

# Migrant Remittances: Mixed Motives and the Impact on Household Expenditures

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*(Work in progress. Please do not cite or circulate.)*

## Abstract

The flow of remittance signals the economic connection between migrants and their households of origin, despite the physical separation. A huge collection of literature investigates why migrants remit and whether household expenditure is affected by the inflow of remittances. Migrants' remittance sending behaviors can be driven by multiple factors. In addition to altruism and insurance that are explored in previous work, this study proposes a third possible motive: identity norm. I first develop a stylized theoretical framework that generates testable predictions on these three possible motives. Then, using a panel dataset pooled from three waves of the China Laborforce Dynamic Survey (CLDS), I find empirical evidence for migrants' remittance sending under mixed motives. The second part of the empirical analysis examines the impact of migrant remittances on household expenditure. When the amount of migrant remittances is one percent higher, household total expenditure per capita increases by roughly five percent, which is driven mainly by consumptive expenses. Specifically, I observe an increase in several subcategories of household expenditure, including housing, medical care, education, commuting and gift sending, following the receipt of migrant remittances. These findings generally point to a welfare improvement for the migrant-sending households in rural China.

**Keywords:** migrant workers; motives; remittance; expenditure; rural households; China

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# 1 Introduction

Migration of labor out of agriculture is a primary feature of economic development (Rozelle et al., 1999; de Brauw and Harigaya, 2007). Not surprisingly, in many developing countries, rural workers migrate to cities, or even abroad, for better job opportunities. Although physically separated, migrants are still connected with their households of origin via the remittance that they send back home. According to statistics from the World Bank, the amount of officially recorded international remittances has increased substantially from less than 2 billion U.S. Dollars (USD) in 1970 to roughly 716.67 billion USD by the end of 2019.<sup>1</sup> The noticeable scale of international remittances has prompted substantial research on international remittance flows and the impact on source households in the country of origin (Adams, 1998; Yang and Choi, 2007; Yang, 2008; Adams and Cuecuecha, 2010). Evidence from developing countries in Asia and the Pacific suggest that remittances have a significant impact on poverty reduction through several channels (Jongwanich, 2007). In a broader sense, remittances are defined as a source of income that households receive from migrant workers, which are sent as cash or in kind, via formal or informal channels (Yang, 2011). This study takes a relatively narrower perspective by focusing on domestic remittance sending and receiving in China between migrant workers in the urban sector and their left-behind households in the rural communities of origin.

The goal of this study is twofold. First, I investigate the potential motives of remittance sending. The altruistic motive involves at least two components: “social loafing” and “dependent caring” (Vanwey, 2004). The more migrants that a household sends out, the lower amount of remittance that each migrant sends back. Relatedly, the more dependents in a household, the greater amount of remittance each migrant sends home. The theory of the insurance motive is based on migrants sending back more remittances in respond to income shocks that hit the left-behind household. Additionally, the theory of remittance as a response to identity norm or peer pressure is substantiated if the amount of remittance from each migrant is affected by the remittance sending behaviors of migrants that come from the same rural community. Second, I explore the allocation

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<sup>1</sup>Data Source: The World Bank Group. *Migration and Remittances Data*, updated as of October 2020 (<http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data>).

of migrant remittances within rural households by examining changes in each category of expenditure following the receipt of remittances. It is of special interest to compare changes in household expenditures for productive purposes (for example, farm inputs) and those considered as unproductive or consumptive (for example, housing).

There is an extensive literature on the motivations behind migrants' remittance sending practices. To start with, remittances can be sent out of migrants' altruism. Altruism itself can be hard to define, but there are certain features that may reveal the altruistic motivation behind remittance sending. First, "loafing" occurs when multiple migrants each send smaller remittances, presumably because they rely on their fellow migrants to contribute to the household as well (Agarwal and Horowitz, 2002). Second, family ties between the migrant and the household can also affect altruistic remittances (Vanwey, 2004). When there are more dependents of the migrant left behind (e.g. spouse, children and elderly members), a higher amount of remittances is expected. Previous studies also documents that remittance sent out of altruism tend to decrease in amount over time (Rapoport and Docuquier, 2006). Additionally, there is usually a positive correlation between the amount of altruistic remittance and migrants' wage earnings. When altruistic migrants earn more in the destination, they tend to remit a higher amount to their households of origin (Joseph et al., 2014).

The second theory on remittance sending deems risk sharing as the main driving force. According to this theory, the connection between migrants and households of origin is essentially an insurance or contractual scheme, which is often implicit or informal. Rural households are susceptible to a variety of shocks. Some of them are covariate or community-level risks, like natural disasters; while others are idiosyncratic or household-specific, like health, ritual or other forms of financial shocks (Günther and Harttgen, 2009). Previous studies document an increase in migrant remittance when rainfall shocks hit the household at home, with evidence from both the Philippines (Yang and Choi, 2007) and Nicaragua (Molina Millán, 2015). Related studies also discuss financial shocks from large amount of ritual and social spending in rural areas of China (Brown et al., 2011) as well as Thailand and Vietnam (Gloede et al., 2015). Due to status concerns in

the local community, this kind of expense is often inevitable.<sup>2</sup> When these ritual events take place too frequently and the aggregate social spending becomes unaffordable for rural households, it is natural for these households to seek financial support from the migrants that are connected to them. Relatedly, there are also accounts of information asymmetry about migrants' real earnings in the large cities (Joseph et al., 2018; Baseler, 2019) and the problem of migrant control over remittances (Ashraf et al., 2011).

In summary, theories on the altruistic and insurance motives of remittance sending are well established in the literature. However, existing studies have largely ignored another potential motive: identity norm. Identity is fundamental to economic behaviors (Akerlof and Kranton, 2000). The affiliation to a certain social category is often confounded with factors like socio-economic status and peer pressure (Austen-Smith and Fryer, 2005; Benjamin et al., 2010). When identity consideration is in place, individuals may end up with an optimal action that deviates from their original optimum. This is true not just for risk preference (Benjamin et al., 2010), but also for micro-economic behaviors like migrants' remittance sending.

In addition to motivations, relevant studies in the literature also evaluate the impact of migrant remittances on household saving, expenditure and investment, which are often seen as measurements for household welfare.<sup>3</sup> Empirical evidence mostly comes from the developing world, including Pakistan (Adams, 1998; Ahmed et al., 2018), Vietnam (de Brauw and Harigaya, 2007), Guatemala (Adams and Cuecuecha, 2010), Ecuador (Bertoli and Marchetta, 2014), Kenya (Bang et al., 2016) and Thailand (Disney et al., 2017). In the context of China, the "lost-labor effect" of migration on the left-behind household is often discussed. For example, Rozelle et al. (1999) find a significant decrease in maize yield in northeast China following labor out-migration. Taylor et al. (2003) show that remittances sent home by migrants partially make up for the "lost-labor effect" in crop production, contributing to an increase in household income through elevated crop productivity. Another interesting debate is the impact of migration or remittance sending

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<sup>2</sup>Occasions that can generate ritual and social spending include wedding, funeral, and other gatherings to celebrate major life events like child's birth or moving to a new house.

<sup>3</sup>One concern discussed in Barham and Boucher (1998) is that remittances may not be an exogenous income source, as their findings suggest lower income inequality in the no-migration counterfactuals than what it appears in the observed income distribution.

on household productive or consumptive expenditures. Using survey data from six selected provinces in China, de Brauw and Rozelle (2008) find no correlation between migration and productive investments. Instead, they find a significant increase in housing and other durable assets in areas with higher household median incomes. Additionally, other studies evaluate household consumption volatility after the receipt of remittances. For example, Zhu (2016) shows that remittances that are sent more frequently help households of origin smooth consumption over time. Kinnan et al. (2018) utilize inter-province migration links established historically as a result of the *sent-down youth* (SDY) program to predict access to migration in contemporary China, and show that improved access to migration reduces consumption volatility and asset holding as precautionary savings. On the other hand, increased expected migrant remittances following improved access to migration lead households of origin to participate in economic activities that are of the “high risk, high return” type.

This study builds on existing work but contributes to literature in the following ways. First, this paper is one of the few studies that recognize that migrants’ remittance sending can be a complicated decision-making process. The possible mixture of different motives is largely ignored in the literature. Instead, it is common in the literature that only one motive for remittance sending is substantiated (Agarwal and Horowitz, 2002; Yang and Choi, 2007; Joseph et al., 2014). This study first establishes a simple but informative theoretical framework to analyze the three possible motives: altruism, insurance and identity norm, among which identity norm is rarely discussed in previous work on the driving forces of remittance sending. Then, I test all these possible motives using household survey data from China. Second, among all the existing literature on migrant remittances, the two fundamental questions of “why do migrants remit” and “how do remittances affect the household” are strongly correlated, yet seldom discussed simultaneously. This study aims to present a more complete story on remittance sending and receiving in the context of China, where the annual volume of rural-to-urban migration is huge. Third, this study may contribute to the literature in econometric methods. While several papers address the potential endogeneity issue in evaluating the role of migrant remittances on the left-behind households (Yang and Choi, 2007; de Brauw and Harigaya, 2007; Robinson, 2012;

Kinnan et al., 2018), very few existing studies deal with the selection problem in the migrant sending decision for the household of origin. One exception is Bertoli and Marchetta (2014), which studies migration and poverty in Ecuador using propensity score matching to deal with the selection bias issue. In the empirical analysis of this study on the mixed motives for migrants' remittance sending, I correct for the selection bias associated with migrant sending using the Heckman-type correction for panel data. Taking a step further, I estimate a system of equations for migration, remittance sending and household expenditures similar to Rozelle et al. (1999) and Taylor et al. (2003) but with panel data, with a special interest on the impact of remittance inflow on household expenditures. I use a three-stage least squares (3SLS) model to address the endogeneity concern associated with contemporaneous correlations, which may be a contribution in econometric methods to the literature.

This paper proceeds as follows. In Section 2, I briefly review the institutional background on urban-rural inequality, reforms on the *hukou* system, and how these factors facilitate rural-to-urban migration in China. Section 3 develops a theoretical framework that explores the mixed motives behind the remittance-sending behaviors of migrant workers. Section 4 describes the data used in this study and illustrates the identification strategies to explore the motives of remittance sending and its welfare impact on rural households. Then, Section 5 reports the empirical results and discusses the main findings. Finally, Section 6 concludes and provides some discussion on the limitations of this study, as well as potential avenues for future research.

## 2 Institutional Background

In the historic development of internal migration in China, two elements can never be neglected. First, the reform on the *hukou* system removes institutional barriers and makes large volumes of internal migration possible. Second, the discrepancy between rural and urban areas in the economic development stimulates rural households to send out migrants to work in the large cities. This section reviews these two important factors that directly affect rural households' migrant-sending decisions.

## 2.1 The Household Registration System

The Household Registration System (HRS), also known as the *hukou* system, keeps record of the legal residential address and family relations of every citizen living in mainland China, during the whole period from birth to death. Prior to recent reforms, it also divided all citizens into urban and rural residents based on the address record (Chan and Zhang, 1999). For decades, it functioned as an institutional barrier set to prevent free flows of the rural population into cities. Since the official enforcement of the *hukou* system in 1958, an “invisible wall” has been built between urban and rural areas.<sup>4</sup> Only residents holding an urban *hukou* were entitled to access a variety of social welfare benefits, including education, medical care, pension and qualification for certain jobs (Wu and Treiman, 2004). As a result, rural-to-urban migration was *de facto* prohibited before the 1980s (Wong and Huen, 1998).

The situation started to change in line with the rural and urban economic reforms around the late 1970s and the early 1980s. In 1985, the “temporary residence permit” was released for migrants over 16 years old who would like to live in urban areas for more than 6 months (Wong and Huen, 1998). While the requirement to apply for this permit was still a form of regulation on migration, it marked a new era for rural-to-urban migrants. Then, in 1993 and 1995, the Blue Chop Household Registration System (*lanyin hukou*) was implemented in Shanghai and Shenzhen as a special *hukou* in between a “temporary residence permit” and an official *hukou*. This was intended to attract academic talents, high-skilled workers and foreign investors to settle down in the two pioneer cities in the economic reform and opening-up. Afterwards, there were some trials and errors in the pilot of uniform household registration for urban and rural residents in the early 2000s. In August 2010, Chongqing was the first municipality (province level) that abandoned the demarcation between rural and urban household registration, aiming to attract three million migrant workers within two years. By the end of 2016, a total of 30 provinces had issued administrative documents to realize the uniform *hukou* registration within a

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<sup>4</sup>In June 1955, the State Council released the *Instructions on Establishing the Regular Household Registration System*, which is often seen as the very beginning of the *hukou* system. In January 1958, the Standing Committee of the National People’s Congress approved the *Regulations on Household Registration of the People’s Republic of China*. The *hukou* system was then officially implemented.

certain number of years.

## 2.2 The Urban-Rural Polarization in China

The rural and urban economic reforms in China starting from the late 1970s have contributed significantly to the nation's striking achievements in economic development. However, it is not all that perfect. One major social problem it generates is the urban-rural polarization, in particular, inequality in income distribution between urban and rural sectors. This has been a long-lasting and also disturbing issue since the late 1970s when China adopted the reform and opening-up policy. The gap between urban and rural sectors in terms of earnings and social welfare has been drastically widening since the early 1990s, when market began to play a more fundamental role in the economy. Zhao (1999a) shows that the economic return from migrant work is much higher than staying for farm production or local non-farm employment. It is documented that the overall increase in China's Gini index is largely driven by the rural-urban inequality (Wu and Perloff, 2005; Li, 2010). Given the huge discrepancy between the urban and rural economy, together with reforms on the *hukou* system, internal labor migration in China from rural to urban areas has witnessed a giant leap over the past three decades. Additionally, lineage network plays an important role in facilitating rural-to-urban migration by lowering migration costs for all social groups, especially for the poor (Foltz et al., 2020).

In the early 1990s, there were only around 30 million internal migrants moving from agriculture to industrial sectors in China. In contrast, by the end of 2019, the number of rural-to-urban migrant workers in China had reached 290.77 million.<sup>5</sup> Migrant workers either send money home regularly via wire transfers, or return home with a large sum of remittances right before the Lunar New Year. While official statistics are absent, it is almost certain that the total amount of remittance from internal migration in China is a non-negligible figure. Real-life observation suggests that these remittances are extremely helpful when various shocks hit the millions of rural households in China that live on tiny-scale family farms. In the sections to follow, I explore the motives of remittance

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<sup>5</sup>Data source: China's *National Bureau of Statistics* (NBS), *Annual Inspection Report on Migrant Workers (2019)*, published on 05/01/2020.

sending and how the receipt of remittances affects household expenditures.

### 3 Theoretical Framework

In this section, I first develop a baseline theoretical model to explore the two frequently discussed motives behind migrants' remittance sending, altruism and insurance. The general setting for this model is less developed regions in the world where households face constraints in both credit and labor markets. This model extends the two-player model developed by Rapoport and Docquier (2006) into multiple players and incorporates an extensive discussion on the first two motives of remittance sending, altruism and insurance. Then, I extend the baseline model and show how identity norm can affect migrants' remittance behaviors by borrowing the framework in Benjamin et al. (2010). In aggregate, this section generates five theoretical predictions that can be empirically tested.

#### 3.1 Individual Optimization

Consider a rural household of  $(m + n)$  members living for two periods. In the first period, all members of the household live in the rural home and each of them earn a deterministic income of  $w^0$ . In the second period, the household faces two states of the world, good ( $g$ ) and bad ( $b$ ). The probability of the bad state is  $p$  ( $0 < p < 1$ ), which is known to the household.<sup>6</sup> In the good state, each person earns an income of  $w^1$  ( $w^1 > w^0$ ) in the rural economy. In the bad state, however, there is a potential negative income shock to the household, the magnitude of which is denoted as  $s$  ( $0 < s \leq 1$ ). In that case, each of the agents earn an income of  $w^1(1 - s)$ . As an alternative, the household can choose to send  $m$  migrants to the urban sector ( $n > m > 0$ ).<sup>7</sup> Here, I assume that migrants and non-migrants are homogeneous in ability and working efficiency, and their pre-migration

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<sup>6</sup>This assumption can be strong, but is necessary to simplify my analysis and focus on the main points. A real-life scenario for this assumption can be an ideal weather forecast that predicts perfectly the probability of natural disasters, so that rural households can make arrangements accordingly.

<sup>7</sup>The assumption on the number of migrants and non-migrants is based on observed facts. In most rural households, migrants are a smaller group than those who stay at home.

earnings are identical.<sup>8</sup> Further, I assume that migration is only temporary or seasonal, meaning that migrants do not establish new households in the city.<sup>9</sup>

Suppose working in the city is without uncertainty and generates a wage income of  $w^m$  ( $w^m > w^1 > w^0$ ). However, migrating to the city is costly. The migration cost for each migrant worker is denoted by  $c$ , which cannot be financed by any single agent, but is affordable with the help from all non-migrants of the household ( $w^0 < c < \frac{m+n}{m}w^0$ ). Assume the share paid by the migrant is  $\theta$  ( $0 < \theta < 1$ ). If the household chooses to send a migrant, the migration cost needs to be paid by the end of the first period. Then, by the end of the second period, each migrant sends back state-contingent remittances. The amount of remittances received by the household in the good and bad states are denoted as  $R_g$  and  $R_b$ , respectively ( $R_b > 0$ , while  $R_g$  can be positive or negative; if it is negative, that means the household is supporting the migrants).

Assume all members in the household have homogeneous preference for wealth, and the utility of different people in the household is additive. Let  $v(\cdot)$  be the utility function of each agent, and  $\beta$  be the discount factor across two periods ( $0 < \beta \leq 1$ ). Assume that all agents are risk averse, i.e.  $v' > 0, v'' < 0$ . We can derive three sets of expected utility based on the setting: (a)  $E(V^0)$ , the expected utility of the household without migration; (b)  $E(V^m)$ , the expected utility of each migrant; and (c)  $E(V^n)$ , the expected utility of each non-migrant that stays at the rural home. They can be formally characterized by

$$\begin{aligned} E(V^0) &= (m+n)v(w^0) + \beta(m+n)[pv(w^1(1-s)) + (1-p)v(w^1)] \\ E(V^m) &= mv(w^0 - \theta c) + \beta m[pv(w^m - R_b) + (1-p)v(w^m - R_g)] \\ E(V^n) &= nv(w^0 - (1-\theta)c) + \beta n[pv(w^1(1-s) + R_b) + (1-p)v(w^1 + R_g)] \end{aligned}$$

The household expected utility with migration is given by  $E(V^1) = E(V^m) + \lambda E(V^n)$ , where  $\lambda > 0$  measures the weight assigned to the welfare of non-migrants in the household.

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<sup>8</sup>This can be a strong assumption, as migration is often positively selected on individual characteristics like skills or ability (Chiswick, 1999). However, taking this into account will complicate my analysis. Therefore, I stick to the simplifying assumption that all laborers in the household are homogeneous.

<sup>9</sup>Remittances can be lower, *ceteris paribus*, when migrants do settle down and form new households in the urban destination. However, in the context of China, *floating* migrants with *hukou* back at the rural home are the majority (Liang and Ma, 2004), which justifies the assumption made here.

From the perspective of the migrant, it can be seen as an alternative measure for altruism. With this setting, sending migrants is rational only if  $E(V^1) \geq E(V^0)$ , which indicates that the migration cost  $c$  should not exceed a ceiling, denoted as  $\bar{c}$ . This explains why there can be selection issues associated with migrant sending. In this case of sending migrants, migrants and non-migrants negotiate the share of migration costs and the amount of remittances in the two states of the world. The optimization problem can be characterized as

$$\max_{\theta, R_b, R_g} E(V^m) + \lambda E(V^n)$$

Plugging in the expressions for  $E(V^m)$  and  $E(V^n)$ , we can write down three first order conditions (FOCs) that solve the maximization problem.

$$\begin{aligned} [\theta] \quad & -mv'(w^0 - \theta c) + \lambda nv'(w^0 - (1 - \theta)c) = 0 \\ [R_b] \quad & -mv'(w^m - R_b) + \lambda nv'(w^1(1 - s) + R_b) = 0 \\ [R_g] \quad & -mv'(w^m - R_g) + \lambda nv'(w^1 + R_g) = 0 \end{aligned}$$

To derive a numerical solution to the three FOCs, let  $v(x) = \log(x)$ .<sup>10</sup> Then,  $v'(x) = 1/x$ . Through some algebra, we can get a set of optimal solution for the three choice variables. That is,

$$\begin{aligned} \theta^* &= \frac{m + (\lambda n - m)\frac{w^0}{c}}{m + \lambda n} \\ R_b^* &= \frac{\lambda n w^m - m w^1(1 - s)}{m + \lambda n} \\ R_g^* &= \frac{\lambda n w^m - m w^1}{m + \lambda n} \end{aligned}$$

The expression for  $\theta^*$  characterizes the bargaining over the split of migration cost between the migrant and the household, which is important but not the focus of this study. On the other hand, the optimal solution for remittances in the good and bad states ( $R_g^*$  and  $R_b^*$ ) yields four predictions that are relevant to this study. They relate to the two most often discussed motives of remittance sending, altruism and insurance.

First,  $R_b^*$  and  $R_g^*$  both decrease with  $m$ . This represents the ‘‘loafing effect’’:

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<sup>10</sup>In addition to computational convenience, another favorable feature of the log utility function is the property of constant relative risk aversion, which holds for most rural households in China.

*Prediction 1: The amount of remittances from each migrant is lower when the household sends out more migrants.*

Second,  $R_b^*$  and  $R_g^*$  both increase with  $\lambda$  and  $n$ . It is hard to quantify  $\lambda$ , the weight placed on non-migrants. Therefore, I focus on changes in  $n$ , the number of dependents. This represents the “dependent-caring effect”:

*Prediction 2: The amount of remittances from each migrant is higher when there are more dependents (children or elderly people) left behind in the household of origin.*

Third,  $R_b^*$  increases as  $s$  gets larger ( $0 < s < 1$ ). This corresponds to the “insurance effect”:

*Prediction 3: The amount of remittances from each migrant is higher when a larger negative shock hits the household.*

Fourth,  $R_b^*$  and  $R_g^*$  both decrease with  $w^1$  ( $\lambda > 0$ ). In words, it characterizes the “poverty alleviation effect”:

*Prediction 4: The amount of remittances from each migrant is higher when a rural household’s earnings from its local economy is lower.*

In the literature, Predictions 1 and 2 are viewed as supporting evidence of the altruistic motive. The kind of “loafing effect” suggested by Prediction 1 is in line with discussions in Agarwal and Horowitz (2002). Their work reveals a potential linkage between a larger migrant population and a disincentive to remit for each migrant. Similarly, the “dependent-caring effect” is discussed in Vanwey (2004) and elaborated on here with this stylized model. With the potential interaction between the number of migrants and non-migrants, my prediction is that the household is less dependent on each migrant when it sends out more migrants. This may create room for migrant “loafing” and result in a decrease in the amount of remittances from each migrant to the household in either a good or bad state. However, the inverse is true when only one migrant needs to support the life of several dependents left behind at home.

On the other hand, Predictions 3 and 4 link income shocks and poverty status of the

household with the amount of migrant remittances. This reflects the insurance motive of remittance sending. I expect to see a larger amount of remittances delivered when the migrant-sending households' financial situation worsens.

### 3.2 Identity Considerations

The baseline framework above identifies migrants' optimal choice when identity consideration is absent. Here I take it into account and explore the potential impact of identity norm on migrants' remittance sending behaviors. By borrowing the model in Benjamin et al. (2010) on social identity and individuals' economic choice, I show that identity norm can be another driver for migrants' remittance sending.<sup>11</sup>

Let  $R_j$  ( $j \in \{g, b\}$ ) be the amount of remittances that a representative migrant sends to his household in the good and bad states. This migrant comes from community  $C$ , where a prescribed amount of remittances is set by its residents, denoted as  $r_j^C$ . In the absence of identity considerations, the representative migrant chooses to remit  $r_j^0$ , which is characterized by the optimal solutions  $R_g^*$  and  $R_b^*$  shown above. The representative migrant chooses  $R_j$  to solve the following optimization problem.

$$\max_{R_j} U = -(1 - \delta)(R_j - r_j^0)^2 - \delta(R_j - r_j^C)^2, \quad j \in \{g, b\}$$

where  $0 \leq \delta \leq 1$  is the weight placed on identity norm in the migrant's decision.

The optimal level of remittances in this setting is given by the first-order condition,  $R_j^{**} = (1 - \delta)r_j^0 + \delta r_j^C, j \in \{g, b\}$ . When  $r_j^C \neq r_j^0$ , the optimal choice  $R_j^{**}$  deviates from  $r_j^0$  towards  $r_j^C$ . In the real world,  $r_j^C$  can be the average amount of all other migrants from the same community. In this context, migrants are affected by their peers in remittance sending. In words, this corresponds to the "identity effect":

***Prediction 5: The amount of migrant remittance to one household increases with the average amount of remittance that all other households in the***

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<sup>11</sup>Some notations are changed in order to fit this study and avoid confusion with the ones that I have already used.

*same community receives.*

In the sections to follow, I test all the model predictions above using a longitudinal dataset pooled from three waves of a household survey on nationally representative samples in China. Additionally, I examine how the receipt of migrant remittances affect household expenditures.

## 4 Data and Empirical Specification

### 4.1 Source of Data

Data used in this study come from the China Laborforce Dynamics Survey (CLDS), conducted by Sun Yat-Sen University in Guangdong, China. This survey project collects nationally representative, household-level, longitudinal data in mainland China. This is a household survey that also include community-level information, such as the number of households in a community. Households that enter the sample pool at an earlier wave are tracked in later periods, unless the survey team cannot get in contact with them after the first meeting.<sup>12</sup> Following two pilot surveys in 2010 and 2011, the baseline survey (Wave 1) was launched in 2012. Two more waves of surveys were conducted in 2014 and in 2016. In all three waves, the CLDS project covers 29 provinces in mainland China (out of 31 in total), excluding Tibet and Hainan.

The main focus of this study is rural-to-urban migration and migrant remittances. Regarding this topic, three relevant variables are reported for each rural household: (a) a dummy indicating whether a household sends out one or more migrants for work; (b) the number of migrants that each household sends out; and (c) the amount of remittances that migrants send back to the household. In this survey project, a migrant worker is defined as someone away from home, working in a different county for at least six of the past twelve months. The amount of remittances that each household receives from migrants is self-reported by the household head.

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<sup>12</sup>This attrition group includes 1,447 households (urban and rural combined), which represents roughly 3.7 percent of the total sample.

In this study, I pool all three waves into a panel dataset for empirical analysis. In each wave, three separate data files are published based on corresponding questionnaires: (a) household-level data (family economic activities and relations between all family members); (b) individual-level data (personal characteristics of adults and children in the sample households); (c) community-level data (general information about the residential community of the sample households). Each dataset incorporates both urban and rural household samples. In this study, I focus mostly on the household-level data, but also merge some information about migration network from the community-level datasets. In 2012, 2014 and 2016 respectively, a total of 10,612, 14,188 and 14,198 households (urban and rural combined) enter the sample based on stratified sampling. I restrict my analysis to rural household samples only. This leaves me an unbalanced panel of 12,509 households and 22,261 observations in total. In order to utilize the longitudinal property of this dataset, I further restrict my sample to households that are surveyed more than once in this project.<sup>13</sup> After dropping some observations with missing values in almost all main variables utilized in this study, the final number of household-year observations is 15,405.

## 4.2 Summary Statistics

Summary statistics for all variables used in the empirical analysis of this study are reported in Table 1, after dropping singletons that are observed in one year only.<sup>14</sup> Several interesting facts are revealed through simple observation and interpretation of these mean statistics. First, the total income of rural households in the sample is steadily on the rise over the three periods. These households are getting more dependent on earnings from non-farm employment and less reliant on farm revenues. While the average amount of migrant remittances for all households seem low, the actual importance may be underestimated by simply looking at the mean of the full sample, as there are a lot of zero-value observations. Among all 15,369 non-missing household-year observations in the final sam-

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<sup>13</sup>In the CLDS datasets, the household identifier (*FID*) is traceable across three periods. I use this identifier to compile data from different waves of survey into a panel. Among all 12,509 households, 2,677 participated in all three waves, 4,391 participated in two waves and 5,441 were surveyed only once.

<sup>14</sup>Appendix Table A1 presents the mean statistics for both the restricted sample after dropping singletons. There is no stark difference between the two sets of statistics.

ple for analysis, 13,531 report the receipt of a zero remittance. The average amount of remittances for the 1,838 households reporting non-zero remittances reaches 8,451 yuan, which is not negligible compared with the average household income.<sup>15</sup> Second, in line with the increase in total income, household expenditures are also getting higher over the three periods, the largest share of which is farm cost, followed by food and medical expenses. The average household expenditure had been increasing over the three periods in almost all categories, except farm costs. Comparing the average farm income with farm cost, we can find that agricultural production is not profitable for most small farm owners. Therefore, it is natural for them to seek alternative channels to improve their livelihood. As suggested in Panel C of Table 1, while the average farm size is relatively stable, the proportion of households that are still working on the farm has dropped from 77 percent in 2012 to 61 percent in 2016. Correspondingly, the share of migrant households increase from 56 percent in 2012 to 69 percent in 2016, and the average number of migrants increase from 1.42 to 1.79. The increase in the migrant population is partly driven by the *hukou* reform discussed in Section 2.1. As shown in Appendix Table A2, with the *hukou* reform that officially launched in 2014, household heads with a uniform *hukou* enter the sample, but the number of households whose head has a rural *hukou* is still dominant.<sup>16</sup> As for other demographics in the rural households, the average family size increases from 3.18 in 2012 to 4.93 in 2016. The average number of children and elderly members are both increasing over time, although both are below 1. The heads of most Chinese rural households are middle-aged males, with an average age of 51.3 years in 2012, or 55.9 years in 2016. And roughly 18 to 26 percent of all surveyed households experienced water source contamination, which may be an adverse shock to their health and farm yield, if polluted water is used for irrigation. Additionally, I explore the dynamics of some community-level characteristics. The possession of ancestral halls and share of most common surname in village are both relatively stable, at 20 percent and 44 percent,

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<sup>15</sup>By nominal currency exchange rate, 1 U.S. Dollar (USD, \$) approximately equals 7 Chinese yuan (CNY). However, in accordance with the definition of poverty lines from the World Bank, this study primarily uses purchasing power parity (PPP) to implement currency conversions. Under PPP, the value of one USD approximately equals 3.5 to 4 CNY.

<sup>16</sup>Given the tiny fraction of households whose head has a uniform *hukou*, it is hard to evaluate how the *hukou* reform starting in 2014 affects migration and remittance sending. In the subsequent analysis, I further restrict the sample to the mainstream rural *hukou* holders.

respectively. The frequency of natural disaster experience is on the rise, from 21 percent reported in 2012 to 66 percent reported in 2016. This may be a covariate adverse shock to evaluate for rural households.

To qualitatively explore the financial impact of migrant remittances on rural households, I document in Table 2 the change in poverty rates before and after the receipt of migrant remittances for each study period. The results suggests that migrant remittances may help alleviate extreme poverty, which is consistent with findings in previous studies (Du et al., 2005). Comparing Panel A and Panel B of Table 2, we can see that the proportion of households in extreme poverty (below the \$1 per day poverty line) drops by 3 percentage points in 2012 and 2 percentage points in 2014 and 2016 when remittances are included in the assessment. Most of these households are still under the \$1.90 or \$3.20 per day poverty line, but are already better off than their poverty status with “local” income only. However, an alternative explanation for the observed poverty rate change based on different income measures is that it results purely from an intra-household arrangement of labor. In that case, the poverty status of rural households based on their “local” earnings may not be an accurate measure for household welfare. In the second part of my empirical analysis, I evaluate how the inflow of migrant remittances affects household welfare measured by per capita household expenditures.

### **4.3 Identification Strategies**

In this subsection, I introduce the identification strategies for addressing the two primary research questions of this study, namely understanding the motives of remittance sending behaviors and the impact of migrant remittances on household expenditures.

#### **4.3.1 Motives of Remittance Sending**

##### *A. Baseline Specification*

I use three sets of indicators for the three motives to test the motives of migrants’ remittance-sending behaviors. First, indicators for remittance sending out of altruism

include the number of migrants and dependents (children and elderly members) in a household. As discussed in previous sections, a negative correlation between the number of migrants and the amount of remittances per migrant provides evidence for “social loafing” in remittance sending. And similarly, a positive correlation between the number of dependents and the amount of remittances per migrants indicates “dependent caring”. These two correlations characterize altruistic remittance sending. Second, the ideal indicator for the insurance motive of remittance sending is a direct measure for idiosyncratic household-level shocks, like a health shock or other forms of adverse financial shocks. However, an ideal measure for household-level income shocks is not directly available in the CLDS datasets. Fortunately, I have a covariate adverse shock measure, an indicator for the experience of village-level natural disasters in the past twelve months. It is intuitive that natural disasters function as a negative shock to all rural households in a village and may adversely affect their income.<sup>17</sup> Additionally, an indirect measure for idiosyncratic shocks to rural households is available. The dummy for whether surveyed rural households experienced the contamination of their water source in the past twelve months. Water source contamination may bring about health problems to affected rural residents. Besides, if used for farm irrigation, polluted water may affect the yield and even lead to crop failure. Either of these scenarios would be an adverse idiosyncratic shock to rural households. In line with predictions from the theoretical model, I also include the amount of household “local” income and check how it correlates with variations in migrant remittances.<sup>18</sup> Third, I use the village-level prescribed level of remittance as the indicator for remittance sending under the influence of social norms. If the average amount of migrant remittances is positively correlated with this prescribed level remittance, then it provides supporting evidence for the intention to conform the social norm in migrants’ remittance sending. Summarizing all these discussions, the baseline empirical strategy is

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<sup>17</sup>Considering the potential heterogeneity in the impact of a natural disaster on different households, I also interact this village-level measure with household characteristics other than the poverty status as robustness checks.

<sup>18</sup>Considering the potential endogeneity of household “local” income, I conduct an auxiliary regression based on household characteristics and derive the predicted values for household “local” income, which enters the final estimation.

therefore specified as:

$$PMRemit_{ivt} = \tau + \sum_j \alpha_j Alt_{ivt}^j + \sum_k \beta_k Ins_{ivt}^k + \gamma Norm_{ivt} + \mathbf{X}'_{ivt} \boldsymbol{\xi} + \mu_i + \lambda_t + \varepsilon_{ivt}, \quad (1)$$

where  $PMRemit_{ivt}$  denotes the average amount of remittances that flows from each migrant to household  $i$  in village  $v$  in year  $t$ ;  $Alt_{ivt}^j$  is a set of indicators for the altruistic motive of remittance sending, which includes the number of migrants in household and the number of dependents (children and elderly members) in household  $i$  in year  $t$ ;  $Ins_{ivt}^k$  is a set of indicators for the insurance motive of remittance sending, which includes a binary indicator for village-level natural disaster (proxy for covariate shocks), a binary indicator for whether household water source is contaminated (proxy for idiosyncratic shocks), as well as the predicted household local income;  $Norm_{ivt}$  is the indicator for remittance sending under the influence of identity norms, which is proxied by the average amount of per-migrant remittances that all households other than household  $i$  in village  $v$  receive in year  $t$ ;  $\mathbf{X}_{ivt}$  is a vector of household characteristics, including family size, land size, age and gender of household head, and formal insurances like pension or unemployment insurance;  $\mu_i$  is time-invariant household fixed effect;  $\lambda_t$  is year fixed effect;  $\varepsilon_{ivt}$  represents unobserved errors. The coefficients of interest are  $\alpha_j$ ,  $\beta_k$  and  $\gamma$ .

### ***B. Dealing with Selection Bias***

Since each survey wave in the CLDS project follows the same protocol, and data quality management is cautiously executed by fixing data input errors on a regular basis, errors in measuring cash amounts are mitigated. Therefore, in this part, I focus on the most critical empirical challenge that may compromise the identification of the correlations of interest: selection bias in the rural households' migrant sending. There are two ways of dealing with the selection bias associated with migrant sending: either restricting analysis on migrant households, or correcting the bias using some econometric skills. Practically, the simplest way to deal with the selection bias in migrant sending is restrict analysis to households that have sent migrants. But in this case, I need to justify that attrition from the migrant household sample is not correlated with the income shock. This can be challenging as the shock itself is not directly observable in this study. Therefore, it would

be more convincing to actually correct for the selection bias instead of avoiding this issue by studying the restricted migrant household sample. I address this concern following the Heckman approach.

The type of Heckman correction is slightly different from the original model (Heckman, 1974; Heckman, 1979), which fits the longitudinal property of the data used in this study. It also deviates from the classic labor economics literature which discusses selection bias of migration and wage earnings from the individual's perspective (Borjas, 1987). In contrast, the present study takes into consideration the more collectively oriented Chinese context, and treats rural-to-urban migration as a household decision, rather than an individual one. Following the literature, I use two indicators to predict the migrant-sending decision of rural households in China. First, many studies have characterized migration as a means of income diversification (e.g. Wouterse and Taylor, 2008). Relatedly, crop diversification on family farms is a commonly seen risk-coping strategy in the rural areas of the developing world, especially among smallholder farmers (Di Falco and Chavas, 2009; McCord et al., 2015). Therefore, I propose to use the total categories of farm products as an indicator for the migrant-sending decision of rural households. The prior assumption is that households that choose to diversify the types of products on the family farm are more likely to send out migrants for income diversification. Second, village-level social network plays a vital role in facilitating rural-to-urban migration in China. Such a social network is usually stronger in villages where a greater proportion of residents share the same surname and are very likely connected with kinship or blood ties (Peng, 2004). Co-villagers help each other in covering the migration cost and searching for jobs at the urban destination (Zhao, 2003; Chen et al., 2010). Additionally, lineage groups are the organizations that play a salient role in the social network of rural communities in China. Households within the same lineage group are bonded together and strive for common interest. Ancestral hall and genealogy are two possible measures to identify the lineage network (Foltz et al., 2020), but genealogy records are not available in the data that I use. In this study, I select the share of the most common surname in a rural community and the existence of ancestral halls as two measures for the intensity of village-level social network to predict the migrant-sending decision of rural households in China.

After the first-stage prediction of the probability of sending out migrants for Chinese rural households, in the second stage, I evaluate how the amount of remittance that the households receive from the migrants is affected by variables indicating migrants' different motives. Mathematically, together with the baseline specification shown in Equation (1), the most intuitive selection equation is denoted as:

$$M_{ivt} = \mathbb{1}(\omega_0 + \omega_1 Cat_{ivt} + \omega_2 Network_{vt} + \mathbf{X}'_{ivt} \boldsymbol{\xi} + \rho_i + \lambda_t + \epsilon_{ivt} > 0), \quad (2)$$

where  $M_{ivt}$  is an indicator for whether household  $i$  sends out one or more migrants in year  $t$  (1=yes);  $Cat_{ivt}$  represents the total categories of farm products that household  $i$  plants or raises in year  $t$ , which may include crop planting, fruit planting, vegetable planting, forestry, animal husbandry, and fishery;  $Network_{vt}$  is a set of variables that identify the intensity of social network in village  $v$  in year  $t$ , which includes the existence of ancestral halls and the share of most common surname in the total population of the village;  $\mathbf{X}_{ivt}$  represents household characteristics, as described in Equation (1);  $\rho_i$  is time-invariant household-level unobserved effect and  $\lambda_t$  reflects the year trend;  $\epsilon_{ivt}$  represents unobserved errors.

The underlying assumption for the selection equation denoted by Equation (2) is that neither the household-level diversification measure nor village-level network measure affects the amount of migrant remittances through channels other than the impact on households' migration decision. The social reality in rural China can help justify this assumption. One key feature of the rural reform in China that initiated in the late 1970s is de-collectivization. After nearly fifty years of reform, rural households have become socially atomized and have been immune from exterior influence in almost all economic activities. The only exception is the migration process. Through this specific channel, the communal network imposes an indirect impact on migrants' remittance-sending behaviors.

One possible issue with such an equation system is that it inevitably imposes strong assumptions on the household-level unobserved effects, the year trend, as well as the unobserved error terms. Thus, it remains controversial whether the corresponding coefficient estimates reflect the effect of interest accurately. As an alternative, Wooldridge (1995)

and Vella (1998) propose a similar correction procedure under the assumption that unobserved errors in the selection equation are normally distributed. Further relaxing this assumption, Semykina and Wooldridge (2010) propose an improved three-step correction procedure: (i) run a cross-sectional version of Equation (2) for each period using the standard Probit estimation and compute the inverse Mills ratio (IMR); (ii) run a pooled two-stage least squares (2SLS) regression on the migrant household sample, with the exogenous explanatory variable in the selection equation as the excluded instrument and the predicted IMR from the first step as the included instrument for potentially endogenous explanatory variables in the outcome equation (interaction terms between the predicted IMR and year dummies can also be included to allow the coefficient on predicted IMR to be different across years); (iii) apply “panel bootstrap”, get asymptotic standard errors and use the t-statistic to test whether the coefficient estimate on the IMR is statistically significant.<sup>19</sup> If yes, then we can conclude that selection bias does exist and the results after bias correction is preferred. Otherwise, current evidence is not conclusive and we cannot confirm whether there is selection bias in migrant sending. I follow this method to detect selection bias in testing mixed motives behind migrants’ remittance sending behaviors.

### 4.3.2 Migrant Remittance and Household Expenditure

The second aim of this study is to explore how remittances are allocated within migrant-sending households. The outcome variable here is per capita household expenditure in total and by category. I first contribute to the discussion of whether remittances affect productive and consumptive expenditures in the household by tracking changes in two specific categories: farm inputs and housing expenses. Additionally, I evaluate more categories of household expenditure, including education, medical, food, commuting, gift and ceremony expenses. For this part, I perform a log transformation on all financial measures in order to derive proportional changes, which simplifies result interpretation.<sup>20</sup>

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<sup>19</sup>The last step of this correction procedure “involves resampling cross-sectional units (and all time periods for each unit sampled) and using the bootstrap sample to approximate the distribution of the parameter vector (Semykina and Wooldridge, 2010).”

<sup>20</sup>In order to keep all zero observations, the log transformation applied here can be denoted by  $\log(1+x)$ , where  $x$  is the original value.

The core equation to identify the impact of labor out-migration and receipt of migrant remittance can be denoted as:

$$PCExp_{ivt} = \theta_0 + \theta_1 Remit_{ivt} + \theta_2 Mig_{ivt} + \mathbf{X}'_{ivt} \phi_E + \rho_i + u_{ivt} \quad (3)$$

In Equation (3),  $Remit_{ivt}$  denotes the total amount of remittances that household  $i$  receives from all migrants it sends out in year  $t$ ;  $Mig_{ivt}$  is the number of migrants from household  $i$  in year  $t$ ;  $PCExp_{it}$  is the per capita expenditure of household  $i$  in the past twelve months of survey year  $t$ ;  $\mathbf{X}_{ivt}$  represents household characteristics, as described in Equation (1);  $\rho_i$  is time-invariant household-level unobserved effect. Both the number of migrants and the amount of remittances that flows from a migrant to his household of origin is likely to be endogenous (Barham and Boucher, 1998). Following the analysis on different motives of migrants' remittance sending shown in Equation (1), I use the following equation to explore the determinants of migrant remittances:

$$Remit_{ivt} = \delta_0 + \delta_1 Mig_{ivt} + \mathbf{Z}'_{ivt} \phi_R + \rho_i + \sigma_{ivt}, \quad (4)$$

where  $Remit_{ivt}$  and  $Mig_{ivt}$  are defined in the same way as in Equation (3);  $\mathbf{Z}_{ivt}$  contains all the variables except the number of migrants ( $Mig_{ivt}$ ) that are used to identify the potential motives of migrants' remittance sending, as denoted in Equation (1).

Similarly, following the discussion of households' selection into migrant sending shown in Equation (2), the reduced-form equation that I use here to estimate the number of migrants can be written as:

$$Mig_{ivt} = \psi_0 + \psi_1 Cat_{ivt} + \psi_2 Network_{vt} + \mathbf{W}'_{ivt} \phi_M + \rho_i + \eta_{ivt}, \quad (5)$$

where  $Cat_{ivt}$  and  $Network_{vt}$  are defined in the same way as in Equation (2);  $Mig_{ivt}$  is defined in the same way as in Equation (3);  $\mathbf{W}_{ivt}$  is a set of household characteristics that may affect the migrant sending decision, which incorporates variables listed in  $\mathbf{X}_{ivt}$  and additional measures for farm characteristics.

Equations (3) through (5) form a recursive system that characterizes migration, re-

mittance and household expenditure. The main coefficient of interest is  $\theta_1$ , which measures the marginal propensity to spend with the inflow of migrant remittances. Following Rozelle et al. (1999) and Taylor et al. (2003), I estimate this model using three-stage least squares (3SLS) to account for contemporaneous correlations across equations. As shown in the relevant literature, 3SLS is asymptotically more efficient than 2SLS. Given the longitudinal property of the data used in this study, I once again use the “panel bootstrap” introduced in the previous subsection to derive standard errors for all coefficient estimates.

## 5 Results

This section reports empirical results for testing the three potential motives associated with migrants’ remittance sending behaviors, as well as the estimated effect of migrant remittances on the expenditures of rural households in China, based on evidence from the CLDS data. In addition to the main analysis based on the three-year household panel, I also pool all observations into a cross-sectional dataset and report corresponding results as a reference for the main results. Throughout this section, I cluster standard errors at the household level in order to account for potential heteroskedasticity.

### 5.1 Determinants of the Migrant-sending Decision

As discussed above in Section 4, selection bias is a potential concern to our empirical results. Thus, before diving into the discussion of the empirical results of testing three motives of remittance sending, I first explore demographic and economic factors that may affect households’ migrant sending decision. Based on the empirical design shown in Equation (2), I first investigate the extensive margin in the migrant sending decision (whether households send out migrants). For comparison, I also explore the intensive margin (how many migrants each household sends out on average). Corresponding results are presented in Table 3. The more preferred results are shown in Columns (2) and (4), where random-effect Probit and Poisson models are employed to get the two sets of results,

respectively.

Several interesting findings emerge based on the results shown in Table 3. First, as expected, households that are engaged in more diversified farm production are more likely to send out migrants. Second, the village-level social network, as proxied by the share of population with the most common surname in the village and the existence of ancestral halls, plays a positive role in migrant sending, although the magnitude of such an effect is small. Third, it is noticeable that a larger population of susceptible household members (children and the elderly) is associated with a lower chance of migrant sending. This effect is more prominent in the presence of more children, as the results suggest that the number of children negatively affects both extensive and intensive margins of the migrant sending decision. Fourth, a larger family size is associated with a higher chance of migrant sending. This is an intuitive result, since more people in the rural household probably means more surplus labor that can be utilized to provide extra earning for the household. Finally, the formal insurance scheme established by the government provides some disincentive against migration. We can see that a higher amount of pension and low-income subsidy discourages migrant sending in terms of both extensive and intensive margins.

Following Semykina and Wooldridge (2010), I conduct three auxiliary regressions using the standard cross-sectional Probit model for each period. Results are presented in Appendix Table A3. Based on the predicted probability of sending out migrants, I compute the IMR correspondingly, which is utilized later in the detection of selection bias when evaluating the three motives of migrants' remittance sending.

## 5.2 Motives of Remittance Sending

After exploring the possible demographic and socioeconomic factors affecting households' migrant sending decision, I move on to testing the three potential motives of migrants' remittance sending. I use three types of specifications: (a) OLS with full sample, (b) OLS with migrant households only and (c) Heckman-type correction with full sample, following Semykina and Wooldridge (2010). Estimations based on each specification yields

two sets of results, one with household-level controls included and the other not included. Corresponding results are presented in Table 4. The significance of the coefficient on the IMR in the year 2012 provides some evidence for the existence of selection bias associated with migrant and remittance sending. Therefore, the results with Heckman-type bias correction are most preferred.

### 5.2.1 Altruism

I begin by testing the hypotheses of “social loafing” and “dependent caring”, which structures two elements of the theory for the altruistic motive of migrants’ remittance sending. As shown in the first two columns of Table 4, OLS with full sample yields no significant results. However, after restricting the study sample to migrant households, linear estimation predicts that the amount of remittance per migrant decreases by 122 to 123 yuan with each additional migrant sent by the household. Result based on the Heckman-type correction indicates a similar pattern with an additional migrant, but the magnitude can be as high as a decline of roughly 190 yuan on average (See Column 6 of Table 4). Compared with the average amount of remittances per migrant (about 657 yuan), the proportional decrease is considerably large. This result supports the “loafing” story that more migrants can lead to a decrease in the amount of remittances from each migrant. The average number of migrants in this sample is 1.61. In comparison, the average number of family members is 4.36. When the number of family member and the number of migrants are higher than average, it will cause each migrant to remit less than he would otherwise do if he is the sole migrant to support the household.

Additionally, the “dependent caring” theory associated with altruistic remittance sending is substantiated with empirical results based on the Heckman-type correction. With one additional elderly member, the average amount of remittances that each migrant sends home increases by 118 to 240 yuan (See Columns 5-6 of Table 4). Generally speaking, after correcting for selection bias, the empirical result supports both “social loafing” and “dependent caring” in migrants’ remittance sending, which lends support for the altruistic motive in the context of China.

### 5.2.2 Insurance

Finding evidence for the altruistic motive does not preclude alternative explanations for migrants' remittance-sending behaviors. I continue to test the insurance motive for remittance sending. Results shown in the first four columns of Table 4 suggest some evidence for the positive impact of covariate and idiosyncratic shocks to rural households on the average amount of remittance per migrant. But after correcting for selection bias in migrant sending. However, I do find a negative correlation of predicted household income and the amount of per-migrant remittance. When the predicted household local income increases by 10 yuan, the average amount of per-migrant remittance decreases by 1.03 yuan (See Column 6 of Table 4). This provides some evidence for the poverty alleviation effect of migrant remittances, as predicted in the theoretical framework.

Considering the possibility that the same natural disaster may have heterogeneous impact on different households, I interact the village-level disaster indicator with several variables indicating different household characteristics as robustness checks. As shown in Appendix Table A4, adding the interaction between village-level disaster indicator with household demographic or farm characteristics, including the indicator for farm production, the possession of farm machinery and livestock, as well as household debt status, does not significantly change the main result. This suggest that the heterogeneity in the impact of village-level disasters on different households is minimal. Therefore, it functions as a valid proxy for covariate adverse shocks to rural households.

As a brief summary of the findings in this subsection, I do not find significant increase of per-migrant remittances in response to covariate and idiosyncratic adverse shocks to rural households. However, the average amount of remittances from each migrant is indeed lower when the rural households earns a higher income in the local community. This lends some support for the insurance motive of migrants' remittance sending.

### 5.2.3 Identity Norm

The last motive to evaluate for migrants' remittance sending is identity norm. I test this motive by checking the correlation between the amount of per-migrant remittances

of each household and the prescribed level of remittances in the community (proxied by the average remittance amount received by other households in the same village). Across all specifications, this positive correlation is positive and strongly significant at 1% level. And the magnitude is larger after correcting the selection bias in migrant sending. As shown in the last two columns of Table 4, a 10-yuan increase in the prescribed level of remittances in the community is associated with an average increase of 5.6 yuan in each migrant's remittance to his household of origin, which is a relatively large impact.

To summarize, findings presented in this subsection suggest that identity norm does play a role in migrants' remittance sending. Migrants want to make a contribution to their households of origin. This intention is often confounded with peer effects. As observed from the empirical results, rural-to-urban migrants in China are affected by their peers in the same social network in the amount of remittance sent back home. When a migrant knows that all other migrants from the same rural community remit more to their households, it is very likely that he will increase the amount of remittances sent home.

### 5.3 Migrant Remittance and Household Expenditure

As discussed above, I find supporting evidence for mixed motives of migrants' remittance sending, including altruism, insurance and identity norm. One natural question to explore next is whether the inflow of migrant remittances changes the pattern of household expenditures (after adjustment by family size), both in aggregate and by subcategories. Estimation results using 3SLS based on the equation system described in Section 4.3.2 are reported in Table 5. My first finding, as shown in the first column, is a 5 percent increase in household total expenditure per capita. This reflects a welfare improvement for rural households after receiving migrant remittances.<sup>21</sup>

Then, I contribute to the debate of whether migrant remittances are used for productive or consumptive household expenditures. I find that a 10 percent increase in the

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<sup>21</sup>It is worthwhile to note that this effect may very likely be underestimated, as roughly one third of households in the sample reported a lower total expenditure than all subcategories summed up.

total amount of migrant remittances received by the household on average leads to no change in farm costs and a 11 percent increase in housing expenditures (see Columns 2-3 in Table 5). This suggests that rural households in China tend to use migrant remittances for consumptive rather than productive expenditures. This result is similar to previous findings in de Brauw and Rozelle (2008) based on evidence from selected provinces in China.

Last but not least, I explore changes in six additional subcategories of household expenditure that are commonly discussed in the existing literature. Corresponding results presented in Columns 3-9 of Table 5 suggest no change in food and ceremony expenses. But significant increases are observed for the other four categories. A one-percent increase in migrant remittances leads to a 22 percent increase in medical expenses and 29 percent increase in education on average. These are two main expenditures for rural households. A relevant policy implication may be to allocate a greater amount of fiscal funds to investment on rural medical and education systems. Additionally, a one-percent increase in migrant remittances results in a 19 percent increase in commuting expenses and 14 percent increase in gift expenses. The increase in commuting costs may arise from additional migrants sent out, or trips for family reunion. On the other hand, gift expenses in Chinese rural communities are steadily on the rise over the years, due to status concerns. The government should consider advocating against the highly pecuniary norm of gift exchange in the rural areas. This will greatly relieve the heavy burden for rural households as well as for the migrants that they send out to work in the urban destinations.

## 6 Concluding Remarks

This study investigates two fundamental research questions associated with migrants' remittance sending practices: (a) why do migrants remit; and (b) how do migrant remittances affect household expenditures. To evaluate potential explanations for the first question, I first develop a stylized model that generates theoretical predictions regarding the first two motives of remittance sending: altruism and insurance. Additionally, I show the potential impact of identity norm on migrants' remittance sending by utilizing the

model presented in Benjamin et al. (2010). Empirically, I test the three proposed motives for remittance sending using a panel dataset pooled from three waves of the China Labor-force Dynamic Survey (CLDS), which collects nationally representative data on household finance and intra-household labor allocation. I have several interesting findings on the motives of migrants' remittance sending. First, the average amount of remittances from each migrant falls by roughly 114 to 190 yuan for each additional migrant in the household. This evidence substantiates the altruistic motive theory's prediction that migrants who share their remittance-sending burden with other migrants from their household will reduce the amount of remittance they send ("social loafing" behavior). Second, while there are no significant evidence for a higher amount of migrant remittance in response to covariate and idiosyncratic shocks to rural households, I do find a negative correlation between migrant remittance and rural households' predicted local income. This may lend some indirect support for the insurance motive of migrants' remittance sending. Third, the amount of migrant remittances is positively affected by the average amount of remittances sent home by all other migrants from the same community. Therefore, remittance sending in China, which flows from rural-to-urban migrants to their households of origin residing in the rural communities, is very likely driven by mixed motives. Altruism, insurance and identity norm may simultaneously contribute to the observed remittance-sending practices of the internal migrants.

In addition to the motivations behind migrants' remittance-sending behaviors, I also explore the impact of receiving migrant remittances on household expenditures. Inspired by the testing of the impact of identity norm on migrants' remittance sending, I estimate the effect of interest using 3SLS with bootstrapped standard errors. After addressing the endogeneity concerns, I first find a 5 percent increase in household total expenditure per capita when the amount of migrant remittance is one percent higher, which suggests a welfare improvement for migrant-sending households. Then, I contribute to the debate on the productive and consumptive expenditures of rural households with the finding that the average per capita farm cost remain statistically unchanged, while housing expenditures of rural households in China increase by roughly 11 percent when the amount of migrant remittance is one percent higher. This result suggests that the inflow of re-

mittance from migrants facilitates consumptive rather than productive expenditures in the migrant-sending households. This finding is similar to the conclusion of de Brauw and Rozelle (2008). As for other subcategories, I find a significant increase in household expenditure in medical care, education, commuting and gift sending following the receipt of migrant remittances, which generally suggests a welfare improvement for the migrant-sending households.

Admittedly, there are several limitations in this study and the empirical results should be interpreted with caution. First, wage earnings are not reported in the CLDS datasets that I use for empirical analysis in this study. If the migrant workers' earnings in the urban sector could be observed, the altruistic motive could be more convincingly tested, as shown in Joseph et al. (2014). Together with discussions on "social loafing" and "dependent caring", we could potentially have a more complete image of the altruistic motive of remittance sending in developing economies. Second, the village- and household-level proxies that I use for covariate and idiosyncratic income shocks are not perfect. Given a more accurate measure for income shocks, potential bias in testing the insurance motive of remittance sending could be reduced. Third, it is interesting to evaluate an alternative theory on the insurance role of migration, which argues that sending out migrants itself is actually a way of seeking insurance as well (Batista and Umblijs, 2016). In this sense, the informal insurance mechanism starts even before the flow of remittance from migrants to households of origin. This may be a beneficial supplement to the current research design on the risk sharing or contractual mechanism that drives the observed remittance-sending behavior of migrants. Future studies can follow this path and provide more insights on the interaction between remittances sent back to the household and family support delivered to the migrant. Last but not least, if more detailed data including the timing of remittance sending and receiving are available, future studies may be able to identify how the frequency of remittance sending affects household saving, expenditure and other financial decisions. It will be intriguing to see some empirical results in addition to those derived from simulation (Zhu, 2016).

Despite the above limitations, this paper has several contributions to the related literature. First, the stylized model that I establish based on Rapoport and Docquier (2006)

is an important tool to understand two frequently discussed motivations for remittance sending, altruism and insurance. Second, while not the first to develop a theoretical model on identity norm, as in Benjamin et al. (2010), this study is one of the first to highlight the role of identity norms as one potential motive for migrants' remittance sending. Third, this paper has potential contributions in econometric methods. Both the Heckman-type correction and three-stage least squares using panel data are used to address endogeneity concerns in evaluating the motives and impact of migrants' remittance sending. Last but not least, the theoretical predictions and empirical findings presented in this study are of great significance in understanding the rural-to-urban migration, family ties, remittance sending and rural household expenditures in China, which yields practical suggestions for not only millions of internal migrants and their households of origin, but also policymakers. The finding of increases in household expenditure with the inflow of migrant remittances is particularly relevant for policymakers. More fiscal funds should be allocated to improve the livelihood of rural households via the following channels: (a) strengthening the current New Cooperative Medical Scheme with a wider coverage and more generous reimbursement ratio; (b) enforcing free nine- or even twelve-year compulsory education in rural areas; (c) improving infrastructure construction to make commuting easier for internal migrants and their household members that stay at the rural home; (d) promoting less pecuniary social norms of gift exchange, which will relieve the heavy yet unnecessary financial burden for rural residents.

## References

- Adams Jr, R. H. (1998). Remittances, investment, and rural asset accumulation in Pakistan. *Economic Development and Cultural Change*, 47(1): 155-173.
- Adams Jr, R. H., and Cuecuecha, A. (2010). Remittances, household expenditure and investment in Guatemala. *World Development*, 38(11): 1626-1641.
- Agarwal, R., and Horowitz, A. W. (2002). Are international remittances altruism or insurance? Evidence from Guyana using multiple-migrant households. *World development*, 30(11): 2033-2044.

- Ahmed, J., Mughal, M., and Klasen, S. (2018). Great expectations? Remittances and asset accumulation in Pakistan. *Journal of International Development*, 30(3): 507-532.
- Akerlof, G. A., and Kranton, R. E. (2000). Economics and identity. *The Quarterly Journal of Economics*, 115(3): 715-753.
- Ashraf, N., Aycinena, D., Martinez, C., and Yang, D. (2011). *Remittances and the problem of control: A field experiment among migrants from El Salvador*, Working paper, University of Chile, Department of Economics.
- Austen-Smith, D., and Fryer Jr, R. G. (2005). An economic analysis of “acting white”. *The Quarterly Journal of Economics*, 120(2): 551-583.
- Bang, J. T., Mitra, A., and Wunnava, P. (2016). Do remittances improve income inequality? An instrumental variable quantile analysis of the Kenyan case. *Economic Modelling*, 58: 394-402.
- Barham, B., and Boucher, S. (1998). Migration, remittances, and inequality: Estimating the net effects of migration on income distribution. *Journal of Development Economics*, 55(2): 307-331.
- Baseler, T. (2019). *Hidden income and the perceived returns to migration: Experimental evidence from Kenya*. Working paper, Department of Economics, Stanford University.
- Batista, C., and Umblijs, J. (2016). Do migrants send remittances as a way of self-insurance?. *Oxford Economic Papers*, 68(1): 108-130.
- Benjamin, D. J., Choi, J. J., and Strickland, A. J. (2010). Social identity and preferences. *American Economic Review*, 100(4): 1913-1928.
- Bertoli, S., and Marchetta, F. (2014). Migration, remittances and poverty in Ecuador. *The Journal of Development Studies*, 50(8): 1067-1089.
- Borjas, G. J. (1987). Self-selection and the earnings of immigrants. *American Economic Review*, 77(4): 531-553.
- Brown, P. H., Bulte, E., and Zhang, X. (2011). Positional spending and status seeking in rural China. *Journal of Development Economics*, 96(1): 139-149.
- Chan, K. W., and Zhang, L. (1999). The hukou system and rural-urban migration in China: Processes and changes. *The China Quarterly*, 160: 818-855.
- Chen, Y., Jin, G. Z., and Yue, Y. (2010). *Peer migration in China* (No. w15671). Working paper, National Bureau of Economic Research.
- Chiswick, B. (1999). Are immigrants favorably self-selected?. *American Economic Re-*

- view*, 89(2): 181-185.
- de Brauw, A., and Harigaya, T. (2007). Seasonal migration and improving living standards in Vietnam. *American Journal of Agricultural Economics*, 89(2): 430-447.
- de Brauw, A., and Rozelle, S. (2008). Migration and household investment in rural China. *China Economic Review*, 19(2): 320-335.
- Démurger, S., and Xu, H. (2011). Return migrants: The rise of new entrepreneurs in rural China. *World Development*, 39(10): 1847-1861.
- Di Falco, S., and Chavas, J. P. (2009). On crop biodiversity, risk exposure, and food security in the highlands of Ethiopia. *American Journal of Agricultural Economics*, 91(3): 599-611.
- Disney, R., MacKay, A., and Shabab, C. R. (2017). *Household inequality and remittances in rural Thailand: A lifecycle perspective*, Working paper.
- Du, Y., Park, A., and Wang, S. (2005). Migration and rural poverty in China. *Journal of Comparative Economics*, 33(4): 688-709.
- Foltz, J., Guo, Y., and Yao, Y. (2020). Lineage networks, urban migration and income inequality: Evidence from rural China. *Journal of Comparative Economics*, 48: 465-482.
- Gloede, O., Menkhoff, L., and Waibel, H. (2015). Shocks, individual risk attitude, and vulnerability to poverty among rural households in Thailand and Vietnam. *World Development*, 71: 54-78.
- Günther, I., and Harttgen, K. (2009). Estimating households vulnerability to idiosyncratic and covariate shocks: A novel method applied in Madagascar. *World Development*, 37(7): 1222-1234.
- Heckman, J. (1974). Shadow prices, market wages, and labor supply. *Econometrica*, 42(4): 679-694.
- Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1): 153-161.
- Joseph, T., Nyarko, Y., and Wang, S. Y. (2014). *How do remittances respond to income fluctuations? Evidence from matched administrative data*, Working paper.
- Joseph, T., Nyarko, Y., and Wang, S. Y. (2018). Asymmetric information and remittances: Evidence from matched administrative data. *American Economic Journal: Applied Economics*, 10(2): 58-100.
- Jongwanich, J. (2007). *Workers' remittances, economic growth and poverty in developing Asia and the Pacific countries* (No. WP/07/01). Working paper, United Nations

- Economic and Social Commission for Asia and the Pacific (ESCAP).
- Kinnan, C., Wang, S., and Wang, Y. (2018). Access to migration for rural households. *American Economic Journal: Applied Economics*, 10(4): 79-119.
- Li, Y. (2010). Analysis on the disparity in economic growth and consumption between urban sector and rural sector of China: 1978–2008. *Frontiers of Economics in China*, 5(4): 559–581.
- Liang, Z., and Ma, Z. (2004). China’s floating population: New evidence from the 2000 census. *Population and Development Review*, 30(3): 467-488.
- McCord, P. F., Cox, M., Schmitt-Harsh, M., and Evans, T. (2015). Crop diversification as a smallholder livelihood strategy within semi-arid agricultural systems near Mount Kenya. *Land Use Policy*, 42: 738-750.
- Molina Millán, T. (2015). *Regional migration, insurance and economic shocks: Evidence from Nicaragua*, Working paper.
- Peng, Y. (2004). Kinship networks and entrepreneurs in China’s transitional economy. *American Journal of Sociology*, 109(5): 1045-1074.
- Rapoport, H., and Docquier, F. (2006). The economics of migrants’ remittances. *Handbook of the economics of giving: Altruism and reciprocity*, 2: 1135-1198.
- Robinson, J. (2012). Limited insurance within the household: Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics*, 4(4): 140-164.
- Rozelle, S., Taylor, J. E., and de Brauw, A. (1999). Migration, remittances, and agricultural productivity in China. *American Economic Review*, 89(2): 287-291.
- Semykina, A., and Wooldridge, J. M. (2010). Estimating panel data models in the presence of endogeneity and selection. *Journal of Econometrics*, 157(2): 375-380.
- Taylor, J. E., Rozelle, S., and de Brauw, A. (2003). Migration and incomes in source communities: A new economics of migration perspective from China. *Economic Development and Cultural Change*, 52(1): 75-101.
- Townsend, R. M. (1994). Risk and insurance in village India. *Econometrica*, 62(3): 539-591.
- Vanwey, L. K. (2004). Altruistic and contractual remittances between male and female migrants and households in rural Thailand. *Demography*, 41(4): 739-756.
- Vella, F. (1998). Estimating models with sample selection bias: A survey. *Journal of Human Resources*, 33(1): 127-169.

- Wong, L., and Huen, W. (1998). Reforming the household registration system: A preliminary glimpse of the blue chop household registration system in Shanghai and Shenzhen. *International Migration Review*, 32(4): 974-994.
- Wouterse, F., and Taylor, J. E. (2008). Migration and income diversification: Evidence from Burkina Faso. *World Development*, 36(4): 625-640.
- Wooldridge, J. M. (1995). Selection corrections for panel data models under conditional mean independence assumptions. *Journal of Econometrics*, 68(1): 115-132.
- Wu, X., and Perloff, J. M. (2005). China's income distribution, 1985–2001. *The Review of Economics and Statistics*, 87(4): 763–775.
- Wu, X., and Treiman, D. J. (2004). The household registration system and social stratification in China: 1955–1996. *Demography*, 41(2): 363-384.
- Yang, D. (2011). Migrant remittances. *Journal of Economic Perspectives*, 25(3): 129-152.
- Yang, D., and Choi, H. (2007). Are remittances insurance? Evidence from rainfall shocks in the Philippines. *The World Bank Economic Review*, 21(2): 219-248.
- Zhao, Y. (1999a). Leaving the countryside: Rural-to-urban migration decisions in China. *American Economic Review*, 89(2): 281-286.
- Zhao, Y. (1999b). Labor migration and earnings differences: The case of rural China. *Economic Development and Cultural Change*, 47(4): 767-782.
- Zhao, Y. (2003). The role of migrant networks in labor migration: The case of China. *Contemporary Economic Policy*, 21(4): 500-511.
- Zhu, H. (2016). *Remittance frequency, transaction fees and household impacts*. Presented at the 2016 AAEA Annual meeting (No. 333-2016-14588), July 31 - August 2, Boston, MA, USA.

Table 1: Mean Statistics for Rural Households in CLDS (Restricted Sample)

	2012	2014	2016	All years
<i>Panel A: Income</i> ( $\times 10^3$ yuan)				
Total income	25.45	35.89	37.56	33.48
Wage income	11.89	18.58	21.14	17.49
Farm income	7.78	9.02	8.25	8.45
Migrant remittances	1.06	0.90	1.13	1.01
<i>Panel B: Expenditure</i> ( $\times 10^3$ yuan)				
Total expenses	26.37	31.39	35.35	31.26
Farm costs	9.24	6.90	7.83	7.84
Food expenses	7.43	9.23	9.98	8.99
Medical expenses	4.31	5.07	5.75	5.08
Education expenses	2.96	3.85	4.05	3.66
Gift expenses	2.24	2.55	2.78	2.54
Ceremony expenses	2.12	2.24	2.72	2.36
Commuting expenses	1.24	1.60	1.63	1.51
Housing expenses	1.16	1.40	1.63	1.41
<i>Panel C: Household characteristics</i>				
Farm size (mu)	7.60	7.38	8.66	7.83
Farm production (1=yes)	0.77	0.66	0.61	0.67
Head age (years)	51.28	54.15	55.93	53.89
Head sex (1=male)	0.85	0.91	0.91	0.89
Family size	3.18	4.74	4.93	4.36
Migrant household (1=yes)	0.56	0.62	0.69	0.62
Number of migrants	1.42	1.56	1.79	1.59
Number of children	0.72	0.87	0.89	0.84
Number of elderly members	0.37	0.57	0.69	0.55
Water source contaminated (1=yes)	0.21	0.18	0.26	0.21
<i>Panel D: Community characteristics</i>				
Ancestral hall in village (1=yes)	0.20	0.20	0.23	0.21
Experience of natural disaster (1=yes)	0.21	0.56	0.66	0.49
Share of most common surname (%)	44.29	43.04	44.82	43.92
Observations	4298	6511	4596	15405

Source: CLDS 2012, 2014 and 2016.

Note: (a) The restricted sample, which is used for empirical analysis in this study, includes rural households that are observed in at least two waves of the CLDS survey project. (b) By nominal currency exchange rate, 7 yuan approximately equals 1 USD. However, in line with the poverty line definition from the World Bank, this study primarily uses purchasing power parity (PPP) to implement currency conversions. (c) Six Chinese mu roughly equals an acre.

Table 2: Poverty Rates under Different Poverty Lines in the CLDS Sample

	2012	2014	2016
<i>A. Based on household "local" income</i>			
extreme poverty (below \$1.00)	0.12	0.16	0.18
standard poverty (\$1.00 to \$1.90)	0.09	0.09	0.11
relative poverty (\$1.90 to \$3.20)	0.14	0.15	0.14
<i>B. Based on household total income</i>			
extreme poverty (below \$1.00)	0.09	0.14	0.16
standard poverty (\$1.00 to \$1.90)	0.09	0.10	0.11
relative poverty (\$1.90 to \$3.20)	0.15	0.16	0.15
Observations	4696	6699	4688

Source: CLDS 2012, 2014 and 2016.

Note: To derive the poverty line for each household, first the three individual-level poverty lines (\$1.00, \$1.90 and \$3.20) are converted to Chinese yuan based on purchasing power parity (PPP) in corresponding years. Then, I multiply the three individual-level poverty lines (in Chinese yuan) by 365 days in a year and the family size to get three household-level poverty lines for each household. Comparing the household annual income (either total income counting remittances in, or "local" income without remittances) with each of the three household-level poverty lines, I get the poverty status of a household. Poverty rate is the percentage of households that fall into each poverty status. Households that are above the \$3.20 poverty line are considered as "not in poverty".

Table 3: Determinants of Rural Households' Migrant-sending Decision

	<i>Migrant household (1=yes)</i>		<i>Number of migrants</i>	
	(1)	(2)	(3)	(4)
categories of farm diversification	0.0683*** (0.0158)	0.0717*** (0.0234)	0.0413*** (0.0090)	0.0379*** (0.0121)
share of most common surname in village	0.0013*** (0.0005)	0.0021*** (0.0007)	0.0003 (0.0003)	0.0006 (0.0004)
ancestral hall in village (1=yes)	0.0304 (0.0301)	0.0325 (0.0458)	0.0702*** (0.0167)	0.0609** (0.0244)
number of children	-0.2504*** (0.0158)	-0.2869*** (0.0251)	-0.1079*** (0.0072)	-0.0954*** (0.0115)
number of elderly members	-0.0826*** (0.0172)	-0.1089*** (0.0273)	-0.0058 (0.0094)	0.0270* (0.0143)
family size	0.2498*** (0.0083)	0.2701*** (0.0136)	0.1902*** (0.0029)	0.1225*** (0.0057)
land size (mu)	0.0394*** (0.0147)	0.0458** (0.0226)	0.0287*** (0.0085)	0.0104 (0.0123)
head age	0.0067*** (0.0010)	0.0089*** (0.0016)	0.0147*** (0.0006)	0.0130*** (0.0009)
head sex (1=male)	-0.1355*** (0.0369)	-0.1354** (0.0552)	-0.1220*** (0.0214)	-0.0436 (0.0297)
pension	-0.1002*** (0.0204)	-0.1339*** (0.0314)	-0.0387*** (0.0113)	-0.0345** (0.0166)
low-income subsidy	-0.1390*** (0.0322)	-0.1610*** (0.0477)	-0.1457*** (0.0206)	-0.1044*** (0.0271)
household RE	No	Yes	No	Yes
year RE	No	Yes	No	Yes
Observations	13757	13757	13757	13757

Note: Standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 4: Testing the Three Motives of Migrants' Remittance-sending Behaviors

	<i>Dependent variable: Average amount of remittance per migrant</i>					
	<i>OLS - Full sample</i>		<i>OLS - Migrant HHs</i>		<i>Heckman-type correction</i>	
	(1)	(2)	(3)	(4)	(5)	(6)
number of migrants	19.527 (23.083)	16.897 (22.959)	-122.269*** (40.755)	-123.085*** (40.890)	-114.314*** (42.390)	-190.471*** (60.823)
number of children	6.616 (56.260)	33.462 (64.227)	-43.840 (75.195)	-69.487 (83.606)	239.714*** (49.082)	117.734* (69.998)
number of elderly members	-4.357 (60.814)	11.465 (63.726)	1.289 (92.366)	-12.977 (98.049)	54.189 (42.277)	46.320 (46.168)
village-level natural disaster (1=yes)	83.636 (63.163)	84.454 (63.197)	201.947* (116.165)	208.228* (116.284)	-69.722 (63.615)	-58.792 (65.758)
HH water source contaminated (1=yes)	179.758** (82.937)	179.879** (82.225)	177.004* (105.556)	178.612* (104.512)	107.218 (96.394)	116.841 (96.656)
HH local income, predicted	0.004 (0.008)	-0.001 (0.006)	0.003 (0.012)	-0.015 (0.013)	-0.022*** (0.005)	-0.103*** (0.037)
prescribed remittance level	0.224*** (0.077)	0.220*** (0.077)	0.312*** (0.101)	0.311*** (0.102)	0.560*** (0.065)	0.564*** (0.065)
inverse Mills ratio $\times \mathbb{1}(year = 2012)$					-290.415* (172.163)	-945.060** (376.715)
inverse Mills ratio $\times \mathbb{1}(year = 2014)$					-119.112 (192.226)	155.925 (220.350)
inverse Mills ratio $\times \mathbb{1}(year = 2016)$					92.344 (355.873)	749.705 (514.833)
household controls	No	Yes	No	Yes	No	Yes
household FE	Yes	Yes	Yes	Yes	No	No
year FE	Yes	Yes	Yes	Yes	No	No
panel bootstrap	No	No	No	No	Yes	Yes
Cragg-Donald Wald F statistic	—	—	—	—	136.46	136.05
Observations	13757	13757	8787	8787	13757	13757

Note: Standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 4 reports the empirical results for testing the three potential motives of migrants' remittance-sending behaviors: altruism, insurance and identity norm. The results provide evidence for all three motives. The statistical significance of inverse mills ratio for two years suggests the existence of selection bias associated with migrant sending. Household controls include family size, farm size, head age, head sex, as well as the amount of formal insurance like pension and low-income subsidy issued by the government. For results shown in the last two columns, bootstrap reps=1000. See text for more details.

Table 5: Migration, Remittances and Household Per Capita Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	total	farm	housing	medical	education	food	commuting	gift	ceremony
<i>Equation 1: HH per capita expenditures</i>									
migrant remittances	0.0493*** (0.0119)	0.0955 (0.0835)	0.1081*** (0.0329)	0.2245*** (0.0465)	0.2858*** (0.0575)	0.0066 (0.0257)	0.1900*** (0.0621)	0.1437*** (0.0487)	-0.0012 (0.0262)
number of migrants	-0.1815*** (0.0138)	-0.2730*** (0.0348)	-0.1119*** (0.0194)	-0.1267*** (0.0288)	0.3026*** (0.0520)	-0.1505*** (0.0172)	0.0979*** (0.0278)	-0.2582*** (0.0460)	0.0178 (0.0245)
<i>Equation 2: Migrant remittances</i>									
number of migrants	0.2152*** (0.0613)	0.1706 (0.1072)	0.1973* (0.1090)	0.1788*** (0.0396)	0.0919 (0.0574)	0.1666* (0.0992)	0.1236 (0.0808)	-11.0689 (7.3803)	-11.5106 (11.2737)
number of children	0.2441*** (0.0598)	0.2461*** (0.0480)	0.2441*** (0.0520)	0.2581*** (0.0412)	0.3916*** (0.0681)	0.2403*** (0.0494)	0.1740** (0.0703)	-0.7777 (0.7188)	-0.8515 (1.3260)
number of elderly members	0.1214*** (0.0315)	0.1160 (0.0903)	0.1168** (0.0508)	0.1612*** (0.0503)	0.2205*** (0.0419)	0.1499** (0.0710)	0.0806 (0.0616)	0.3957 (0.4822)	0.4557 (0.7161)
village-level natural disaster (1=yes)	0.1074** (0.0443)	0.1194* (0.0671)	0.0715 (0.0660)	0.1512** (0.0766)	0.0942 (0.0878)	0.1250* (0.0717)	0.1367** (0.0547)	1.8014 (1.5640)	1.9605 (2.3707)
prescribed remittance level	0.2161*** (0.0068)	0.2189*** (0.0120)	0.2178*** (0.0134)	0.2148*** (0.0077)	0.2098*** (0.0150)	0.2215*** (0.0130)	0.2254*** (0.0089)	0.4381*** (0.1691)	0.4562 (0.2887)
<i>Equation 3: Number of migrants</i>									
categories of farm diversification	0.0220*** (0.0059)	0.0208*** (0.0072)	0.0204*** (0.0062)	0.0200*** (0.0072)	0.0207*** (0.0062)	0.0193*** (0.0060)	0.0201*** (0.0075)	0.0216*** (0.0082)	0.0215** (0.0084)
share of most common surname in village	0.0004** (0.0002)	0.0004*** (0.0001)	0.0004*** (0.0001)	0.0004* (0.0002)	0.0004* (0.0002)	0.0004** (0.0002)	0.0004** (0.0002)	0.0004*** (0.0002)	0.0004** (0.0002)
ancestral hall in village (1=yes)	0.0085 (0.0111)	0.0077 (0.0109)	0.0032 (0.0097)	0.0057 (0.0100)	0.0062 (0.0135)	0.0068 (0.0105)	-0.0050 (0.0126)	0.0089 (0.0101)	0.0089 (0.0113)
household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
panel bootstrap	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13757	13757	13757	13757	13757	13757	13757	13757	13757

Note: Standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 5 reports the estimated effect of migration and remittance on household expenditure, both in aggregate and by different categories. The core result reported is derived from estimating a system of equations using three-stage least squares (3SLS) with panel bootstrap (reps = 1000). The results show that the receipt of remittances leads to an increase in medical and education expenses. Omitted household controls include family size, farm size, head age, head sex, as well as the amount of formal insurance like pension and low-income subsidy issued by the government. See text for more details.

# Appendix

Table A1: Mean Statistics for Full and Restricted Samples

	<i>Full sample</i>			<i>Dropping singletons</i>		
	2012	2014	2016	2012	2014	2016
<i>Panel A: Income (<math>\times 10^3</math> yuan)</i>						
Total income	28.51	38.49	40.03	26.71	37.35	40.48
Wage income	12.54	21.19	21.28	11.94	20.68	22.07
Farm income	8.20	8.52	8.84	7.55	8.95	8.34
Migrant remittances	1.03	0.87	1.03	1.06	0.90	1.09
<i>Panel B: Expenditure (<math>\times 10^3</math> yuan)</i>						
Total expenses	27.09	32.07	36.29	26.57	31.66	36.11
Farm costs	15.24	8.17	10.31	9.24	6.90	7.83
Food expenses	8.03	9.89	10.45	7.61	9.49	10.30
Medical expenses	4.23	4.99	6.07	4.35	5.05	5.91
Education expenses	3.02	3.81	4.19	2.97	3.84	4.12
Gift expenses	2.18	2.54	2.78	2.24	2.55	2.78
Ceremony expenses	2.11	2.24	2.45	2.12	2.24	2.72
Commuting expenses	1.35	1.71	1.72	1.24	1.60	1.63
Housing expenses	1.27	1.52	1.70	1.16	1.40	1.63
<i>Panel C: Household characteristics</i>						
Farm size (mu)	8.73	7.03	8.35	7.50	7.31	8.43
Farm production (1=yes)	0.72	0.61	0.57	0.75	0.64	0.59
Head age (years)	50.99	53.85	55.25	51.51	54.26	55.99
Head sex (1=male)	0.84	0.90	0.89	0.85	0.91	0.90
Family size	3.16	4.61	4.57	3.18	4.75	4.93
Migrant household (1=yes)	0.56	0.59	0.62	0.57	0.62	0.68
Number of migrants	1.45	1.49	1.57	1.46	1.56	1.78
Number of children	0.71	0.85	0.84	0.72	0.87	0.89
Number of elderly members	0.36	0.56	0.62	0.39	0.58	0.69
Water source contaminated (1=yes)	0.22	0.19	0.28	0.21	0.18	0.26
<i>Panel D: Community characteristics</i>						
Ancestral hall in village (1=yes)	0.24	0.22	0.24	0.20	0.20	0.23
Experience of natural disaster (1=yes)	0.25	0.56	0.58	0.21	0.56	0.66
Share of most common surname (%)	45.00	42.88	44.87	44.29	43.04	44.82
Observations	6006	8024	8231	4298	6511	4596

Source: CLDS 2012, 2014 and 2016.

Note: (a) By nominal currency exchange rate, 7 yuan approximately equals 1 USD. However, in line with the poverty line definition from the World Bank, this study primarily uses purchasing power parity (PPP) to implement currency conversions. (b) Six Chinese mu roughly equals an acre.

Table A2: *Hukou* Status of Household Heads in the CLDS Rural Sample

	2012	2014	2016
Rural <i>hukou</i>	4702	6702	4688
Urban <i>hukou</i>	149	171	114
Uniform <i>hukou</i> (previously rural)	—	107	75
Uniform <i>hukou</i> (previously urban)	—	14	27
Observations	4851	6994	4904

Source: CLDS 2012, 2014 and 2016.

Note: It is unclear why rural households could attain an urban *hukou* prior to the reform. Besides, the fraction of household heads with a uniform *hukou* are just too small, which might bring noise to our empirical analysis. To avoid this kind of noise, rural households reporting to have a urban or uniform *hukou* are dropped in subsequent analysis.

Table A3: Determinants of the Migrant-sending Decision (Subsample by Year)

	(1)	(2)	(3)
	year=2012	year=2014	year=2016
categories of farm diversification	0.0053 (0.0103)	0.0410*** (0.0084)	0.0129 (0.0084)
share of most common surname in village	-0.0001 (0.0003)	0.0004* (0.0002)	0.0004 (0.0003)
ancestral hall in village (1=yes)	0.0946*** (0.0207)	-0.0227 (0.0154)	-0.0242 (0.0160)
number of children	0.1495*** (0.0115)	-0.1142*** (0.0074)	-0.1312*** (0.0082)
number of elderly members	0.0205 (0.0132)	-0.0503*** (0.0086)	-0.0283*** (0.0088)
family size	-0.1535*** (0.0074)	0.1137*** (0.0036)	0.1142*** (0.0039)
land size (mu)	0.0425*** (0.0101)	-0.0035 (0.0075)	0.0209** (0.0082)
head age	0.0024*** (0.0007)	0.0011** (0.0005)	-0.0018*** (0.0006)
head sex (1=male)	-0.0211 (0.0211)	-0.0166 (0.0207)	0.0028 (0.0227)
pension	-0.0127 (0.0160)	-0.0344*** (0.0107)	-0.0276*** (0.0104)
low-income subsidy	-0.0916*** (0.0268)	-0.0254 (0.0176)	-0.0369** (0.0154)
Observations	3806	5756	4195

Note: Standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table A4: Testing Potential Heterogeneity of the Impact of Village-level Adverse Shock on Different Households

	<i>Dependent variable: Average amount of remittance per migrant</i>							
	<i>OLS - Full sample</i>				<i>Heckman-type correction</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
village-level disaster (1=yes)	157.71 (104.39)	115.07* (64.79)	62.89 (68.91)	37.19 (67.55)	162.61 (104.33)	116.93* (64.94)	65.56 (68.88)	40.87 (67.48)
village-level disaster × farm production (1=yes)	64.29 (102.43)				58.00 (102.16)			
village-level disaster × HH has farm machinery (1=yes)		-259.46 (222.74)				-260.79 (222.62)		
village-level disaster × HH has livestock (1=yes)			372.66* (206.58)				364.84* (206.17)	
village-level disaster × HH in debt (1=yes)				19.52 (123.94)				16.08 (123.94)
inverse Mills ratio × $\mathbb{1}(year = 2012)$					-28.77 (79.97)	-20.95 (81.37)	-26.50 (81.89)	-7.69 (82.00)
inverse Mills ratio × $\mathbb{1}(year = 2014)$					-184.04* (95.61)	-186.83* (95.98)	-182.83* (95.74)	-179.60* (95.36)
inverse Mills ratio × $\mathbb{1}(year = 2016)$					-41.74 (125.58)	-56.36 (122.49)	-43.38 (121.72)	-46.29 (121.18)
household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
household FE	Yes	Yes	Yes	Yes	No	No	No	No
year FE	Yes	Yes	Yes	Yes	No	No	No	No
panel bootstrap	No	No	No	No	Yes	Yes	Yes	Yes
Observations	13756	13752	13752	13756	13756	13752	13752	13756

Note: Standard errors in parentheses; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Appendix Table A4 reports the result of robustness checks for identifying the causal connection between the experience of covariate (village-level) economic shocks and the amount of per-migrant remittances received by rural households in China. In these estimations, measures for the other two motives of remittance sending (altruism and identity norm) are also included, but not reported. In most cases, I do not find significant evidence for the heterogeneity of the impact of village-level natural disaster on different households. Household controls include family size, farm size, head age, head sex, as well as the amount of formal insurance like pension and low-income subsidy issued by the government. See text for more details.