UNIVERSITY OF CALIFORNIA, SAN DIEGO

Essays on Rural-Urban Migration in Hinterland China

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Economics and International Affairs

by

Lei Meng

Committee in charge:

Professor Gordon Hanson, Chair
Professor Barry Naughton, Co-Chair
Professor Julian Betts
Professor Craig McIntosh
Professor Langche Zeng

2009

The dissertation of Lei Meng is approved, and it is acceptable in quality and form for publication on microfilm and eletronically:

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Co-Chair

_____
Chair

University of California, San Diego

2009

To my advisor, Gordon Hanson, for his constancy in guidance, patience, and encouragement.

To my mother, for her love and prayer.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my advisor, Gordon Hanson. He has made known to me the true value of paying one's due diligence in work and of honoring and being helpful to the work of other colleagues. I have been amazingly blessed to have him as an advisor and am indebted to him more than he knows.

I am especially grateful to Barry Naughton, who has given me the most steady support with his original insight, his thorough and lucid understanding of the Chinese economy in the most unassuming way. I have also been especially fortunate to have Julian Betts, Craig McIntosh, and Langche Zeng on my committee, their intellectual energy and personal encouragement are truly appreciated. Research funding from Center on Pacific Economies at UCSD and the Pacific Rim Research Program is also gratefully acknowledged.

My sincere thanks are due to Tom Lyons, who gave me courage and supported me to pursue academics while at Cornell University. I convey warm acknowledgement to my colleague at UCSD, Dong Jin Lee, who has inspired me with his exceptional economic intuition and has given me so much help.

Finally, words fail to express my gratitude to my mother. None of this would have been possible without her prayer and love.

VITA

2002	B.A., Economics, Cornell University, Ithaca, New York
2007	M.A., Economics, University of California, San Diego
2009	Ph.D., Economics University of California, San Diego.

FIELDS OF STUDY

Major Field: Applied Microeconomics (Development Economics, Labor Economics, Economy of China)

Studies in Development Economics
Professors Gordon Hanson and Barry Naughton

Studies in Labor Economics
Professors Gordon Hanson and Barry Naughton

ABSTRACT OF THE DISSERTATION

Essays on Rural-Urban Migration in Hinterland China

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Doctor of Philosophy in Economics and International Affairs
University of California, San Diego, 2009

Professor Gordon Hanson, Chair
Professor Barry Naughton, Co-Chair

Using self-collected rural household data in Zhijiang municipality, Hubei province, China, my dissertation addresses three different aspects of rural-urban migration in hinterland China. First, I study the relationship between origin income and the individual's migration decision. I instrument the key variable, the household land, using the administrative record of initial land allocated by the state to the households in the early 1980s, and find that rural-urban migration selects negatively on landholding. I also study individuals' migration decisions that were not selected on the parental migration choices versus those that were. My findings show that the selectivity problem is important. While a negative relationship between landholding and migration propensity is found for the descendants of an immobile cohort of rural residents, selectivity alters the result for the descendants of a mobile cohort of villagers and a positive relationship can emerge.

Second, I examine the causal impact of the grain subsidy, which was ushered in by China's agricultural policy shift since 2004, on villagers' urban-bound migration propensity. My study validates the concern that the grain subsidy

is dissuading farmers to engage in migratory work, however, the magnitude of the reduced incidence of rural-urban migration is modest. If China values the welfare of the rural sector and would like to continue subsidizing its grain production in a WTO-compliant way, it can do so without jeopardizing the country's process of rural-urban migration or notably reduce the local welfare that might result from a loss of the migrant income.

Lastly, I focus on the fall of the marriage rates of rural men in their early twenties and study the extent to which the rise in rural young women's participation in migratory work has contributed to this fall. I find that (1) a 10 percentage point increase in the local female out-migration reduces rural male marriage propensity by 5%; (2) the impact was felt by both non-migrant and migrant men, but the marriage propensity of migrant men was affected more by female out-migration than non-migrant men; (3) the more educated the migrant men, the less severely their marriage probability was affected by the local female out-migration.

1

Land, Household Selectivity, and Rural-Urban Migration in Hinterland China

1.1 Introduction

In this chapter I solve the problem of endogeneity that surrounds a major determinant of rural-to-urban migration: the origin income of the migrant as proxied by household land and examine the extent of a household selectivity problem created by one's parental generation in the study of migration choices. I address the land endogeneity issue by making use of an instrument for the current household land, which is found in the village administrative record of the initial land allocation to the rural households at the brink of the Chinese economic reform. I address the household selectivity problem by studying in the Chinese context the mobility choice of a generation of rural residents whose parents were restricted in

their youth to live in the countryside by government decree and remained there through life.

Rural-urban migration is an important feature along a country's path of industrialization(Williamson (1988)). Recent field studies show a rapidly growing tide of rural-urban migration in developing countries such as China, Indonesia, Bangladesh, Vietnam, and Thailand (Deshingkar (2005); Huang and Pieke (2003); Afsar (2000); Dang (2005)). Even in India and Cambodia where rural-rural migration still dominates, a new trend of rural-urban migration is on the rise (Acharya (2003); Srivastava (2005)). Among these countries, the volume of China's rural-urban migration is the most impressive. Figure 1.1 compares the level of rural population over the 1950-2005 period for China, India, Indonesia, Bangladesh, Vietnam, Thailand, Cambodia, and another large developing country, Nigeria. China's base of rural population has been the largest among the developing countries, reaching over 800 million in 1980, and only in recent years tapered off behind India. Figure 1.2 plots the percent of the population living in the urban area over the 1950-2005 period for the same group of countries. In 1950, populations in these developing countries primarily lived in rural areas. Urbanization in most of these countries has notably picked up in the past two decades, accompanied by growing rural-urban migration (Deshingkar (2005)). Since 1980, China has experienced one of the highest rates of urbanization among the developing countries.

When the Chinese economic reform loosened the administrative barriers hindering mobility, a period of massive rural-urban migration has ensued since the 1980s. According to the estimates published by China's National Bureau of Statistics, the number of rural-urban migrants increased from 2 million in the mid 1980s to about 70 million by 1999. This number climbed over 100 million in 2005. Another 200 million rural residents are expected to migrate to urban areas by

2020. From 1980 to the present, China has urbanized rapidly and has caught up with the developing country average in 2005; over 40% of its population is now considered as urban dwellers. The immense scale notwithstanding, the experience of rural-urban migration in China since the 1980s is conventional compared to other countries also treading on the path of industrialization (West and Zhao (2000); Huang and Pieke (2003); Liang and Ma (2004)) and the knowledge of the determinants of Chinese rural-to-urban migration, a relatively new phenomenon in a major developing country, is useful in shedding light on our understanding of the general experience of industrialization.

Numerous researchers have studied the determinants of China's rural-urban migration (Rozelle et al. (1999); Zhao (1999b); Hare (1999)). They have found in China a migrant profile that is similar to other developing countries: migrants are typically young, male, more educated, and has access to migration networks. However, the literature has not provided consistent evidence on the relationship between migration propensity and origin income. In the context of rural-urban migration, the origin income is often proxied by household land, since land is the major determinant of rural income (Zhao (1999a)). Hare (1999) finds in a local study that household land is an inconsequential determinant of individual's migration status. De Brauw et al. (2002) also find that household's land has no impact on individual's migration participation decision using China National Rural Survey (CNRS 2000). On the other hand, Zhao (1999a,b) finds in a rural survey in Sichuan province in 1995 that household land is negatively associated with individual's migration propensity. Rozelle et al. (1999) also find that migrants are being drawn from land-poor households using a nationally representative sample, acknowledging the traditional income motivation behind rural-urban migration in China. A positive relationship between household land and household decision to engage in migratory work is also found by researchers (Taylor et al. (2003)),

suggesting that the Chinese rural households may face liquidity constraints. The mixed results in the literature may be driven by the problem of omitted variable bias. Following the initial land allocation to the rural households in the early 1980s, land reallocations continued to take place in rural China (Brandt et al. (2002)) and numerous local studies (Judd (1992); Zhu and Yi (1993)) show that these subsequent village-wide land reallocations are related to changes in household composition, household's social status, and other individual and household characteristics, and are therefore endogenous. Treating household land as exogenous, as has been often done in the literature, implicitly assumes the initial exogeneity in the land distribution as well as the subsequent exogeneity in the land reallocation schemes.

In addition to the endogeneity of household land, our understanding of the relationship between migration propensity and origin income is further hindered by the selection of farm households. Because parents migrate selectively, taking their children with them, and also tend to transmit their characteristics to their children (Becker and Tomes (1979)), those who remain in the countryside may not be representative of the overall population - they are a selected group of individuals who, while responding to income shocks, make migration decisions conditioned on their parents being irresponsive to the past income shocks. If the unobserved factors affecting the parental generation's migration decision correlate with both origin income and the next generation's migration choice, the coefficient of origin income cannot be consistently estimated. Previous contributions to the literature of rural-urban migration were silent on the problem of selective migration of one's parental generation (Vigdor (2002)). This is because this selectivity problem is difficult to solve, it is deeply-rooted in most modern societies in which mobility decisions have for generations been based on individual's free choice. Short of a natural experiment, the intricate nature of the problem has made researchers

routinely leave the problem unaddressed in the migration literature, treating rural households as if they were randomly located in the countryside. Similar problem also intrudes in the neighborhood effects literature where the failure to account for it yields inconsistent results(Katz et al. (2001)).

It is difficult to use the available data sets to address issues of the endogeneity of income and the household selectivity in the context of Chinese rural-to-urban migration. The Chinese micro-level census data which are most conducive to migration studies, such as the 2000 census and 2005 mini-census, have not been made publicly available. Other most frequently accessed data sources, such as the Chinese Household Income Project (CHIP 1988, 1995, and 2002), contain only limited information on migration. The longitudinal data provided by the Chinese Health and Family Life Survey (CHNS 1989 - 2002) does not distinguish between migrant workers and locally employed workers so that the geographical mobility cannot be studied. I therefore collected my own data over a three-year period, from 2005 to 2007, in Zhijiang city, Hubei province, China.

Hubei is one of the six major migrant-sending hinterland provinces in China. It has a population of 60 million, of which 66% live in rural areas in 2005. Zhijiang situates in the southwest of Hubei and is on the north bank of the middle sections of the Yangtze river. It is a migrant-sending municipality that has a traditional farming base. Zhijiang has a population of 510,000 in 2005, of which 64% are rural, and 18% of its rural labor force (aged between 16-65) engaged in migratory work. Like that of Hubei and other migrant sending hinterland provinces, Zhijiang sees more than half of its out-migrants going to the coastal Guangdong province.

I address the problem of endogenous landholding by noticing that the

initial land allocation to rural households in the early 1980s was decreed by non-market based considerations and is therefore unrelated with household head's skill and ability. The absence of the rural land sales and rental market in China's hinterland also ensures that the pattern set by the initial allocation has persistence over time (Feng (2006)). These two features of the initial land allocation allow it to be used as an instrument for household land in the subsequent years. My instrumented results show an even more pronounced negative relationship between landholding and migration propensity, suggesting that landholding is positively correlated with the unobserved factors affecting the income earning potential of the villagers.

Regarding selectivity, I exploit the fact that China's household registration system (the *hukou* system), interwoven with other urban and rural institutional arrangements, has generated a group of rural people who were encamped in the countryside throughout the prime of their lives and were too old to leave the countryside since the economic reform. This group of rural people were thus dispossessed of the opportunity to select themselves out of the countryside primarily by government decree. The migration choice of their offspring therefore is not conditioned on the household selectivity problem generated by the parental generation. In other words, by analyzing the offspring of this group of "encamped" rural residents, I am able to roll back the selectivity problem by an entire generation. While this feature is implicit in all Chinese data sets, it has not been taken advantage of. One reason is that the standard rural household surveys do not provide information for researchers to identify the life-long immobility age range of this generation of rural residents. Through primary data collection, I overcome this problem by collecting the permanent mobility information on all the siblings of the locally born adult household members and am able to document the age range of the immobile rural residents. Having identified the age group of the immobile

rural residents, I study the mobility choice of their offspring. I then compare it with a cohort of rural residents who have mobile parents, i.e., parents who could have selected themselves out of the countryside in response to the past income shocks but chose not to leave. My findings show that selectivity can mar the relationship between landholding and migration and also between historical class background and migration, therefore the rural residents whose parents were not subject to the selectivity problem are the more appropriate subjects to study in the Chinese context.

The paper is organized as follows. In section 2, I introduce the data, describe the land endogeneity problem and present the instrument for land. In section 3, I describe the household selection problem and propose my solution to it. In section 4, I set up the econometric model, give and interpret the estimation results. Section 5 offers concluding remarks.

1.2 Land in the Rural-Urban Migration Decision

In this section, I begin by introducing the data used in this study. I then discuss the importance of land in the rural-urban migration decision and provide evidence on how the variable of landholing can be plagued by the problem of endogeneity. I use an instrument found in the initial land distribution to solve this problem and discuss the problems associated with the validity and relevance of this instrument towards the end of this section.

1.2.A Data

I collected the primary data used in this study during the Chinese Spring Festivals of 2006, 2007, and 2008 in Zhijiang city, Hubei province. The Spring Festival is a time during which interviews with all household members, especially the migrants[1], are feasible because of the traditional family reunion. Initially, the survey covers 1,200 rural households and 4640 individuals in 2006. Over the next two years, follow-up surveys were done on the same households and the resulting data set constitutes what is essentially a rich panel data set[2]. The details of the sampling design are described in the Appendix.

The data I collected contains extensive information on individual and household characteristics beyond what is usually obtained in census or rural household income surveys. For example, because the village accountants in each sampled village were hired as surveyors, they were able to provide the administrative data maintained by the local village offices on the historical land allocation for each household, among them the initial round of land allocation in the early 1980s. Retrospective information on, for example, employment, migration history, education, marital status, and CCP membership status is also obtained for each household member for the past twenty years. In addition, permanent migration information is obtained for all the children of the household head as well as for all

[1]The presence rate of all household members at the time of the 2006, 2007, and 2008 interview was 88%, 94%, and 80% respectively. The drop in the presence rate in 2008 was due to the severe snowstorm which deterred homecoming of many migrants. The problem of the absence of adult household members, especially migrants, was largely overcome by telephone interviews whenever possible.

[2]The attrition of households from the initial survey in 2006 is small. In total, 9 out of 1,200 sampled households permanently moved out of the countryside by the time of the third survey in 2008. In terms of individual attrition, 2.56% of the originally surveyed individuals were absent from the surveyed village since the first interview, through marriage, permanent change of residence, or death. However, their information was still provided by the remaining household members.

the siblings of the household head, creating yet separate random data sets for the empirical analysis.

1.2.B Instrumenting for Land

As in most developing countries, the single largest source of Chinese rural income comes from household production activities, and income from farm production makes up the bulk of the total income generated by these activities (Khan and Riskin (1998)). Since farm land is one of the principal determinants of farm household's permanent income generating potential, it is often used by researchers as a proxy for farm income (Zhao (1999a); Taylor et al. (2003); Du et al. (2005)) in the study of migration decisions. According to the traditional income driven story, reducing land size could decrease income at the rural origin hence motivate out-migration. However, the relationship between landholding and migration can also be affected by the omitted variable bias. Since land in rural China is potentially subject to periodic land reallocations, unobserved personal ability which may affect the consequence of any land reallocation may at the same time affect one's migration propensity. In the absence of appropriate control for the unobserved heterogeneity in ability, the impact of land endowment on migration probability is confounded by the omitted factor. If the traditional income driven motivation of migration truly holds, yet the unobserved ability positively affects both migration propensity and land amassment during the process of land reallocation, then the coefficient on land endowment will be biased toward zero. This may explain why the relationship between land and migration propensity has ranged from negative to positive in the literature. The observed negative relationship could also be revealing other stories. For example, households engaging actively in out-migration could dispense more land in terms of renting. So income-maximizing individuals

may seek to first obtain off-farm employment, and once they succeeded in securing a job, they rent out their land, resulting an inverse relationship between land endowment and migration activity. In fact, researchers have found evidence that both migration activity and land rental transactions have been rising rapidly in recent years (Kung (2002)), suggesting intimate connections of the two factor markets. Interestingly, among those who have found a negative relationship between land and migration probability, there is no discussion about the possibility that the negative relationship observed may not only depict the traditional income driven motivation of the migrants, it may also reveal a reverse causality of migration-stimulated land relinquishment. So the estimated coefficients on landholding in these studies are inconsistent and cannot be simply interpreted as migrants selecting negatively on income.

A proper estimation of the relationship between landholding and migration propensity calls for the use of an instrumental variable that can predict landholding well yet not affect migration decision through any other routes besides the channel of landholding. In the Chinese context, the initial round of rural household land distribution in the early 1980s can serve as an instrument for the land cultivated by the households in any subsequent years. The initial land distribution has few distinct features that make it a good candidate for an instrument in this case.

First, the distribution of the initial land was not coordinated through the market (Zhu and Yi (1993)). Its distribution criterion was designed not to achieve allocative efficiency or to realize households' comparative advantage, but to uphold an egalitarian aspiration. The farm land was therefore distributed to households based on household size, the number of household adult labor, or both (Brandt et al. (2002)). The distribution was carried out within production teams, which

are usually small villages or a neighborhood of a large village. Land was calculated with regard to individuals but made to households (Judd (1992)). In Zhijiang in the early 1980s, a village in general had 5 to 10 production teams, and each production team had 20 to 40 households. Within each production team, about 70 - 80% of the land was distributed to each household in proportion to its total number of household members and the other 20 - 30% was distributed in proportion to its number of able-bodied labors (also called labor power units, referring to those full time farm workers aged 18 and above). More land was therefore allotted to households with larger household size and more adult members and which happened to live in per capita land-rich production teams. The configuration of the production team was primarily based on geographical and historical reasons; no attention was paid to optimizing the production team income or equalizing the land/labor ratio at the time of its formation. Land was pooled and worked in common and labor was rewarded on the basis of a work point system within the production teams. But the work point system greatly discouraged effort in collective production (Putterman (1988)), in addition, cross village mobility was practically non-existent, so individuals hardly had any incentive or feasibility to select into per capita land-rich teams when these teams were first formed. The team population thus varied randomly, and once the team was formed, being located in a specific team was primarily determined by birth or through marriage (Morduch and Sicular (2000)).

But can families endogenize its size to take advantage of the criterion and gain more land? There are several factors working against such endeavor. One is that the return to household farming in 1982 was a radical departure of governmental policy, unanticipated by the Chinese farmers (Watson (1983)). In 1978, the official stand was to condemn individual farming. During 1978 and 1979, peasant experimentations with household farming were only tolerated in some severely impoverished areas (Unger (1985)). The ensuing success of private farming

in these poorest areas persuaded the central government to expand the practice of contract farming in more broadly defined backward areas in 1980. However, even in 1980, the official stance still unambiguously favored collective farming and regarded household farming only as a temporary expediency for the poor regions (Watson (1983); Nolan (1983)). In December 1980, only 14% of the production teams contracted collective land to the individual households (Nolan (1983)). The full official endorsement of the return to family farming came in late 1981. By the end of 1981, 45.1% of production teams returned to family farming (Lin (1987)). By the end of 1982, 90% switched systems (Naughton (2007)). So the window of opportunity to endogenize family size was at most two years for those who felt confident that the return to family farming was inevitable. But in reality, Chinese farmers put little faith in the promise of the first long-term (15 year then) household land contract and there was widespread disbelief at the beginning of the land distribution (Watson (1983)) that a return to family farming would be permanent. The doubt of the peasants was reflected in the commonly reported stories that describe a somewhat indifferent attitude towards the initial land allocation.

> The villagers hardly argued when first dividing the land. For example, if 5 people were dividing one piece of land and the last person somehow got a couple of hundred squared meters more than the rest, people in general just left the matter as it happened to be. People were not really bent on claiming household land because it was not taken seriously that such anti-collective policy would become a long-term commitment. The uncertainty of the future course of the land tenure system was not resolved quickly. It was not until 3 to 5 years later did they realize that the policy was here to stay. (Shen (2007))

Another factor that prevented household from endogenizing its household size in response to the initial land distribution is that the initial land allocation came at a time after the government had set into place the one-child policy in 1979. The timing of the one-child policy implementation largely circumvented the

attempts of the households to claim more land by changing their fertility choices within that two year window (Johnson (1994)). A variety of sanctions in the countryside to penalize violations of the one-child policy could also prevent calculated family size expansion (Saith (1981); Chen (1984)). Although the strength of the policy implementation has been weaker in rural areas than in cities, the leniency only extends to allowing rural families to have a second child if the first is a girl (Saith (1981)). Since the local rural authorities are given the power to penalize the noncomplying households and are evaluated at least in part according to their merit in the one-child policy implementation (Kane and Choi (1999)), violating the policy can be no less detrimental for households in the countryside than in the cities. In fact, the proportion of the rural communities strictly adhered to the one-child policy increased steadily throughout the 1980s and into the 1990s. The basic form of the one-child policy stands unchanged today.

I present in Figure 1.3 the distribution of the initial land allocation. Since my data contains information regarding household size, Communist Party membership status, marital status, years of schooling, and the household's historical class background at the time of the initial land allocation, I present in Table 1.1 the results on the determinants of the initial land allocation. As expected, village dummies and household size together explain 59% of the variation in the initial land endowment. Adding age, education, marital status, political status, and social status at the time of the initial land allocation only explain 3% more of the variation. Household heads' years of schooling and marital status had no effect on the amount of land the household obtained. The Communist Party membership status at the time of the distribution had no bearing on the amount of land the household could claim, indicating that political stance was not used to gain more land. The class background variable refers to one's political and social status in the village at the time of the initial land allocation. A class background, such as

landlord, rich peasant, middle peasant, or poor peasant, was affixed to each household in the early 1950s during the land reform according to the family's economic position under the pre-1949 regime (Unger (1982)). The classification soon became part of a peasant's identity throughout his or her life (Zhang (2004)). From the early 1950s to the end of the collectives, individuals inherited their class designations from their fathers and endured the discriminations their class backgrounds imposed on them (Cohen (1993)). A poor peasant class was synonymous to a socially and politically elite class. A rich peasant or a landlord class was generally considered as socially and political inferior. Between 1950 and 1979, people from the rich peasant and landlord class were the least of all to be considered for any benefit in the countryside; for example, they were dispossessed of the opportunity to join the army, go to university, and join the Party; and they were also discriminated against in the marriage market. The class system was abandoned in the early 1980s (Unger (1982); Chan et al. (1984)). But it is surprising to see that the class designation which since the 1950s had weighted so heavily in determining an individual's access to social and political welfare had no effect on the initial land allocation. This strongly indicates that the land was initially distributed in a spirit of neutrality both in terms of political and social considerations. It is interesting to note that after controlling for factors directly related to the distribution criterion and factors considered to indicate individual abilities, there remains almost 40% of the variation unexplained, indicating there are other factors such as household composition and random land measurement errors driving the variation.

Once the initial land allocation was made, land was passed on within the families, and was subject to occasional village wide reallocations. The subsequent growth of the rural land markets was slow after the initial land distribution (Kung (2002); Feng (2006)). The interest-bearing transfer of land usage right was permitted only in 1993 and the Rural Land Contracting Law was not adopted until 2003.

The rural rental market for land-use right developed rapidly in recent years in commercialized coastal areas but progressed more slowly in hinterland China. The data I collected in Zhijiang include the land amount allocated to each household that is senior enough to have experienced the initial land allocation and the initial land allocated to one's parental household if the household is too young to have existed on its own in the early 1980s. For the senior households, I use a transition matrix (see Table 1.2) to depict the evolution of land for these households that received the initial land allocation by 1982. Of all the households in a certain quintile in terms of the amount of initial land contracted in 1982, a good proportion of them still remained in the same quintile in terms of the amount of land contracted in 2005. Table 1.3 presents the first-stage regression of the currently contracted land on the amount of initial land and other covariates. The F-statistic is well above 10, indicating that the initial land is not a weak instrument.

There is another important consideration before the initial land allocation can be used as an instrument. One might expect that the initial land allocation had impacted the rural households in a variety of ways. It could have affected the households' current education and marital status which in turn have influences on their migration decisions. To study whether this is the case, I regressed current education, marital status, and CCP membership status on the amount of initial land and other covariates, the results as well as the F-test statistics are reported in Table 1.4. The estimated coefficients on initial land allocation are insignificant in all three regressions, indicating that the initial allocation of land is not working through the channels of education, marriage, or political careers to influence current migration propensity. The current household landholding is the only channel through which the initial land allocation relates to rural-urban mobility.

1.3 Household Selectivity

The relationship between origin income and migration propensity can be further hindered by a household selectivity problem. If, in response to income shocks, parents have left the village permanently, taking their offspring with them, then the households left behind are a nonrandom subset of people. The next generation's migration decision in response to income shocks is therefore conditioned upon having parents who did not respond to the opportunities to go in the past. In the Chinese context, this selection can be rolled back for one full generation because there exists a generation of rural residents whose parents were thrust into farming upon birth and restricted to live in the countryside by political decree throughout life.

This phenomenon is a result of the household registration system (the *hukou* system) instituted since the 1950s. It was first set up to monitor, not control, population movements in cities in 1951 and was extended to rural areas in 1955. However, intertwined with the institutions of the work-units and communes, the household registration system soon developed to serve the purpose of pursuing a state-led, heavy-industry oriented development strategy within a predominantly agrarian and poor country (Cheng and Selden (1994); Knight and Song (1999)) by rigidly restricting mobility. The natural process of rural-urban migration was arrested as a result. Zhao (2000) compiles the rural–urban migration rates for China from 1949 to 1985 as well as the world rural-urban migration rates during roughly the same period (I reproduce her table in Table 1.5). From 1949 to 1985, China's average rural-urban migration rate was only 0.24%, less than one-seventh of the world average. The years from the beginning of the 1960s until the end of the 1970s saw the most rigid form of the *hukou* system and, for a span of twenty years, the flow of rural-to-urban migration "dwindled to practically zero" (Chan

and Zhang (1999); Naughton (2007)).

From the early 1980s onward, reforms of the *hukou* system have taken small and sometimes symbolic steps to reduce the institutionally generated socioeconomic discrimination (Liang and White (1997); Fang (2002)). Since the early 2000s, provinces across China started to end the legal distinction of agricultural and non-agricultural *hukou*, and register people as either local or temporary residents (Wang (2004)). In recent years, the Chinese central government has increasingly oriented its policy towards facilitating the country's rural-urban migration and improving the livelihood of rural migrants in cities. However, since age is a great deterrent to migration (Zhao (1999a); Rozelle et al. (1999); Hare (1999); De Brauw et al. (2002)), the generation of rural residents who did not have a chance to leave the countryside in response to the income shocks during the period of mobility freeze, was also too old to leave for cities in the period of mobility relaxation. It was also difficult for the once "encamped" generation to leave for cities on account of its offspring, because the multi-generation family reunions in cities are unrealistic for most migrant workers until the present day (Solinger (1995); Chan and Zhang (1999)).

One special feature of my data is that I can unique identify the name, age, education background, and the household registration status of the siblings of all household members. I treat the sibling data as a random sample to document villagers' permanent selection out of the countryside. Table 1.6 gives the percentage of the possession of urban *hukou* for different birth cohorts of the rural residents. The implicit assumption that makes this table meaningful is that among all the children born to a parent pair, at least one of them remained in the village since reform. As expected, for the rural residents born in the 1940s and in the 1950s, very few of them have left the countryside; in fact, only 0.65% on average

have gained an urban *hukou* by 2005. The rural residents who were born in the 1960s and thereafter, however, were increasingly more likely to have permanently selected themselves out of the countryside. About 5% of the rural villagers born in the 1970s had permanently selected themselves out of the sampling frame by 2005. Although the absolute level of permanent out-migration is relatively small, the 1980s generation of rural villagers produced a more than ten-fold increase in terms of attrition compared to the 1940s generation.

I term the rural residents whose parents were born in the 1940s and 1950s as the cohort with immobile parents. Similarly, I term the rural residents whose parents were born in the 1960s and 1970s as the cohort with mobile parents. The mobility choice of the cohort with immobile parents is made as if upon a "clean slate" because it does not face an extra qualification which conditions its mobility choice on the parental decision of not leaving the countryside in the past. In the empirical analysis, I study the cohort with immobile parents vis $\grave{a}$ vis the cohort with mobile parents to see how the problem of household selectivity affects the estimation results. There is a caveat that needs to be made here. The immobile parents are on average older than the mobile parents and so are their offspring. These two groups of parents differ in the degree of mobility freedom in a temporal manner and this temporal difference makes my solution to the selectivity problem less than perfect. Even if I condition my study on the offsprings of these two groups of parents who are of comparable age, there is still a concern whether the differential response of the second generation's migration decision to income shocks is due to household selection or cohort effect. For the common age offspring of these two groups of parents, the children themselves do not suffer from cohort effect, but their parents do come from two temporally distinct cohorts and the cohort effect may exist when the different temporal experiences of the two groups of parents had differential impacts on their children. My study cannot distinguish

between household selection and this kind of cohort effect.

1.4 Empirical Analysis

In this section, I begin by setting up a simple model to motivate the empirical estimation. I then discuss the estimation results. Robustness checks are performed toward the end of this section.

1.4.A Model and Empirical Specification

Consider a simple, static migration model in the framework of human capital investment. Suppose that individuals from the rural area, indexed by r, choose whether to engage in migratory activities in an urban setting, indexed by c. In the urban setting, income faced by the individual is given by

$$y_c = \mu_c + \delta_c S + \beta_c L + \gamma_c X + \epsilon_c \tag{1.4.1}$$

where y_c is the urban income, μ_c is the base income, S is the level of schooling, δ_c is the return to schooling, β_c is the return to landholding if the individual works in cities, L is the landholding of the household to which the individual belongs to and it represents the local income earning potential of the individual. X is a vector of control variables, and γ_c is the corresponding vector of the marginal effect of the covariates. ϵ_c is the unobserved factors influencing the individual's urban income. If the individual chooses to remain in the rural area, the rural income facing the individual is given by

$$y_r = \mu_r + \delta_r S + \gamma_r X + \beta_r L + \epsilon_r \tag{1.4.2}$$

where the coefficients and variables are similarly defined for the rural sector. If $y_c > y_r$, the individual will engage in the urban-bound migration. The migration decision rule of the individual is therefore given by

$$\begin{aligned} P(m = 1) &= P(y_c - y_r > 0) \\ &= P((\mu_c - \mu_r) + (\delta_c - \delta_r)S + (\gamma_c - \gamma_r)X - (\beta_c - \beta_r)L > -(\epsilon_c - \epsilon_r)) \end{aligned} \tag{1.4.3}$$

Let m_i be a binary variable equals to 1 if rural-urban migration takes place within a specified time interval, the empirical specification for individual i is:

$$m_i = \mu + \delta S_i + \gamma X_i + \beta L_i + \varepsilon_i \tag{1.4.4}$$

where

$$\begin{aligned} \mu &= \mu_c - \mu_r; \\ \delta &= \delta_c - \delta_r; \\ \beta &= \beta_c - \beta_r; \\ \gamma &= \gamma_c - \gamma_r. \end{aligned}$$

1.4.B Estimation Results

The conventional sample

The sample of rural villagers aged between 16-65 is conventionally studied in the literature(Hare (1999); Zhao (1999a)). For the purpose of comparison, I first study this conventional age cohort using the cross section of 2005. I present the descriptive statistics in Table 1.7; individuals have been separated into two groups, migrant and non-migrant. Migrants are defined as those individuals who worked away from the local township during 2005 for at least three consecutive months. The number of observations demonstrates the over-sampling of migrant workers. Population weights recover the fact that on average 17.71% of the rural villagers aged between 16 and 65 (or 12.96% of the population) participated in migratory work in 2005 in Zhijiang.

The general pattern revealed in the descriptive statistics corresponds to the findings from an extensive literature (Hare (1999); Zhao (1999a); Rozelle et al. (1999); De Brauw et al. (2002); Taylor et al. (2003); Du et al. (2005); Chen et al. (2008)). Compared to non-migrants, migrants are younger, tend to be males, have more education, unmarried, and non-Communist Party members[3]. As commonly found in the literature, migrant households are also larger in size and more fre-

[3]The criterion of becoming a CCP member in pre-reform rural China was largely based on one's class background and political performance. In contemporary China, studies of the determinants of CCP membership show that being a cadre, being senior in age, being a male, and having fathers who had party member status are all important factors in determining one's CCP membership (Liu (2003)). In rural China, the advantage of becoming a CCP member has to do with enhancing the probability of holding more important cadre post in or outside of one's local village (Morduch and Sicular (2000)), and reward to cadre status includes privileged access to off-farm employment, credit, information, and other non-market allocated resources. Becoming a local cadre requires investment in specific human capital and could be a decision simultaneously determined with one's migration decision. For the migrants, joining the communist party while working in cities is very hard (Solinger (1999)).

quently have pre-school children. Migration network, which I measure using the existence of migrant relatives in the same village, is also more prevalent for the migrant households. As for the variable of interest, the household landholding, I measure it using the currently contracted land recorded in the village administrative record. Migrants come from households that have less land, suggesting that more land may raise the local permanent income earning potential of the individual and hence discourage migration. In addition to what is generally addressed in the literature, my data also shows that migrants tend to be elder siblings (the share of first born among migrants is also larger than among non-migrants). The total number of siblings for migrants is however smaller. Migrants also have more educated fathers and tend to come from households that were designated as landlords or rich peasants historically.

Using a probit model with proper weights that correct for the oversampling of the migrant workers, I present in column 1 Table 1.8 the estimation results for the conventional sample. The result largely preserves the pattern observed in the descriptive statistics. Villagers from land-scarce households are more likely to engage in the urban-bound migration and this relationship is statistically significant. Parental education, which could also have raised the household's endowment of permanent income earning potential, does not seem to have an effect on migration probability, indicating that parental education has little bearing on raising the individual's permanent income earning potential on the farm. The effect of parental education on one's migration probability may only come from the correlation of parental education with the unobserved parental ability. My results indicate that the individual's migration choice does not select on parental ability once his own educational background is controlled for. The individual does select positively on his own education background, but having a college level education does not increase one's migration probability. There are two explanations for it.

Many college educated rural residents have already obtained urban *hukou* so they are no longer part of my sample and my result between college level education and migration probability does not reflect the behavior of this group of people. A second explanation is that those with college education but did not obtain urban *hukou* prefer local nonfarm job over migration, a finding consistent with Zhao (1999a).

The effect of education on migration can be marred by the endogenous nature of education. I address this concern by excluding one's own years of schooling from the regression, and in its stead, I include dummy variables indicating the completion of primary school and the completion of secondary school, and assume that the decision of finishing primary school and junior-high school is not endogenous with one's migration decision. This is because China's nationwide system of public education provides free primary education for six years, starting at age six or seven, followed by three years of middle school; and these nine years of education is technically compulsory for all Chinese students. In column 3 Table 1.8 I report the result for the conventional sample. School completion status does not have any impact on the migration probability.

In column 2 and 4 of Table 1.8 I report the estimation results using the initial land allocation to household as an instrument for the current landholding of the household [4]. The estimated coefficients on land stay negative and statistically significant. The coefficients on landholding are also larger in absolute values, suggesting that the unobserved skill which influences both the income earning potential and migration propensity is positively correlated with landholding. For the conventional sample (using column 3 and 4 as my preferred model) my instru-

[4]Where the initial land allocation record is not available for the current households (because the current households were too young to have experienced the initial land allocation), I use the initial land allocated to their parental households as the initial amount, assuming that inheritance of the land is proportional to the initial land allocated to the parental households.

mented result shows that increasing household land by one Chinese unit *mu* (i.e., one fifteenth of a hectare or one sixth of an acre) will decrease one's migration probability by 11.01%, compared with 7.34% using the uninstrumented result[5].

The generation with immobile versus mobile parents

The study of the migration decision of villagers aged 16 to 65 fails to account for the fact that a subset of these people was born to parents who were "encamped" in the countryside throughout their lives and another subset was born to more mobile parents. In the analysis that follows, I study the migration decisions of the generation with immobile parents versus the generation with mobile parents and discuss how results may differ as the household selectivity problem increasingly permeates the sample. In order to utilize all three years of survey data yet avoiding the complications caused by the time dimension, I redefine the migration choice, the dummy variable m_i, as leaving one's own township at least once for at least three consecutive months within the three year interval from 2005 to 2007[6].

According to the degree of mobility of one's parental generation, I categorize the offspring of the immobile parents as those who were born to the local residents of the 1940 - 1959 birth cohort[7]; the age of these offspring ranges from 16 to 48 (age is averaged across the 2005-2007 period). I classify those born to the local residents of the 1960 - 1972 birth cohort as the offspring of the mobile rural residents. The year 1972 is chosen to allow a rural resident to have at least one migration age child over the 2005-2007 interval. The age of the offspring of the

[5]The marginal effect is evaluated at the means.

[6]I abstract from the time dimension here but explored the panel feature of the data in (Meng (2009b))in the study of the impact of agricultural subsidy on the rural-urban migration propensity.

[7]Restricting the parental birth cohort more stringently, take for example the 1940-1954 birth cohort, yields similar estimation results

mobile rural residents ranges from 16 to 25.

To facilitate comparison, I further consider two subcohorts among the descendants of the immobile rural residents. One subcohort contains those who are in the same age bracket (16-25) as the descendants of the mobile rural residents. By comparing these two groups, I can exclude the life-cycle effect but cannot exclude the effect of differential intergenerational age gap. The second subcohort contains the descendants of the immobile rural residents who share similar intergenerational age differences with the descendants of the mobile rural residents[8]. By comparing this second subcohort with the offspring of the mobile rural residents, I have made sure that any systematic differences between these two groups do not arise from differences in the intergenerational age gap, but I can not exclude any life-cycle effects.

Table 1.9 gives the estimation results for the descendants of the immobile rural residents. The variable of contracted land is instrumented using the initial land allocation in all specifications. Column 1 in Table 1.9 only presents the estimated coefficients for the purely exogenous variables. In column 2, covariates that are likely to be endogenous were added to the model. The most interesting result in Table 1.9 is that the historical class background, a factor that has no effect on migration probability in the study of the 16-65 year-old sample, becomes an important determinant of migration for the offspring of the immobile rural residents. Being the descendants of the middle to rich peasants or landlord class increases the probability of migration (for at least once within the three year interval) by 17 percentage points, or 39%[9]. The historical class background may affect current individual's migration decision in the following ways. First, it may

[8]The second subcohort thus includes those whose age differentials with their parents do not exceed 29 years.

[9]The marginal effect is evaluated at the means.

proxy for the degree of household's urban connections. The descendants of the former landlord or rich peasant class are more likely to have relatives who live in cities than the descendants of the former poor peasant class. Second, it may proxy for a negative psychic cost of migration: the descendants of the former landlord or rich peasant class are more likely to out-migrate because they have thinner attachment to the place of origin. Third, the likely importance of the historical class background in the determination of migration decision may have to do with the intergenerational transmission of skills. Children from the landlord and rich peasant class may inherit skills that would help them navigate more easily and reap higher returns in an urban setting.

In Table 1.10, I present the estimation result for the offspring of the mobile rural residents and juxtapose it with the results for the comparable subcohorts defined earlier (only the estimated coefficients for land and class background were reported). Two important differences emerge. First, the effect of land on migration probability for the offspring of the mobile rural residents is positive and statistically significant. Second, the effect of the class background on migration propensity disappeared for the descendants of the mobile rural residents[10]. Both of these differences can be explained by the problem of household selectivity. Why does the effect of historical class background disappear for the descendants of the mobile rural residents? A selected group of mobile rural residents who had rich peasant or landlord class background had already moved out of the rural area since the reform started, taking their offspring with them; regardless of the class background, the nonrandom subset of offspring who remain in the rural area do not differ in their attachment to the countryside or their unobserved skills proxied by the class background, therefore class background no longer has any influence over the mobility decisions of those who are the descendants of the mobile residents.

[10]Among the descendants of the mobile rural residents, 14% have parents who belong to the rich peasant or landlord class, compared to 16.7% for the generation with immobile parents.

Why does land positively affect the migration decision of the descendants of the mobile rural residents? The possible explanation is that a land-poor group among the descendants of the mobile rural residents has already selected themselves out of the countryside, so among the relatively land-rich households who remain, the financial cost effect dominates in the migration decision, more land will generate more income to cover the financial cost of migration, therefore encouraging mobility.

1.4.C Robustness Checks

In the above analysis, migration decision is defined to take place within a three year interval; defining the migration decision as taking place during a two-year interval from 2005-2006 or 2006-2007 yields similar results. In Table 1.11, I define migration choice as a static yearly decision and study the robustness of the pattern observed in Table 1.9 and 1.10. In panel 1, the descendants of the immobile rural residents were followed from 2005 to 2007, and I report here only the estimated coefficients for landholding and historical class background. Since this cohort with immobile parents is defined as adult children (aged 16 and above), the number of observations increases as the number of those who are at least sixteen years old increases. The estimated coefficients for landholding and class background are all statistically significant and with the expected signs.

In panel 2, the cross section results for the first subgroup of the offspring of the immobile rural residents are reported. Since the qualification set for this subcohort has to do with the intergenerational age differential, the result is essentially based on the same group of people followed over three years. the pattern of negative selection on landholding and positive selection on historical class back-

ground preserves well for this subcohort. Panel 3 presents results for the offspring of the immobile rural residents who are of comparable age as the offspring of the mobile rural residents. The estimated coefficient for the historical class background fails to be statistically significant only in 2005. Here, the number of observation varies because this subcohort includes those aged 16 to 25 from the cohort with immobile parents and the number of people fall into this age range changes from year to year. Panel 4 presents the cross-sectional results for descendants of the mobile rural residents. As before, the historical class background does not seem to have any effect on migration probability. The effect of landholding on migration probability remains positive, but the estimated coefficient is no longer statistically significant.

The cross sectional robustness checks show that first, landholding affects migration propensity through the income channel, more land endowment increases the permanent earning potential of the individual at the rural origin and reduces her urban-bound migration propensity. But this conclusion is only valid for the descendants of the immobile rural residents. Second, in the absence of the household selectivity problem, the historical class background emerges to be an important determinant of rural-urban migration, people from households affixed with rich peasant or landlord class historically are more likely to migrate than people from households designated with poor peasant class. The differences observed between the descendants of the immobile rural residents and descendants of the mobile rural residents do not seem to arise because the latter cohort is younger in age or smaller in sample size. Household selectivity is likely playing an important role in driving the differences in these results.

1.5 Conclusion

China has been experimenting with marketization for the past thirty years. The country treads on the path of industrialization on a foundation that is characterized by the peculiar legacies of state controls. These state controls permeated people's lives in the past and nowhere was their impact more strongly felt than in rural China. It is exactly this phenomenon of "pouring new wine into the old skin" set in rural China a context that is particularly useful in studying how rural-urban migration proceeds, once the villagers were given the freedom to move.

Similar to other developing countries prior to their onset of rapid industrial growth, China in 1950 was primarily rural. What is unusual about China is that since the late 1950s, China's urbanization process was stalled and came to a standstill while the rest of the world was experiencing increased rural-urban mobility. From the late 1950s to the early 1980s, China remained un-participative in the world's general trend of urbanization, developing its heavy industries in its enclosed cities on the foundation of a frozen rural-urban mobility over the course of more than twenty years. The control of rural-urban mobility prior to the economic reform was made possible through a rigid household registration system, interlaced with the work unit system in cities and the collective institution in the countryside. This resulted in the countryside a generation of rural people who were dispossessed of the opportunities to leave the countryside during the prime of their lives, i.e., through their migration peak ages. More importantly, as the economic reform ushered in opportunities to leave the countryside since the early 1980s, the old age of this generation of people prevented them from taking advantage of the urban opportunities. I identified the age range of this immobile group of rural residents in this paper. They were born in the 1940s and 1950s. I consequently

studied the migration choice of the children of this group of encamped rural residents, arguing that the migration decision of these descendants is "clean": it is not affected by the encrustation of selectivity mechanisms of the parental generation which is never easy to eliminate in the study of migration choices.

My results show that ignoring selectivity, as in the case of the study of the 16 to 65-year-old conventional sample, can mask the fact that the historical class system in China is still having an influence over people's decision to migrate out of the countryside (contrary to Chen et al. (2008)). I find that the descendants of the encamped generation of rural residents are more likely to migrate if they come from rich peasant of landlord class background. The offspring of the mobile rural residents (a selected group of people), however, do not respond to their historical class background while making migration choices, suggesting that household selectivity is playing a role in annulling the effect.

Another feature of "pouring new wine into the old skin" in the Chinese rural context has to do with the distribution of farm land to the rural households in the beginning of the 1980s. The return to family farming was a great success in terms of attuning the incentives of the farmers to agricultural production, but the land distribution criterion was not market-based. Since the land rental and sales market in hinterland China developed slowly, the pattern set by the initial land distribution has derived persistence over time. These features have made the initial land an instrument for the current landholding of the household. I obtain the initial land information from the administrative village record and have established in this paper the causal relationship between origin income, as proxied by landholding, and migration. I find that migrants select negatively on landholding, and this finding is not masked by selectivity in the study of the conventional 16 to 65-year-old sample. However, when the descendants of the mobile rural residents

are examined alone, the negative causal relationship changes into a positive one, suggesting that selectivity could be an important source altering the result.

Features in the Chinese context that make the analysis in this paper "clean" from the endogeneity of landholding and the household selectivity problem have implications for the growth of rural land market in hinterland China and the barriers migrants face in urban areas. The fact that the pattern set by the initial land has persistence over time demonstrates that the recent round of land contracting in hinterland China, which took into account the legal forms of land-use transfer, sale, lease, subcontract as well as land reallocation among villagers prior to 2005, did not alter to any significant extent the exogenous allocation implemented twenty years ago. This reveals that although land markets are developing rapidly in commercialized coastal regions, inland areas lag behind in the development of land market. Consolidation of plots as more young people leave the land will change the landscape in the countryside, and may render the instrument used in this paper an increasingly weak one. In addition, the existence of a generation of encamped rural residents also indicates that Chinese migrants face extreme difficulties in realizing the traditional practice of inter-generational family reunions in urban destinations. For most migrants, the primary barrier is the unaffordable housing in cities. If the housing conditions in urban areas improve for the migrants and they start to fetch their parents to the cities, it is possible that the encamped generation of rural residents will become mobile on account of their children, and the selectivity problem addressed in this paper can no longer be solved in the Chinese context.

1.6 Figures and Tables

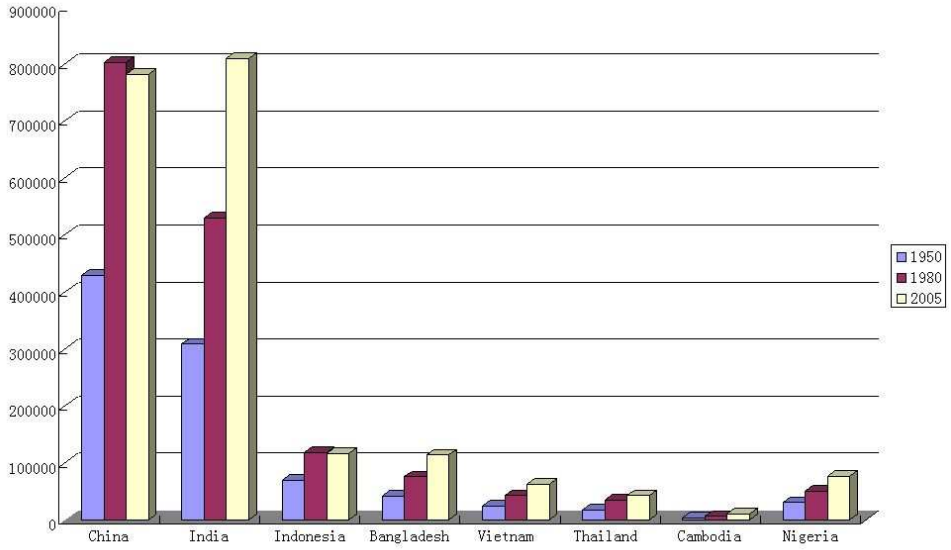

Figure 1.1: Rural Population, by country, 1950 - 2005

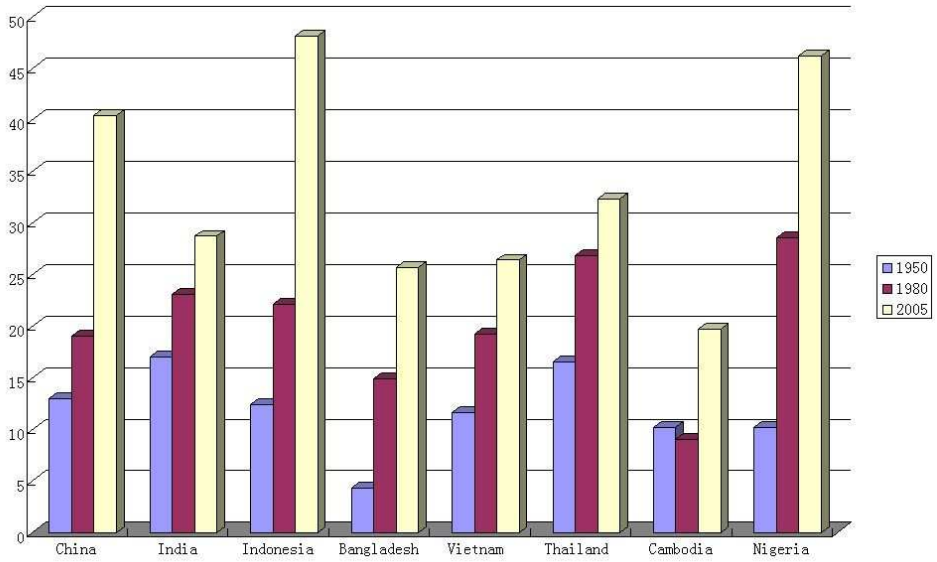

Figure 1.2: Percentage Urban, by country, 1950 - 2005

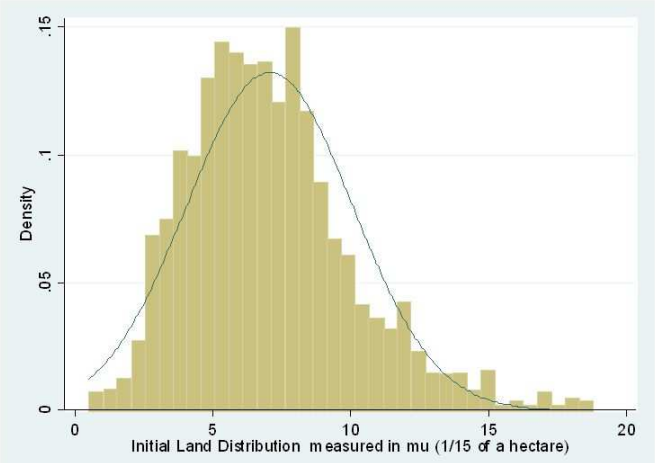

Figure 1.3: Initial Land Distribution: 1982, Zhijiang

Table 1.1: Initial Land Allocation and Its Determinants

Variable	(1)	(2)	(3)
Village dummies	Yes	Yes	Yes
Household size 1982		0.96***	1.09***
		(0.13)	(0.14)
Head's age 1982			0.95**
			(0.47)
Head's age 1982 squared			-0.014**
			(0.006)
Head's marital status 1982			0.91
			(1.30)
Head's schooling 1982			-0.01
			(0.07)
Head's CCP membership 1982			-0.09
			(0.42)
Head's class background 1982			0.05
			(0.32)
Observations	267	267	264
R-squared	0.41	0.58	0.62

Note: Robust standard errors are in the parentheses. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 1.2: Transition Matrix

	Year 2005				
Land in 1982 (mu)	Q1	Q2	Q3	Q4	9.3+
Q1=4.8	79.5%	12%	4.9%	1.2%	2.4%
Q2=6.25	16%	61.3%	11%	5.2%	6.5%
Q3=7.82	13%	13%	58%	9%	9%
Q4=9.26	6.3%	7.6%	26%	40.1%	20%
9.3	2.5%	5%	7.5%	25%	60%

Table 1.3: Initial and Current Landholding: The First Stage Regression

Variable	
Initial Land	0.39***
	(0.09)
Male	Y
Rank	Y
Age	Y
Middle school	Y
High school	Y
College	Y
Father primary school	Y
Father middle school	Y
Father high school	Y
Married	Y
CCP member	Y
Class background	Y
Household size	Y
Migration network	Y
Enrolled children	Y
Township dummies	Y
Obs.	707
F statistic	18.86

Note: Result for the generation with immobile parents is reported here. Results are similar for other cohorts. Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 1.4: Initial Land, Education, Marital Status, and CCP Membership Status

Variable	Education	Marital Status	CCP Member Status
Initial Land	0.027	0.006	0.002
	(0.024)	(0.004)	(0.003)
Male	0.187	-0.072	0.056***
	(0.136)	(0.004)	(0.016)
Rank	-0.058	0.026**	-0.013*
	(0.091)	(0.011)	(0.007)
Age	-0.091***	0.042***	0.0001
	(0.013)	(0.002)	(0.002)
Middle school		0.328**	-0.002
		(0.154)	(0.016)
High school		0.275**	0.167***
		(0.161)	(0.047)
College		0.217	-0.001
		(0.181)	(0.039)
Father middle school	0.243*	-0.023	0.010
	(0.137)	(0.041)	(0.028)
Father high school	0.222	-0.092	0.061
	(0.329)	(0.062)	(0.067)
Married	0.402*		0.053*
	(0.238)		(0.031)
CCP member	1.527***	0.099*	
	(0.245)	(0.052)	
Class background	-0.108	0.031	-0.042*
	(0.154)	(0.039)	(0.023)
Household size	0.009	0.104***	-0.007
	(0.062)	(0.014)	(0.009)
Migration Network	0.191	0.006	0.014
	(0.119)	(0.038)	(0.019)
Current landholing	-0.023*	-0.007	0.002
	(0.012)	(0.004)	(0.003)
Township dummies	Yes	Yes	Yes
First-stage F statistic	1.23	2.10	0.49
Obs.	707	707	707

Note: Result for the clean slate cohort is reported here. Results are similar for other cohorts. Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 1.5: Rural to Urban Migration Rates

Decade	China (in %)	World Average (in %)
1949 - 1959	0.22	1.54 (1950 - 1960)
1960 - 1969	0.13	2.16 (1960 - 1970)
1970 - 1979	0.18	2.24 (1970 - 1980)
1980 - 1985	0.25	2.38 (1980 - 1990)
1949 - 1985	0.24	1.84 (1950 - 1990)

Note: Rural-to-urban migration rate is defined as the ratio of rural population that migrates to urban area each year. Source: (1) Table Zhao (2000); (2) Table and Annex Larson and Mundlak (1997).

Table 1.6: Conversion from Rural to Urban *Hukou* by Birth Cohorts

Birth Decades	Urban *Hukou* Acquired by 2007 (in %)
1920s	0.6
1930s	1
1940s	0.5
1950s	0.8
1960s	2.5
1970s	4.98
1980s	5.79

Note: For those rural residents who were born between the 1940s and 1950s, only 0.65% of them had changed their *hukou* status and thus had permanently migrated to cities. Those who were born since the 1960s are increasingly more likely to obtain an urban *hukou*, although the proportions of permanent movers are still quite small.

Table 1.7: Descriptive Statistics for the Age Cohort 16 - 65 in 2005

Variable	Migrant Mean (SD)	Non-migrant Mean (SD)
Age	28.69	43.41
	(8.77)	(9.91)
Male	0.58	0.49
	(0.49)	(0.50)
Rank among siblings	1.83	2.30
	(1.09)	(1.31)
First Born	0.47	0.36
	(0.46)	(0.47)
Total no. of siblings	3.31	3.77
	(1.26)	(1.38)
Primary school	0.04	0.24
	(0.20)	(0.43)
Middle school	0.81	0.63
	(0.38)	(0.48)
High school	0.13	0.11
	(0.34)	(0.31)
University	0.005	0.00
	(0.07)	(0.00)
Father illiterate	0.13	0.41
	(0.30)	(0.49)

Continued on next page

Table 1.7 : Descriptive Statistics, Continued

Variable	Migrant Mean (SD)	Non-migrant Mean (SD)
Father primary school	0.34	0.38
	(0.45)	(0.48)
Father middle school	0.42	0.16
	(0.50)	(0.35)
Father High school	0.09	0.02
	(0.30)	(0.13)
Married	0.55	0.96
	(0.49)	(0.19)
Communist party member	0.02	0.06
	(0.14)	(0.24)
Contracted land	6.74	7.31
	(2.98)	(3.28)
Household size	4.18	4.02
	(1.04)	(1.05)
Enrolled children	0.44	0.54
	(0.50)	(0.50)
Migration network	0.68	0.65
	(0.46)	(0.48)
Class Background	0.17	0.16
	(0.38)	(0.36)
No. of observations	774	1958

Table 1.8: Determinants of Migration for the Age Cohort 16 - 65 in 2005

Variable	(1)	(2) IV	(3)	(4) IV
Contracted Land	-0.071***	-0.108**	-0.071***	-0.105***
	(0.01)	(0.03)	(0.02)	(0.03)
Male	0.30***	0.29**	0.32***	0.31***
	(0.08)	(0.09)	(0.08)	(0.07)
Age	-0.05***	-0.05***	-0.05***	-0.05***
	(0.005)	(0.005)	(0.006)	(0.006)
First born	-0.10	-0.08	-0.09	-0.08
	(0.10)	(0.10)	(0.10)	(0.10)
First born male	0.05	0.05	0.04	0.04
	(0.15)	(0.15)	(0.15)	(0.15)
No. of siblings	-0.02	-0.02	-0.02	-0.02
	(0.01)	(0.02)	(0.02)	(0.02)
Class background	0.21	0.24	0.20	0.24
	(0.17)	(0.16)	(0.16)	(0.16)
Middle school	0.21**	0.23**		
	(0.10)	(0.10)		
High school	0.37***	0.38***		
	(0.13)	(0.13)		
College	-0.20	-0.26		
	(0.74)	(0.76)		
Finished Primary School			0.47	0.49
			(0.35)	(0.35)

Continued on next page

Table 1.8 : Determinants of Migration, 16 - 65 in 2005, Continued

Variable	(1)	(2) IV	(3)	(4) IV
Finished Secondary School			0.06	0.08
			(0.14)	(0.14)
Father Primary school	-0.01	-0.01	-0.006	-0.009
	(0.09)	(0.09)	(0.08)	(0.08)
Father middle school	-0.08	-0.05	-0.08	-0.06
	(0.13)	(0.13)	(0.14)	(0.13)
Father high school	0.11	0.10	0.11	0.10
	(0.21)	(0.21)	(0.21)	(0.21)
Married	-0.28**	-0.31**	-0.29**	-0.32**
	(0.14)	(0.13)	(0.14)	(0.13)
CCP member	-0.24	-0.21	-0.18	-0.15
	(0.17)	(0.17)	(0.17)	(0.17)
Migration network	0.25**	0.25**	0.25**	0.22**
	(0.1)	(0.09)	(0.09)	(0.09)
Household size	0.12***	0.13***	0.12***	0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
Enrolled Children	-0.11	-0.09	-0.11	-0.09
	(0.08)	(0.08)	(0.08)	(0.08)
Township dummies	Yes	Yes	Yes	Yes
Obs.	2732	2732	2732	2732

Note: Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 1.9: Descendants of Immobile Rural Residents

Variable	Pure Exogenous	Full Model
	(1)	(2)
Contracted Land	-0.128***	-0.139***
	(0.045)	(0.05)
Male	0.198	0.124
	(0.20)	(0.196)
Age	-0.097***	-0.059***
	(0.01)	(0.016)
First Born	-0.058	0.017
	(0.202)	(0.226)
First Born*Male	0.109	0.112
	(0.285)	(0.276)
No. of Siblings	-0.056	0.006
	(0.053)	(0.042)
Class background	0.487***	0.462***
	(0.138)	(0.143)
Middle School		1.011**
		(0.398)
High School		1.210***
		(0.456)
College		-0.406
		(0.809)
Father primary		-0.547**
		(0.248)

Continued on next page

Table 1.9: Descendants of Immobile Rural Residents, Continued

Variable	Pure Exogenous (1)	Full Model (2)
Father middle school		0.08
		(0.15)
Father high school		0.154
		(0.39)
Married		-0.800***
		(0.231)
CCP member		-0.713**
		(0.297)
Migration network		0.337**
		(0.155)
Household size		0.200***
		(0.07)
Enrolled Children		-0.284*
		(0.155)
Township dummies	Yes	Yes
Obs.	707	707

Note: Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 1.10: Descendants of Mobile Rural Residents

Variable	offspring of mobile residents	of immobile residents subcohort 1	of immobile residents subcohort 2
	(1)	(2)	(3)
Contracted Land	0.431***	-0.09	-0.125**
	(0.094)	(0.109)	(0.053)
Class background	-0.097	0.487**	0.288*
	(0.280)	(0.244)	(0.155)
Township dummies	Yes	Yes	Yes
Obs.	215	236	367

Note: 1)Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level. 2)Other control variables not reported in the table are the same as in column 2 Table 9.

Table 1.11: Robustness Checks, 2005 - 2007 (the IV results)

	Descendants of Immobile Residents					
	2005		2006		2007	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
Contracted Land	-0.11**	0.043	-0.09*	0.054	-0.13**	0.057
Class background	0.26*	0.148	0.338**	0.166	0.40**	0.16
Obs.	801		812		827	
	Comparable Age Differential					
	2005		2006		2007	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
Contracted Land	-0.091**	0.037	-0.105*	0.053	-0.07***	0.025
Class background	0.25*	0.15	0.32*	0.17	0.303**	0.15
Obs.	370		369		367	
	Comparable Age					
	2005		2006		2007	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
Contracted Land	-0.105*	0.063	-0.145**	0.065	-0.113*	.064
Class background	0.23	0.23	0.454*	0.245	0.546**	.217
Obs.	280		249		220	
	Descendants of Mobile Residents					
	2005		2006		2007	
Variable	Coeff.	SE	Coeff.	SE	Coeff.	SE
Contracted Land	0.044	0.16	0.078	0.087	0.058	0.20
Class background	0.11	0.41	-0.33	0.41	0.407	0.30
Obs.	180		208		252	

Note: 1)Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level. 2)Other control variables not reported in the table are the same as in column 2 Table 9.

1.7 Appendix: Data collection and Sampling Design

My sampling design followed a stratified random sampling schedule down to the village level. Since Zhijiang is naturally stratified into 9 townships, 6 to 7 villages from each of the 9 townships were randomly sampled, constituting 60 randomly sampled villages from a total of 198 villages. From this sampling frame of 60 villages, 10 households reporting no migratory work at all in 2005 and 10 households reporting at least one member engaged in some migratory work in 2005 were randomly sampled in each village. Because the percentage of rural households that have members engaged in migratory work is still small (below 20% in 2005), capped by a limited research budget, I deliberately over-sampled migratory households in order to obtain for comprehensive research purposes an effective representation of individuals who have migratory work experience. I obtained the population weights of migratory versus non-migratory households from a preliminary survey conducted by the local statistical bureau in all of the sampled villages in November 2005. The preliminary surveys defined migrants as those who worked away from their local townships for at least three months in 2005. It should be noted that people who, prior to the first survey in 2006, had permanently moved out of the countryside, thus had withdrawn their *hukou* status from the local village as of 2006 and settled down elsewhere with their children, parents, and siblings, were missing from the sampling frame.

2

Grain Subsidy and Rural-Urban Migration in Hinterland China

2.1 Introduction

In 2004 China embarked on a new course concerning agricultural policy. Motivated by the concern for grain security and the country's newfound desire to support agriculture and raise rural income, China was set to repeal the centuries-old agricultural tax and began to subsidize the grain production through direct cash transfer to the grain farmers. The primary focus of this chapter is to examine the impact of the grain subsidy through its effect on changing villagers' urban-bound migration probability and to determine the extent to which the reduced mobility, hence the reduced migrant income, is a concern to the rural community's total welfare.

The 2004 grain subsidy program is not only a reversal of China's preda-

tory taxing and pricing policy towards agriculture, it represents China to some extent treading the earlier path of Japan and Korea in beginning to protect agriculture as its GDP per capita grows. The subsidy is also in line with the WTO regulations[1]. The cash transfers to grain farmers are well within the WTO's "amber-box" limit of legal subsidy that directly stimulates agricultural production. Unlike the developed countries, however, China still has a huge rural population (780 million or 60% of the country's population in 2004), and is in the midst of a dynamic process of rural-urban migration (Liang and Ma (2004)). Because the subsidized grain producing areas in China are at the same time the major migrant-sending regions, China's grain subsidy offers an opportunity to study how rural-urban migration reacts to policy changes in the migrant-sending source communities; specifically, it provides a case to study how subsidizing grain production in migrants' source communities changes individuals' rural-urban migration probability. Simple economic theory predicts that subsidizing grain production could encourage rural people to remain in farming when they should have worked in cities (Sjaastad (1962)). But subsidy transfers may also relieve farmers from the financial pressure of migration when there exists credit constraints, increasing instead of impeding rural-urban migration (Rosenzweig and Wolpin (1993); Halliday (2006)). It is therefore an empirical question whether or not the subsidy program holds back rural-urban migration in China.

In Zhijiang municipality where I have collected my data for this study, rice and cotton are the two most important crops. Because rice and cotton demand different soils and irrigation systems, farmers have traditionally planted cotton along the riverbanks of Zhijiang, while the inland of Zhijiang has historically been

[1]I thank Prof. Barry Naughton for the comment on the significance of the subsidy as a change in China's development policy that models on the earlier experiences of Japan and Korea and also as a WTO-compliant way to support agriculture.

irrigated to grow rice[2]. Taking advantage of the unique aspect of the subsidy program, that it is administered only to grain farmers whereas cotton farmers are not subsidized, I address the endogeneity of the subsidy in the migrant sending rural community by using an instrument found in the historical share of the household land used in grain production. The historical share is constructed as the proportion of the household's land used in rice production in the initial land allocation in 1982. Meng (2009a) demonstrated that the amount of the initial land allocated to each household is neutral to the household head's ability and his or her social and political status. The share of household's initial land used in grain production depends on the geographical location of the household, which is primarily determined upon birth into a specific village for the locally-born individuals. My instrumented result shows a statistically significant negative relationship between the grain subsidy and rural-urban migration propensity: a hundred yuan increase in grain subsidy will cause 8.1% drop in the migration probability of rural residents. I also adopt the difference-in-differences estimation strategy, using cotton farmers explicitly as the control group for the treated group of rice farmers. The retrospective migration information I collected allows me to construct the rate of migration trends for both cotton and rice farmers from 1985 to 2007, the parallel trend assumption is strengthened by the historical pattern. Further more, the local market price of both rice and cotton I collected from 1987 to 2007 help me construct price index so that I can exclude price movements of these two crops as an alternative explanation for the observed drop in migration rate of rice farmers as opposed to cotton farmers.

In recent years, the off-farm wage income has increasingly become an important source of rural household income and is the primary source of rural household's income growth in China. According to China's National Bureau of

[2]Please see the first chapter of this dissertation for details about the research location Zhijiang.

Statistics, 36% of the net per capita income of the rural residents was wage income and remittances of migrants contributed to almost two thirds of the household's wage income in 2005. Will the decreased migration propensity, hence the reduced migrant income, be so grave that the overall income in the local community is decreased as a result? I investigate this question by computing Zhijiang's counterfactual GNP in the absence of the grain subsidy. I found that despite the decrease in the number of migrants and the loss in migrant income in 2005, the GNP in Zhijiang with subsidy is 4.8% more than what its GNP would have been had the policy reversal not taken place.

In section 2, I discuss the Chinese policy shifts and describe the grain subsidy. In section 3, I introduce the data used and present the treatment and control groups for the analysis. In section 4, I set up the econometric model, give and interpret the estimation results. In section 5, I treat Zhijiang as a small open economy and study the impact on its gross national product as a result of the grain subsidy. Section 6 offers concluding remarks.

2.2 The Shift of Chinese Policy and the Grain Subsidy

In most developing countries, agriculture is taxed through direct price interventions (such as government procurement boards acting as the only buyer of agricultural output) and indirect industrial protection policies which reduces the purchasing power of farm households as consumers of manufactured products. A World Bank study of eighteen developing countries from 1960 to 1984 reveals that the total tax on agriculture in developing countries amount to 30% on average,

including 8% direct tax and 22% indirect tax (Schiff and Valdes (1992)). It is not surprising that as rural residents of a major developing country Chinese farmers had paid taxes on their land for more than 2,500 years. Especially since the late 1950s, as China began to feed industrialization by artificially depressing the price of agricultural goods, Chinese farmers had earned an extraordinarily low income. The return to family farming at the beginning of the 1980s restored the explicit agricultural taxation. Since the 1990s the Chinese government tried to support agricultural prices indirectly by subsidizing the procurement prices of farm output, storage, and the export of grain. But most of these subsidies were frittered away in the state commercial channels, farmers hardly received any benefit. In 2002, the various rural taxes and fees were consolidated into a single agricultural tax of 8.4% of each household's value of agricultural production.

A major shift in the Chinese development and agricultural policy took place in 2004. A phasing-out of the agricultural tax was set in motion that year and completed by the end of 2005[3]. In addition to the impetus of a tax repeal, the government also started in 2004 to subsidize the grain farmers through cash payments - a big reversal from the predatory pricing and taxing policies. The motivation of subsidizing the grain farmers is built on the notions of grain security and income parity between rural and urban households. Since China's accession into the World Trade Organization in 2001, subsidizing farmers became more pressing but also more difficult to do. The agriculture subsidizing rules laid out by the WTO fall into the "green box" category and the "amber box" category. China faces no limit on agricultural subsidies under the "green box" category. The "green box"

[3]China eliminated its agricultural tax at a time when the revenue share of the agricultural tax had long ceased to play an important role in the central government's fiscal budget. It amounted to 1.7% of the government's tax revenue in 2003. At the township and village level, the agricultural tax contributed on average 20% of the local tax revenue. The lost tax revenue of the township government was compensated by transfers of fund from the central and provincial government.

subsidy is supposed to be non-market distorting, it pertains to government investment in agriculture, including investment and subsidy to its technology, irrigation, environment controls, and other public works. China can also intervene directly with agricultural product prices and directly subsidize agricultural production according to rules within the "amber box" category. China can pay "amber box" subsidies of up to 8.5% of the country's value of agricultural production. The subsidies paid to the Chinese grain farmers are the "amber box" subsidies, and they represent a compromise between China's WTO commitments and its determination to support agriculture. In 2004, the total grain subsidy amounted to 0.7% of China's agricultural GDP, the total central government fiscal outlay as a result of the agricultural tax repeal and the subsidy program amounted to 2.1% of the agricultural GDP.

The subsidy program increased in its scope and intensity since 2004. In 2004, the 14.52 billion yuan (approximately $1.7 billion) subsidy included subsidy to grain planting (79.9%), subsidy to using premium grain crop seeds (19.6%), these are seeds of rice, soybeans, corn, and wheat (and the seeds subsidy extended to including oilseeds and cotton in 2007 in selected regions), and subsidy to purchasing farming equipment (0.5%). The first two kinds of the subsidies were paid out according to a fixed subsidy method that ties the payment to the household current grain planting area. Since 2006, the subsidy starts to include cash support for purchasing grain production related materials, which essentially increased the subsidy standard per unit of the grain planting area. Table 2.1 illustrates the composition of the steadily increasing amount of the grain subsidy from 2004 to 2008 both in levels and as a percentage of China's agricultural GDP. The subsidy continues to reach the farm households in 2009, with amount yet to be reported.

In the implementation of the subsidy, the general practice is to pay house-

holds a fixed amount per unit of land cultivated for grain production [4]. There is some latitude in setting the subsidy standard across provinces. For example, in Jiangxi province, early rice, middle rice, and late rice were all subsidized at 10 *yuan* per *mu*; in Beijing, subsidies were set much higher, at 50 *yuan* per *mu*(Gale et al. (2005)). The subsidy reached the rural households in Zhijiang as local bank deposits in their respective bank accounts. Each eligible household is given an independent account number and a deposit book updating the subsidy transfers. The household grain planting area, the amount and the composition of the subsidies were recorded by the village officials in the Supervision Card of the Rural Taxes and Fees Reform each spring, the actual subsidies were credited to the households in mid summer. Table 2.2 lists the grain planting subsidy, the premium grain seed subsidy, and the grain comprehensive subsidy standard in Zhijiang from 2004 to 2007. The grain planting subsidy in Zhijiang is essentially a rice planting subsidy; the grain seed subsidy covers not only rice but also wheat and corn, although the latter two crops aren't prominent cash crops in the region. In 2004, an average rural household in Zhijiang was given 168 *yuan* in subsidy, about 1.26% of its household income, a rice household, however, received on average 222 *yuan* in 2004, about 2.4% of its household income.

2.3 Data: Rice and Cotton Farmers - the case of Zhijiang

The data[5] for this study was collected in Zhijiang municipality in Hubei province from 2006 to 2008 (which pertain to activities from 2005 to 2007). It has

[4]The unit of land, *mu*, is equivalent to one sixth of an acre.

[5]Please see the first chapter of this dissertation for details about the data.

the following advantages for studying the impact of the grain subsidy on the individual migration propensity. First, longitudinal migration decisions were obtained for the period of 1985-2007. Second, the data contains comprehensive information on household planting history which covers the period of 1982 to 2007. From the planting history, the grain farmers (the treatment group) and the cotton farmers (the control group) can be identified. All three rounds of the surveys were also conducted during the Chinese Spring Festival, a time during which interviews with all household members are feasible because of the traditional family reunion.

Two of the most important crops produced in Zhijiang are rice and cotton. Rice and cotton require very different types of soil and irrigation system. Rice is often grown in paddies (a flooded parcel of arable land) and is highly dependent on irrigation. Cotton production requires light and sandy land, namely alluvial soil, which cannot withstand excessive moisture. Land that is suitable for cotton planting cannot be readily converted to planting rice due to the difficulty of adapting the irrigation system. Since Zhijiang is situated along the banks of the middle section of the Yangtze river, some of its soils close to the river banks are the alluvial soils suitable for cotton production whereas its inland soils had been traditionally irrigated to plant rice.

Figure 2.1 presents the map of Zhijiang. Zhijiang has nine townships, six of which have part of their land bordering the Yangtze river, the best soil for cotton plantation is concentrated in four (Bailizhou, Qixingtai, Madian, and Gudian) of these six townships. In Table 2.3, I show the break-down of the total planting area in terms of crop planted in each township during the period 2001-2005 and in Table 2.4 the break-down of the soil type in each township. Not surprisingly, the planting of rice and cotton correlates well with the geographical location and the soil type distribution of each township. Being a cotton or a rice farmer can be

considered a random event for those who came to dwell in a certain village upon birth. Inter-village migration, save marriage, is restricted and very rare. Farmers in general cannot select themselves into a village in hope of changing their crop production portfolios by changing the soil type with which they are endowed.

Since each household's planting history is obtained from 1982 to 2007, I define rice farmers as those who have worked on irrigated land to grow rice each year but never planted cotton. I classify cotton farmers as those who are endowed with sandy land and have produced cotton each year but never planted rice. According to this definition, of the 1,200 households surveyed, 619 households are rice households and 311 households are cotton households. The remaining 270 households (referred to as the mixed households thereafter)are planting at least some cotton along with rice. Table 5 compares the average grain subsidies received by the rice, cotton, and mixed households from 2004 to 2007. The first panel of Table 2.5 tabulates only the grain planting subsidies (these are just the rice planting subsidies). The second panel tabulates the total grain subsidies, including subsidies for premium seeds of wheat and corn and comprehensive grain production subsidies after 2006. Although the cotton households were excluded from the grain planting subsidy, some of them received nonzero subsidy because of the corn and wheat production. The total grain subsidy a cotton household receives is about one quarter to one third of the amount that a rice household receives. The subsidies received by the mixed households were reasonably sandwiched between that of the rice and cotton households. Had the total grain subsidy had an effect on the migration propensity, one would expect that it would impact the rice farmers much more than the cotton farmers; and the magnitude of the effect of the subsidy on the mixed farmers would be in between that of the rice and cotton farmers.

In Table 2.6, I compare the characteristics of the rice, cotton, and mixed

crop farmers who were locally born and aged between 16 and 65 in 2003, a year prior to the policy shift. I first focus my discussion on the differences between the rice and cotton farmers. In terms of age, gender, number of siblings, household size, per capita landholding, there are no statistically significant differences between these two groups of farmers. Nor do they differ in their own level of schooling. However, the fathers of the cotton farmers have slightly more years of schooling than those of rice farmers. The cotton farmers had lower level of per capita wealth of durable goods than rice farmers, as well as lower level of per capital productive assets, and these differences are statistically significant. The cotton farmers however have higher per capita net farm income than the rice farmers (recall that rice growers are a lower-income group and have received the grain planting subsidy since 2004), although the difference is not statistically significant. The rice and mixed crops farmers are even more alike. All of the mean differences along the dimensions of age, number of siblings, own years of schooling, father's years of schooling, household size, per capita landholding, per capita productive assets, and per capita net farm income are not statistically significant.

Based on the longitudinal information contained in my data concerning the migration decision of individuals from 1985 to 2007, I compiled the migration rate (i.e., the percentage of working individuals who participated in migratory work for at least three months during a give year) separately for the locally born rice, cotton, and mixed crop farmers. Figure 2.2 presents the corresponding migration trends. In 1985, only 2.17% of the rice farmers and 1.48% of the cotton farmers participated in the rural-to-urban migration; by 2007, 18% of the rice farmers and 20.51% of the cotton farmers engaged in migratory work. The percentage of cotton farmers involved in migratory work had, since 1985, been below that of rice farmers, except for the year 1993 and 1999 during which the percentage of cotton farmers engaged in migration slightly went above that of rice farmers.

Nevertheless, the two groups of farmers seem to have followed a similar trend and their migration rates increased at similar pace until 2004. In 2005, the percentage of rice growers participating in the migratory work dropped two percentage points below its previous year's level[6] while the migration rate of cotton farmers continued to trend up. The migration trend of the rice farmers picked up again in 2006, but the wedge between the migration rate of the rice farmers and cotton farmers became only wider. The migration rate of the rice farmers did not seem to have resumed its former trend in 2007. Farmers from the mixed group started off in 1985 with a higher rate of migration than farmers of the other two groups, and its rate of migration trended above both cotton and grain farmers throughout the entire sample period. But in 2005, its migration rate dropped by 1.5 percentage points; the rate rose up a little in 2006 before it dropped slightly in 2007.

2.4 Empirical Specification and Results

The plot of the migration trends in Figure 2.2 suggests that something jolted the trends of the rice farmers (as well as the mixed crop farmers) off their original trajectories in 2005 while exerting no negative impact on the trend of the cotton farmers. Since the timing of the grain subsidy to rice farmers coincided with the sudden movement of the migration trend of the rice farmers, I am interested in establishing a causal effect of the grain subsidy on a person's migration propensity. This relationship can be expressed with the following reduced-form equation:

[6]The drop happened in 2005 instead of 2004 because the announcement of the 2004 policy change came after the end of the spring festival, at which time the migrants had already made their decisions to return to cities for another year and had left the countryside. In addition, the actual implementation of the policy came months after the announcement, even though there might be migrants returning from cities to take advantage of the policy change, they had already stayed in cities for at least three months and were hence classified as migrants during 2004 according to my definition.

$$M_i = \alpha + \beta SUBSIDY_i + \chi X_i + \varepsilon_i \tag{2.4.1}$$

Here, M_i is a measure of a person's participation in migratory work, it is a binary variable equals to 1 if the person works away from local township for at least three consecutive months during a given year, $SUBSIDY_i$ is the total amount of grain subsidy received by the person's household, and X_i is a vector of individual and household covariates (the household subscript is suppressed for notation simplicity). In order to interpret the estimate of β as an unbiased estimate of the causal effect of the subsidy, X_i needs to contain all the elements that affect both subsidy amount (and eligibility) and migration probability. The concern is that the total grain subsidy amount and/or eligibility is correlated with many observed and unobserved characteristics that affect migration decision.

To overcome this problem, I use the historical share of the household land cultivated in rice, recorded at the time of the initial land allocation in 1982, as an instrument for the subsidy variable. The identification comes from two sources. First, Meng (2009a) has demonstrated that the initial land allocation amount is orthogonal to individual ability as well as to the household head's social and political status. Second, the land share in rice cultivation, as opposed to the share in cotton planting, depends on what kind of soil the household was endowed, a decision largely outside the control of the locally born household members. Table 2.7 shows the first-stage regression of total subsidy on initial land share in rice cultivation and on a vector of control variables; the F-statistics is 15.05, indicating that the initial land share is not a weak instrument. I then estimate equation 2.4.1 first using OLS and then instrument the variable of total grain subsidy using the initial land share in rice cultivation. Table 2.8 gives the linear probability model estimation results using the pooled cross section data from 2004 to 2007

for locally born rural residents aged between 16 and 65. The OLS regression result in column 1 shows that increasing total grain subsidy by 100 yuan decreases migration probability by 3.7%. With instrumentation, a 100 *yuan* increase in total grain subsidy decreases migration probability by 8.1%, indicating that the unobserved variable could be positively correlated with both the total grain subsidy and the migration propensity, biasing the coefficient estimate towards zero. For an average rural household that receives about 168 *yuan* in the total grain subsidy, its member's migration propensity will decrease by 13.6%.

I also use the fixed effect difference-in-differences methodology to examine the effect of the total grain subsidy on migration probability. The key estimating equation is the following:

$$M_{it} = \alpha + \chi X_{it} + \gamma_0 RICE_i + \gamma_1 POST_t + \gamma_2 (RICE \times POST)_{it} + \varepsilon_{it}, \\ t = 0, ..., T; i = 1, ..., N \quad (2.4.2)$$

where X_{it} as before contains all the control covariates, including period and location dummies. $RICE_i$ is the treatment dummy equals to 1 for rice growers. $POST_t$ is the period dummy equals to 1 for the post 2004 regime. ε_{it} collects the unobserved random variables and shocks that the individuals experience every period, it is assumed to take the form of $\varepsilon_{it} = \alpha_i + u_{it}$, and u_{it} is assumed to be independently distributed conditional on (X_{it}, α_i). The permanent unobserved heterogeneity α_i is assumed to be the only source of the time persistence in an individual's migration decision and may be correlated with elements in X_{it}.

The migration decision is treated here as a static choice. It is assumed to be made anew every year and is not affected by last year's migration decision.

Chinese migrants in general return every year during the Chinese Spring Festival for family reunion and they use this time to settle financial obligations, plan family investment, and reconnect with the local network of opportunities. Researches have shown that rural-urban migration decision in China is mostly a temporary and circular decision (Zhao (1999b); Li and Zahniser (2002)). Rural households, for example, do not increase their consumption proportionately with remitted income, suggesting that they view the remitted income as transient income that cannot be depended on in the long run. In a static migration model, autocorrelation could be seen as coming from the persistence in the unobserved time-invariant individual heterogeneity. By using a conditional fixed effect logit model in the following analysis, I have assumed conditional independence for consistency, i.e., that the yearly migration decisions $m_{it}, ..., m_{iT}$ are independent of each other conditional on $(X_{it},\ \alpha_i)$. The shortcoming of the static model is that it avoids the issue of state dependence, which exists in migration decisions if past mobility choices affect current ones.

The parameter γ_0 is predicted to be positive because rice growers have had a higher rate of migration than cotton farmers prior to the policy change in 2004, γ_1 is also predicted to be positive because the overall trend of rural to urban migration is on the rise for both cotton and rice growers. The Difference-in-Differences (DID) estimator is:

$$\hat{\gamma_2} = (\bar{m}_{rice,post2004} - \bar{m}_{rice,pre2004}) - (\bar{m}_{cotton,post2004} - \bar{m}_{cotton,pre2004}).$$

If the migration propensity of rice farmers decreased relative to the cotton growers after 2004, i.e., if γ_2 is < 0, then it indicates that subsidizing grain production encouraged farmers to remain in farming given that the identifica-

tion assumption of parallel trends holds. By using the DID estimator, the true treatment effect of the grain subsidy will not be confounded by any permanent differences in treatment and control groups that existed prior to the policy shift. From another perspective, if a time-trend exists in the rate of migration, using a DID estimator will ensure that the time trend will not be confounded as being part of the treatment effect. The identification assumption is that absent the grain subsidy, the migration propensity of both the cotton and rice farmers would have increased at the same rate. The failure of the parallel trend assumption will cause the DID estimator to be biased. Any other policy shocks or changes in social-economic variables in the same period that affected the migration behavior of the rice and cotton farmers differentially would be picked up by the DID estimator and change the causal interpretation of the results. For example, since the tax repeal took place at the same time as the grain subsidy, rice and cotton farmers might react differently to the tax cut and embark on a different migration trend independent of the impact of the grain subsidy, although there are no particular reasons to suggest that it might be the case.

A more imminent undermining factor is the price movements of rice and cotton. If the price of rice trended up while the price of cotton trended down during the same time, then rice farmers would also be less likely to migrate than cotton farmers, confounding the causal link between the subsidy and migration probability. Figure 2.3 presents the local price trend of these two crops from 1987 to 2008. The price of rice had stagnated since 2003 and then dropped in 2005, it stayed the same in 2006, and increased in 2007. The price of cotton had been rising since 2001, dropped in 2004, but rose again in 2005, it dropped again in 2006, then trended up in 2007 and 2008. If prices, through their effect on income, were exerting any impact on migration propensity, they worked against the actual pattern observed, i.e., a drop in migration rate of rice farmers in 2005 and a

continued increase in migration rate of cotton farmers since 2004. The observed trends of the crop prices seem to strengthen the identification assumption: that in the absence of the subsidy, the rise in the migration probability of the rice farmers would not be systematically different from the cotton farmers. To substantiate this observation, I construct a household level, agricultural product price index, that uses the historical share of land used for different crops, chiefly rice and cotton, as the weights; the price vector for different crops were collected from the local statistic bureau from 1986 to 2007. I use this variable in the regression analysis to control for the price movements.

Table 2.9 gives the estimation results using the conditional fixed effect logit model. All the time-invariant variables were dropped out of the estimation. The coefficient estimate of the price index is statistically insignificant. The coefficient estimate of the interaction between the post policy dummy and rice household dummy is indeed negative and statistically significant, indicating that although the migration rates were higher for both the rice and cotton farmers in the post 2004 period, the rise in the migration propensity of the rice farmers was significantly smaller when compared to the cotton farmers. This strengthens the conclusion that the migration propensity of the farmers had been negatively affected by the grain subsidy. In column 2 of Table 2.9, I include the third category, the mixed crop farmers, in the regression. Compared to the cotton farmers, the migration propensity of the mixed crop farmers was also negatively affected by the subsidy, but, as expected, the impact was felt less pronounced by the mixed crop farmer than by the rice farmers.

The grain subsidy was administered according to households' grain planting area, therefore one may expect that the land-rich farmers received more in terms of the lump-sum subsidy than the land-poor farmers. A more robust analysis is

done by introducing a triple interaction term which takes into consideration that the rice farmers decreased their migration propensity after 2004 relative to the cotton growers, and the dissuasive effect of the subsidy on individual's migration propensity might be felt more strongly by farmers who were endowed with more land. An extended empirical specification is given in the following equation.

$$\begin{aligned} M_{it} = \alpha + \chi X_{it} + \gamma_0 RICE_i + \gamma_1 POST_t + \gamma_2 (RICE \times POST)_{it} \\ + \gamma_3 LAND + \gamma 4 (RICE \times LAND)_i + \gamma_5 (LAND \times POST)_{it} \\ + \gamma_6 (LAND \times RICE \times POST)_{it} + \varepsilon_{it}, \\ t = 0, ..., T; i = 1, ..., N \end{aligned} \tag{2.4.3}$$

where $LAND_i$ measures the amount of households' grain planting area. The coefficient of the triple interaction term γ_6 is predicted to be negative. The more land the rice farmers have, the less likely they would engage in rural-urban migration in the post 2004 regime. Table 2.10 presents the estimation results. In both column 1 and column 2, the estimated coefficients of the triple interaction term do not have the negative sign but they are not statistically significant either. The dissuasive effect of the subsidy may be felt more seriously by rice farmers with more land yet the data is too noisy to establish it statistically.

2.5 Were Farmers Better off as a Result of The Grain Subsidy?

It is difficult to assess how the total grain subsidy has changed the welfare of China as a whole, but a much narrower question can be asked. Suppose

the Chinese government cares most about the welfare of the farmers in the grain producing localities, were these farmers better or worse off as a result of the total grain subsidy? The empirical analysis has shown that as a response to the total grain subsidy, farmers decreased their migration probability. The opportunity cost of the decision to stay in farming is the forgone wages that the rural residents would have received in cities. If the increase in subsidy as well as the increase in the value of the agricultural production at the rural origin together can not compensate for the loss in migrant income, then we have evidence indicating that the grain subsidy transfer is not efficient - because it has detained labor in farming while labor should be allocated more productively in cities. There is however a caveat to be made up front. I am treating the impact of the total grain subsidy on the rural community separately from the impact of the tax repeal. The tax repeal occurs whether or not the farmers choose to engage in agricultural production in the current year; the total grain subsidy transfer, however, only realizes if the farmers stay in farming and engage in grain cultivation in the current year, and it is a function of the actual land acreage involved in the current grain production. The following investigation demonstrates how important the leakage of the migrant income is as a result of the migration-impeding grain subsidy.

One way to investigate the welfare impact of the grain subsidy on the subsidy receiving locality is to treat the locality as a small open economy and study its gross national product (GNP) with and without the grain subsidy. By using the concept of the GNP instead of the gross domestic product (GDP), I include Zhijiang residents' incomes from economic activities carried on outside of Zhijiang as well as within Zhijiang, and excludes incomes produced in Zhijiang by non-residents. Recall that Zhijiang, the research locality, is a migrant-sending rural community. Non-residents in Zhijang's rural community are rare and negligible. The rural-urban migrants from Zhijiang are likened as the nationals operating

abroad, their earnings are considered as part of Zhijiang's economic activity since these migrants are still economically connected to Zhijiang by remittances and circular home-visits, they are also linked institutionally to Zhijiang by their household registration status. The permanent settlement of these migrants in urban areas is still the exception rather than the rule; using GNP thus acknowledges the temporary nature of their migration.

Let Zhijiang's GNP consist of only two parts: wage income and agricultural income. Further assume that the wage income can only be obtained in cities. Without the grain subsidy, Zhijiang' GNP is

$$GNP_{ns} = W_{city,ns} \times L_{m,ns} + P_{ns} \times Q_{ns} \tag{2.5.1}$$

where $W_{city,ns}$ is the wage rate in cities in the case of no subsidy, $L_{m,ns}$ is the number of migrants in the case of no subsidy. P_{ns} is the price of agricultural product. Q_{ns} is the output of the agricultural product in the absence of grain subsidy, it is a function of land (T_{ns}) and labor working in agriculture ($\bar{L} - L_{m,ns}$), where $\bar{L}$ is the total labor endowment in Zhijiang.

$$Q_{ns} = F(T_{ns}, \bar{L} - L_{m,ns})$$

Similarly, with the grain subsidy, Zhijiang's GNP is

$$GNP_s = W_{city,s} \times L_{m,s} + P_s \times Q_s + GrainSubsidy \tag{2.5.2}$$

Since Zhijiang is assumed to be a small open economy, $W_{city,s} = W_{city,ns}$ and $P_s = P_{ns}$. Q_s is the output of the agricultural product when there is subsidy,

it is similarly defined as $Q_s = F(T_s, \bar{L} - L_{m,s})$, where T_s is the land used in the presence of subsidy and $L_{m,s}$ is the number of migrants when farmers are subsidized. $GrainSubsidy$ denotes the total amount of grain subsidy received by the locality. The difference between GNP_{ns} and GNP_s is therefore:

$$GNP_{ns} - GNP_s = W \times (L_{m,ns} - L_{m,s}) - P \times (Q_s - Q_{ns}) - GrainSubsidy \quad (2.5.3)$$

The preceding empirical study of the impact of the grain subsidy on migration propensity suggests that $L_{m,ns} > L_{m,s}$, so the first term in equation 2.5.3 is positive. The number of migrants decreased as a result of the subsidy implies that there is an increase of labor supply in agriculture, i.e., $\bar{L} - L_{m,s} > \bar{L} - L_{m,ns}$; furthermore, for a given labor supply, farmers are cultivating at least the same amount of land in the presence of the grain subsidy, i.e., $T_s \geq T_{ns}$, therefore $PQ_s > PQ_{ns}$. The second term in equation 2.5.3 is positive. Starting in 2004, the grain subsidy has been positive. Whether the term $GNP_{ns} - GNP_s$ is negative or positive cannot be assessed a priori, it needs to be decided empirically.

I take 2005 as the year of analysis to investigate whether the counterfactual GNP without subsidy exceeds the predicted GNP with subsidy. The estimate for the 2005 urban wage, $\hat{W}$, is calculated as the average wage reported by Zhijiang's migrants in 2005. The estimate for the share of migrants (12.96%) in the population is obtained from the data in 2005. Using this percentage and the number of total rural residents (372,208) in Zhijiang in 2005, I arrived at the estimate of the actual number of rural migrants in the presence of grain subsidy in 2005, $\hat{L_{m,s}}$, which was 48,238. The number of migrants without the grain subsidy is calculated as follows. The 2004 estimated share of migrants in the population was first obtained from the data (13.24%). The rate of change in the migration rates

of cotton farmers (9.7%) from 2004 to 2005 is then used as the counterfactual rate of change in the migration rates for the entire population, so the counterfactual migration rate in 2005 for the entire population is 14.52%, and the counterfactual number of migrants in 2005 $\hat{L_{m,ns}}$ is 54,044. The amount of the total grain subsidy allocated to Zhijiang in 2005 was 13.58 million yuan. The value of the agricultural product in the presence of the subsidy, $\hat{P} \times \hat{Q}_s$, and the counterfactual value of the agricultural product without subsidy, $\hat{P} \times \hat{Q_{ns}}$, are calculated as follows.

I first estimate an agricultural production function (see Table 2.11) using the times series data of the nine townships in Zhijiang from 2000 - 2003 - the regime prior to the policy shift. The dependent variable is the value of agricultural product (which includes grain, cotton, and oilseeds), the independent variables are agricultural labor, cultivated land (for grain, cotton, and oilseeds), and the share of non-irrigated dry land to proxy for land quality. Based on the coefficient estimates, I compute the predicted value of the agricultural product with subsidy for the year 2005 using the land, labor, and the share of non-irrigated dry land actually used in 2005. Note that by doing so, the predicted value of the agricultural product is computed using the pre-subsidy product prices. As for the coefficient estimate of the 2005 year dummy, I use the average value of the estimated coefficients on the year dummies prior to 2005 to approximate for it, the base year I use for the estimation is year 2000. The predicted value of agricultural output in 2005 with subsidy is 662 million yuan. I use the same coefficient estimates to obtain the counterfactual value of agricultural production in the absence of the subsidy, taking into account that counterfactually, i.e., labor engaged in agriculture in 2005 in each township of Zhijiang would have been less than the amount that is actually reported. I adjust down the labor used in agriculture for each township in 2005 according to the total number of would-be migrants, weighted by the different percentages (averaged between 2000 and 2003) of migrant population in

each township prior to the policy shift. The counterfactual value of agricultural output in the absence of the subsidy is estimated at 567 million yuan.

All the estimates are presented in Table 2.12. The estimated difference, $GNP_{ns} - GNP_s$, is -53 million yuan, indicating that despite the loss in migrant income, Zhijiang's GNP with the grain subsidy is 4.8% more than its GNP without the grain subsidy. When the counterfactual rate of change in the migration rates for the entire population is taken to be 4.6% (equals to the previous year's rate of change), the GNP with subsidy is 7.1% more than without subsidy. The above calculation has assumed that the entire migrant income can be viewed as part of Zhijiang's economic activity. My research has shown that migrants on average remit 27% of their annual income to the source community. If this is taken into consideration so that I only take that part of the income that migrants remit to the source community as component of Zhijiang's GNP, with the counterfactual rate of change in migration being 9.7%, the GNP with subsidy is 13.2% more than without; and, in this case, the lost in migrant income is almost entirely compensated by the transfer of the grain subsidy.

This simple exercise reveals that, in terms of the income of Zhijiang's rural residents received as a whole in 2005, the locality is better off as a result of the grain subsidy. The loss in migrant income is not sizable. If only a third of the migrant income is counted as Zhijiang's GNP via remittance, then the grain subsidy can already recompense the counterfactual loss in migrant income. The counterfactual value of agricultural production without subsidy is noticeably smaller than with subsidy, it is only 85.6% of the value of the latter. It should be noted that the counterfactual state of no subsidy is framed in a context that refrains from addressing the impact of the tax repeal. So the above simple welfare analysis should be understood as studying only the impact of a net grain subsidy

transfer on the income received in a locality as a whole, and accounting for the leakage in the migrant income that might arise from the grain subsidy.

2.6 Conclusion

Subsidizing grain farmers through cash payment is a stark departure for China from its previous path. After China's accession into the WTO, supporting agriculture not only becomes more difficult but more pressing. It is therefore impressive that during its transition period as a WTO member, China is able to strike a balance between its WTO promises and its growing desire to protect its agriculture, especially the grain sector. By operating under the "amber box" category of subsidy, China is distributing increasingly more cash to its grain farmers since 2004. This paper investigates how would the grain subsidy, which is distributed according to the current grain planting area, impact the rural-urban migration in Zhijiang, China.

The identification assumption I use to establish the causal relationship between the grain subsidy and migration propensity requires that the rice and cotton farmers in Zhijiang to have been randomly designated and cannot switch identities as a response to the grain subsidy. The random designation of the rice and cotton farmers in Zhijiang arises from the fact that Zhijang is endowed with two types of soil suitable for rice and cotton farming, and each type is concentrated in different geographical areas. Since the local farmers are affixed their soil type upon birth into a specific geographical area and inter-village migration, save marriage, is very rare, farmers to a great extend assume their roles as rice or cotton farmers in a random way. As each crop demands completely different irrigation system, it is very difficult for a typical rice farmer to convert into a typical cotton farmer,

or vice versa. Also in this paper, I exclude the price movements as an alternative explanation for the reduced migration propensity of rice farmers as opposed to cotton farmers.

My main finding suggests a causal relationship between individual's migration propensity and the grain subsidy, a one hundred yuan increase in grain subsidy reduces the migration probability of rural residents by 8.1%. Despite the loss in the migrant income, Zhijiang is better off as a result of the grain subsidy: its GNP with the grain subsidy is 4.8% more than its counterfactual GNP without the grain subsidy. My study validates the concern that the grain subsidy is to some extent dissuading farmers to engage in migratory work, however, the magnitude of the reduced incidence of rural-urban migration is modest. If China values the welfare of the rural sector and would like to continue subsidizing its grain production in a WTO-compliant way, it can do so without jeopardizing the country's process of rural-urban migration or notably reduce the local welfare that might result from a loss of the migrant income.

2.7 Figures and Tables

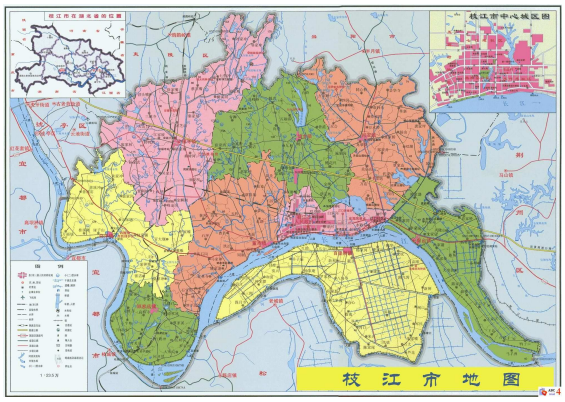

Figure 2.1: Map of Zhijiang

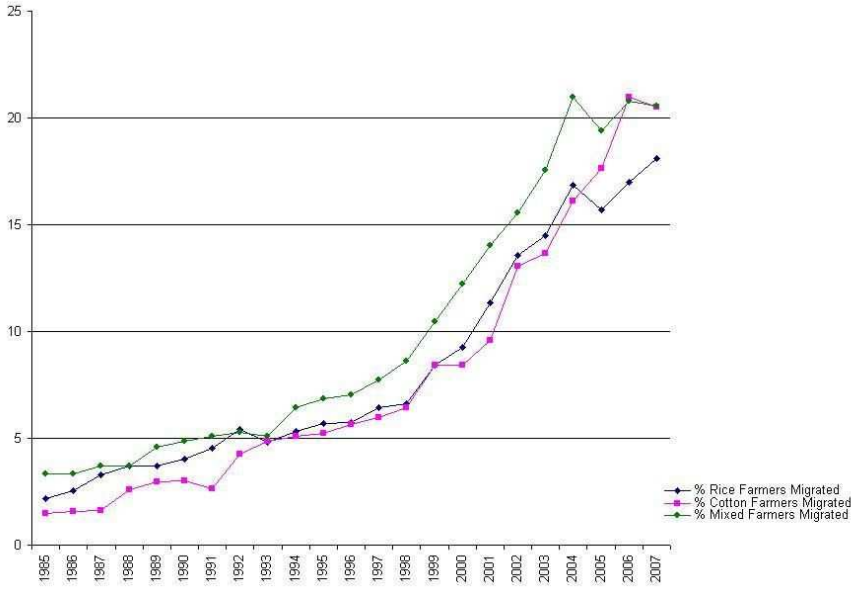

Figure 2.2: Migration Trends of Rice, Cotton, and Mixed Farmers, 1985-2007

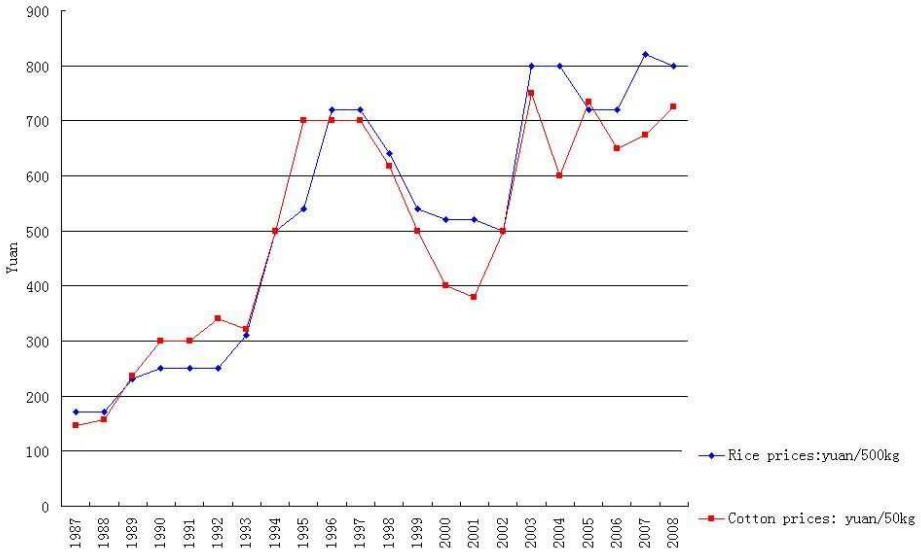

Figure 2.3: Market Prices of Rice and Cotton, 1987-2008

Table 2.1: The Composition and Magnitude of the Grain Subsidy (subsidy amounts are in billions of *yuan*)

year	Grain planting subsidy	Premium seeds subsidy	Equipment subsidy	Comprehensive subsidy	Total grain subsidy	% of agri. GDP
2003	0	0	0	0	0	0
2004	11.6	2.85	0.07	0	14.52	0.7
2005	13.2	3.7	0.3	0	17.2	0.75
2006	14.2	4.07	0.6	12	30.87	1.1
2007	15.1	5.02	1.2	27.6	48.92	1.7
2008	15.1	12.07	4	48.2	79.37	2.33

Table 2.2: The Grain Subsidy Standard in Zhijiang (*yuan* per *mu*)

Grain Planting Subsidy	2003	2004	2005	2006	2007
mid-season rice	0	21.0	21.5	22.5	23.5
late-season rice	0	21.5	21.5	21.5	21.5
Premium Seed Subsidy					
early-season rice	0	10	10	10	10
mid-season rice	0	15	15	15	15
late-season rice	0	7	7	7	7
wheat	0	7	7.3	8.5	10
corn	0	14	14	14	13
Comprehensive Subsidy	0	0	0	10	12

Table 2.3: Total Planting Area Breakdown (in %), Zhijiang, 2001-2005

Township	Rice	Cotton	Oil Seeds	Vegetables	Orchards	Other Grain
Baiyang	44	0	22	13	19	0.3
Anfusi	39	0.1	29	8	21	1
Xiannv	48	0.3	31	10	9	0.9
Wenan	50	3	34	9	2	0.3
Dongshi	48	4	27	7	12	0.7
Madian	11	11	15	51	6	3
Gudian	38	13	27	10	11	0.6
Bailizhou	1	49	12	15	20	2
Qixingtai	0.2	52	19	19	4	4

Table 2.4: Soil Type Breakdown (in %), Zhijiang, 2001-2005

Township	Irrigated land	Sandy/Dry land
Baiyang	73	27
Anfusi	85	15
Xiannv	81	19
Wenan	80	20
Dongshi	71	29
Madian	25	74
Gudian	47	53
Bailizhou	3	97
Qixingtai	0.2	99

Table 2.5: The Grain Subsidies to Rice, Cotton, and Mixed Households, 2004 - 2007 (in *yuan*)

		2004	2005	2006	2007
Grain planting subsidies	rice households	122	122	130	135
	cotton households	0	0	0	0
	mixed households	56	56	61	64
Total grain subsidies	rice households	222	222	230	231
	cotton households	52	52	71	83
	mixed households	115	115	120	122

Table 2.6: Characteristics of the Locally Born Rice, Cotton, and Mixed Farmers of the Age Cohort 16-65 in 2003

Variable	Rice farmers	Cotton farmers	Mixed Crop farmers
Age	36.15	35.60	35.47
	(13.13)	(13.26)	(12.97)
Male	0.69	0.68	0.63
	(0.46)	(0.46)	(0.48)
Number of Siblings	3.73	3.69	3.65
	(1.33)	(1.47)	(1.36)
Father's Years of Schooling	5.00	5.48	5.01
	(3.36)	(3.22)	(3.25)
Own Years of Schooling	8.30	8.40	8.45
	(2.43)	(2.21)	(2.58)
Household size	4.01	4.07	3.98
	(1.02)	(1.02)	(1.03)
Per capita land	1.99	1.98	1.94
	(1.03)	(1.05)	(2.77)
Per capita wealth of durables	1496	1310	1388
	(1036)	(915)	(1124)
Per capita productive assets	1444	1268	1475
	(1745)	(897)	(1775)
Per capita net farm income	2566	2629	2477
	(2106)	(2130)	(2489)
No. of Observations	1096	627	507

Note: Means are reported and standard deviations are in the parentheses.

Table 2.7: Initial Share in Rice Cultivation and Total Subsidy: The First Stage Regression

Explanatory Variable	Total Subsidy (OLS)
Initial Share of Land in Rice	43.92***
	(11.32)
Initial Land	Y
Age	Y
Age Squared	Y
Male	Y
No. of Siblings	Y
Middle School	Y
High School	Y
College	Y
Father's schooling	Y
Marital Status	Y
CCP member	Y
Household size	Y
Year dummies	Y
Township dummies	Y
Obs.	5420
F Statistic	15.05

Note: Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 2.8: Effect of the Grain Subsidy on Probability of Migration

Explanatory Variable	Migration (OLS)	Migration (IV)
Total Subsidy	-0.037***	-0.081***
	(0.009)	(0.027)
Initial Land	Y	Y
Age	Y	Y
Age Squared	Y	Y
Male	Y	Y
No. of Siblings	Y	Y
Middle School	Y	Y
High School	Y	Y
College	Y	Y
Father's schooling	Y	Y
Marital Status	Y	Y
CCP member	Y	Y
Household size	Y	Y
Year dummies	Y	Y
Township dummies	Y	Y
Obs.	5420	5420

Note: Total subsidy is in hundreds of yuan. Standard errors are clustered at the village level. *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 2.9: Conditional Fixed Effect Logit Model

Variable	(1)	(2)
Age	-0.05	-0.02
	(0.19)	(0.20)
Middle School	0.10	-0.14
	(0.77)	(0.69)
High School	-0.24	-0.33
	(0.85)	(0.74)
College	1.71	0.75
	(1.15)	(0.95)
Marital Status	0.04	0.19
	(0.28)	(0.26)
CCP member	0.02	-0.03
	(0.50)	(0.26)
Price Index	0.0004	-0.0007
	(0.0007)	(0.0009)
Post04	3.46	2.67
	(4.16)	(4.21)
Rice farmers×Post2004	-0.82**	-0.93**
	(0.39)	(0.41)
Mixed farmers×Post2004		-0.76*
		(0.43)
Year dummies	Yes	Yes
Obs.	10392	14033

Note: *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 2.10: Conditional Fixed Effect Logit Model: Three-way Interaction

Variable	(1)	(2)
Age	-0.05	-0.02
	(0.19)	(0.20)
Middle School	0.12	-0.17
	(0.80)	(0.72)
High School	-0.26	-0.39
	(0.88)	(0.77)
College	1.58	0.63
	(1.15)	(0.91)
Marital Status	0.001	0.18
	(0.29)	(0.26)
CCP member	0.06	0.01
	(0.56)	(0.47)
Price Index	0.0003	-0.0008
	(0.0008)	(0.001)
Post04	3.38	2.50
	(4.22)	(4.06)
Rice farmers×Post2004	-1.48**	-1.56**
	(0.69)	(0.69)
Mixed farmers×Post2004		-0.93
		(0.72)
Land×Post2004	0.01	0.01
	(0.05)	(0.05)
Land×Rice farmers×Post2004	0.09	0.09
	(0.07)	(0.07)
Land×Mixed farmers×Post2004		0.02
		(0.10)
Year dummies	Yes	Yes
Obs.	10063	13428

Note: *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 2.11: The Agricultural Production Function

Variable	Coefficient Estimates
Log labor	0.28
	(0.19)
Log land	0.85***
	(0.13)
Log share of dry land	-0.12
	(0.18)
Township dummies	Yes
Year dummies	Yes
Obs.	36

Note: *, **, *** mean that estimated coefficient is significant at 10%, 5%, and 1% level.

Table 2.12: The GNP with and without the Grain Subsidy in 2005

	(1)	(2)	(3)
Wage (yuan/mon)	800	800	800
Remittance (% of migrant income)	100	100	27
Δ in Migration rates	9.7	4.6	9.7
$L_{m,ns}$ (number of persons)	54044	51588	54044
$L_{m,s}$ (number of persons)	48238	48238	48238
PQ_s (millions of yuan)	662	662	662
PQ_{ns} (millions of yuan)	567	567	567
GNP_s (millions of yuan)	1138	1138	800
GNP_{ns} (millions of yuan)	1085	1062	707

3

Bride Drain: Rising Female Migration and Declining Marriage Rates in Rural China

3.1 Introduction

The proportions of married young people in rural China have fallen considerably in recent decades. Based on the nationally representative rural household survey data from China Health and Nutrition Survey (CHNS,1989) and Chinese Household Income Project (CHIP, 1995 and 2002), 69.5% of men 22-29 and 66.2% of women 20-29 were married in 1989[1]; in 2002, these percentages dropped to 45.8% and 52.1% respectively. The sharp decline of the marriage rates over these years was concentrated among those who were in their twenties, marriage rates re-

[1]According to the Marriage Law of China, the legal marriage age is 22 for men and 20 for women. The stipulation regarding the legal marriage age has remained the same since 1980.

mained high for the older age cohorts: for example, of all the men (women) 30-34, 93.8% (98.3%) were married in 1989, and 94.1% (98.7%) in 2002[2]. In this paper I focus on the role of rising female participation in rural-urban migration and study the extent to which it has disrupted the traditional local marriage markets and contributed to the fall in the marriage rates of young men in rural China.

There are several explanations provided by the marital search models that can account for the drop in the marriage rates. The first category of the explanation has to do with the availability of local mates (Preston and Richards (1975); Lichter et al. (1992)). For example, a shortage of men depresses female marriage rates; in addition, women have to lower their "reservation quality" of future partner in the presence of a shortage of available males, further thwarting their incentives to marry (South and Lloyd (1992); Lichter et al. (1992); Wood (1995)). Lloyd and South (1996) also find that a shortage of prospective female partners in the local marriage market lowers men's marriage rates. A competing imbalanced sex ratio theory however predicts that the shortage of one sex in the local marriage market will increase the marriage rate of the other sex (Guttentag and Secord (1983); Fossett and Kiecolt (1990); Angrist (2002)). For example, in the presence of female shortage, men are more motivated to commit to marriage and attach themselves permanently with a potential wife. A frequently used indicator of mate availability is the sex ratio, measured by the number of males to the number of females in relevant age cohorts. The shortage of females (thus high sex ratio) is a demographic reality in China and the situation has deteriorated since the implementation of the one-child policy in 1978. The dearth of girls is mainly caused by the son preference combined with low fertility, the one-child policy worsened sex-selective abortion, female infanticide and neglect of baby girls (Banister (2004)). Table 3.1 shows that between 1995 and 2002, the sex ratios

[2]However, this does not mean that the high marriage rates will necessarily persist for rural people who reach their thirties in more recent years.

at peak marriage ages in rural China rose - men in their twenties increasingly outnumber women of similar ages. According to the marriage search theory, it is not surprising that a shortage of women in both the local and national context will lead to a fall of male marriage rates. But the the factor of rising sex ratio alone leaves unexplained why a decline of marriage rates among young women also occurred in rural China.

The second type of the explanation centers on the quality of the searcher, and a frequently studied dimension of quality is individual earnings. Individual earnings have two opposite effects on transition to marriage: the "self-reliance" effect that enhances the value of outside option, making marriage less likely, and a "good catch" effect that signals the quality of the searcher, making marriage more likely (Burgess et al. (2003)). Both these effects are at work and it is difficult to predict which one dominates a priori. Empirically, it is found that for men the "good catch" effect dominates (Lloyd and South (1996); Burgess et al. (2003)). This pattern may run counter to the popular opinion that high-wage persons marry later, but it has been consistently found for men of different birth cohorts in the U.S. since the pioneering work of Becker (1973). Becker in his analysis in the early 1970s also suggested a gender difference in the impact of own earnings on marriage formation: an increase in the wage rate of women relative to men would decrease women's incentive to marry. This is because the gains from marriage is greater for women the lower the female wage rate is relative to male wage rate[3]. The empirical evidence on the relationship between female earning and marriage formation is however mixed. Earnings ability and employment opportunities are found to accelerate women's transition to marriage (McLaughlin et al. (1993); Buck

[3]The underlying assumption is that the increase in female wage rate would not increase married output as much as the decrease in male wage rate would decrease it if married women worked sufficiently fewer hours in the market sector than single women, and married men worked at least as much as single men (Becker (1973)).

and Scott (1993)), suggesting that the "good-catch" effect dominates for women as well as for men; but other researchers also find that marriage rates are decreasing in the female wage rates and female employment opportunities (Klaauw (1996); Burgess et al. (2003)), arguing that for women the main impact is the "self-reliance" effect.

In the context of China, rural household income as well as rural male and female non-farm wage rate have risen since the early 1980s (Khan and Riskin (1998, 2005)). The most reliable data shows that the annual growth rate of rural net household income from 1991 through 2004 is 4.9% (Naughton (2007)). The non-farm wage rates for men and women have increased by 22% and 25% respectively from 1995 to 2002[4]. As the off-farm labor market conditions improved for rural men, the more recent birth cohort of men in their twenties earned more than their predecessors. If the "good catch" effect for men dominates in China as well as in the developed countries, rising male earnings should provide more incentives for current young men to get married, the sharp over all decline of the marriage rates among young men in rural China is thus a puzzle. If the "self-reliant" effect dominates for women, the rise in female earnings could diminish women's incentive to enter marriages at the traditional marriage age, resulting a decline in the marriage rates among people in their twenties.

In this chapter I broach yet another explanation which I call the rural bride drain. The bride drain is a consequence of the dramatic rise of the rural female participation in migratory work from virtual non-existence since the 1990s (De Brauw et al. (2002)). Table 3.2 presents the percentage of married men aged 22 to 26 and the percentage of women aged 20 to 24[5] who engaged in migratory

[4]These figures were calculated using the 1995 and 2002 CHIP data. Details about the data are provided in section 2.

[5]Women's age is chosen to be few years younger than men to account for the tendency that women marry men few years older than themselves. The average sample size of the yearly cohort

work from 1985 to 2005 using the field survey data I collected in Zhijiang, China. The table gives a first pass about a highly suggestive relationship between male marriage rates and female migration rates. The momentum of migration of young women picked up in the mid to late 1990s, about the same time as the marriage rates of young men started to drop noticeably. In Table 3.3, I also present the shares of women from various age cohorts who engaged in migratory work in 1995 and 2002 using the nationally representative data[6]. The rise of women engaged in migratory work is phenomenal, given that the data only covers a seven year span, and is concentrated in the age cohorts that are typically young and unmarried. For example, 15% of all women aged between 20 and 24 engaged in migratory work in 1995, in 2002, this proportion rose to 35%. And these female migrants were overwhelmingly single as over 85% of them were unmarried in both years.

This exodus of women out of the countryside has profound impact on the local marriage markets. For 50 years, rural men and women were excluded from the urban marriage markets (but not vice versa) because they not only lacked the social and economic privileges and entitlements pertaining solely to the urban residents, they were also physically restricted to stay in the countryside by government decree and could not move to the urban marriage markets to receive or make marriage offers. As the invisible walls separating the rural and urban society in China started to break down in the midst of the economic reform, mass rural-urban migration ensued, and it is now physically feasible for rural people to expand their marriage markets beyond their local confines.

But rural men and women do not experience the expansion of the marriage markets in the same way. As researchers have pointed out (Fan and Huang (1998); Huang (2001); Fan and Li (2002)), rural men encounter more difficulties

is 214 for men and 202 for women.

[6]The 1995 and 2002 CHIP data are used to compute the table.

to enter the urban marriage markets than rural women because of the practice of hypergamy intertwined with patrilocal residence in China. The male-centered marriage custom requires that husbands be at least socially and economically established as wives in a marriage union. Urban women thus rarely consent to marry rural men. The difficulties faced by rural migrants to settle down in cities have further stigmatized the low economic and social status of rural men when compared to urban males, making them unattractive to both urban and rural women who prefer to live in urban areas. Rural women, on the other hand, have a much more credible chance of marrying an urban partner because there is a large population of single and old men in cities, who are willing to take rural wives in the absence of better urban matches (Ding et al. (1999)). Rural women are not the most desirable in the urban marriage markets, but they nonetheless have the urban marriage markets opened up for them in unprecedented ways since the relax of mobility restrictions. Under the assumption that rural women prefer urban men to rural men[7], through migration they would deplete the potential pool of spouses for local rural men, driving down the marriage rates of young men in rural China. But incomplete information and inadequate social networks that can facilitate marriage matches for rural women in urban areas may also lead to failures of matches for rural women who want to marry urban men, which may explain why the marriage rates of women dropped as well.

My empirical strategy is to use the inter-locality variation in female outmigration in order to explain individual marriage choices of men. I use self-collected panel data in Zhijiang, China that covers the period of 1985 to 2007. By using the individual level data, personal characteristics such as age and education can be included in the analysis. Other local level variables such as sex ratio, female education, mean female wage, mean male wage have also be controlled for wherever

[7]The assumption describes the general tendency in the Chinese society well, please see Huang (2001) for discussion.

data is available; the national trends in the preference for formal marriage and changing social norms have been accounted for by including year dummies. The results show that male marriage propensity indeed decreases in the rate of local female out-migration: a 10 percentage point rise in the share of local young women engaged in migratory work leads to about 5% reduction in the probability of getting married for men in their early twenties. The impact of the bride drain caused by female out-migration is felt by both migrant and non-migrant men, but marriage propensity of migrant men is more negatively affected by female out-migration. I also find that for migrant men, higher education background may attenuate the negative impact of the bride drain on their marriage probability, except for those with college degrees. The key relationship is also found to be robust when a nationally representative data set is used for analysis.

In section 2, I present the data used in the analysis and describe the phenomenon of declining marriage rates in more detail. In section 3, I explain the rising female migration and the resulting bride drain. In section 4, I discuss the empirical methodology, give and interpret the estimation results. Section 5 offers concluding remarks.

3.2 Declining Marriage Rates in Rural China

3.2.A Data

The primary data used in this study was collected through rural household surveys that covered 1,200 households and 4,640 individuals in Zhijiang municipality during the Chinese Spring Festivals of 2006 through 2008. Zhijiang is

a migrant-sending municipality with a traditional farming base in the hinterland province of Hubei. It situates in the southwest of Hubei and is on the north bank of the middle sections of the Yangtze river. Zhijiang has a population of 510,000 in 2005, of which 64% are rural. The initial survey of spring 2006 elicited retrospective information since 1985 on migration, marriage, education, and employment history for all adult household members above the age 16. An important variable lacking in most standard household surveys: the age of first marriage, was also obtained since the initial survey. Another important dimension of the data is that it includes the information on the origins of the spouses of the household heads, their original household registration location and birth location. From 2007 to 2008, follow-up surveys were done on the same households and the resulting data set constitutes what is essentially a rich panel data set[8].

In the absence of census data, I use instead in this analysis the publicly accessible data of 1989 China Health and Nutrition Survey (CHNS) and the 1995 and 2002 Chinese Household Income Project (CHIP) to examine the national pattern. The CHNS is an on-going international collaborative project and designed to primarily examine how the social and economic changes in China are affecting the health and nutritional status of the its population. The CHNS covers both urban and rural areas in nine provinces that vary substantially in geography, economic development, public resources, and health indicators and its data is hence nationally representative. Unfortunately, the CHNS does not contain migration information. I therefore use the 1995 and 2002 wave of the CHIP data to document changes in marriage rates and migration rates at the national level. The CHIP collects nationally representative data to measure and estimate the distribution of personal income in both rural and urban areas in China. It's 1995 wave covers 19 provinces and the 2002 wave covers 22 provinces.

[8]The details about the data set can be found in chapter 1 of this dissertation.

The marital status questions used in the CHIP data are identical across time and also identical to the one used in the 1989 CHNS. Unlike the CHNS data, the CHIP data contain information on migration. The 1995 CHIP defines migration as leaving the local village for work for at least a month in the past year and designs a straight-forward question soliciting such information. The 2002 CHIP breaks the migration information into parts and first asks the number of days an individual worked outside home in the past year and then asks for the location of the employment. I synthesize the information in the 2002 CHIP to create a migration indicator that is comparable to the definition of migration in the 1995 CHIP.

3.2.B Declining Marriage Rates

It has been taken for granted in rural China that as men and women approach their legal marriage age, which is 22 for men and 20 for women, they would get married. Traditionally, a good proportion of Chinese rural men and women were married in their early twenties. For Zhijiang as a whole, 83% of men 22 to 26 and 74% of women 20 to 24 were married in 1987. In 1997, however, the proportions married within the first five-year window since the legal marriage age dropped to 67% for men and 70% for women. In 2007, the respective shares further dropped to 22% for men and 19% for women.

This is not a local phenomenon. Using nationally representative data, I find that for both men and women the proportions married within the first five-year window since the legal marriage age fell markedly between 1989 and 2002. For example, 61% of rural men 22 to 26 and 44% of women 20 to 24 were married in 1989. In 1995, the respective proportions dropped to 43% and 32%. The shares of

married men and women in their early twenties continued to decline and in 2002, 32% of men 22 to 26 and 29% of women 20 to 24 were married in rural China. The national downtrend is not driven by specific regions. Table 3.4 lists the marriage rates for rural men 22 to 26 and rural women 20 to 24 for a presentative sample of 19 provinces in China in year 1995 and 2002. The reduction of marriage rates for rural young men is nearly across the board. The fall in female marriage rates is less dramatic in the national context, but it fell on average by 3 percentage point between 1995 and 2002 nevertheless.

A natural question concerning the fall is whether the decline reflects a change in the marriage age (i.e. a postponement of marriage) or an equilibrium change of the marriage rates (i.e. an increase in forgone marriages). It's difficult to draw a clear answer at this point, but evidences suggest that it is not simply an issue of rural people marrying late, for example, the phenomenon of the declining marriage rates is not limited to people in their early twenties. The proportion married in the late twenties also fell in the last two decades. In 1989, 92% of rural men 27 to 31 and 92% of rural women 25 to 29 were married, but in 2002, only 80% of men and 85% of women entered marriage in their late twenties in rural China. But the unmarried men and women in their late twenties could eventually get married in their thirties, yet for the more recent birth cohorts time need to pass before data concerning their transitions to marriage can be collected.

I present in Figure 3.1 and 3.2 the marriage-age trajectories for men and women of various birth cohorts in Zhijiang. Using the information on age at first marriage, I draw for men the trajectories of percentage married across different ages by birth-cohorts five-year apart, from the 1961-1965 birth cohort to the 1981-1985 birth cohort. Although the legal marriage age is 22 for men (and 20 for women), few reported to have been married at age 21 (and 19 for women), the spike comes

nonetheless for all birth-cohorts at 22 for men (and 20 for women). The median age for men at first marriage for the various birth cohorts has remained at 22 for the 1961-1965, 1966-1970, and 1981-1985 cohorts, and rose to 23 for the 1971-1975 and 1976-1980 cohorts. For women, the median age at first marriage has been at 21 except for the 1976-1980 birth cohort, which rose to be 22. Figure 3.1 shows that men of the 1961-1965 and 1966-1970 birth cohorts have quite similar marriage trajectories, both trajectories asymptote to 100% after reaching mid to late thirties. The marriage trajectory of men born between 1971 and 1975 lies farther below the trajectories of the earlier cohorts, indicating a decline of marriage rate at every age in one's twenties and early thirties; but the trajectory of this birth-cohort of men quickly asymptotes to 100% around mid to late thirties, resulting virtually no bachelors in this cohort as men age. The younger cohorts (born between 1976-1985), however, could have different marriage trajectories than the older cohorts, and there could be a non-negligible proportion of unmarried men in these younger birth cohorts as men age, the extent to which is however difficult to gauge. Figure 3.2 presents the case for women. The pattern of marriage-age trajectories for women show that for women born between 1961 and 1975, over 80% were already married by the age 23, almost 100% were married by the age 30. However, for women in the more recent birth cohort (those born between 1981 and 1985), only 40% were married before the age 23, the marriage trajectory for this cohort could asymptote to 100% once they reach their thirties, it could also level off before reaching 100%. Since the information on marriage collected in Zhijiang ends in 2007, the trajectories are incomplete for men and women in the more recent birth cohorts.

Declines of first-marriage rates among people in their early twenties have been extensively documented in the developed countries, notably the U.S. and most of the other Western nations, since the 1970s (Eldrige and Kiernan (1985);

Bumpass et al. (1991); Gould and Paserman (2003)). These declines coincide with a shift in attitude away formal marriage and a rising trend of cohabitation, which to a certain extent replaces formal couplehood at an early age. Does the fall in marriage rates observed in rural China simply imply an increase in the rate of cohabitation that may be a prelude to or a substitute for formal marriage? Research on premarital cohabitation in rural China is scarce. A survey conducted in rural areas of Shanxi province (Qiao (2000)) in 2000 shows that most of the adult rural residents oppose cohabitation replacing formal marriages as a living arrangement, but 30% of the young people (aged 18 to 24) interviewed acknowledge that premarital cohabitation is a private matter and need not be rejected because it defies tradition. There are anecdotal evidences indicating the existence of premarital cohabitation in rural China and that it is more tolerated by the rural-urban migrant population, but these reports also acknowledge that even among the migrants the incidences of cohabitation are still quite limited, the traditional institution of marriage still dominates the rural scene and cohabitation is in general tabooed and sanctioned by the local villages (Chen (2003); Zhou (2009)).

Rising divorce rates could also influence people's decision to enter marriage. In the past thirty years, there has been an upsurge of divorces in China. For China as a whole, the number of divorces per 1,000 population (the crude divorce rate) increased steadily from 0.35 in 1978 to 0.95 in 1998 (Wang (2001)), and rose to 1.37 in 2005. However, China's present level of divorce rate is still low by Western standards (e.g., the crude divorce rate is 2.7 in Japan in 2001 and 4.1 in the U.S. in 2000). It is very hard to find data on divorce disaggregated by urban and rural areas in China. What researchers have agreed upon is that the incidence of divorce in rural China is on the rise but remains low relative to its urban counterpart (Gao (1998); Wang (2001)). The sharp fall of first-marriage rates for young people in rural China since the 1980s therefore cannot be interpreted

simply as a shift of preference away from the formal institution of marriage, and its reasons need to be found in the more substantial changes in the local marriage markets since the Chinese economic reform.

3.3 the Bride Drain

China has since the 1950s an unusually large rural-urban divide. The dualistic system was institutionally imposed and maintained by strict mobility controls. Residents in its rural and urban areas have essentially two different forms of citizenship (Naughton (2007)), and they consume, work, and invest in different goods, labor, and capital markets. This is especially true in the marriage markets. The marriage markets have been segmented for the rural and urban population mainly through the household registration system (the *hukou* system). Within the system, rural residents were tied to the land and could not move to cities to live or find employment. In addition, the system made it extremely difficult for farmers to convert their rural *hukou* status to that of an urban one in order to enjoy the level of benefits and public goods provided in the city. Rural men and women were therefore physically restricted to enter the urban marriage markets and were also socially and economically disadvantaged as potential marriage partners. The rural-urban migration ushered in by the Chinese economic reform, however, has changed the landscape of the marriage markets, and relative to rural men, rural women have a better access to the suburban and urban marriage markets via migration.

Deeply embedded in the Chinese marriage culture is norm of patrilocal residence in addition to the the practice of hypergamy[9]. Hypergamy originally

[9]I thank Professor Barry Naughton for making a forthright point about this feature in the

refers to the custom among Hindu women of "marrying up" into a caste at least as high as their own. The term also describes the common and cross-cultural tendency for women to marry better-off men. Chinese culture is unusually explicit about hypergamy. Husbands are expected to be "superior" to or at least as well off as their wives in socioeconomic status, they are also expected to provide housing for their brides upon marriage (Fan and Huang (1998)). In rural China, the provision of housing for wives takes the form of patrilocal residence, a system in which the married couple lives with or close to the husband's parents. Although migration could potentially expand rural men's marriage markets, they still primarily search in the local marriage markets for spouses. This is because except for few elite rural male migrants who have managed to purchase housing and settle down in cities, the majority of the rural male migrants cannot expect to "marry up" into more prestigious urban social groups, the pool of potential urban wives is still not opened to rural men. And rural men will turn to their hometowns to search for wives. Using data I have collected in Zhijiang, I compile in Table 3.5 the origin of wives for the married males of different birth-cohorts in year 2005, distinguished by men's migration status. Regardless of men's migration status, at least 65% of men in each five-year birth cohort found wives within the rural communities of Zhijiang, over 85% found wives within the same province. Wives of other-province origin[10] are increasing for people in the younger birth cohorts, yet constitute still a small proportion. It's difficult to compile a similar table for the origin of husbands for the locally born married women. Because of the patrilocal marriage custom, women in general follow their husbands after marriage and disappear from my sampling frame as they change their household registration location and/or status. Although the permanent migration and household registration information for all the children and siblings of the household head was obtained in the Zhijiang data,

Chinese culture.

[10]The Zhijiang data is not yet coded in such a way as to tell whether the wives of outside province origin are rural or urban. Presumably most of these wives came from rural origins.

it was yet to be coded by gender, making it practically difficult to trace how many women have changed their household registration location by marrying husbands of suburban or urban origin.

The urban marriage markets could be less limiting to rural women compared to rural men. Because women's inferior social and economic status are less of an obstacle than men in the marriage markets, the prospect of "marrying up" into more prestigious social group in urban areas has always existed for women. However, from the 1950s into the 1990s, the household registration legislation stipulated that children's *hukou* status must be inherited from their mothers' *hukou* status, and this made rural women undesirable in the urban marriage market. Urban males who married rural women would have had to deal with the fact that their offspring would not have the same privileges they had, and might not even allowed to go to the urban school, live in the same place and assume the same *hukou* status. The traditional practice of patrilocal residence in marriage made the concern for the hereditability of *hukou* status of one's children and its related privileges work invariably against the taking of rural wives by urban males.

Between 1985 and 1990, as the mobility restrictions started to unwind and rural-urban migration budded, rural men preceded women to leave the countryside as most of the urban jobs were in construction industries. But even at this early stage, female migrants took advantage of the mobility relaxation and extended their marriage markets to more developed rural and suburban areas. According to the 1990 Census, marriage was the leading reason of female migration, accounting for 28% of inter-province female migration. Fan and Li (2002) find in their field study in western Guangdong (the prominent migrant-destination province) that 60% of the female migrants they interviewed left their home villages to "marry up" into a higher income and better region. They also find that the migrant women

consider rural men in richer coastal areas more desirable than rural men in their relatively poorer hometown. Those who marry the migrant rural women in the more developed rural areas are found to be older and poorer relative to other men in the same region, some are even mentally or physically handicapped (Fan and Huang (1998)), however, their favorable residential location and the employment opportunities the location purports compensate for their perceived lower ranking in the socioeconomic status. This pattern of lower status men in wealthier regions marrying migrant women from poorer regions holds internationally as well. Humbeck (1996) finds that in Germany, women from Thailand married German who are older and less educated. Piper (1999) cites that rural Japanese men imported wives from Korea, Thailand, China, and Philippines when face problems in the domestic marriage markets. In a recent overview article, Jones and Shen (2009)[11]present more evidence on how relatively less educated men from more developed countries such as Japan, Taiwan, South Korea, and Singapore are increasingly seeking brides from poorer countries such as China, Philippines, Thailand, and Vietnam who are not in as "choosy" a position as local women if they wish to get secure and legal residence status in the host country.

Since the second half of the 1990s, rural women accelerated their exodus from the countryside and the female migrant population was increasingly younger and composed of single women (De Brauw et al. (2002)). It should be noted that it is not the case that more women migrate than men; in fact, more men migrate than women (Liang and Ma (2004)). The crucial and interesting fact is that some significant number of women who are migrating are young and single, and their marriage trajectories after migration are quite different - unlike rural men, they have the option of leaving behind the local marriage markets and looking for spouses in wealthier suburban or urban areas. In 1998, a new policy changed the

[11]I thank Professor Barry Naughton for providing the reference.

hukou inheritance law and began to allow children to inherit their *huku* status from either parent. This policy could have removed a great deal of discrimination that the urban marriage market had against rural women. However, hardly any research has been done to investigate how rural women fared in the urban marriage market after this law change. Recently, few researchers (Chyi (2009)) began to study how urban men had benefited by the *hukou* system - that is, rural women would not refrain from marrying urban men with relatively lower socio-economic status in order to acquire urban residency.

Labor migration has expanded the marriage market for rural women in China, female out-migrants not only marry other rural men in more affluent regions, they also marry urban-dwellers and stay in cities. However, rural men are excluded from the urban marriage market due to their low social status, inability to purchase housing and settle down in cities. With local women expect to "marry up" after migration, the local pool of potential wives is diminished, creating a bride drain for Chinese rural men. By studying the bride drain in this paper, I am not discounting the possibility of a groom drain caused by male out-migration, which could possibly explain the drop in female marriage rates. The focus on the bride drain acknowledges first that rural men, unlike rural women, do not have the option of "marrying up", i.e., entering the urban marriage markets, and are primarily confined to the local marriage markets. It also illustrates the practical difficulty of documenting the origin of husbands for the locally born rural women in the absence of suitable data.

3.4 Model Specification and Empirical Results

I take advantage of the variation in marriage and migration rates across Zhijiang's nine townships and over time in order to establish the link between male marriage propensity at the individual level and female out-migration at the township level. An underlying assumption is that rural men's local marriage market is not only primarily confined to the local municipality but to the local township. This assumption is quite reasonable as rural men often look for wives in the vicinity of their local community. Take Zhijiang for example, in 2005, 31% of all married men took wives from own village, 32% from other village in the same township, 17% from other townships in Zhijiang, and 16% come from municipalities nearby in the same province, the remaining 4% took wives from other provinces. In sum, 63% of the husbands found wives within the same township, 80% within the same municipality. I model the individual marital decision of men using a probit model, the basic empirical specification is:

$$P(M_{ijt} = 1) = \Phi(\alpha_0 + \alpha_1 F_{jt} + \alpha_2 S_{jt} + \alpha_3 X_{ij} + \delta_j + \delta t + \lambda_j t + \varepsilon_{ijt}) \qquad (3.4.1)$$

where M_{ijt} is a dummy variable with value 1 if man i in township j at time t was married, and with value 0 otherwise. F_{jt} is the key variable of interest, it is the migration rate of young women in township j at time t; S_{jt} is the age-specific proportions of young men over young women in township j at time t, the sex ratio measures the intensiveness of men's competition for women in a given locality over time. X_{ij} contains individual characteristics that do not vary across time, such as education. δ_j and δt are the township and year dummies that account for the unobserved township level fixed effect and all the national trends in the tastes for marriage, such as contraceptive methods, technological progresses

in household production, divorce laws, and social norms. By controlling for the township fixed effect, the regression will yield consistent estimates for my key variable of interest if the unobserved township characteristics that are correlated with both marriage and migration are indeed time-invariant. $\lambda_j t$ is a township-specific linear time trend. By including it in the specification along with the township fixed effect, all the cross-township variation in the levels and trends have been thrown away. The parameter of interest is therefore identified only from deviation in the female migration rates and in men's marriage rates from a township-specific linear trend. In other words, I am assuming that the variations around the transition path of each township's female out-migration are random. If a time varying township level characteristic, such as the township specific business cycle, is negatively associated with female out-migration and positively correlated with male marriage propensity, then the coefficient estimate of key variable will be negatively biased (i.e., biased away from zero). ε_{ijt} captures all the other unobserved shocks to one's marriage decision. The parameter of interest is α_1, according to the the bride drain explanation, it is expected to be negative.

My main sample consists of over 1000 men in the age cohort 22-26 in Zhijiang's 9 townships in year 1985, 1990, 1995, 2000, and 2005. There is no specific reason why a five-year interval is chosen over the six or seven-year intervals. I have performed the same analyses separately for men aged 22 to 27 and 22 to 28, the regressions yield similar results. To operationalize the female migration variable F_{jt}, I first define migration as leaving one's home township for at least three consecutive months within a given year. The migration rate of young women is then defined as the proportion of female migrants in the age cohorts of 20 to 26. This age cohort is chosen because only female aged 20 and above are eligible for marriage so that their leaving the countryside could potentially deplete the local marriage market. Various age cohorts, such as 20-24, 20-25, have also been

examined, slightly different definition of the age cohorts do not alter the estimation results or the statistical significance of the coefficient estimates of interest. The age specific sex ratio variable S_{jt} is defined as the number of men aged 22 through 26 divided by the number of women aged 20 through 24 in each township across time. The sex ratio variable is a time-varying township level variable, based on 5-year age groups. Ideally, the sex ratio should pertain to the actual age cohorts and should not be calculated based on the current residents. In the Zhijiang data, the age and gender information on all the children and siblings of the household head was collected and the children and sibling data can be treated as separate random samples and used to compute the appropriate sex ratios. However, the data is yet to be coded by sex. Therefore, in this study, I compute the sex ratio using the current sample. If the age-cohorts for women in the definition of the sex ratio were chosen to be even younger than men, for example, if the numerator changes to the number of women ages 18 through 22, the estimation results are hardly affected. Alternative definitions of the sex ratio such as the number of men aged 22 to 26 divided by the number of women aged 22 to 26 also do not alter the estimation results. The age cohorts of women are specified to be two year younger than men to account for the fact that men in general marry women younger than themselves. The summary statistics for selected years are presented in Table 3.6.

Column 1 in Table 3.7 presents the marginal effects probit results for the basic specification. Standard errors have been adjusted for clustering by both township and year. Since the key variable of interest is at a higher level of aggregation than the individual units, two dimension clustering allows for correlation among different townships in the same year and different years within the same township. After controlling for age, education, the local market sex ratio, the township and year fix effects, and township specific linear trend, men's marriage propensity decreases with female migration, and the coefficient estimate for the key

variable is negative and statistically significant. The magnitude of the estimated coefficient suggests that at the average values of the covariates, a 10 percentage point increase in the female migration rate in the 20-26 age cohort in Zhijiang will decrease men's marriage probability by 5 percent. The results also show that as sex ratio rises, male marriage propensity falls. Compared to men of primary school education, men of middle and high school education are more likely to get married. The marriage propensity however declines for men of college education, but this result is not statistically significant. Not surprisingly, for young men in their early twenties, the probability of marriage rises with age.

In column 2, I allow men of different education background to be impacted differently by female out-migration. The results suggest that relative to men of primary school education, men of college education are more affected by the bride drain brought about by female out-migration, and the result is statistically significant. Concurrent with the rising female migration is the rise in the formal schooling of women in rural China, the years of schooling for women of the 20-26 age cohort rose from 7.67 to 10.76 years from 1985 to 2007. The effect of female out-migration on male marriage could be overestimated if the growing female out-migration reflects partly the growing earning prospects for women who are increasingly better educated so that the "self-reliance" effect for women may take on prominence. In column 3 and 4, I include the township level time-varying variable of female education, measured by the formal years of schooling, to account for this consideration. After controlling for female education, female out-migration still exerts a statistically negative impact on male marriage probability.

In Table 3.8 I categorize men by migration status each year and examine whether migrant young men and non-migrant young men are both affected by the female out-migration. The results suggest that in Zhijiang, the phenomenon of

bride drain is affecting men regardless of their migration status. The estimated coefficients on female migration remain negative and statistically significant for both groups of men. Again it seems that the negative impact of female out-migration on male marriage propensity diminishes with education at least for those who do not have college degrees. The rise in female migration rates has a larger effect on migrant than on non-migrant, the difference is statistically significant at 5% level (standard error for the difference is obtained by running a fully specified model with a migrant status dummy and its interaction with all covariates). This is possibly due to the fact that non-migrants by staying in the local community can access the local marriage markets with more frequency.

To broaden the implication of my analysis beyond Zhijiang, I also examine the relationship between female out-migration and male marriage propensity using the nationally representative CHIP data. There are 58 counties in 19 provinces covered in both the 1995 and 2002 wave of the CHIP data. I use the same model specified in equation 3.4.1 but change the township level variable to that of the county level and define all the other relevant variables in similar ways. Table 3.9 presents the summary statistics. The estimation results are presented in Table 3.10. Male marriage probability again decreases with female out-migration, and the coefficient estimate for the key variable of interest is statistically significant too. The magnitude is much higher than that obtained in the Zhijiang data. A 10 percentage point increase in the female migration rate evaluated at the average values of the covariates will decrease men's marriage probability by 57 percent. Since the CHIP data also contain individual's monthly wage information in 1995 and 2002, I construct a county level non-farm average wage variable for men and women to proxy for local labor market conditions and include them in the regression in column 2. The coefficient estimate of the key variable of interest remains negative and statistically significant, despite the fact that it is positively correlated

with both female education and female wage. The non-farm monthly wage of men is positively associated with male marriage propensity, suggesting that the "good catch" effect dominates for men. Similar to the female out-migration rate and female education, the non-farm county level female wage rate is also negatively associated with male marriage rate, suggesting there might be "self-reliance" effect for women as earnings rise. In column 3 and 4, I perform the analysis on migrant men and non-migrant men separately. Regardless of the migration status, female migration negatively affected men's marriage propensity, just as found in the Zhijiang data, migrants are more negatively impacted than non-migrants, and the difference is statistically significant. The results also show that for migrant men, male marriage propensity diminishes with men's education level, but female out-migration exerts less negative impact on marriage propensity for men with higher levels of schooling.

The striking fall in the first-marriage rate of rural Chinese men in their early twenties and its relationship to the rise in young women's participation in migratory work in recent decades is not only obtained in the Zhijiang data, it is also found in the nationally representative data. In both cases, the estimation results suggest that the effect of female out-migration on male marriage propensity attenuates for men of higher education background; but the Zhijiang sample also indicates that men of college education is more affected by the rural bride drain. Female out-migration is positively correlated with female education, and by including female education in the regression, the effect of female migration on male marriage remains negative and statistically significant. The coefficient estimates for the sex ratio variable are also negative and statistically significant in both the Zhijiang and the national samples, supporting the predictions of the marital search model over the imbalanced sex ratio theory. Another common finding in both the Zhijiang and national data sets is that regardless of migration status,

female out-migration is negatively associated with male marriage probability, and the relationship is more pronounced for migrants than for non-migrants. Also for migrants, marriage propensity decreases with education, but the patten is only statistically significant in the national data. Including county level non-farm wages for both men and women in the regression does not wash out the effect of female out-migration on male marriage propensity, the key coefficient of interest is still significant even in the presence of multicollinearity. The results also show that men get married more when their local labor market prospects improve (relative to women) and, except for migrant men, the marriage propensity decreases for men when labor market prospects for women are relatively better.

3.5 Conclusion

The fall in the first-marriage rates among Chinese rural people in their early twenties in the past two decades is remarkable. This paper examines the impact of local female out-migration on the decline of men's marriage choices. Via migration, the marriage market for rural females has expanded and they can expect to "marry up" into suburban or urban social groups, however, for rural males, the marriage market is still primarily confined to the local market. This created a bride drain for rural men in the local community, shrinking the availability of local mates, and according to the marriage search model, the bride drain reduces the marriage incidence of men. Using both local and national data set, my results indeed show that male marriage propensity decreases with female out-migration and the result is robust after controlling for local level sex ratio, female education level, male wage rate, female wage rate, individual level male education and age, local fixed effect and national trends.

Another important finding in this paper is that female out-migration has reduced male marriage propensity regardless of the migration status of men and, compared to non-migrants, migrants are more affected by the bride drain in the local marriage market. There is also some evidence, especially among migrant men, that increased schooling can attenuate the negative impact of the bride drain. Since the key variable of interest in this paper is aggregated at a higher level than the individual unit, by controlling for the local fixed effect and locality-specific linear time trend, the parameter of interest is identified on the premise of whether the within-locality acceleration of female out-migration explains the within-locality deceleration of male marriage rates. Essentially, my identifying assumption is the randomness not of the long run transition path of female out-migration of each locality but of the variation from that transition path. In order to examine the impact of a shock to the migration options of local women on men's marriage choices in a cleaner manner, instrument for female out-migration needs to be found in future work.

The focus on the decline of male marriage rates in this paper in no way discounts the phenomenon of the fall in marriage rates among women in their twenties in rural China. Traditionally, virtually all rural women wed by about age 30, whether this pattern will continue to hold for the more recent birth cohort who is apparently marrying late is not fully known, the available evidence from Zhijiang suggests that women from this cohort might eventually get married too. While male out-migration could potentially create a similar groom drain for women whose marriage markets are confined locally, it is less reasonable that this should be the cause for the falling marriage rates for young women who can feasibly expand their marriage markets into wealthier regions. The impact of female out-migration on women's marriage pattern is not clear. While mobility expands women's marriage markets and can therefore drive up marriage incidence for women, rising

female wage, education and training (all are positively associated with female out-migration) could also make women more confident of their ability to find a good suitor and therefore more willing to keep their option open longer, knowing that by delaying marriage for a while they would improve marriage prospects in the long run. Future research can investigate rural female marriage pattern and its relationship with female out-migration.

As Becker (1973) pointed out, marital patterns have major implications for fertility decision, population growth, inequality in income, and the allocation of leisure and other household resources. Possible extensions of this research involve the study of the consequences of the bride drain, for example, of its impact on fertility and on female bargaining power in the marriage market and in the household. The relationship between the intensities of female migration and factors that reflect female bargaining power, such as the bride price they command in the marriage market and the outcome on children within the household may be interesting to look at in future research.

3.6 Figures and Tables

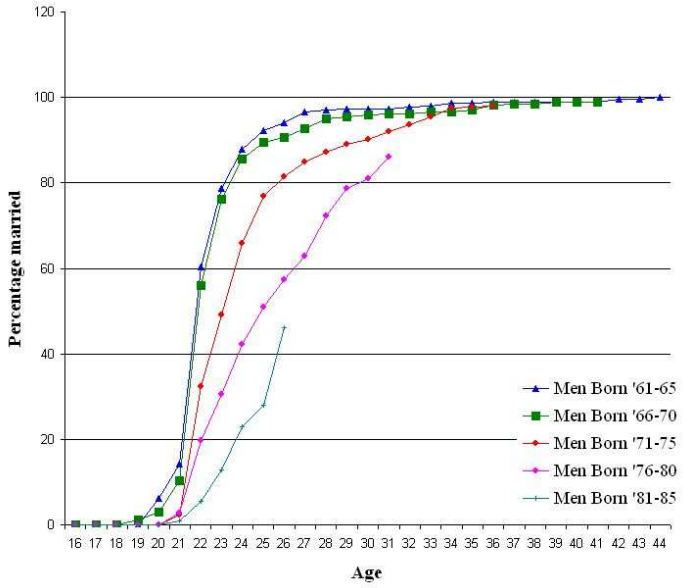

Figure 3.1: Men's Marriage-Age Trajectories, Zhijiang

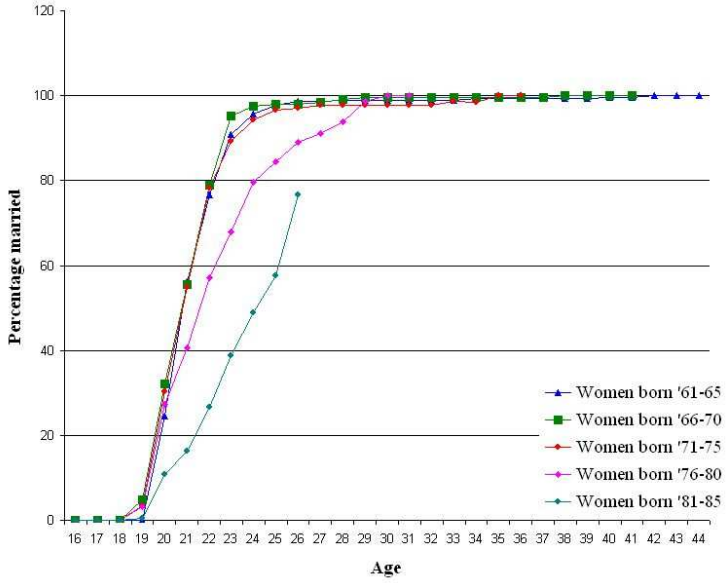

Figure 3.2: Women's Marriage-Age Trajectories, Zhijiang

Table 3.1: Sex Ratios in Rural China from 1995 to 2002, Various Age Cohorts

Age Cohorts	1995	2002
22-26	1.09	1.14
20-24	0.97	1.07
16-20	0.93	1.01
11-15	1.20	1.15
6-10	1.17	1.24
1-5	1.22	1.16

Note: This table table was constructed using the 1995 and 2002 wave of Chinese Household Income Project. Sex ratio here is defined as the number of males over the number of females in each age cohorts.

Table 3.2: Declining Male Marriage and Rising Female Migration in Zhijiang, 1985 - 2007

Year	Marriage Rate		Migration Rate	
	Men 22-26	Δ (in %)	Women 20-24	Δ (in %)
1985	79.8		0.0	
1990	79.7	-0.1	2.8	2.8
1995	73.0	-6.7	10.3	7.5
2000	49.2	-23.8	33.1	22.8
2005	28.0	-21.2	65.5	32.4

Table 3.3: Rising Female Migration in Rural China, 1995 - 2002

Age cohorts of females	1995 % migrated	% unmarried female migrants	2002 % migrated	% unmarried female migrants
16-19	9.39	95	18.42	97
20-24	15.35	88	35.14	86
25-29	2.81	41	18.05	32
30-34	2.25	0	11.41	2
35-39	1.39	0	6.84	0
40-54	0.80	0	4.20	0

Note: This table was constructed using the 1995 and 2002 wave of Chinese Household Income Project.

Table 3.4: Declining Marriage in Rural China, 1995 - 2002

	Men 22-26, (in %)			Women 20-24, (in %)		
Province	1995	2002	Δ	1995	2002	Δ
Beijing	22	20	-2	16	25	9
Hebei	54	36	-18	34	17	-18
Shanxi	30	26	-4	21	24	3
Liaoning	25	28	3	29	31	2
Jilin	69	46	-23	42	34	-7
Jiangsu	42	37	-6	36	23	-13
Zhejiang	27	24	-3	21	25	4
Anhui	40	39	-1	31	27	-5
Jiangxi	42	41	-1	34	46	12
Shangdong	41	24	-17	11	14	3
Henan	48	38	-11	27	31	5
Hubei	61	22	-39	44	22	-22
Hunan	28	24	-4	28	17	-12
Guangdong	25	15	-9	16	16	0
Sichuan	52	42	-10	36	41	5
Guizhou	40	38	-1	29	48	18
Yunnan	41	40	-1	49	47	-3
Shaanxi	55	21	-34	39	27	-12
Gansu	53	50	-3	56	40	-16
Average	43	32	-11	32	29	-3

Note: This table was constructed using the 1995 and 2002 Chinese Household Income Project.

Table 3.5: Origin of Wives by Husbands' Migration Status in Zhijiang

Birth Cohort	Nonmigrant (in %)			Migrant (in %)		
	within Zhijiang	within Hubei	other province	within Zhijiang	within Hubei	other province
1936-1940	67	92	8	no	migrant	
1941-1945	78	100		no	migrant	
1946-1950	81	97	2.6	100		
1951-1955	77	97	3	77.7	100	
1956-1960	83	98.1	1.9	94.7	100	
1961-1965	89	98.2	1.7	79	95.4	4.6
1966-1970	76	98	1.95	76	96.8	3.2
1971-1975	76	94.9	5.1	70	93	7
1976-1980	100			71	85.7	14.3
1981-1985	no	married	males	no	married	males

Table 3.6: Summary Statistics (Zhijiang, Selected Years)

	1985	1995	2005
Percent male 22-26 married	79.76	73.03	28
Percent female 20-26 migrated	0	7.5	64.8
Sex ratio	0.99	1.11	1.2
Mean years of schooling female 20-26	7.5	8.35	10.04
Percent male 22-26 primary	8.5	3.73	3.5
Percent male 22-26 middle school	61.9	83.06	64.5
Percent male 22-26 high school	29.55	10.78	25
Percent male 22-26 college	0	2.41	7

Table 3.7: Probit Model of Being Married, Men 22-26 (Zhijiang, 1985, 1990, 1995, 2000, 2005)

	(1)	(2)	(3)	(4)
Female migration	-0.005*	-0.005	-0.006***	-0.006***
	(0.003)	(0.006)	(0.002)	(0.002)
Sex ratio	-0.21**	-0.21***	-0.25***	-0.26***
	(0.06)	(0.06)	(0.02)	(0.03)
Female education			-0.08*	-0.09**
			(0.05)	(0.04)
Middle school	0.12	0.14*	0.11	0.12
	(0.17)	(0.22)	(0.18)	(0.19)
High school	0.17	0.15	0.18	0.15
	(0.12)	(0.18)	(0.13)	(0.63)
College	-0.36	0.42***	-0.35	0.42***
	(0.24)	(0.01)	(0.25)	(0.004)
Middle school×		-0.001		0.002
female migration		(0.005)		(0.003)
High school×		0.002		0.003**
female migration		(0.004)		(0.001)
College×		-0.133***		-0.135***
female migration		(0.001)		(0.002)
Age	0.15***	0.16***	0.15***	0.16***
	(0.03)	(0.02)	(0.003)	(0.003)
Year dummies	Yes	Yes	Yes	Yes
Township dummies	Yes	Yes	Yes	Yes
Township specific linear time trends	Yes	Yes	Yes	Yes
No. of observation	1062	1062	1062	1062

Note: Standard errors in parentheses are adjusted for clustering by township and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level.

Table 3.8: Probit Model of Being Married, Men 22-26, by Migration Status (Zhijiang, 1985, 1990, 1995, 2000, 2005)

	Migrant	Non-migrant
Female migration	-0.023**	-0.005*
	(0.01)	(0.003)
Sex ratio	-0.22	-0.17*
	(0.36)	(0.08)
Female education	0.09	-0.065
	(0.15)	(0.06)
Middle school	-0.08	0.14
	(0.54)	(0.14)
High school	-0.05	0.15*
	(0.49)	(0.08)
College		0.305***
		(0.007)
Middle school×	0.009	-0.001
female migration	(0.009)	(0.006)
High school×	0.014*	0.003*
female migration	(0.008)	(0.001)
College×		-0.11***
female migration		(0.003)
Age	0.22***	0.12***
	(0.02)	(0.004)
Year dummies	Yes	Yes
Township dummies	Yes	Yes
Township specific linear time trends	Yes	Yes
No. of observation	275	783

Note: Standard errors in parentheses are adjusted for clustering by township and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level.

Table 3.9: Summary Statistics (CHIP 1995, 2002)

	1995	2002
Percent male 22-26 married	43	32
Percent female 20-26 migrated	12	44
Sex ratio	1.07	1.2
Mean years of schooling female 20-26	7.27	8.44
Percent male 22-26 primary	25.73	10.34
Percent male 22-26 middle school	57	61
Percent male 22-26 high school	13.89	19.37
Percent male 22-26 college	1.09	8.09
Mean male monthly wage	530	650
Mean female monthly wage	381	480

Table 3.10: Probit Model of Being Married, Men 22-26 (CHIP 1995, 2002)

	All Men Aged 22-26		Migrant	Non-migrant
	(1)	(2)	(3)	(4)
Female migration	-0.057***	-0.03*	-0.10***	-0.07***
	(0.01)	(0.014)	(0.01)	(0.01)
Sex ratio	-0.29***	-0.53***	-0.62***	-0.25***
	(0.01)	(0.02)	(0.05)	(0.01)
Female education	0.17***	-0.05***	0.73***	0.26***
	(0.01)	(0.005)	(0.02)	(0.005)
Mean county female wage		-0.04***	0.4***	-0.1***
		(0.005)	(0.02)	(0.01)
Mean county male wage		0.1***	0.09***	0.8***
		(0.004)	(0.02)	(0.01)
Middle school	-0.05	-0.05	-0.85***	0.06
	(0.20)	(0.20)	(0.13)	(0.21)
High school	-0.01	-0.01	-0.91***	0.05
	(0.16)	(0.16)	(0.03)	(0.22)
College	-0.27***	-0.27***	-0.44***	-0.26
	(0.07)	(0.07)	(0.01)	(0.15)
Middle school×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.02)	(0.003)	(0.02)
High school×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.01)	(0.003)	(0.02)
College×	0.02	0.02	0.05***	0.02
female migration	(0.01)	(0.01)	(0.005)	(0.02)
Age	0.15***	0.15***	0.07***	0.18***
	(0.01)	(0.01)	(0.01)	(0.01)
Year dummies	Yes	Yes	Yes	Yes
County dummies	Yes	Yes	Yes	Yes
County specific linear time trends	Yes	Yes	Yes	Yes
No. of observation	1581	1581	543	964

Note: Standard errors in parentheses are adjusted for clustering by county and year. *, **, *** mean that estimated coefficient is significant at 10%, 5% and 1% level. Female and male wages are measured in hundreds of yuan.

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