversed for son-families and daughter-families. That is, son-families have a upward sloping and non-linear relationship between bank deposits and household income, while this relationship in daughter-families is negative and non-linear. Additionally, income and the age of the child were significant factors in household saving behavior; however, income and age are not statistically significant determinants of home ownership. Finally, we observe a negative relationship between the sex ratio variable and the decision to own a home, which suggests that home ownership may no longer be a sign of wealth that improves a son's standing in the marriage market.

The implications of these findings suggest there no longer exists a strong and positive relationship between the sex ratio and household savings, a result drawn from Wei and Zhang's analysis. The One-Child Policy was implemented in 1979 and initially only minority regions were exempt from much of the policy. However, as time progressed, more and more exceptions were introduced by province, region, and families that fell under specific circumstances, such as those in Shanghai who could apply for a second-child permit if the first child was disabled or had died (Scharping, 2003). This exception was put in place in 1981, just two years after the initial implementation of the policy. By 2007, China's National Population and Family Planning Commission stated that only 35.9% of China's population was subject to a strict One-Child Policy (Parkinson, 2015). The data from my paper come from the 2010 Census as well as a household survey from the same year, over 30 years after the implementation of the policy. Therefore, while the household saving rate remains high in China, it seems plausible that this desire to save is no longer a result of the One-Child Policy and perhaps other factors may be involved.

Further research can turn towards the recent change in the One-Child Policy. These conclusions regarding financial decisions at a household level might have implications on families, as they now are able to have a second child. How might these families act and what financial decisions might factor into whether or not a family will have a second child? I leave these questions for future research.

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