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Risk Taking and the Quality of Informal Insurance: Gambling and Remittances in Thailand

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ABSTRACT

More than 35% of Thai households either give or receive remittances, and remittances account for about one-third of the income of the receiving households. Remittance relationships may be an important source of protection against adverse events for the individuals involved. This paper provides evidence that remittances behave in a way that is consistent with insurance: they are sensitive to shocks to regional rainfall and they respond to household level events. The paper goes on to consider how the quality of insurance that is offered through remittances affects household risk taking behavior. Specifically, we show that the likelihood and the amount of gambling increase with the quality of informal insurance. The findings suggest that households who are more insured shift their portfolios toward riskier investments.

Key Words: Informal Insurance, Risk, Investment, Gambling, Remittances, Thailand

JEL Codes: O12, L83, G11, D8

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1. INTRODUCTION

In this paper we examine two issues related to gambling, risk, and informal insurance. First, we document that remittance relationships can serve as an important channel for informal insurance. Using data from Thailand, we show that individuals adjust their remittances to account for unexpected shocks. Second, we document that the quality of this informal insurance affects household decisions. In particular, we find that better insurance leads households to make less conservative choices. We do so by examining the impacts of informal insurance on gambling expenditures.

For many economists gambling is a puzzling behavior. It can be thought of as a financial transaction with two undesirable properties: negative expected returns and uncertainty. One standard approach to understanding gambling has been to focus on local convexities in the income-utility relationship (Friedman and Savage 1948, Hartley and Farrell, 2002). A common alternative is to model gambling as a direct consumption good in its own right (Johnson et al, 1999). One strand of the empirical literature has focused on whether gambling demand responds in ways that are consistent with economic rationality (Garrett and Sobel, 1999, Kearney, 2005). Our paper contributes to this literature, by showing that gambling is systematically related to insurance opportunities.

In addition to being of direct interest, gambling behavior may shed light on risk-taking behavior more generally. A defining feature of the individual decision making problem is dealing with risk. In general, uninsured risk can cause households to make conservative and often inefficient choices. This issue can be particularly relevant for developing countries, which are often characterized by extensive risk, a lack of formal insurance and imperfect informal

insurance (See Dercon 2005 (and the cites therein) for an excellent overview of the evidence). This suggests that households may allocate resources more efficiently if better insurance were available, and there is an on-going policy debate about whether access to formal insurance can be expanded without crowding out private, informal insurance. There is an extensive literature that documents how the magnitude of risk (rainfall variability, financial crises, health shocks, etc.) affects household decisions and provides indirect evidence that mechanisms to help people cope with risk (i.e. insurance) would be beneficial (see for example: Beegle et al, 2003, Jacoby and Skoufias, 1997, Kochar, 1995, Morduch, 2005, Paulson, 2003, Rosenzweig and Binswanger, and Thomas et al, 2004).

In this paper, motivated by the broader questions of insurance and risk, we focus our attention on these issues through the lens of remittances and gambling. Specifically, we examine how the likelihood and the extent of gambling (buying government lottery tickets or playing a related underground numbers game) responds to the quality of informal insurance offered through remittances. One advantage to looking at gambling is its prevalence. Every two weeks in Thailand, approximately 27 million government lottery tickets are sold for 40 baht a piece which yield gross annual revenues to the government of approximately $648 million. More than 40% of households surveyed in the 1988 and 1990 Thai Socio-Economic Survey (SES) report positive expenditures on gambling in the month before the survey. Gambling accounts for approximately 4% of total monthly expenditures among households with positive gambling expenditures. A second (and presumably related) advantage to studying gambling is that only small expenditures are required to buy lottery tickets, so this activity is unlikely to be influenced

by financial market imperfections.[1] Finally, data on gambling is widely available in large household surveys that include detailed information on expenditures.

As noted above, playing the government lottery has a negative expected return. Hence, it is not directly encouraging (from an efficiency perspective) to find that gambling increases with the quality of informal insurance. However, there is evidence that gambling reveals important components of behavior that are likely to influence other more productive decisions that are more difficult to observe, especially in environments where financial market imperfections are important. Binswanger (1980) estimated risk parameters for rural Indian farmers through a series of lottery-like games (using real money). The estimated risk parameters are systematically related to agricultural decisions (Binswanger et. al, 1980). Farmers whose lottery choices indicate that they are more risk averse choose more conservative agricultural options. In a study of the effect of the effect of liquidity constraints on self-employment, Lindh and Ohlsson (1996) find that people who have won the lottery are more likely to become entrepreneurs. Their interpretation of this result emphasizes the role of lottery winnings in overcoming liquidity constraints. Alternatively, their findings may be interpreted to suggest that, in the presence of liquidity constraints, playing the lottery is correlated with other risky investment activities like starting a business.

The informal insurance mechanism that we examine is remittances. More than 35% of Thai households either give or receive remittances and remittances account for about one-third of the income of the average receiving household. We show that remittances behave in a way that is largely consistent with insurance: they are sensitive to shocks to regional rainfall and they

[1] Paulson and Townsend (2004) and Paulson, Townsend and Karaivanov (2006) show that financial market imperfections place important constraints on entrepreneurial activity in rural and semi-urban Thailand.

also respond to the circumstances of the sending and receiving households. The paper goes on to examine how the quality of informal insurance that is available through remittances affects household behavior. Specifically, we examine how the quality of insurance affects the probability and the amount of gambling done by households that either send or receive remittances.

We use the correlation pattern of annual shocks to provincial rainfall to measure the quality of insurance available through remittances. The lower the correlation between shocks to the sending and the receiving household, the more likely the sending household is to be in a position to help the receiving household in stressful times. Consider the case of two households who live in provinces with perfectly negatively correlated rainfall. Suppose each household has income of 100 half the time and zero income the other half of the time. Because the income shocks to each household are perfectly negatively correlated, one household will always have income of 100 while the other household has zero income. If the household with high income sends half of it to the other household then they will both be perfectly insured: every period their post-remittance income will be 50. So long as income shocks to the two provinces are not perfectly correlated, the two households will be able to partially insure themselves via remittances.

It is important to note that remittances could be driven by many different underlying motivations, and yet still provide insurance opportunities. Even if remittances have a strategic or contractual component, to insure future inheritances or to repay parents for educational investments, for example, they can still have an important insurance component. So long as the timing and the amount of payments are sensitive to shocks faced by the remitting and the

receiving household, they will help the extended family smooth consumption. Many informal contracts in developing countries appear to provide insurance together with other services. Ligon (1998) finds evidence of insurance in long-term sharecropping arrangements in India. Udry (1990) reports that the timing and the amount of repayment on informal loans in Northern Nigeria varies as a function the circumstances of both the lending and the borrowing household. Lillard and Willis (1997) find that probability and the amount of remittances from Malaysian children to their parents are sensitive to the current and permanent income of the child's family. Rosenzweig and Stark (1989) document that marriage arrangements in rural India are impacted by insurance concerns.

We find that remittances between Thai households have an insurance component. In particular, remittances are significantly higher when the receiver's province experiences a negative shock. We also find suggestive evidence that remitters also share lottery winnings (and losses) with the houses they remit to. Further, households receive higher remittances when their medical expenses are higher. In addition, we find that risk taking behavior responds to the quality of insurance that is available to them. Households who remit are more likely to gamble and gamble more the higher the potential quality of insurance between the sending and the receiving province.

The rest of the paper is organized as follows. Section 2 describes the empirical models and summarizes the household and regional data that is used in the analysis. In section 3, the evidence that remittances provide insurance is examined. Given that evidence, section 4 describes how the quality of insurance affects the likelihood and the extent of gambling by households that send or receive remittances. The final section concludes.

2. DATA AND EMPIRICAL MODEL

2.1 Empirical model for response of remittances to income shocks

The paper draws on two types of data: cross-sectional information on Thai households, and panel data on rainfall for Thailand's 73 provinces. The provincial level time series data on rainfall are used to estimate the correlation structure of provincial shocks.

The first objective of this paper is to examine the ability of remittances to provide an insurance component. To do this, we will estimate an equation of the following form

$$REMIT_{ipq} = \beta X_{ip} + \gamma Z_{iq} + \delta_1 RAINSHOCK_p + \delta_1 RAINSHOCK_q + \delta_1 DIST_{pq} + \varepsilon_{ipq} \qquad (1)$$

where $REMIT_{ipq}$ is the amount of cash and value of goods remitted from household i in province p to province q, X_{ip} is a set of characteristics of the remitting household, Z_{iq} is a set of characteristics of the receiving household, $RAINSHOCK$ is a measure of the rainfall shock that is common to households living in a given province, and $DIST_{pq}$ is a measure of the distance between the two provinces. We estimate this model using data on individuals who report giving a remittance. In this specification we are interested in the coefficients on the rainfall shocks, as well on those X's which are plausibly related to unexpected income or expenditure shocks (lottery winnings and household medical expenses).

We also estimate an analogous model for households that report receiving remittances:

$$RECEIVE_{ipq} = \beta X_{iq} + \gamma Z_{ip} + \delta_1 RAINSHOCK_p + \delta_1 RAINSHOCK_q + \delta_1 DIST_{pq} + \varepsilon_{ipq}. \quad (2)$$

In order to estimate (1) and (2), we need to construct provincial level shocks. To do this, we use annual rainfall (1960-1990) collected at 61 meteorological stations throughout Thailand. The rainfall data are collected by the Meteorological Department of the Ministry of Communications.[2] Annual rainfall shocks are constructed by subtracting the long run average for each province from each annual observation.

2.2 Empirical model for the effect of insurance on risk-taking

The second goal of the paper is to examine how the quality of informal insurance affects the household's risk-taking behavior. We estimate the following model:

$$RISKINESS_{ipq} = \beta X_{ip} + \delta_1 INSURANCE_{pq} + \delta_1 DIST_{pq} + \gamma_p + \varepsilon_{ipq}. \quad (3)$$

Here RISKINESS is a measure of the risk-taking activity of household i in province p in a remittance relationship with someone in province q, X is a set of household level control variables, INSURANCE is our measure of the inter-province insurance opportunities, and γ_p is a set of province dummy variables.

In order to estimate model (3), we need to construct a measure of the inter-province insurance opportunities. To do so, we compute the correlation matrix of the rainfall shocks. The potential for remittances to provide insurance depends on the correlation of shocks to the sending

[2] Provinces without rainfall stations are assumed to have the same rainfall as the nearest province for which data is available.

and the receiving household. The lower the correlation between shocks to the sending and the receiving household, the more likely the sending household is to be in a position to help the receiving household in stressful times. The correlation between shocks to two provinces provides an estimate of the potential "quality" of the insurance that can be delivered via remittances.

Using the same rainfall data and observations on household income from the Thai SES, Paxson (1992) finds a strong relationship between rainfall and the income of rice farmers: their mean income would increase by 13% if rainfall were one standard deviation above the mean from April to June. Distance data is also collected at the provincial level. The distance in kilometers between the capital of the sending household's province and the capital of the province that the receiving household lives in provides a proxy for the costs of remitting and monitoring the activities of the extended family.

2.3 Description of household data

The 1988 and 1990 Thai Socio-Economic Surveys (SES) provide the household level data used in this paper. The Thai SES records data for 11,045 households in 1988 and 13,177 households in 1990. The survey includes detailed consumption and income information for each of the surveyed households, as well as the age, education, occupation and earnings of each household member. In addition, there is information on household physical asset holdings as well as changes in financial asset holdings in the month prior to the survey.

If someone in the surveyed household reports sending money or goods to someone outside the household during the twelve months prior to the survey, the household is considered

a remitter.[3] Receiving households are analogously defined. If a surveyed household receives a remittance, the value of the transfer, how it was delivered and whether it was for educational purposes are recorded. In addition, the survey reports the sender's province, occupation, industry, community type (rural, urban, and foreign) as well as the relationship of the sender and the receiver. There are similar data about the receiver if someone in the surveyed household sends a transfer. The empirical work examines only domestic transfers.

Table 1 summarizes the data by remittance status. The income of households who send remittances is roughly twice that of households who receive remittances. In addition, the transfers recorded in the SES flow from households who are headed by people who, on average, have three years more schooling and are thirteen years younger than the heads of recipient households. Households who receive remittances are also less likely to be headed by men, 60% versus 83%.

Table 1 also describes the regional and occupational distribution of the sample by remittance status. Receivers are over-represented in the very poor northeastern region of Thailand, while remitters are more likely to live in Bangkok. Remitters are also more likely to be entrepreneurs and professionals than are households who receive transfers. Receiving households, on the other hand, are likely to farm or be economically inactive.[4]

There is a strong life-cycle component to remittances, which suggests that they play an important role in old age support. Figure 1 describes the percentage of households who send and

[3] More recent Thai Socio-Economic Surveys do not include remittance modules that are the source of crucial variables for our study.

[4] Most "economically inactive" households receive property income. In rural areas, this income is typically equal to some fraction of the rice harvest from land that has been rented out. So despite being "economically inactive" the income of these households is subject to the same rainfall risk as their neighbors.

receive remittances as a function of the age of the head of the household.[5] The percentage of households that remit is around 40% when the head of the household is 20 years old. This figure falls as the head ages, dropping to around 5% by age 70. The percentage of households who receive remittances falls from 26% to 12% from age 20 to age 35. Then it rises steadily as the household head ages. At age 50 approximately 20% of households receive remittances, and by age 70 approximately 40% of households receive remittances. The fraction of inactive households who receive remittances is high for all ages.

Table 2 documents the importance of remittances in supplementing the income of receiving households.[6] Remittances account for almost one-third of the income of receivers, and sending households remit 19% of their income on average. While remitters report doing so to help pay for educational expenses more than 30% of the time, only 10% of receiving households report that the remittance was intended for this purpose. This is likely to be a feature of who was included in the sample, rather than evidence of moral hazard. The number of people who actually receive remittances for educational purposes is likely to be much higher than reported in the survey, since the institutional population (students living in dormitories, for example) is not included in the sample. The fraction of remittances designated for educational purposes is consistent with the fraction received from parents (in the case of households who received a remittance) and with the fraction of households giving to sons or daughters (in the case of households who gave a remittance).

[5] This Figure pools 1988 and 1990 data. We estimate locally linear non-parametric regressions, using an Epanechnikov kernel and a bandwidth of one year.

[6] For Table 2 we drop those observations where reported monthly remittances exceed monthly income. We do so because we are concerned that these indicate misreported data, as remittances received should be considered as part of income. For remittances sent, we use a similar exclusion rule for consistency. This results in a loss of 254 out of 5223 receivers, and 78 out of 3863 remitters.

Almost 60% of remittances were delivered in person. This suggests that the distance between the sending and the receiving province may be an appropriate proxy for the transaction cost associated with remitting and monitoring the activities of the receiving household.

Tables 3.A and 3.B describe gambling expenditures and receipts. Fifty-two percent of households who send remittances play the lottery compared to 39% of households who receive remittances (see Table 3.A).[7] Sending households who play the lottery bet almost twice as much as receiving households per month. Winnings make up a greater fraction of income for the sending households as well: 10% compared to 7% for receiving households.

3. REMITTANCE ESTIMATES

In this section we provide evidence that remittances have characteristics of informal insurance. If remittances act as insurance then they should offset shocks to the sending and receiving households. One measure of shocks to the sending and the receiving households is captured by regional conditions in the places where they live. When the recipient lives in a region that experiences a bad shock, remittances should be higher to make up for this hardship. When the remitter lives in a region that experiences adverse conditions, remittances should be scaled back. Similarly, we expect remittances to be higher when the sending region experiences especially favorable conditions and lower when the receiving province gets a good shock. The regressors include a dummy variable that is equal to one when the sending province experiences below average rainfall and a similar dummy variable for below average rainfall in the receiving province.

[7] Kearney (2005) finds that 51% of US Adults in 1998 reported playing the lottery in the last year. In this regard, US and Thai households are not dramatically different.

In addition to providing insurance for aggregate regional shocks, remittances may also provide insurance for idiosyncratic shocks – job loss or illness, for example.[8] We would expect that households who experience unusually good conditions to send higher remittances (or receive lower remittances). Households with particularly bad outcomes may receive higher remittances (or reduce the remittances that they send). It is difficult to accurately measure "unusually" good or bad household conditions from cross-sectional data. The data do not provide a benchmark for what is "usual" for the household. Despite these difficulties, expenditures on medicine and medical services are also included in the remittance regressions as a potential measure of idiosyncratic household shocks.

Lottery winnings are also included in the remittance regressions. Winning the lottery is always "unusual" in the sense that it is determined by a random draw. The remittance estimates include net gambling winnings (gross winnings – expenses). If idiosyncratic shocks are insured through remittances then we would expect households to send remittances to offset gambling winnings and losses. Households should send higher remittances when they have lottery winnings and lower their remittances when they have losses. Similarly, receiving households should receive smaller remittances when they win the lottery and higher remittances when they lose.

Table 4.A presents estimates of average monthly remittances for households who *sent* a cash or in-kind remittance during the twelve months prior to the survey.[9] The regression incorporates some characteristics of the receiving household as well as the income and other

[8] Demand for insurance via remittances against idiosyncratic risk may be smaller than demand for insurance against regional risk. Since regional risk by definition affects many households in the region, these households may be unable to insure one another. By contrast, insurance against idiosyncratic risk may be cheaply available in local areas.

characteristics of the sending household. Older, urban remitters send significantly larger transfers. Remittances that are targeted to urban areas, to the sending household's children and to more distant households are also higher. Remittances that are delivered in person are lower. Higher income also leads to significantly higher remittances. If the sending household's income were to increase by 1000 baht ($40), remittances would go up by 101 baht ($4.04). There is suggestive evidence (significant at the 10% level) that remittances are positively correlated with lottery winnings.

Controlling for these and other factors, remittances are significantly higher when the receiving household lives in a province that experienced below average rainfall in the year prior to the survey. When the province of the receiving household experiences adverse conditions, remittances are about 127 baht ($5.08) higher. This is equal to 13% of average monthly cash remittances in the 12 months prior to the survey. We also predict that remittances will be lower when the sending province receives a negative shock. However, in the estimates of remittances sent, a negative shock to the sending province does not significantly affect the level of transfers.[10]

Table 4.B presents a similar regression for households who reported *receiving* a cash or in-kind remittance during the twelve months prior to the survey. When the receiving household lives in a province that experienced a bad shock, remittances go up by 250 baht ($10), which is equal to 25% of the average monthly per capita income of households who receive remittances. Further, remittances do appear to provide insurance for illness. If medical expenditures increase,

[9] As in Table 2, we drop observations where reported monthly cash remittances are greater than monthly income.
[10] One possibility is that the per capita income measure, being visible to the remitter, incorporates any impacts of negative rainfall shock. Another possibility is that rainfall shocks capture conditions in the receiving region (often rural) more accurately than they do in the sending region (often urban).

remittances increase to cover 8.2% of the increased expenditure. Illness is likely to be of particular importance to households who receive remittances since they are often elderly.

Male-headed households receive smaller remittances. We find suggestive evidence that households with higher per capita income (net of remittances) also receive smaller remittances. This type of result is typically interpreted as evidence in favor of altruistic motives for remitting (see Cox 1987, for example). It is important to note that this result is consistent with many motives for remitting – so long as the remittances offer some insurance.

It is interesting to note that households with more educated heads receive higher remittances. One additional year of schooling leads to an increase in remittances of 68 baht ($2.76). It is possible that this variable captures characteristics of the sending household. More educated parents are likely to have children who also have relatively more schooling and therefore higher income that would result in larger remittances. Farm households receive lower remittances, while urban households and households that live further from the sending province receive higher remittances. Households that own their home and land also receive much higher remittances – remittances are 279 baht ($11.16) higher for households who own their home and land. Strategic motives for remittances – remitting in order to ensure a bequest – would be consistent with this result.

Whatever the motive for remitting, the remittances themselves appear to have an insurance component that is sensitive to both aggregate and idiosyncratic measures of shocks. In particular, remittances are higher when the sending household's income is higher and lower when the receiving household's income is higher. They are also higher when the province where the receiving household lives has below average rainfall. Finally, receiving households receive

higher remittances when they have higher medical expenditures, and sending households send more when they have greater lottery winnings. This evidence suggests that remittances are used to insure a combination of events – some of which would be public and easily verifiable, like provincial rainfall conditions, and others that would be private.

4. GAMBLING, INCOME AND THE OF QUALITY OF INSURANCE

Given the evidence that remittances between Thai households appear to provide some insurance against both aggregate and idiosyncratic shocks, this section of the paper examines whether the provision of this insurance affects household decisions. If households adjust their risk taking behavior in response to informal insurance, then as the quality of insurance offered through remittances increases they will be more likely to gamble, and to gamble more. Equivalently, households will be less likely to gamble, and gamble less, the higher the correlation of shocks to the sending and the receiving household.

Estimates of the Probability and the Extent of Gambling

Table 5.A presents several specifications related to gambling expenditures for remitting households. The first column present results from a Probit regression with positive gambling expenditures as the outcome of interest. The coefficients reported in the column present the estimated change in the probability of gambling associated with an infinitesimal change in the independent variable. If the independent variable is discrete, dF/dx is for the discrete change in the dummy variable from 0 to 1. The second and third columns present results from regression specifications. The second column has gambling expenditures divided by food expenditures as

the outcome variable of interest. The third column normalizes by total expenditures instead. The last two columns are Tobit specifications with gambling-to-food-expenditures and gambling-to-total-expenditures as the outcome variables. Table 5.B presents the analogous estimates for receiving households.

The independent variables include per capita income, a dummy variable for male household head, the age and age squared of the household head, the years of schooling of the household head, household size, and a dummy variable if the household lives in an urban area. The distance in kilometers between the sending and the receiving province is also included in an effort to measure the cost of enforcing and monitoring the implicit insurance contract.

The estimates also include a measure of the quality of insurance that is offered through remittances, the correlation of shocks between the sending and the receiving household. The correlation is the correlation of rainfall shocks between the two provinces. The average correlation for remitters is 0.317 (s.d. = 0.519) and the average correlation for receivers is 0.345 (s.d. = 0.522). Dummy variables for each of Thailand's provinces are also included. Their inclusion is intended to rule out the possibility that the correlation variable picks up some other spatial variation that is associated with gambling.[11]

Higher income is not strongly associated with gambling expenditures for remitting households (Table 5.A). Sending households are much more likely to gamble, and gamble more,

[11] Our measure of insurance quality is an inter-province shock correlation, and our specifications include province dummy variables. Therefore the coefficient on insurance quality is picking up within-province variation in shock correlation. We are concerned about the extent to which the overall variation in insurance quality is within-province versus between-province. If it were mostly between-province, then we would be more hesitant in interpreting the correlation of our outcome variables with the (small amount of) **within-province** variation in insurance quality. To explore this, we regress insurance quality on a full set of province dummies, for receiving households and for remitting households. For receiving households, the R-squared is 0.117, and for remitting households the R-squared is 0.071. For both groups, therefore, the bulk of the variation in insurance quality comes from within-province, and so we proceed with confidence on this front.

if they have a male head. Older household heads are more also significantly more likely to report gambling expenditures, although the propensity to gamble mitigates with age. Education has no effect on the likelihood of reporting gambling expenditures, and is negatively associated with the share of gambling expenditures.

Households are more likely to gamble the larger the household, but do not gamble larger amounts. Presumably this captures the fact that bigger households have more people who may have gambled in the month prior to the survey. Urban dwellers are much more likely to gamble than their rural counterparts. Among remitting households, urban dwellers are 20 percentage points more likely to gamble. The distance between the sending and the receiving household has no impact on the probability of gambling for either receiving or remitting households. One interpretation of this result is that distance does not accurately capture the enforcement costs associated with remittances.

For households who send remittances, the quality of insurance appears to have a significant impact on gambling expenditures. When the quality of insurance is higher (the correlation between shocks to the sending and the receiving provinces is lower), the household gambles more. If a remitting household were in a position to offer perfect insurance (correlation = -1), the probability that they would gamble would be 7.6 percentage points higher compared to a case where they could offer very good insurance (correlation = 0).[12] The point estimate from the Probit specification is meaningfully large, but does not rise to conventional levels of statistical significance. However, for the expenditure share specifications, the results are significantly negative ranging from the 5% level (when normalized by total expenditures) to the

[12] At the mean correlation, a one standard deviation increase in the correlation of shocks to the sending and the receiving province, an increase of 0.519, would lead to a decrease in the probability of gambling of 3.94 percentage

10% level (when normalized by food expenditures). We interpret this evidence, along with the patterns of remittances that were revealed in Tables 4A and 4B, as suggesting that risk-taking behavior responds to insurance opportunities.

Table 5.B presents results for receiving households. Here we see similar age, gender, urban, and household size patterns, and similar patterns with distance between households. In contrast to the remitters, we find that schooling is not strongly related to gambling, and that income is positively related to gambling in most of the specifications.

For receiving households, the quality of insurance appears to have no impact on the probability that the household gambles. The point estimate on correlation of province shocks is about half the magnitude of that for remitters, and in contrast to the case for remitters the confidence interval includes meaningfully large positive impacts as a possibility. The specifications looking at levels of gambling offer mixed evidence. For the specifications normalizing by food expenditures, there is modest evidence (significant at the 10% level) that gambling levels increase with better insurance. However, this evidence is not robust to normalizing by total expenditures.

Taken as a whole, our estimates suggest that the quality of insurance is important in determining the probability and amount of spending on gambling by remitting households. Remitting households gamble less the higher the correlation between the sending and the receiving households. Equivalently, they gamble more the higher the quality of insurance. Remitters with perfect insurance would spend 0.6 to 2.1 percentage points more on gambling as a percentage of total expenditures, compared to remitters with a correlation of zero. This

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points. This is a decrease of 7.6% from the average likelihood of gambling for remitters of 52%.

corresponds to a 26% - 93% increase in gambling expenditures relative to the average of 2.27%. For receiving households, gambling expenditures are not significantly related to the quality of insurance.

6. DISCUSSION AND CONCLUSION

This paper provides evidence that remittances between Thai households have an insurance component. In particular, remittances are significantly higher when the receiver's province experiences a negative shock. Remitters also share lottery winnings (and losses) with the households they remit to and households receive higher remittances when their medical expenses are higher. We also find that remittances are lower when the receiving household's income is higher. In addition, we have shown that households who remit are more likely to gamble, and gamble more, the higher the potential quality of insurance between the sending and the receiving province. The impact of insurance on gambling expenditures is particularly notable.

There are several policy implications that we derive from our findings. First, the fact that remittances provide an insurance component to the parties involved has implications for policy related to remittances. Policies that increase costs of remitting may reduce the insurance available to households. Alternatively, providing public goods that reduce the costs of remittances (improved information and financial infrastructure) may increase households' insurance opportunities. Second, the fact that risk taking behavior responds to insurance implies that policies or programs that improve the insurance opportunities available to households may result in greater engagement with risky investment. If the current situation involves a sub-

optimal degree of risky investment, then increased insurance opportunities may be welfare enhancing.

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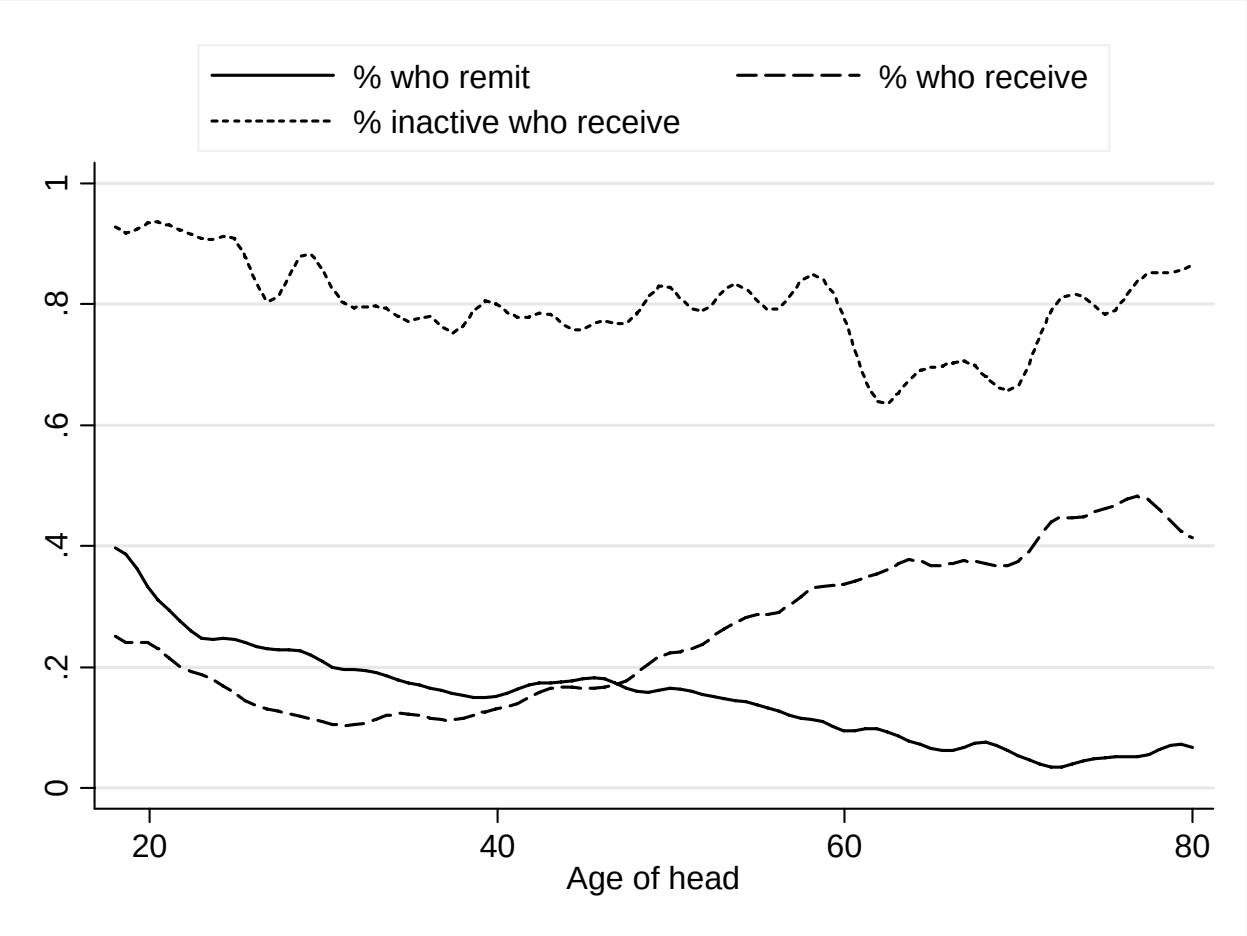
Figure 1



Notes: Data are 24,222 observations from 1988 and 1990 Thailand Socio-Economic Surveys. Graphs are non-parametric locally weighted linear regressions, using an Epanechnikov kernel and a bandwidth of 1 year.

TABLE 1

CHARACTERISTICS OF SAMPLE HOUSEHOLDS BY REMITTANCE STATUS

	Give = 0, Get = 0	Give = 0, Get = 1	Give = 1, Get = 0	Give = 1, Get = 1
# Household	15590	4769	3409	454
% of Sample	(64.36)	(19.69)	(14.07)	(1.87)
Characteristics of Household				
Age of head	44.54	52.36	39.27	46.78
	(14.22)	(16.34)	(12.90)	(15.03)
Education of head (years)	5.33	4.71	7.79	7.32
	(4.10)	(4.11)	(4.99)	(5.26)
Income	1769.11	1749.27	3550.38	3263.03
	(2529.27)	(2519.05)	(4926.26)	(3761.45)
Size	4.20	3.70	3.29	3.60
	(1.82)	(1.89)	(1.77)	(1.87)
% Male head	82.61%	60.01%	82.63%	61.67%
% Urban	33.98%	31.10%	59.17%	46.92%
Regional Distribution (Percent)				
North	21.61%	22.71%	14.23%	17.18%
Northeast	21.76%	29.86%	14.37%	28.19%
Central	20.80%	19.65%	16.05%	14.54%
South	17.06%	11.07%	16.46%	9.47%
Bangkok	18.77%	16.71%	38.90%	30.62%
Occupational Distribution (Percent)				
Farmers	31.77%	23.19%	11.06%	15.42%
Entrepreneurs	19.87%	11.30%	22.79%	13.88%
Professionals	8.15%	5.26%	16.63%	18.50%
Laborers	10.81%	7.09%	3.67%	1.54%
Other Employees	26.70%	17.40%	43.65%	28.41%
Inactive	2.70%	35.75%	2.20%	22.25%

Notes: "Give" means someone in the household reported giving a cash or in-kind remittance during the 12 months preceding the survey. "Get" means someone in the household reported receiving a remittance during the 12 months preceding the survey. Income is in 1988 per capita (standardized using adult male equivalents) baht per month (25 baht = $1). "Migrant" means the household has changed amphoes (county) in the last ten years. Standard deviations are in parentheses.

TABLE 2

CHARACTERISTICS OF SAMPLE REMITTANCES

	Get = 1	Give = 1
Delivery Method (%)		
Person to Person Delivery	58.89%	59.50%
Money Order	27.95%	30.46%
Other Delivery Method	13.16%	10.04%
Relationship (%)		
Spouse	14.25%	3.67%
Son or Daughter	60.33%	30.25%
Parents	13.18%	54.74%
Brother or Sister	5.03%	6.10%
Other	6.22%	5.15%
% For Education	9.52%	30.12%
Size of Remittance		
Last Year: Cash/Mo.	1003.73	820.94
#	4866	3734
	(1968.83)	(1456.93)
Last Year: In-Kind/Mo.	266.00	177.20
#	635	316
	(923.45)	(314.72)
Last Month: Cash	1428.76	1287.15
#	3383	2630
	(2175.82)	(1578.67)
Last Month: In-Kind	793.78	802.66
#	353	176
	(1477.08)	(1338.66)
Remittance as % of Total Income (last Month)	31.97%	18.62%

Notes: Remittances are in 1988 baht (25 baht = $1) per household. See Table 1 for definition of "Give" and "Get". Standard deviations are in parentheses.

TABLE 3.A

LOTTERY CHARACTERISTICS OF SAMPLE HOUSEHOLDS BY REMITTANCE STATUS

	Give = 0, Get = 0	Give = 0, Get = 1	Give = 1, Get = 0	Give = 1, Get = 1
% who play lottery	40.88%	38.73%	51.75%	53.96%
% who win lottery	6.04%	7.74%	10.88%	16.52%
Lottery Expenditures				
All Households				
Mean	77.75	61.77	140.43	139.22
Std deviation	(325.11)	(296.94)	(637.16)	(362.92)
% of expenditure	1.57%	1.32%	2.27%	2.02%
Players				
Mean	190.20336	159.50352	271.38152	257.98776
Std deviation	(487.03)	(460.59)	(865.57)	(462.34)
% of expenditure	3.85%	3.42%	4.39%	3.73%
Lottery Winnings				
All Households				
Mean	31.33	26.45	71.43	67.72
Std deviation	(662.98)	(246.25)	(914.23)	(366.08)
% of income	0.58%	0.54%	1.04%	0.87%
Winners				
Mean	518.98	341.82	656.31	409.95
Std deviation	(2652.57)	(823.16)	(2704.38)	(823.54)
% of income	9.53%	6.93%	9.53%	5.29%

TABLE 3.B

LOTTERY CHARACTERISTICS BY INCOME DECILE

		Bets/Monthly Expenses		Winners		Winnings/Monthly Income		
Income Decile	% who play	All HHs %	Players %	All HHs %	Players %	All HHs %	Players %	Winners %
1	28.23	1.13	4.02	5.37	14.33	0.83	2.31	15.52
2	31.42	1.14	3.63	5.33	13.93	0.58	1.58	10.83
3	35.80	1.24	3.46	6.40	14.88	0.72	1.48	11.32
4	37.74	1.42	3.75	6.56	15.32	0.64	1.55	9.75
5	42.20	1.59	3.77	7.60	15.07	0.55	1.15	7.24
6	47.30	1.72	3.63	6.69	12.91	0.54	1.05	8.03
7	49.17	1.84	3.75	7.93	13.85	0.73	1.35	9.21
8	51.24	2.03	3.97	9.08	15.87	0.65	1.10	7.19
9	51.78	2.27	4.39	8.71	15.63	0.69	1.20	7.87
10	47.44	1.92	4.04	8.84	16.19	0.61	1.22	6.86
All	42.23	1.63	3.86	7.25	14.85	0.65	1.34	9.01

TABLE 4.A

ESTIMATES OF REMITTANCES *FROM* THE SURVEYED HOUSEHOLD

Variable	Coefficient	T-Statistic
Characteristics of the Sending Household		
Monthly Per Capita Income	0.101	18.630
Age of HH Head	12.072	6.660
Male HH Head	57.364	1.220
Years of Schooling, Head	9.043	2.140
Monthly Lottery Winnings	0.054	1.700
Monthly Per Capita Medical Expenses	0.044	3.240
Farm Household	-61.389	-0.910
Urban Household	85.269	1.890
Own Home and Land	-49.190	-1.030
1990 Survey year	113.608	3.020
Characteristics of Remittance		
Sent to Urban HH	201.377	4.740
Sent to Parents	-89.885	-1.530
Sent to Kids	256.036	3.750
Sent for Educational Purposes	68.854	1.120
Delivered in Person	-135.999	-2.970
Characteristics of Sending and Receiving Provinces		
Rain Shock < 0 to Sending Province	-44.897	-0.860
Rain Shock < 0 to Receiving Province	126.631	2.560
Distance between Sending and Receiving Province	0.176	2.370
Constant	-432.056	-3.610
Observations	3405	
Adjusted R^2	21.63%	

Note: Dependent variable is the amount of cash and value of goods remitted per month during the twelve months prior to the survey.

TABLE 4.B

ESTIMATES OF REMITTANCES *TO* THE SURVEYED HOUSEHOLD

Variable	Coefficient	T-Statistic
Characteristics of the Receiving Household		
Monthly Per Capita Income	-0.026	-1.770
Age of HH Head	3.328	1.710
Male HH Head	-325.096	-6.190
Years of Schooling, Head	67.660	9.160
Monthly Lottery Winnings	-0.042	-0.500
Monthly Per Capita Medical Expenses	0.082	3.470
Farm Household	-276.868	-4.390
Urban Household	503.246	7.880
Own Home and Land	279.393	4.430
1990 Survey year	66.558	1.380
Characteristics of Remittance		
Sent from Urban HH	203.467	3.590
Sent from Parents	-327.624	-3.680
Sent from Kids	-525.713	-7.960
Sent for Educational Purposes	356.075	3.920
Delivered in Person	11.281	0.190
Characteristics of Sending and Receiving Provinces		
Rain Shock < 0 to Sending Province	-69.753	-0.970
Rain Shock < 0 to Receiving Province	249.808	4.020
Distance between Sending and Receiving Province	0.373	3.730
Constant	212.456	1.410
Observations	4084	
Adjusted R^2	14.35%	

Note: Dependent variable is the amount of cash and value of goods received per month during the twelve months prior to the survey.

TABLE 5.A
REMITTERS

Model:	**Probit**	**OLS**		**Tobit**	
Dependent Variable:	Gambling expenditures > 0	Gambling expenditures / Food expenditures	Gambling expenditures / Total expenditures	Gambling expenditures / Food expenditures	Gambling expenditures / Total expenditures
Independent Variable	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**
Income per Capita†	-0.011	0.002	0.001	0.002	0.000
	-(1.53)	(2.58)	(1.63)	(1.35)	(0.57)
Male Household Head	0.398	0.027	0.013	0.084	0.036
	(6.74)	(3.37)	(4.06)	(5.99)	(6.50)
Age	0.066	0.002	0.001	0.011	0.004
	(7.03)	(1.96)	(1.43)	(5.03)	(4.58)
Age^2	-0.001	0.000	0.000	0.000	0.000
	-(6.55)	-(1.89)	-(1.44)	-(4.73)	-(4.33)
Years of Schooling	-0.002	-0.002	-0.001	-0.003	-0.001
	-(0.47)	-(2.67)	-(3.57)	-(2.16)	-(2.83)
Household Size	0.050	0.000	0.000	0.006	0.002
	(3.33)	-(0.12)	-(0.62)	(1.65)	(1.28)
Urban Dummy	0.202	0.015	0.006	0.038	0.015
	(3.20)	(1.74)	(1.89)	(2.68)	(2.79)
Correlation b/w sending	-0.076	-0.011	-0.006	-0.021	-0.010
and receiving province	-(1.57)	-(1.67)	-(2.35)	-(1.90)	-(2.40)
Distance b/w sending	-0.053	-0.011	-0.002	-0.021	-0.006
and receiving province†	-(0.61)	-(0.93)	-(0.53)	-(1.04)	-(0.72)
1990 Survey*	-0.175	-0.015	-0.007	-0.038	-0.016
	-(3.76)	-(2.37)	-(2.80)	-(3.61)	-(3.94)
P-value χ^2 test that province dummies are jointly zero	0.000	0.919	0.887	0.007	0.004
# of observations	3376	3394	3394	3394	3394

* dF/dx is for discrete change of dummy variable from 0 to 1 for Probit specification.
† The number in the table is the estimated coefficient multiplied by 1,000.
Notes: Estimates also include dummy variables for provinces. The correlation is between the rainfall shocks in the sending and receiving provinces. Independent variables are characteristics of the head of the household.

TABLE 5.B
RECEIVERS

Model:	**Probit**	**OLS**		**Tobit**	
Dependent Variable:	Gambling expenditures > 0	Gambling expenditures / Food expenditures	Gambling expenditures / Total expenditures	Gambling expenditures / Food expenditures	Gambling expenditures / Total expenditures
Independent Variables	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**
Income per Capita†	0.055	0.007	0.001	0.015	0.004
	(5.03)	(6.02)	(1.62)	(6.81)	(4.01)
Male Household Head	0.257	0.014	0.005	0.052	0.022
	(5.62)	(2.62)	(2.27)	(4.77)	(4.63)
Age	0.048	0.001	0.000	0.009	0.004
	(5.94)	(1.65)	(1.02)	(4.76)	(4.36)
Age^2	0.000	0.000	0.000	0.000	0.000
	-(6.39)	-(1.87)	-(1.22)	-(5.15)	-(4.74)
Years of Schooling	0.004	-0.001	0.000	0.000	0.000
	(0.69)	-(1.25)	-(0.48)	-(0.16)	(0.27)
Household Size	0.091	-0.001	0.000	0.011	0.005
	(7.48)	-(0.44)	(0.24)	(3.91)	(4.42)
Urban Dummy	0.189	0.011	0.004	0.039	0.017
	(3.15)	(1.59)	(1.42)	(2.84)	(2.71)
Correlation b/w sending	-0.040	-0.009	-0.003	-0.019	-0.007
and receiving province	-(0.86)	-(1.70)	-(1.22)	-(1.76)	-(1.45)
Distance b/w sending	-0.076	-0.002	0.001	-0.010	-0.001
and receiving province†	-(0.87)	-(0.22)	(0.32)	-(0.51)	-(0.15)
1990 Survey*	-0.155	-0.009	-0.004	-0.034	-0.015
	-(3.63)	-(1.89)	-(1.72)	-(3.36)	-(3.29)
P-value χ^2 test that province dummies are jointly zero	0.000	0.735	0.655	0.000	0.000
# of observations	4101	4102	4102	4102	4102

* dF/dx is for discrete change of dummy variable from 0 to 1 for Probit specification.
† The number in the table is the estimated coefficient multiplied by 1,000.
Notes: Estimates also include dummy variables for provinces. The correlation is between the rainfall shocks in the sending and receiving provinces. Independent variables are characteristics of the head of the household.

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