Does Asymmetric Information in Transnational Households Affect Remittance Flows?

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Abstract

Transnational households where one or more members are employed abroad while others remain back home are likely be characterized by a higher degree of private information relative to households where members are co-resident. We provide new evidence that demonstrates how asymmetric information in the transnational household affects the amount of remittances sent home. Using a dataset of married male Indian migrants working in Qatar whose wives remained back home that were interviewed simultaneously but separately which allowed for cross-reports, I find that the greater the under-reporting of overseas income by the wife, expressed as a ratio of her account to his own, the lower the annual remittances sent home. This result remains robust when the reported earnings ratio is instrumented by variables that reflect the limited monitoring ability and varying preferences of the couple. The finding demonstrates how remittance flows can be affected by the presence of information gaps arising from imperfect monitoring of intra-household allocations. It also shows the mechanism by which migrants may vary the amount transferred home by exploiting the incomplete information remittance recipients have of foreign earnings.

Keywords: asymmetric information, intra-household decision-making, remittances, India, Qatar

JEL codes: D13, D82, F22, F24

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1. Introduction

The large growth of international migration over the past decades implies an increasing number of transnational households in developing nations with one or more members working abroad in other countries. These households benefit, oftentimes from large increases in income brought about by international migration and the ensuing remittances that are transferred back home. Such households also engage in transnational household finance, that is household financial management that faces challenges arising from extended separation from primary income earners and management of international remittance transfers.

A better understand of how transnational households make financial decisions is potentially important given the significant and growing flows of international remittances. Remittance receipts of developing countries reached an estimated US$ 325 billion in 2010, doubling the levels observed in 2004.[2] Recent research has shown that households that receive remittances are more likely to emerge from poverty, to send their children to school and to invest in small enterprises, health, education and housing.[3]

A distinguishing feature with respect to financial decision making of transnational households that differentiates them from intact households is that the former are likely be characterized by a greater degree of asymmetric information between physically separated members that constraints their ability to make coordinated financial decisions. Information gaps may affect financial outcomes such as savings and expenses and other uses of remittances where the behavior on one side of the transnational divide differ from what is

[2] World Bank, *Migration and Development Factbook 2011*.
[3] See Adams and Cuecuecha (2010), Adams and Page (2005), Cox-Edwards and Ureta (2003), Woodruff and Zenteno (2007), Yang and Martinez (2005) and Yang (2008).

perceived or expected by the other party. Consequently, international migrants, who can only imperfectly monitor and control uses of remittances by household members remaining behind, may remit less money home if intra-household preferences differ. On the other hand, the inability of remittance-receiving households to monitor the migrants' financial situation may effect the migrants' behavior by say, enabling migrants to privately spend more, thereby remitting less.

Recent literature lends support that intra-household informational asymmetries have important consequences for transnational households. Ashraf et al. (2011) find that a randomized intervention that helped that US based-migrants from El Salvador control and monitor savings in recipient household led to higher savings levels back home. Chin et al. (2011) document that randomly assigned access to bank accounts among Mexican immigrants in Texas increased savings and lowered remittances which they interpret is to the migrants' increase ability to manage their own financial resources, instead of relying on the household back home to do so. Using observational data, De Laat (2008) showed that male Kenyan internal migrants spend considerable resources monitoring their rural wives and Chen (2006) finds that spouses of Chinese internal migrants consume more leisure hours while their daughters engaged in more household work. Ambler (2012) shows how asymmetric information works the other way: incomplete information by remittance recipients about the migrant's financial situation influences the migrant's behavior. She finds in a randomized experiment that Salvadoran migrants in the US shared less of a potential lottery prize with their families in El Salvador if their families were not aware of it.[4]

[4] In a related study of non-migrant households, Ashraf (2009) show that Filipino men whose wives manage the financial affairs of the household will hide money from their spouses when that decision is kept private.

This paper contributes to the emerging literature on the impact of asymmetric information on transnational households in several ways. First, we provide new evidence of how information gaps impacts remittance flows using a unique dataset of married, male Indian migrants workers in Doha, Qatar whose wives remained behind in India wherein both were interviewed simultaneously but separately which allowed for cross-reports to be collected. In particular we focus on the discrepancy between migrant's reported wages and the wife's account of his foreign earnings. The greater this discrepancy, measured using a ratio of the wife's account of her husband's earning to that of his own, the lower the amount of annual remittances sent home. This result is robust when the ratio is instrumented by variables that reflect varying preferences and monitoring ability of the couple. This also serves as additional evidence of noncooperative behavior within the transnational household as remittances sent home by the migrant should not be affected by the wife's incomplete information of his earnings if both share common financial objectives. Second, this paper highlights the mechanism by which migrants may adjust the amount of remittances sent home if the migrant household is unable to agree on a cooperative outcome. A migrant may be constrained from independently changing the amount of remittances sent if he has to re-negotiate or bargain over a new level, particularly if recipients have full information about his true financial situation and expect a share of his income in exchange for services rendered.[5] On the other hand, if recipients can only imperfectly monitor the migrant's real economic situation, he may be able to exploit their ignorance by varying the amount transferred home with little repercussion. Previous studies have not explicitly addressed this issue.

[5] Remittances could be used to "purchase" various types of services such as taking care of the migrant's assets, repayment of the family loan for obtaining a job abroad or securing the family's inheritance. Rapoport and Docquier (2006) indicate that such motivations are generally indicative of temporary migration, signaling the migrant's intent to return which is highly applicable with the sample of contract-based migrants that is studied here.

The remainder of this paper is organized as follows. Section 2 describes some facts about international migration to Qatar and the migrant population of interest. Section 3 describes the dataset and presents some key patterns. Section 4 specifies the empirical model with the empirical results provided in Section 5. Section 6 concludes with some policy considerations.

2. International Migration to Qatar

In 2010, remittance outflow from the State of Qatar was estimated at USD 7.89 billion, representing 6.2 percent of the country's GDP.[6] Approximately 90 percent of the population in the country age 15 or older, were foreign born in 2010, rendering it the nation with the highest share of immigrants in the world.[7] The majority of immigrants to Qatar originate from developing countries, with a significant proportion from South and East Asia (Kapiszewski, 2006).[8] Migration into Qatar and other oil and gas producing countries of the Arabian Gulf took off in the 1970s with rising oil prices that subsequently fueled a large construction boom. This required a large pool of unskilled and semi-skilled labor, which the national labor force was unable and unprepared to provide (Shah, 2008). The share of skilled and professional migrant workers has increased since the 1970s but the foreign labor force is still dominated by a large share of workers in the construction sector. Most nationals in Qatar are employed in the public sector though in recent times, as in the rest of the Gulf

[6] Quarterly Qatar Statistical Bulletin, September 2011.
[7] The fraction of foreign born was computed from Qatar's 2010 census, undertaken by the Qatar Statistical Authority. Qatar's total population in April 2010 was 1.7 million. The country ranked at the top of immigration countries in 2010 (measured by the population share of immigrants) based on data published in the *Migration and Remittances Factbook 2011*.
[8] Migrant stocks or flows to Qatar or the Gulf region by origin country are difficult to find. Census data for Qatar do not provide a breakdown of the origin countries for the migrant population.

Cooperation Council (GCC) countries which are oil and gas rich, there is a drive to increase their employment share in the private sector. [9]

Migration to Qatar and to the neighboring GCC countries can be viewed as temporary immigration where work contracts stipulate the duration of stay in the country (Shah, 2008). At the end of the work contract, migrants are expected to return to their home countries. These contracts are typically for one year to two years and some may extend to five years though they are renewable at the discretion of the employer.[10] A migrants' work permit or visa is sponsored by his employer that effectively ties him to his sponsor. Only workers earning incomes above a minimum level are allowed to bring their dependents with them - in Qatar, the figure was QR 8,000 a month in 2010, the equivalent of USD 26,300 annually.[11] Labor markets are tightly regulated in Qatar as in other GCC countries and migrants are not permitted to change employers unless permitted by their current job sponsor.

Migration from India's southern state of Kerala to the countries of the Gulf also accelerated with the oil price boom in the 1970s. Until recently, Keralites made up more than half of the Indian migrants to the Gulf and the remittances received in Kerala from abroad accounted for nearly 22 percent of the state's net GDP in the 90s (Prakesh, 1998). Results from the 2011 Kerala Migration Survey (KMS), which was a representative survey of 15,000 households in Kerala conducted between December 2010 and June 2011, indicated that 17.1

[9] The 2007 Qatar Labor Force Survey indicated that 94.6 percent of Qatari nationals in the workforce are employed in the public sector. The GCC countries consist of Saudi Arabia, United Arab Emirates, Bahrain, Kuwait, Qatar and Oman.

[10] There are no data on whether the duration of a contract varies depending on the migrant's job or country of origin. The length of the contract is not entirely left to the sponsor. The country's Ministry of Interior may also place limits on the contract term.

[11] Shah (2008) further states that family dependents are sponsored by the worker and in the case of expatriate children, the sons can stay in the country until they reach 21 and daughters until they get married. The Qatari Riyal (QR) is pegged to the US dollar. One dollar is equivalent to QR 3.65.

percent of households received remittances during the survey period and remittances were estimated to make up 31 percent of the state's net GDP (Rajan and Zachariah, 2011).

3. Data

The data for this study is a subset of observations drawn from the Qatar Study of Kerala Families (QSKF) 2010 which comprised a total of 234 couples where the husband is a migrant worker in Doha, Qatar and his wife resides in Kerala, India. A survey firm was hired to recruit and subsequently interview the subjects between August and December 2010. The firm used a convenience sampling approach with recruitment focusing on migrants mostly residing in Doha's Industrial Area. The representativeness of the sample will be addressed shortly.

For QSKF 2010, couples recruited were randomly assigned with equal probability to two groups that determined how they were interviewed later. Couples assigned to group one, labeled the *public session*, had the survey firm interview the husband and wife together.[12] Couples allocated to the second group called the *private session*, had each member interviewed separately but the interviews were coordinated such that they began at the same time to avoid the possibility that the couple may discuss responses with each other.[13] Husbands were interviewed face-to-face while their wives were interviewed over the phone or computer (using Skype or equivalent). The private session was intended to document not

[12] The public session is meant to be a control group in that with each member being able to listen to their partner's answers, the couple would convey responses to the interviewer that are typical of what is shared with each other. Field workers interviewed the husband at his residence or in some case invited him to come to the survey firm's office if the phone reception was unclear. In the presence of the husband, the interviewer would make a phone call to his wife. If she were available to be interviewed, the interview would begin either with the husband or wife first for each section of the questionnaire, depending on a random assignment. This was to determine if being asked first for a set of questions in a section influenced the response of the other. The wife was put on speakerphone so that her husband's responses could be heard and vice-versa.

[13] Calls to both parties were scheduled in advance.

only the subject's responses about themselves but also what he or she knew were the socio economic conditions of the partner. For example, not only was the husband asked about his income but his wife was also separately queried on his earnings in Qatar. Similarly, just as the wife was asked to disclose her household's monthly expense in India, the husband too was requested to enumerate expenses back home.[14]

Detailed data were collected on the migrant's demographics, expenses, incomes, life and work satisfaction, remittances sent home in addition to savings and loan decisions. Similar data were collected from the migrant's spouse about herself and of the household remaining behind in India. Comparing the outcomes between the public and private session is the subject of a separate study. In this paper we focus instead on the results from the private session, which totaled 116 observations.

A valid concern is how representative this sample is. If the data collected are unique in terms of the characteristics of the migrant household, then the results cannot be generalized. However, determining whether the sample collected is representative is non-trivial – Qatar's census, the latest of which was completed in April 2010 does not reveal the nationality of foreign born residents nor does it offer any of the relevant variables of interest.

Fortunately, I had access to a representative household survey conducted between December 2010 and June 2011 in Kerala by the Center for Development Studies. The Kerala Migration Survey (KMS) 2011 covered 15,000 households in all 14 districts of the state and collected data on the characteristic of household members who migrated outside the state. The number of married, male migrants working in the GCC amounted to 1,778 individuals in

[14] At the start of the interview, each member was informed that his or her responses would not be disclosed to the other spouse.

the KMS 2011 dataset. Only the household was interviewed for the KMS 2011 so the data on migrants is comparable to the private session dataset. Table 1 provides a comparison of the summary statistic created from the QSKF data and KMS sub-sample and they are strikingly similar in terms of the average age, duration abroad and annual earnings of the migrant reported by the recipient household. This provides some reassurance that the data collected for this study are representative of the population of interest, though one stills needs to be mindful of the limitations inherent in small samples.

[insert Table 1 about here]

Table 2 reports the responses of the migrants (husbands) and their wives. The average age of the male migrants in the sample was 39 years. The migrants were married for 11 years on average and mean time working outside India was nearly 10 years. The average annual foreign earnings in Qatar was the equivalent of USD 6,350. An average of USD 2,865 was remitted home on an annual basis, net of remittance fees.[15] International remittances, net of fees, averaged 47% of a migrant's annual income. In India, 13 percent of the wives in the sample were employed while the rest were homemakers. The wives substantially under-reported their husband's overseas earnings, averaging USD 4,675 per year or 77 percent of the husband's reported income.[16] The mean difference in reported foreign income between the husband and wife's of USD 1,675 was statistically significant at conventional levels.

[Insert Table 2 about here]

[15] In order to compare across different currencies, all monetary measures are converted to US dollars.

[16] Except for six percent of the sample, most of the women were able to report their husband's foreign income. For wives who were unable to account for their husband's earnings in Qatar, we used the sum of the annual remittances received from him and an annualised amount of her report of his monthly expenses to compute a lower-bound estimate of his income. A dummy variable is included in all empirical specifications for this group of wives.

3.1 Patterns in the Data

I use the discrepancy in the couple's accounts of overseas earnings to measure the extent of the information problem. Define the reported (foreign) earnings ratio as the ratio of the migrant husband's earning reported by his wife to the figure that he provides:

$$\text{Reported Earnings Ratio, } \omega = E_W/E_H, \qquad (1)$$

where E_j is the annual earnings of the husband, reported by person j and $j \in (H, W)$ where H is the husband and W is the wife. The distribution of the reported earnings ratio is provided in Appendix Figure A1 and closely approximates a normal distribution.

Figure 1 plots the reported earnings ratio against the husband's report of his annualized earnings converted to US dollars and includes a fitted line from a non-parametric regression. The fitted line shows that the higher the migrant's own reported income, the greater the under-reporting of his salary by his wife. Figure 1 illustrates a reported wage ratio that begins close to one and falls as annual income rises.

[Insert Figure 1 about here]

One possible reason for this downward sloping pattern is that as the migrant's income increases, he has a greater incentive not to fully reveal it to the recipients in order to manage demands made for additional remittances by the household or from the extended family.[17] On

[17] Osella and Osella (2000) in their anthropological study of male migrants to the Gulf from Kerala described the dilemma facing the Gulf migrant's. On one hand, he seeks to benefit from his improved financial position by building up a reserve of cash and assets for his household but on the other hand, risks losing face and reputation if he does not meet the social obligations of generously spending back home, especially on close and direct kin, who might then regard his migration as a failure.

the other hand, low-income migrants may inflate the account of their income to their spouses to convey an impression that all is well on their end.[18]

Is the reported wage ratio correlated with remittance flows? Figure 2 is a scatterplot of net annual remittance reported by the migrant against the constructed earnings ratio.

[Insert Figure 2 about here]

The non-parametric fitted line presents an intriguing relationship in the data between remittances sent and the reported wage ratio. The lower the reported earnings ratio (i.e., the greater the under-reporting by the wife of her husband's earnings), the lower the amount of remittance he sends home. The remaining empirical exercise is to determine if this relationship continues to hold after controlling for confounding factors.

3.2 What explains the reported earnings ratio?

To what extent does the report earnings ratio reflect varying information conditions within the migrant household? Is this ratio lower in households where monitoring is constrained or greater when the wife has greater bargaining power?

[18] Gardner (forthcoming) writes of encountering a small photography studio while on fieldwork in Bahrain, also hosts to a large population share of migrant workers, where there was a stage office desk together with a clothes pole with various office attire. The proprietor openly described that migrant men working in menial and low-status jobs would have photographs taken of them behind the office desk with a suit and tie, to be sent home. As Gardner aptly puts it "across the transnational divide, custodians become office workers, tea boys become accountants, and clerks become managers". Whether by photos, deeds or words, low-income migrants may attempt to play up their economic status to their family at home that have limited ability to monitor or verify actual conditions abroad.

For the differences in reported overseas earnings to count as private information, the wife would need to be uncertain about her husband's earnings due to her limited ability to monitor his lifestyle abroad. A husband need not deliberately hide his true income from his spouse. She may simply be inattentive to financial matters. Irrespective of what leads to a situation where the wife is unaware of her husband's true income, the existence of private information about his earnings enables him to vary the amount of remittances sent home.

To examine whether the reported earnings ratio is related to limited monitoring ability, we estimate a simple empirical model of the reported earnings ratio as follows:

$$\omega_k = \alpha_0 + \alpha' X_k + \mu_k , \qquad (2)$$

where ω_k is the reported earnings ratio of household k, the vector X_k is a collection of co-varieties that are expected to influence the reported earnings ratio and and μ_k is a random mean-zero error term. We discuss the co-variates in the following paragraphs.

In terms of variables that reflect the wife's ability to monitor or appreciate her husband's working environment abroad, we include indicator variables for wives who are employed in India, who are unaware of his expenses in Qatar and who has blood relatives working in Qatar. Wives with jobs in India are in a better position to appreciate their husband's earning capacity and have greater bargaining power over intra-household resource allocation that those who are homemakers. Their presence should therefore have a positive impact on the reported income ratio.

Similarly, the presence of blood relatives in Qatar enhances the ability of a wife to appreciate her husband's socio-economic circumstances, which is also expected to close the reporting gap. On the other hand, couples where the wife is unaware of her husband's expenses in Qatar are more likely to be taken advantage of their ignorance about salaries and living condition in Qatar. We expect the wife's ignorance about her husband's expenses abroad to be negatively associated with the reported wage ratio.

From the migrant's perspective, his limited ability to monitor how remittances are used by the sending household may lead him to remit less if intra-household preferences about the use of remittance vary. We indirectly capture this by asking the migrant whether he is aware of other people having disagreement over the uses of remittances by the household back home. Asking him directly whether such disagreements exist within his own households would likely be biased downwards since he may not be willing to openly admit having such issues. I expect this indicator variable to be negatively correlated with the earnings ratio if the migrant chooses to downplay or not to fully inform his wife about his true earnings in order to reduce the size of remittances sent home.

On the other hand if a migrant has a desire to spend more on himself privately, he may exploit the recipient household's inability to observe his income and spending behavior abroad by under-reporting earnings and subsequently remitting less. This desire for private spending is measured by the share of the migrant's monthly expense spent on cigarettes, tobacco, alcohol, eating out, and entertainment (i.e "temptation goods"). Migrants with higher shares of such expenditures are more likely to conceal them from their families at home by under-reporting or not revealing their true income. Hence the share of expenses on temptation goods is likely to be negatively correlated with the reported earnings ratio.

In the two preceding cases, if the sending household is fully aware of the migrant's true income, it would be difficult for him to send less home because he would have to provide some justification (i.e., saying "I don't trust you with additional remittances" or that "I want to buy an expensive cell-phone" may not go down well with the spouse and the family). It's simply easier if his spouse or family members back home didn't know his true income, which gives him the flexibility to decrease, or even increase the amount of remittances he decides to send back.

Over time, a migrant's feeling of altruism towards his spouse could wane which may reduce his incentive to fully disclose income to his spouse. We use years of marriage to account for the possible erosion of altruism and anticipate it would be negatively correlated with the reported earnings ratio. Older migrants may have devised ways to better monitor or channel how remittance are used back home or have been able to reach an understanding with their spouse and related family members to spend the remittances in the way that reflect his preferences. Age may be associated with a narrower reported income ratio and therefore is expected to be positively correlated.

Finally, if a couple has complete information about the migrant's income but one or both members decide not to fully disclose it to the interviewer, this would appear as a discrepancy in the account of overseas earnings reported to the researcher but it would be misleading to interpret this as evidence of private information between couples. For example, the reported earning gap could be attributed to the wife's inherent tendency to under-report her

husband's income.[19] In the data, we also observe that her account of remittance received from her husband is on average, 89 percent of the amount he reports having sent annually, net of remittance fees. When it comes to remittances, most wives are aware of the amount received.[20] Using the difference in reported level of remittances is therefore a good gauge of the wife's tendency to under-report. If we find a positive and statistically significant correlation between the earnings ratio and remittance ratio, the latter measured as the ratio of annual remittance reported by the wife to that of her husband's, then this would be evidence of an under-reporting bias. We would then have to be cautious in interpreting the earnings gap as a proxy for private information.

Table 3 presents results from an OLS regression of the reported earnings ratio on covariates described earlier. The results are robust to heteroskedasticity. Though the reported remittance gap has a positive sign, it is not statistically significant at the conventional levels (p=0.9). While we cannot rule out that some wives may under-report income even if they know the true amount, this does not seem to play a major role in explaining the reported earnings ratio. The other variables have the expected signs. Older migrants, wives who are employed and wives with relatives working in Qatar are positively correlated with the reported income gap. All three are statistically significant except for the indicator for wife's relatives in Qatar. In contrast; years of marriage, being unaware of the husband's expenses in Qatar, the migrant having disagreement over the uses of remittances and higher expenditures shares on temptation goods by the migrant is negatively associated with the income ratio and are statistically significant at the 5 percent level. These results demonstrates how limited

[19] The psychological literature uses a term called social desirability bias to describe the tendency of respondents to answers questions in a way that would be viewed favorably by others. Low-income earners may report inflated amount of their wage and vice-versa for high earners. The salaries that the migrants reported to the interview in the private session did not seem to reflect one tendency or the other based on inspections of the reported amounts. This could be attributed to the fact these the migrants interviewed were neither among the lowest income earnings nor highest – they could mostly be described as lower-middle income earners.

[20] Only 2 percent didn't know the amount of remittance sent home by their husbands.

monitoring capacity either by the migrant or his household and erosion of altruism lowers the reported earnings ratio while the presence of a more informed household or greater bargaining power raises it. This then suggests that the earnings ratio measure can be adopted as a reasonable proxy for informational asymmetries within the household.

[insert Table 3 about here]

4. Model

The primary focus of this paper is to determine whether remittances flows are influenced by incomplete information that the sending household has about the migrant's overseas income. I adopt a parsimonious remittance function and include the reported earnings ratio as an innovation.[21] Let r_k be the log amount of annual remittances net of fees, sent by a migrant husband belonging to household k ; ω_k be the reported migrant's earnings ratio and ε_k be a random mean-zero error term. The impact of the wage ratio on remittance is obtained by estimating the following specification:

$$r_k = \alpha + \beta\omega_k + \boldsymbol{\delta}'\boldsymbol{Y_k} + \varepsilon_k \qquad (2)$$

The coefficient of interest is β and a positive value would indicate that greater under-reporting of the migrant's income by his spouse is associated with lower remittances. The vector Y_k is collection of covariates that are expected to influence remittance sent by the migrant, which are as follows: (log) annual income reported by the migrant, an indicator if the migrant has post-secondary qualifications, the amount of (log) years spent working

[21] The empirical model does not comprehensively attempt to isolate the various motives for remittance, which researchers have found to be empirically difficult to pursue as some or all may coexist. For a useful survey of remittance motives, see Rapoport and Docquier (2006).

abroad, an indicator variable if another family member is working abroad, a dummy variable for having a wife who is employed in India, the total amount the sending household spent over the past 12 months on medical expenses expressed as a share of the migrant's income and district level dummies where the sending household resides.

Having another family member working abroad is likely to reduce the amount of remittance sent as the responsibility of supporting the sending household is distributed between the members who are employed abroad. Migrants with employed wives may either send less if motivated purely by altruism or more if they are confident that she will be better able to manage or invest the remittances sent back. An employed wife may also have a greater bargaining power over intra-household resource allocation, resulting in a higher level of remittances sent. A higher share of income spent on medical expenses over the year may reflect an unexpected event that warranted additional remittances to be sent. District level dummies account for differences in living costs and access to remittance receiving services across the state of Kerala. All standard errors are robust to heteroskedasticity.

4.1 Identification

The constructed earnings ratio may suffer from reverse causality or endogeneity bias and it may also be measured with error. Wives may infer their husband's foreign income from the remittances he sends back. In this case, remittance would be positively correlated with the earnings ratio which itself is a function of the amount sent. Other unobserved variables may also affect both remittance levels and the earnings ratio. On the other hand, if the empirical measure of the reported earnings ratio has considerable measurement error, this will bias the estimate of the impact of the regressor towards zero.

Instrumental variables (IV) estimates can help overcome the bias arising from endogeneity and random measurement error. I consider instruments that reflect varying preferences of the husband and wife and ability to monitor or understand the migrant's economic condition abroad. Four candidate instruments for the reported earnings ratio are considered, which are each discussed in turn.

First, a husband who does not want to disclose his true income is better able to do so with a wife who is unaware of her husband's living and working conditions in Qatar. This is captured with an indicator variable for a wife who is ignorant about her husband's expenses abroad. This variable would be negatively correlated with the reported earnings ratio if the husband does not wish to reveal his entire income but it also may be positively associated with the wage ratio if he instead reports an inflated level of earnings. The wife's lack of awareness of her spouse's foreign expenditures should not directly determine the amount of remittances sent.

Second, a migrant who desires to privately spend more on himself contrary to the preferences of his wife who for example, may want to spend more on the family back home or save more, may attempt to conceal some of his expenditures. Migrants with higher expenditures share on "temptation goods" may suffer from a lack of self-control and have preferences that are 'present-bias' which favor current consumption over future goods.[22] The share of the migrant's monthly expense spent collectively on cigarettes, tobacco, alcohol, eating out, and on entertainment or local fun trips is used to proxy his desire for private

[22] Banerjee and Mullainathan (2010) defines temptation goods as goods that generates positive utility for the individual that presently consumes them despite recognizing that it produces a disutility when considering future selves. For example, we may derive pleasure from smoking a cigarette today and willingly spend money on it despite wanting to abstain in the future.

spending. We expect this share to be negatively correlated with the reported earnings ratio if the migrant conceals them from his wife by under-reporting his earnings in order to privately spend more of it. Assuming full substitutability of the components of total expenditure, the migrant's share of expenditures on temptation goods should not directly impact the amount of remittance sent unlike total expenditures.

Third, a migrant who disagrees with the household back home over the uses of remittances, which is indicative of differences in intra-household preferences, is more likely to under-report his income so as to mitigate monetary demands from the other end.[23] Forth and similarly, a migrant whose stated preference for the household back home is to save more while they instead prefer to spend may not fully reveal his income. This revealed preference was accounted for by directly asking the migrant if he agreed with the statement "You want your household in Kerala to save more, and they prefer to spend." Such disagreements are not expected to directly affect the amount of remittance sent but rather indirectly by the migrant revealing a lower amount of income that subsequently, can be used justify a reduced level of remittances.

5. Empirical Results

The descriptive evidence in section three suggests a positive relationship between remittances and the reported foreign earnings ratio. However this could be influenced by other characteristics of the migrant and his household that impacts both remittances and the

[23] I use a proxy measure for disagreement within the household by asking the migrant if he is aware of other migrants having disagreement with their households back home over remittance uses. Asking him directly whether such disagreements exist within his own households would likely yield a response that is biased downwards since he is less likely to openly admit having such issues.

wage ratio.[24] To control for possible confounding factors, we run an OLS specification of equation (3) and present the results in Table 4.

[Insert Table 4 somewhere here]

Column one of Table 4 is a basic remittance regression excluding the reported earnings ratio. Remittances sent are positively associated with a migrant's income though at a decreasing rate, reflected in a coefficient that is less than 1.[25] This suggests a self-interest motive where higher earning migrants gain less utility from their transfers sent home. If the household has other members working abroad, remittances sent home decline, which is evidence of an altruistic motive where the responsibility of supporting the sending household is shared among members working abroad. Both motives could coexist – beyond a certain amount that the migrant deems sufficient to support the family at home whom he cares about, he may derive lower marginal utility from a dollar of remittance sent than from a dollar he consumes. Migrants whose wives are employed in India also tend to send a higher amount of their earnings home, which may reflect greater confidence in the wife's ability to manage these flows or her higher bargaining power relative to female home-makers. Higher annual household medical expenses in India as a share of the migrant's income is also correlated with a larger levels of remittances sent, indicating that some flows may have been motivated by unexpected illness or medical needs and demonstrates the insurance aspect of these private transfers. All the variables described have coefficients that are statistically significant at the 5% level or lower.

[24] For example, the wife's employment status, where spouses who are employed are likely to be better aware of their husband's earnings potential and also in the position to manage remittances sent home more astutely.
[25] A Wald test confirms that the log income coefficient is not equal to one (p=0.0164).

Column two of Table 4 is the same regression augmented with the reported earnings ratio. For every 10-percentage point increase in the reported earnings ratio, remittances sent home rises by 7.3 percent. The coefficient on the income variable moves closer to one, suggesting that the wage ratio now captures the non-linearity between income and remittances observed earlier.[26] The overall fit of the regression improves with the additional of the reported wage ratio though the magnitude of the coefficient for wife employment falls and becomes insignificant, which implies that this variable is correlated with the earnings ratio.

5.1 IV Estimates

To address concerns that the impact of the reported earnings ratio on remittances may be biased due to endogeneity and measurement error, the reported earnings ratio measure is instrumented with expenditure shares on temptation goods by the migrant, an indicator variable if a wife is unaware of her husband's overseas expenses, a proxy variable for having disagreements over remittance use and an indicator variable if a migrant prefers the household to save more.

To provide some initial reassurance that the instrumental variables do not have an independent impact on the amount of remittances sent by the migrant, I estimate a reduced form remittance regression with the existing set of control and including all the instruments described previously. Column one of Table A1 replicates the results from Table 4 (column 2) while column two includes the set of instruments. None of the instruments are individually significant at conventional levels. A joint hypothesis test confirms that the instruments are not statistically different from zero (F stat=1.01, p-value=0.41). The overidentification test

[26] The Wald test cannot reject that the log income coefficient from the LIML estimator is one (p=0.2829).

conducted subsequently also validates that the instruments can be excluded from the remittance regression.

The first column of Table 5 provides results from the first stage regression. All instruments are statistically significant at the 10 percent level or lower and operate in the expected direction.[27] The second column displays outcomes of the second-stage regression using two-stage least squares (2SLS). A 10-percentage point increase in the earnings ratio raises annual remittances by 9.6 percent and is statistically significant at the one percent level.

[insert Table 5 somewhere here]

A number of test statistics to determine the validity of the instruments are provided in the bottom half of Table 5. I first test for the significance of the instrumented regressor using the conditional likelihood ratio (CLR) method recommended by Andrews, Moreira and Stock (2006) which is robust to the presence of weak instruments and find that it is significant at the 5% level. The test of overidentification did not reject the null hypothesis at the 26 percent level that the instruments are uncorrelated with the structural error term, and therefore can be validly excluded from the regression. Endogeneity of the instrumented regressor is apparently not a concern. A robust Durbin-Wu-Hausman test of endogeneity yields a joint F-test value of 0.39 and a p-value of 0.53, so I do not reject the exogeneity of the reported earnings ratio.[28] Since the reported wage ratio is not endogenous to the estimated remittance specification, OLS estimates would be preferred to other IV estimators for its efficiency.

[27] As an additional observation, ignorance of the husband's foreign expense is correlated with a lower reported earnings ratio, which implies that husbands are not fully revealing their income.
[28] An alternative score test proposed by Woodridge (1995) also does not reject exogeneity with a p-value of 0.49.

As an additional robustness check, the empirical exercise is repeated using an alternative IV estimator. The limited information maximum likelihood (LIML) estimator is considered to have desirable finite sample properties if the instruments are not strong (Angrist and Pischke, 2009). Column three provides LIML estimates that are similar to the 2SLS outcomes except for the relatively larger size of the instrumented variable coefficient, which may be a result of compensating for the measurement error bias. Its magnitude now implies that remittances rise by an equal proportion for each percentage point increase in the reported earnings ratio.

The data shows that on average, wives under-report their husbands' overseas earnings by 23 percent. Using the coefficient on the earnings ratio from LIML estimator indicates that all else equal, a wife who understates her husband's earnings by the average amount receives 26 percent less in annual remittances compared to a spouse who has perfect information about her husband's wages. Closing the information gap would raise annual remittances sent by USD 741 or about 3.3 months worth of monthly household expenses in India.

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6. Conclusion

International migration provides a venue to examine the role of asymmetric information within the household in the allocation of intra-household resources. Imperfect monitoring of remittances and earnings by remitters and recipients respectively may result in non-cooperative arrangement that would privately benefit one party to the exclusion of the other if preferences differ. Using a new dataset of transnational couples interviewed concurrently, the empirical exercise shows that incomplete information about overseas earnings affects the amount of remittance sent home. Households where the wives under-reports their husband's income tend to receive lower remittance compared to those with more

accurate information about their spouse's foreign earnings. The discrepancy in reporting of foreign income should not matter for remittance flows if preferences of the remitter and recipients are aligned. However, this is not the case. I find that the extent of under-reporting by the wife is positively correlated with disagreement over the uses of remittances, the migrant's expressed preference for savings relative to his household, a wife's lack of awareness of her husband's expenses abroad and the migrant's desire to spend privately on himself. To get an idea of the significance of this information gap on overseas earnings, eliminating it would on average raise annual remittances sent home by 26 percent or the equivalent of 3.3 months worth of household expenses in India.

Improved monitoring by both the sender and beneficiary of remittances is likely to result in an amount transferred that is closer to a cooperative arrangement among the household members. Policy makers interested in stimulating remittances and channeling it towards productive uses should explore ways to enhance the control that migrants have over their remittances. This could include financial products targeting migrant communities that help them manage financial resources back home such as direct bill payment services where vendors can be paid directly by the migrant as opposed to through his family member. Financial literacy workshops for migrants and receiving households could also help to align preferences and ensure that remittances are used more productively. Another channel to improve monitoring is through more affordable or international telecommunication that enables both migrant and sending households to better appreciate each others' financial conditions.

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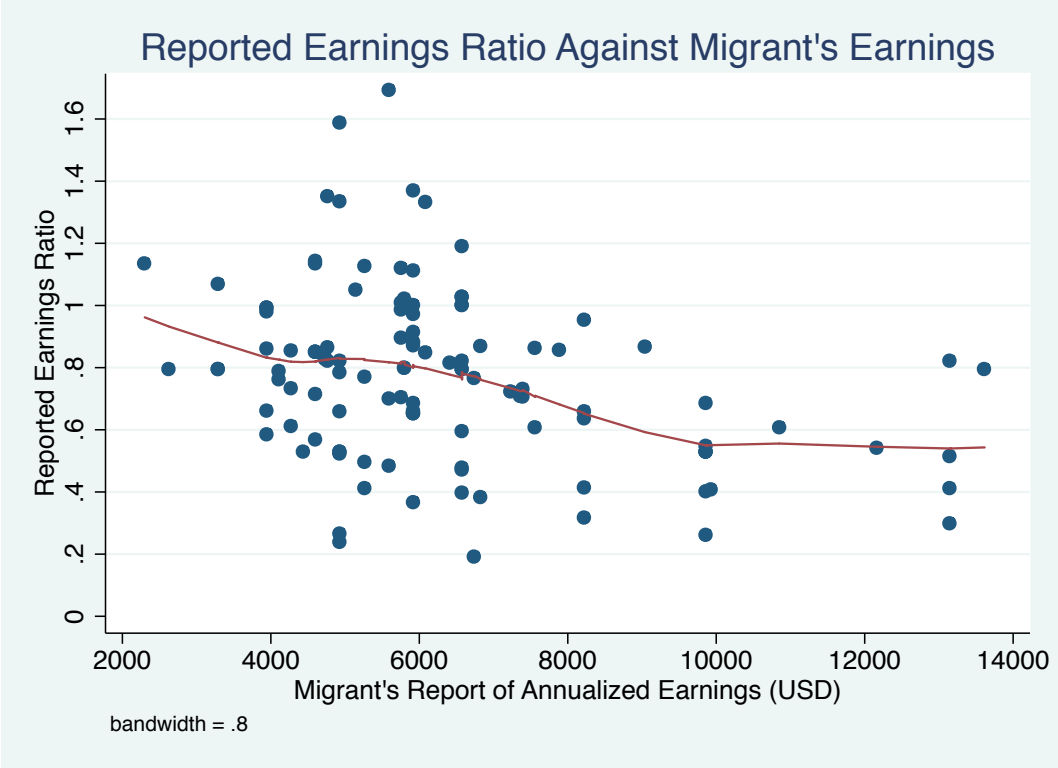
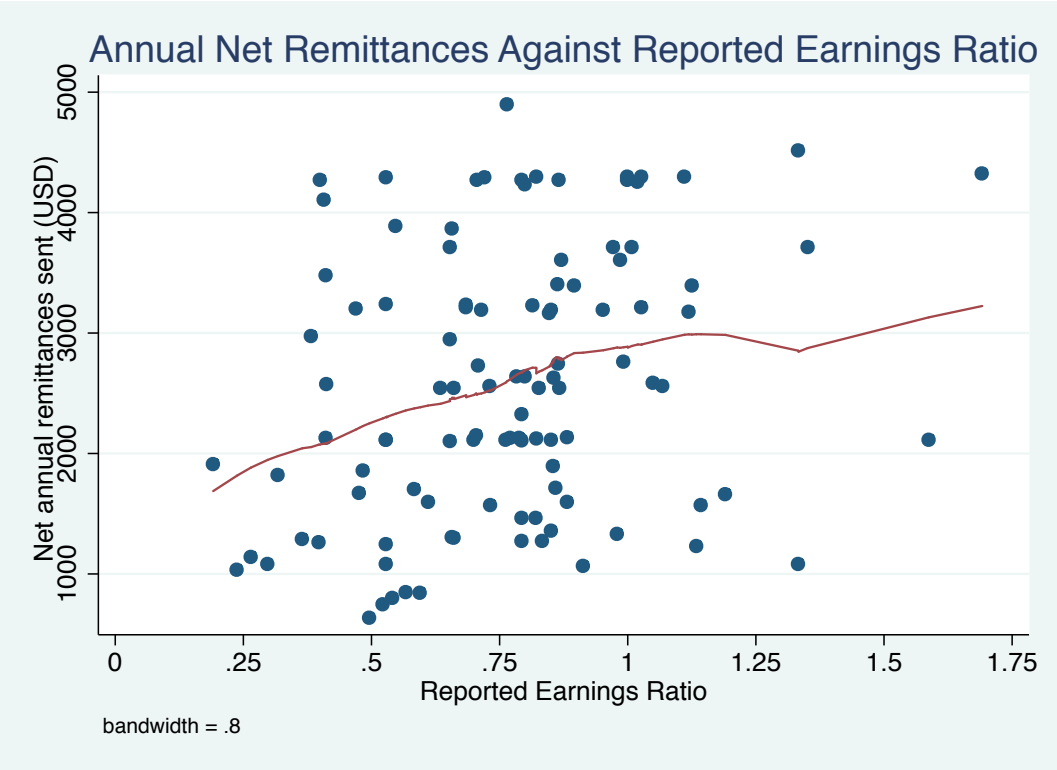
Figure 1: Plot of Reported Earnings Ratio Against Migrant's Annual Earnings (USD)



Note: Fitted line is the predicted value of the reported earnings ratio from a non-parametric locally weighted regression of the earnings ratio on annual earnings using a bandwidth of 0.8.

Figure 2: Plot of Annualized Net Remittance (USD) Against Reported Earnings Ratio



Note: Fitted line is the predicted value of net annual remittances from a non-parametric locally weighted regression of net annual remittances on reported earnings ratio using a bandwidth of 0.8.

Table 1: Comparison of QSKF 2010 and KMS 2011 Samples

	QSKF 2010	KMS 2011
Migrant's Age (years)	38.58	39.81
	(7.55)	(8.33)
Years worked abroad	9.93	10.95
	(8.48)	(8.40)
Migrant's annual earnings (USD)	4675.34	4639.75
	(1856.43)	(3047.94)
Annual remittances received (USD)	2380.16	1845.03
	(1,813.91)	(1985.06)
Number of observations	116	1778

Note: QSKF is the acronym for Qatar Survey of Kerala Families. For QSKF 2010, the report of annual earnings and remittances are from the wife in India. KMS 2011 stands for Kerala Migration Survey conducted between December 2010 and June 2011. The KMS sample is restricted to migrants working in the GCC. Standard deviations are in parentheses.

Table 2: Summary Statistics, Qatar Study of Kerala Families (QSKF), 2010

	Mean	Std. Deviation
Migrant Account		
Age (years)	38.58	7.55
Years married	10.88	7.72
Years worked abroad	9.93	8.48
Has a post-secondary qualification	0.33	-
Annual earnings (USD)	6349.81	2,310.16
Annual remittances sent to household net of fees (USD)	2865.30	1,531.20
Net annual remittance as a share of income	0.47	0.23
Private expenditure on temptation goods as a share of total expenses	0.36	0.48
Household's annual medical expenditure as a share of migrant's income	0.08	0.15
Indicator for other household members working abroad	0.03	-
Indicator for being aware of others having disagreement over remittance use	0.49	-
Migrant wants household to save more	0.21	-
Wife's Account		
Wife is employed	0.13	-
Wife's report of husband's (migrant's) annual earnings (USD)	4675.34	1,856.43
Wife's report of annual remittances received from husband (USD)	2380.16	1,813.91
Household's monthly expenses (USD)	227.78	116.37
Indicator for not knowing husband's income	0.06	-
Indicator for not knowing husband's expenses	0.37	-
Constructed Variables		
Difference between wife and husband's account of annual earnings in Qatar (USD)	-1674.47	200.33 §
Ratio of wife to husband's account of annual earnings in Qatar	0.77	0.28
Difference between wife and husband's account of annual remittances (USD)	-488.91	158.48 §
Ratio of wife to husband's account of annual remittances	0.89	0.60
Number of observations	116	

Note: Survey of Indian migrants in Qatar and their wife's in Kerala, India was conducted between August and December 2010.

§ denotes the standard error of mean difference which was statistically significant at the 1% level.

Table 3: Covariates of Reported Earnings Ratio, OLS Regression

Ratio of wife to husband's account of annual remittance	0.004		(0.03)
Migrant's age	0.015	**	(0.01)
Years married	-0.019	***	(0.01)
Wife's unaware of husband's expenses	-0.089	**	(0.04)
Wife is employed	0.113	*	(0.06)
Aware of disagreement over remittance use	-0.125	***	(0.04)
Wife's relatives are employed in Qatar	0.042		(0.08)
Husband's private expenditure share	-0.156	***	(0.04)
Constant	0.175	**	(0.18)
R-square	0.51		
Observations	116		

Note: Dependent variable is the ratio the wife's account of the migrant's monthly earnings to his own report.. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. All regression specifications include a dummy variable for wife who did not report husband's earnings and who did not know the amount of remittances received. Standard errors are in parenthesis and are robust to heteroskedasticity.

Table 4: Determinants of Log Annual Remittances, OLS Regression

	(1)			(2)		
Reported Earnings Ratio	-	-	-	0.731	***	(0.22)
Log migrant's annual earnings	0.562	***	(0.18)	0.836	***	(0.18)
Post high-school qualification	-0.026		(0.11)	-0.074		(0.10)
Log years worked abroad	-0.018		(0.06)	0.012		(0.05)
Number of other household members working abroad	-0.453	**	(0.18)	-0.480	***	(0.18)
Wife is employed in India	0.242	**	(0.11)	0.117		(0.11)
Hhold annual medical expenditure as a share of income	0.697	**	(0.26)	0.646	**	(0.32)
District Dummies	Yes			Yes		
R-square	0.39			0.49		
Observations	116			116		

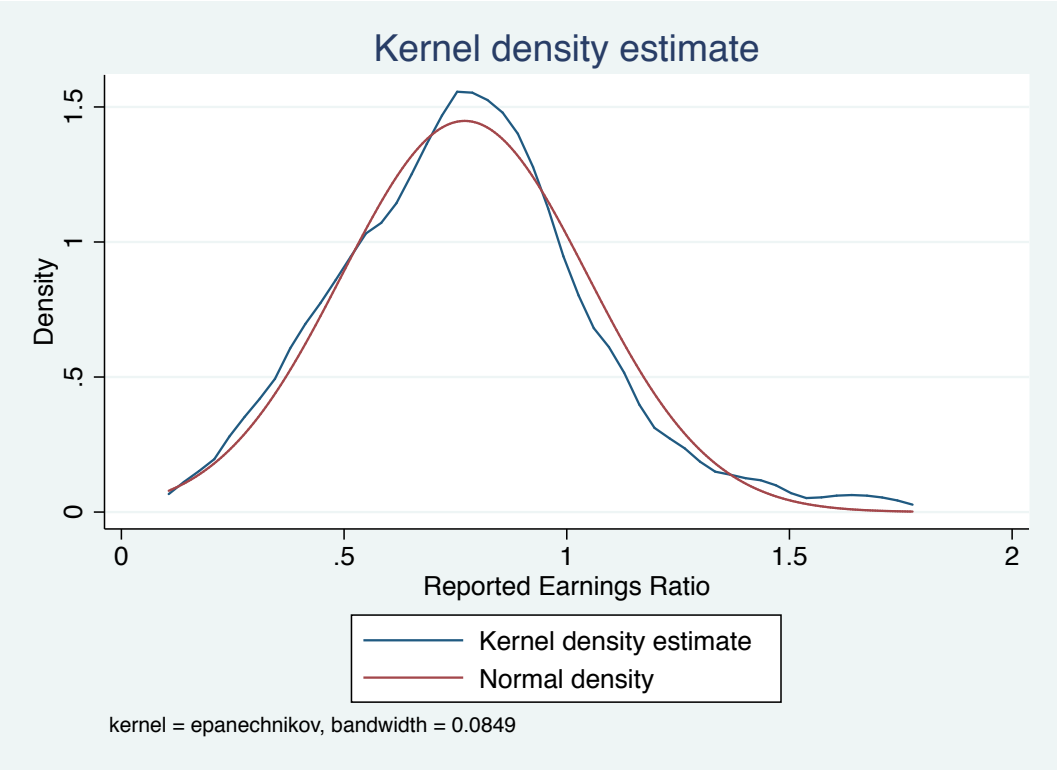
Note: Dependent variable is the net annual remittances reported by the migrant. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. All regression specifications include a dummy variable for wife who did not report husband's earnings. Standard errors are in parenthesis and are robust to heteroskedasticity.

Table 5: IV Estimates of Log Annual Remittances

	First Stage		(2SLS)		(LIML)	
	(1)		(2)		(3)	
Reported earnings ratio	-	-	0.959 ***	(0.37)	1.003 **	(0.43)
Log migrant's annual earnings	-0.343	(0.07)	0.922 ***	(0.19)	0.938 ***	(0.20)
Post high-school qualification	0.040	(0.05)	-0.088	(0.10)	-0.091	(0.10)
Log years worked abroad	-0.035	(0.03)	0.021	(0.05)	0.023	(0.05)
No. of other HHold members working abroad	-0.087 ***	(0.08)	-0.489 ***	(0.17)	-0.490 ***	(0.17)
Wife is employed in India	0.161 *	(0.06)	0.078	(0.11)	0.070	(0.11)
Hhold annual medical expenditure as a share of income	0.016	(0.13)	0.630 **	(0.31)	0.626 **	(0.31)
Wife's unaware of husband's expenses	-0.086 *	(0.05)	-	- -	-	- -
Disagreement over remittance use	-0.091 **	(0.05)	-	- -	-	- -
Husband's private expenditure share	-0.177 ***	(0.05)	-	- -	-	- -
Household should save more	-0.124 **	(0.05)	-	- -	-	- -
District-Level Dummies	Yes		Yes		Yes	
R-square	0.47		0.48		0.47	
Number of Observations	116		116		116	
IV Test Statistics						
Overidentification Chi-square Test, p-value	-		0.26		0.29	
Partial R-square	0.20		-		-	
F-test (4,91)	5.03		-		-	
Endogeneity F-test, p-value	-		0.53		-	
Conditional LR, p-value	-		0.05		0.05	

Note: *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. The regressions in Column (2) and (3) includes a dummy variable for wife's who did not report husband's earnings. The endogeneity test is a Durbin-Wu-Hausman statistic that is robust to heteroskedasticity. The conditional LR is a conditional likelihood ratio method recommended by Andrew, Moreira and Stock (2006) that produces asymptotically correct critical values for the endogenous regressor and is robust to the presence of weak instruments. Standard errors are in parenthesis and are robust to heteroskedasticity with the exception of the LIML estimator in column three.

Appendix Figure A1: Distribution of Earnings Ratio



Appendix Table A1: Reduced Form Regression of Log Annual Remittances

	(1)	(2)
Reported Earnings Ratio	0.731	0.675
	(0.222)***	(0.256)***
Log migrant's annual earnings	0.836	0.763
	(0.183)***	(0.192)***
Post high-school qualification	-0.074	-0.079
	(0.102)	(0.103)
Log years worked abroad	0.012	0.029
	(0.050)	(0.050)
Number of other household members working abroad	-0.48	-0.499
	(0.181)***	(0.193)**
Wife is employed in India	0.117	0.125
	(0.113)	(0.118)
Household annual medical exp. as a share of income	0.646	0.596
	(0.317)**	(0.295)**
Wife is is unaware of migrant's expenses		-0.108
		(0.089)
Migrant's expenditure share on temptation goods		0.025
		(0.096)
Aware of disagreement over remittance use		0.027
		(0.099)
Household should save more		-0.186
		(0.131)
District Dummies	Yes	Yes
Observations	116	116
R-squared	0.49	0.50

Note: Dependent variable is the net annual remittances reported by the migrant. *** denotes statistical significance at the 1% level, ** at the 5% level and * at the 10% level. All regression specifications include a dummy variable for wife who did not report husband's earnings. Standard errors are in parenthesis and are robust to heteroskedasticity.