Chapter 5

Time Preference, Risk and Credit Constrain Evidence from Viet Nam

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CHAPTER 5

Time Preference, Risk and Credit Constraints: Evidence from Vietnam

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We examine empirically the effects of the environment on time preference of economic agents by using a unique household data set collected in Viet Nam. The environment includes credit constraints and loss experience in the recent past—in terms of frequency, the nature of losses and the causes of losses (types of disasters). Subjective interest rates exhibit inverted yield curves, consistent with existing results from laboratory experiments and field surveys, but are contrary to what we usually observe in financial markets. The empirical analyses indicate that recent past loss experience has a significant impact on subjective overnight interest rates. Also, we estimate Euler equations of a time-additive discounted expected utility model that admits quasi-hyperbolic discounting with a power utility. The results suggest that experience of losses from avian influenza (AI) and/or floods has an impact on time preference parameters, although the impacts are not robust when the impacts of AI or flood losses through credit constraints are taken into account, suggesting possible issues with the model specification.

1. Introduction

Time and uncertainty are two central aspects in many economic models. How we model the behaviour or the preferences that dictate the behaviour of economic agents when time and uncertainty are involved is therefore crucial. The standard approach uses the (discounted) expected utility framework, which originates from Daniel Bernoulli's formulation, although there are two distinct expected utility frameworks—the objective and subjective expected utility frameworks.[1] The objective expected utility by von Neumann and Morgenstern (1947) represents preferences over lotteries or probability distributions, while the subjective expected utility by Savage (1954) represents preferences over acts and their consequences for all states of the world, i.e., no probability distributions are given a priori. Thus, the primitives of the representations are different between objective and subjective expected utility frameworks, although the representation form itself follows Daniel Bernoulli's formulation in both cases.

In the standard discrete-time framework, preferences of an agent are represented by a time-additive discounted expected utility form such as

$$U(\mathbf{X}_t) = E\left\{ \sum_{\tau=t}^{\infty} \left(\frac{1}{1+\rho}\right)^{\tau-t} u(X_\tau) \middle| \mathcal{F}_t \right\}, \qquad (1)$$

where $U(\cdot)$ is a utility function defined on an infinite random consumption stream $\mathbf{X}_t$, i.e., $\mathbf{X}_t = (X_t, X_{t+1}, X_{t+2}, \ldots)$ with X_T being consumption at time T, ρ is a discount rate, $u(\cdot)$ is a von Neumann-Morgenstern utility function, F_t is the information set (a σ-algebra) at time t and $E\{\cdot|F_t\}$ is a conditional expectation given F_t. This model assumes that the agent's time preference is completely captured by a single parameter ρ and also assumes that all uncertainty is characterised by probability, i.e., there is no Knightian uncertainty, but only risk.[2] Thus, the model breaks down either when preference is not fully represented by the time discount rate ρ or an

[1] Daniel Bernoulli's original work was published in Latin in 1738, and only translated into English in 1954 and published as Bernoulli (1954).

[2] Knight (1921) was one of the first scholars who made an explicit distinction between risk and Knightian uncertainty by referring to a probabilistic quantification of uncertainty.

expected utility representation fails. The latter case includes *ambiguity* such as the case of multiple priors as per Gilboa and Schmeidler (1989) and unawareness/unforeseen contingencies, where the structure of the state space itself is unknown.[3]

Numerous experimental studies and/or field surveys have reported that the majority of people are willing to accept (demand) a higher interest rate for loans (deposits) with shorter time to maturity and/or with smaller principal.[4] In the literature, this is interpreted as evidence against the above time-consistent discounted (expected) utility model (1), and is referred to as *present bias*. To accommodate present bias, the following *quasi-hyperbolic discounting* model shown for instance in Laibson (1998) has been introduced:

$$U(\mathbf{X}_t) = E\left\{ u(X_t) + \sum_{\tau=1}^{\infty} \beta \left(\frac{1}{1+\rho}\right)^{\tau} u(X_{t+\tau}) \middle| \mathcal{F}_t \right\}, \qquad (2)$$

where β is an additional discount factor, which represents present bias model (2) will be reduced to model (1) when $\beta = 1$.

However, in the financial markets, the yield curve (of riskless assets) is typically upward sloping, and we observe an *inverted* yield curve only during liquidity crises or at times of financial distress. Thus, there appears to be a discrepancy between the results of laboratory experiments or field surveys and the market data. One possible explanation for the discrepancy is that liquidity or credit constraints may affect time discount rates. Among existing empirical studies based on micro data, Pender (1996) examined the impacts of credit constraints on discount rates, and found that credit constrained people tend to have higher discount rates. Thus, the discount rates revealed by laboratory experiments or field surveys may not be directly representing time preference, but are affected by the environment too.

This paper examines the impacts of the environment on time preference empirically, such as credit constraints, uncertainties surrounding the agent,

[3] See for instance Gilboa and Marinacci (2013) for a survey on the literature.
[4] See for instance Frederick, *et al*. (2002) for a literature review.

past loss experience, education level and wealth (income, asset). In particular, we first regress subjective interest rates on these variables, and see if the often observed inverted yield curve from experiments can be explained as a result of these factors. We then test the discounted expected utility model with possible quasi-hyperbolic discounting (2). If model (2) is the correct model, the two parameters β and ρ are primitives that represent the agent's preferences, and they will not be affected by the environment. However, if they are functions of environmental variables such as past loss experience, they are not genuine primitives, and the representation of preferences requires more structure than provided in the discounted expected utility model (2).

The remainder of the paper proceeds as follows. Section 2 explains the data and the econometric models we use for the empirical analyses. The econometric models include model (2) with and without credit constraints as well as reduced-form models of subjective interest rates. Section 3 reports the estimation results and their implications. In particular, we discuss if the null hypothesis that parameters β and ρ are genuine primitives is rejected or not. Finally, Section 4 concludes the paper.

2. Data and Econometric Models

In this section, we first describe the data we use for the empirical analyses. We then present the econometric models that test the null hypothesis that the discounted expected utility model (2) represents the preferences of agents, with an emphasis on the appropriateness of the two parameters β and ρ as genuine primitives of the representation.

2.1. Data

We utilise a unique survey data set jointly collected in Viet Nam by the Research Institute of Economy, Trade and Industry (RIETI) of Japan and Viet Nam's Center for Agricultural Policy from late February 2008 until April 2008, which we call the RIETI-CAP survey. Since the RIETI-CAP survey aims at collecting data to facilitate the design of an insurance scheme against avian influenza (AI) and flooding, sub-samples of VHLSS (Viet

Nam Household Living Standards Survey) 2006 were chosen from four provinces: (1) Ha Tay (hit only by AI); (2) Nghe An (hit only by flooding); (3) Quang Nam (hit both by AI and flooding); and (4) Lao Cai (hit neither by AI nor by flooding). The selection of these four provinces was made using commune questionnaire data in VHLSS 2004.[5] Table 5.1 reports the average numbers of natural disasters and animal epidemics per commune for the five years to 2004 in the above four provinces.

Table 5.1: The Average Numbers of Natural Disasters and Epidemics per Commune in the Five Years to 2004

Province	Floods	Typhoons	Droughts	Natural disasters	Epidemics
Ha Tay	0.042	0.042	0.000	0.083	*0.917*
Lao Cai	0.111	0.333	0.000	0.444	0.333
Nghe An	*0.533*	0.111	0.378	*1.022*	0.444
Quang Nam	*0.500*	0.143	0.393	*1.036*	*0.714*
Nationwide	0.375	0.292	0.235	0.902	0.656

Data: VHLSS 2004.

The households covered in the REITI-CAP data include both those with and without the expenditure module in VHLSS 2006. The data cover approximately 500 households from each province, of which 100 households are with both income and expenditures data and 400 households with income data only. The data set contains extensive information, such as current and retrospective income and expenditure information, asset information, insurance subscriptions, borrowings, past loss experiences of natural disasters in the last five years, subjective probability assessments of AI and/or flooding, the maximum willingness-to-pay for various hypothetical insurance schemes, and subjective interest rates. Table 5.2 reports the summary statistics and the distributions of past loss experiences. It is clear from the table that no household experienced AI losses more than three times, while some households incurred losses from floods more than three times in the last five years.

Regarding subjective interest rates, the RIETI-CAP survey asks the following questions:

[5] Viet Nam's administrative division system (for rural areas) has the following hierarchy; (top to bottom) provinces – districts – communes.

Willingness-to-pay question for loans: *Imagine that you have an opportunity to receive a loan from a local non-governmental organisation. Please tell us the maximum amount you would be willing to pay back for each a loan of VND 100,000 (Vietnamese dong); VND 1, 000, 000; and VND 4, 000, 000 after one day, after three months and after one year.*

Table 5.2: Past loss experience of households in the last five years

Causes of losses	Number of loss experiences							Total	Mean	Std dev
	0	1	2	3	4	5	6			
AI	1827	161	26	4	0	0	0	2018	0.1115	0.3699
Flood	1553	356	83	20	4	2	0	2018	0.3013	0.6293
Typhoon	1575	401	35	7	0	0	0	2018	0.2438	0.4899
Drought	1903	97	4	14	0	0	0	2018	0.0728	0.3364
Hail	1963	51	3	1	0	0	0	2018	0.0297	0.1866
Landslide	2001	14	3	0	0	0	0	2018	0.0099	0.1131
Other epidemics	1557	306	83	20	17	34	1	2018	0.3845	0.9120
Other disasters	1732	218	52	14	2	0	0	2018	0.1843	0.5055

Data: The RIETI-CAP survey.

Thus, the questions are in fact willingness-to-pay questions, and we can deduce the subjective interest rates based on the responses. Let $W^h_{P,t}$ denote respondent *h*'s willingness-to-pay for a loan with principal *P* and time-to-maturity *t*. Then, respondent *h*'s subjective interest rate $r^h_{P,t}$ will be defined as follows when we use continuous compounding:

$$r^h_{P,t} := \frac{1}{t} \ln \frac{W^h_{P,t}}{P}.$$

Figure 5.1: Average Subjective Interest Rates (annualised)

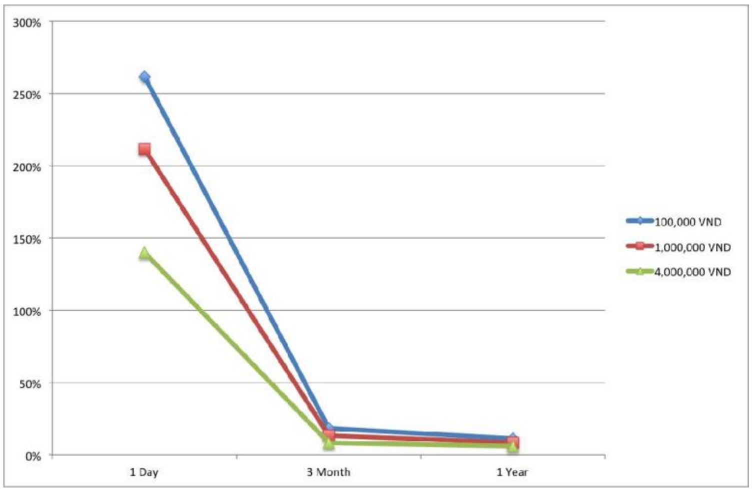

Figure 5.1 shows the cross-sectional average subjective interest rates for loans with different principals and time-to-maturity, i.e, $\bar{r}_{P,t} := \frac{1}{H}\sum_{h=1}^{H} r_{P,t}^{h}$, where H is the number of samples (households). It indicates that the subjective interest rate is on average decreasing in time-to-maturity t; thus, the yield curves are inverted. Also, the subjective interest rate is decreasing in the amount of loan principal P, which implies that the Law of One Price is violated—the Law of One Price requires $r_{P,t}^{h}$ (or $\bar{r}_{P,t}$) to be independent of P. These two aspects are consistent with numerous existing results based on similar questionnaires, as noted above. However, they are incompatible with the shape of the yield curve usually found in the financial markets, which is upward sloping, except during liquidity crises. This suggests that the subjective interest rates may be affected by binding credit/liquidity constraints, arising for various reasons such as chronic poverty and a severe loss suffered in the recent past.

Regarding borrowing and/or credit constraints, the RIETI-CAP survey asks the following series of questions:

Question 1: *Did your household borrow money? Please answer separately for 2006 and 2007. Please consider all the different sources such as government agency, agricultural development bank, commercial banks, credit unions, cooperatives, non-governmental organisations, you prefer to the other by circling (a) or (b) for each pair below micro-finance, pawn shops, ROSCA (Choi Ho/Hui), landlord, employer, relatives, friends, and* *other sources.* YES [Go to Question 2]; NO [Go to Question 3].

Question 2: *Could your household borrow as much as you wanted (needed)?* YES/NO. [END]

Question 3: *What is the primary reason why you did not borrow money?*
1. No need; 2. Applied but rejected; 3. Believed would be rejected; 4. Too expensive; 5. Inadequate collateral; 6. Do not like to be indebted; 7. Fearful of default; 8. Others [Specify]. [Proceed to Question 4]

Question 4: *Please indicate any other reasons why you did not borrow money. Please select any applicable reasons.*
1. No need; 2. Applied but rejected; 3. Believed would be rejected; 4. Too expensive; 5. Inadequate collateral; 6. Do not like to be indebted; 7. Fearful of default; 8. Others [Specify].

From the above series of questions, we generate several dummy variables. To do so, we first make the following distinction:

- Not Credit Constrained: If answered 'Yes' to both Questions 1 and 2; or if answered 'No' to Question 1 and '1' to Question 3;
- Credit Constrained: All other households.

Since we asked the same set of questions for 2006 and 2007, these definitions enable us to generate dummy variables including: *Credit constrained only in 2006*, *Credit constrained only in 2007* and *Credit constrained both in 2006 and in 2007*.

Furthermore, the RIETI-CAP survey asks the following questions on attitude towards risk:

Questions on attitude towards risk: *Imagine a fair coin flip. Choose the option that you prefer to the other by circling (a) or (b) for each pair below*

By combining answers to **4-1** and **4-2**, we may categorise the respondents into the following three types:

4-1
- (a) *Whatever the outcome (Heads or Tails), you receive 30,000 VND.*
- (b) *You receive 60,000 VND if Heads, and nothing otherwise.*

4-2
- (a) *Whatever the outcome (Heads or Tails), you receive 30,000 VND.*
- (b) *You receive 75,000 VND if Heads, and nothing otherwise.*

4-3
- (a) *Whatever the outcome (Heads or Tails), you lose 30,000 VND.*
- (b) *You lose 60,000 VND if Heads, and nothing otherwise.*

By combining answers to 4-1 and 4-2, we may categorise the respondents into the following three types:

(1) *Highly risk averse* if (a) was chosen for both **4-1** and **4-2**;
(2) *Moderately risk averse* if (a) was chosen for **4-1** and (b) for **4-2**;
(3) *Risk loving 1* if (b) was chosen for both **4-1** and **4-2**.

We disregard respondents who chose (b) for **4-1** and (a) for **4-2**, because such a combination violates monotonicity. Moreover, we may categorise the respondents into the following three types by combining answers to **4-1** and **4-3**:

(1) *Risk averse* if (a) was chosen for both **4-1** and **4-3**;
(2) *Loss averse* if (a) was chosen for **4-1** and (b) for **4-3**;
(3) *Risk loving 2* if (b) was chosen for both **4-1** and **4-3**.

Although it is possible that one may choose (b) for **4-1** and (a) for **4-3**, we disregard such a combination, because it is a perverse case.

2.2. Econometric Models

We first estimate the following reduced-form linear regression model of subjective interest rates:

$$r^h_{P,t} = X^h \alpha_{P,t} + \varepsilon^h_{P,t}, \qquad (3)$$

where X^h is a set of control variables such as credit constraints, dummies and loss experience variables and $\varepsilon^h_{P,t}$ is the random error term. The estimation results would indicate what determines the shape of subjective yield curves.

For instance, if credit/liquidity constraints are active for respondent *h*'s household, then *h*'s subjective short-term interest rate would be higher.

Now, we assume that the preferences of the respondents have a discounted expected utility representation with a power utility, i.e.,

$$u^h(x) = \frac{x^{1-\gamma^h}}{1-\gamma^h}.$$

Then, we estimate two parameters *β* and *p* in the following Euler equation by generalised method of moments (GMM): For every loan with principal *P* and time to maturity *t*, and for every respondent/household *h*,

$$P^{-\gamma^h} = \beta \cdot \left(\frac{1}{1+\rho}\right)^t E^h \left\{ R^h_{P,t} \cdot \left(W^h_{P,t}\right)^{-\gamma^h} \middle| \mathcal{F}^h \right\}, \tag{4}$$

where γ^h is respondent *h*'s coefficient of relative risk aversion, E^h is respondent *h*'s expectation operator, F^h is *h*'s current information set (a *σ*-algebra) and $R^h_{P,t} := W^h_{P,t}/P$.[6][7]

Moreover, to see if the parameters *β* and *p* are affected by exogenous factors, we estimate model (4) with an additional structure for *β* and *p* so that they may be different across households as follows:

$$\begin{aligned} \beta^h &= \beta_0 + X^h\beta_1 + \epsilon^h; \\ \rho^h &= \rho_0 + X^h\rho_1 + \nu^h. \end{aligned}$$

Also, to reflect the impacts of possible credit constraints, we estimate the following Euler equation by GMM: For every loan with principal *P* and time to maturity *t*, and for every respondent/household *h*,

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[6] To simplify notation, no time index such as *Γ* with $F^h{}_\tau$ is given, since we are not explicitly analysing the dynamical behaviour of economic variables in the paper.

[7] Since $W^h{}_{P,t}$ itself is riskless, it appears that there is no need to form a conditional expectation here. However, we are representing the future consumption, which is essentially random, with $W^h{}_{P,t}$ by convenience; thus, we use GMM with instruments to assure orthogonality conditions to be satisfied.

$$P^{-\gamma^h} = \beta \cdot \left(\frac{1}{1+\rho}\right)^t E^h \left\{ R^h_{P,t} \cdot (W^h_{P,t})^{-\gamma^h} \middle| \mathcal{F}^h \right\} + \sum_{z \in Z^h} \lambda^h_z, \qquad (5)$$

where $\lambda^h{}_z$ (> 0) is the Lagrange multiplier(s) for a credit constraint represented by variable z and Z^h is a set of variables representing credit constraints.

Let $\hat{\beta}$ and $\hat{\rho}$ denote the estimates of β and ρ in model (5), respectively. Also let $\hat{\beta}_o$ and $\hat{\rho}_o$ donate the estimates of β and ρ in model (4). If the credit constraints, and they will be biased due to the omission of active credit constraints: $\hat{\beta}_o > \hat{\beta}$ and $\hat{\rho}_o > \hat{\rho}$. It follows that the estimates $\hat{\beta}_o$ and $\hat{\rho}_o$ would tend to indicate a lower present bias (a larger estimate of β) and a lower discount rate (a smaller estimate of ρ).

To estimate β and ρ, we fix respondent *h*'s coefficient of relative risk aversion γ^h by referring to the answers to the questions on attitude towards risk above. More specifically, by assuming a power utility we can deduce the range of γ^h for the three types as follows: for respondents who are *highly risk averse* $\gamma^h \geq 0.24$; for respondents who are *moderately risk averse* $\gamma^h \in (0, 0.24)$; and for respondents who are *risk loving* $\gamma^h \leq 0$. It is however not very straightforward how we should fix γ^h for each of these three ranges. Thus, we fix γ^h in three different ways as reported in Table 5.3. The column labelled 'Simple' sets $\gamma^h = 0$ for risk loving respondents, $\gamma^h = 0.12$ for moderately risk averse respondents, and $\gamma^h = 0.24$ for highly risk averse respondents. The column labelled 'Tanaka' refers to Tanaka, *et al*. (2010), and the three values are the mean values of γ for people in the corresponding three ranges of γ from the data used in Tanaka et al. (2010). Finally, the column labeled 'Fitted' refers to fitted values of interval regression model (4) reported in Table B.1 in the Appendix. We use the fixed values of γ^h specified in Table 5.3.

Table 5.3: Fixed Values of the Relative Risk Aversion Parameter γ^h

Types	Simple	Tanaka	Fitted	Households	Share
Risk loving	0	0.05	[0, 0.001)	345	21.88%
Moderately risk	0.12	0.097	[0.001, 0.24)	225	14.27%
Highly risk averse	0.24	0.6765	[0.24, +oc)	1007	63.86%
Total				1,828	100%

3. Estimation Results

In this section, we present and examine the estimation results of the econometric models described in the previous section. The estimation results of the reduced-form regression model (3) are reported first, followed by the estimation results of Euler equations (4) and (5).

3.1. Reduced-form regressions of subjective interest rates

All estimation results of the reduced-form regression model (3) are presented in section C in the Appendix. Table C.1 shows the results of regressions of subjective interest rates on various attributes of the respondents. The province dummy variables *Ha Tay*, and in particular, *Quang Nam* are statistically significant and have positive point estimates for regressions of overnight interest rates. Recall that Quang Nam was frequently hit both by avian influenza and by floods—the province is prone to disasters or epidemics. Thus, it may be the case that frequent natural disasters and/or epidemics are negatively affecting the livelihood of the residents, and credit constraints may be tighter in Quang Nam.

The results of regressions on subjectively perceived credit constraints are shown in Table C.2. Clearly they do not support the hypothesis that credit constraints raise short-term subjective interest rates than long-term subjective interest rates, contrary to what we often observe in the financial market during liquidity crises for market interest rates. However, the credit constraint variables used in the estimations here are constructed from questions that ask the perception of the respondent towards the borrowing possibilities, and the respondents are not necessarily credit constrained even if they perceive as such.

Table C.3 reports the results of regressions on past loss experiences caused by various disasters. *Flood* along with *Typhoon* are statistically significant and have positive point estimates for regressions of overnight interest rates. *AI* and *Other epidemics* are also statistically significant for many regressions, but their point estimates for overnight interest rates regressions are not as large as those of *Flood* or *Typhoon*. Also, we see from Table C.4 that the number of past loss experiences of both AI and floods is statistically significant for overnight interest rates regressions, although the point estimates are higher for floods. These suggest that flood losses may have strong impacts on the subjective overnight interest rates, possibly due to tighter credit constraints. Table C.5, meanwhile, reports the estimation results of regressions on various natures of losses/damages, and *house damage* has a markedly high point estimate for overnight interest rates regressions.

Regressions on attitude towards risk and those on loss aversion types are reported in Tables C.6 and C.7, respectively. The highly risk averse type in Table C.6 and the risk averse type is Table C.7 are treated as the baseline case. For a loan principal of VND 100,000 ('100' in the tables), risk loving types in both tables exhibit higher subjective interest rates than other types, for overnight rates in particular. However, there is no obvious pattern for a larger loan principal.

Finally, the effects of change in income are displayed in Table C.8. An increase in income is associated with a lower subjective interest rates especially for overnight rates, except when the loan principal is VND 100,000 ('100' in the table). The result is consistent with the hypothesis that active credit constraints raise the subjective interest rates.

3.2. Estimation Results of the Euler Equations

We first estimate model (4) with no constraints by CMM. In so doing, we use the following instruments: *asset*, *age*, *age_sq*, *education level of the household head*, *education level of the household head's spouse* and *household size*, and *number of disaster-type experienced from 2003 to 2006*, with disaster-type here refering to AI, flood, typhoon, drought, hail, landslide and other epidemics.[8] Table D.1 reports the estimation results of ρ when β is fixed at $\beta = 0.99$, while Table D.2 shows the estimates of β with ρ fixed at $\rho = 0.0002$. Note that we measure the time to maturity t in terms of days here: $t = 1$ for one day, $t = 31$ for one month and $t = 365$ for one year. Thus, the discount rate ρ is a daily rate, and $\rho = 0.0002$ corresponds approximately to an annual rate of 7.57%. The results of these two tables indicate that the estimates of β and ρ are compatible at around $(\beta, \rho) = (0.99, 0.0002)$ for all three specifications of γ, the coefficient of relative risk aversion.[9] We therefore set, either $\beta = 0.99$ or $\rho = 0.0002$ in all other estimations of models (D.1) and (D.2).

Table D.3 reports the estimates of ρ with β fixed at $\beta = 0.99$ when *CCin2007*, a subjective credit constraints in 2007, is included in models (4) and (5). The first three columns are estimates of model (4), and it is clear that *CCin2007* is statistically significant and is positive. Hence, respondents who are subjectively credit constrained in 2007 tend to have a higher subjective discount rate ρ. Columns (4)—(6) are estimates of model (5). While *CCin2007* itself is insignificant, the interaction terms between *CCin2007* and *asset* and between *CCin2007* and *income* are significant in most cases, where the former tends to be positive and the latter negative. Thus, it appears that a larger possession of assets is associated with a tighter credit constraint while a higher income is associated with a looser credit constraint, indicating that we need to be aware of the distinction between stock and flow, although it is not straightforward how to interpret the positive sign for the interaction term between *CCin2007* and *asset*. Columns (7)—(9) show that *CCin2007* has a positive impact on ρ, while a negative λ is in conflict with model (5), which requires the shadow price of a credit constraint λ to be positive. Meanwhile, Table D.4 reports estimates of β for the corresponding cases, and the implications are the same as the ones from Table D.3.

Next, Table D.5 shows the estimates of ρ when past experiences of AI and floods are included in models (4) and (5). Both AI and floods are

[8] In the list of variables in the Appendix, they are No. of cases of AI 2003—2006, No. of floods 2003—2006, No. of typhoons 2003—2006, No. of droughts 2003—2006, No. of hail storms 2003—2006, No. of landslides 2003—2006 and No. of epidemics 2003—2006.
[9] Ideally, both 0 and p should be estimated simultaneously. However, we have so far failed to achieve a reliable converge

significantly positive in columns (1)—(3), suggesting that disaster experience is positively correlated with discount rate ρ. Columns (4)—(6) meanwhile suggest that both asset and income have opposing impacts between AI and floods for the interaction terms. Although these opposing impacts for the interaction terms remain the same for columns (7)—(9), both AI and floods are no longer significant for ρ itself for columns (7) and (8). One possible interpretation of the opposing impacts of asset and income between AI and floods for the interaction terms is that flood losses mainly concern assets and AI losses concern income, although the positive signs for the interaction terms are hard to interpret. Table D.6 reports the corresponding estimates of β, and the results are essentially the same as those of Table D.5.

The estimates of ρ when the nature of past losses is included in models (4) and (5) are presented in Table D.7. Both house damage and physical livestock loss dummy variables have a significant impact on ρ in columns (1)-(3), indicating that damage or loss incurred to asset (stock) is positively correlated with discount rate ρ. Also, columns (4)-(6) reveal that both house damage and physical livestock loss has a positive sign, consistent with the hypothesis that severe losses tighten the credit constraints, which result in higher subjective interest rates. The interaction term between physical livestock loss dummy and asset has a negative sign in columns (4)-(6), which implies that among households who incurred physical livestock loss, a larger asset holding helps relieve the credit constraints. However, the interaction term between harvest loss dummy and asset has a positive sign, which, perversely, suggests that, among households who incurred harvest losses, households with a larger asset holding face a tighter credit constraint. But the results reported in columns (7)-(9) show that the effects presented in columns (1)-(3) and those in columns (4)-(6) cancel each other out, and almost no variable remains statistically significant. The results presented in Table D.8 are by and large the same as those of Table D.7. However, the results shown in columns (7)-(9) are slightly different between the two tables. In Table D.8, harvest loss has a negative effect on β which indicates more impatience among households who incurred harvest losses, while the opposite holds for households who incurred physical livestock losses. However, the comparisons between columns (1)-(3) and (7)-(9) in both Tables D.7 and D.8 reveal that the estimates of ρ are higher in (1)-(3) than in (7)-(9) and those of β are lower for (1)-(3) than in (7)-(9), contrary to the estimation bias anticipated.

This suggests that the model specification is not appropriate.

4. Conclusion

In this paper, we examined the impacts of the environment, subjectively perceived credit constraints and loss experiences in the recent past in particular, on subjective interest rates as well as on time preference by using the household data of the RIETICAP survey. The reduced form linear regressions of the subjective interest rates revealed that flood loss experience as well as house damage and physical livestock losses have a large impact, especially on overnight interest rates, although subjectively perceived credit constraints have only negligible impacts. Moreover, households in Quang Nam province, who tend to be prone to both AI and floods, indicated particularly high subjective interest rates, the overnight interest rate in particular. Thus, it appears that losses or damage caused by floods on physical assets such as houses or livestock would make the financial situation of the affected households very tight, which is reflected in the high subjective interest rates, especially the overnight rates. Moreover, changes in income tend to have an impact on the subjective interest rates, lower rates when the household’s income has increased, which is consistent with the hypothesis that active credit constraints raise subjective interest rates.

Furthermore, we tested the discounted expected utility framework that admits quasi-hyperbolic discounting with a power utility as in the von Neumann-Morgenstern utility. The estimation results show that the present bias is not very substantial, yet statistically significant. Moreover, estimations that allow for the presence of active credit constraints show that subjectively perceived credit constraints have no impact in general. However, households who subjectively perceive themselves to be credit constrained tend to have a higher time discount, and the same applies for households who incurred losses from AI and/or floods. Nevertheless, the impacts of AI or flood loss experience on time preference parameters are not robust when we take into account the impacts of the losses through credit constraints. Moreover, the estimations of the effects of credit constraints are rather hard to interpret. On one hand, the credit constraints tend to be tighter for households with a larger asset holding among those who experienced AI losses, while the opposite is true for households who experienced flood losses. On the other hand, the constraints tend to be looser for households with a higher income holding among those who experienced AI losses, and again the opposite is true for households who experienced flood losses. This may well be reflecting possible issues with the specification of the model itself, since the estimation model assumes a very restrictive representation of preferences—in particular, time preference is represented by two parameters and risk attitude by a single parameter.

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A List of Variables and Summary Statistics

List of Variables

Respondent characteristics
rural: dummy, 1 if the household is living in a rural area;
wife: dummy, 1 if the respondent is the household head's wife;
husband: dummy, 1 if the respondent is the household head's husband;
son: dummy, 1 if the respondent is the household head's son;
daughter: dummy, 1 if the respondent is the household head's daughter;
others: dummy, 1 if the respondent is not the household head's spouse or child;
age: the age of the household head;
Ha Tay: province dummy, 1 if Ha Tay;
Lao Cai: province dummy, 1 if Lao Cai;
Nghe An: province dummy, 1 if Nghe An;
Quang Nam: province dummy, 1 if Quang Nam;
household size: the number of household members.

Education level
HH no degree: dummy, 1 if household head (HH) has no degree;
HH primary school: dummy, 1 if HH's highest degree is primary school;
HH lower secondary school: dummy, 1 if HH's highest degree is lower secondary school; *HH upper secondary school*: dummy, 1 if HH's highest degree is upper secondary school; *HH junior college*: dummy, 1 if HH's highest degree is junior college;
HH tertiary: dummy, 1 if HH's highest degree is tertiary;
HH education no info: dummy, 1 if no info about HH's highest degree;
Spouse no degree: dummy, 1 if HH spouse has no degree;
Spouse primary school: dummy, 1 if HH spouse's highest degree is primary school;
Spouse lower secondary school: dummy, 1 if HH spouse's highest degree is lower secondary school; *Spouse upper secondary school*: dummy, 1 if HH spouse's highest degree is upper secondary school; *Spouse junior college* : dummy, 1 if HH spouse's highest degree is junior college;
Spouse tertiary: dummy, 1 if HH spouse's highest degree is tertiary;
Spouse other education: dummy, 1 if HH spouse's highest degree is other education; *Spouse education no info*: dummy, 1 if no info about HH spouse's highest degree.

Credit constraint
CC in 2006: dummy, 1 if credit constrained in 2006;
CC in 2007: dummy, 1 if credit constrained in 2007;
Not CC: dummy, 1 if not credit constrained in 2006 and in 2007;
CC only in 2006: dummy, 1 if *CC in 2006* = 1 and *CC in 2007* = 0;
CC only in 2007: dummy, 1 if *CC in 2006* = 0 and *CC in 2007* = 1;
CC both in 2006 and 2007: dummy, 1 if *CC in 2006* = 1 and *CC in 2007* = 1.

Past loss experience
No. of loss experiences: no. of times of losses experienced in the last five years; *AI*: dummy, 1 if the household incurred AI losses in the last five years;
flood: dummy, 1 if the household incurred flood losses in the last five years; *typhoon*: dummy, 1 if the household incurred typhoon losses in the last five years; *drought*: dummy, 1 if the household incurred drought losses in the last five years; *hail*: dummy, 1 if the household incurred hail losses in the last five years;
landslide: dummy, 1 if the household incurred landslide losses in the last five years;
other epidemics: dummy, 1 if the household incurred losses from epidemics (except AI) in the last five years;
No. of AI: number of AI experienced in the last five years;
No. of floods: number of floods experienced in the last five years;
No. of AI 2003—2006: number of AI experienced from 2003 to 2006;
No. of floods 2003—2006: number of floods experienced from 2003 to 2006;
No. of typhoons 2003—2006: number of typhoons experienced from 2003 to 2006; *No. of droughts 2003—2006*: number of droughts experienced from 2003 to 2006; *No. of hails 2003—2006*: number of hails experienced from 2003 to 2006;
No. of landslides 2003—2006: number of landslides experienced from 2003 to 2006;
No. of epidemics 2003—2006: number of epidemics (excluding AI) experienced from 2003 to 2006.

Nature of past losses/damages
house lost: dummy, 1 if house was lost;
house damage: dummy, 1 if house was damaged;
physical assets loss: dummy, 1 if losses of physical assets;
physical livestock loss: dummy, 1 if livestock lost physically;

economic livestock loss: dummy, 1 if economic losses of livestock incurred;
harvest loss: dummy, 1 if harvest was lost;
human casualty: dummy,1 if human casualty suffered;
human sickness/injury: dummy, 1 if human sickness/injury suffered;
other losses: dummy, 1 if losses of other nature incurred.

Attitude towards risk (See Section 2 for details)
highly risk averse: dummy;
moderately risk averse:
dummy; *risk loving 1*:
dummy;
risk averse: dummy;
loss averse: dummy;
risk loving 2: dummy.

Assets
asset: total value of assets;
livestock: total value of
livestocks.

Income
income: annual income in 2007 (in thousand VND);
change in income: index variable categorised according to the change in income in the last year.

Table A.1: Descriptive statistics

	Count	Mean	SD	Min	Max
Respondent characteristics					
rural*	1583	0.91	0.29	0	1
wife*	1583	0.19	0.4	0	1
husband*	1583	0.02	0.12	0	1
son*	1583	0.03	0.17	0	1
daughter*	1583	0.01	0.11	0	1
others*	1583	0.03	0.18	0	1
Age	1583	50.9	14.21	20	96
Lao Cai*	1583	0.24	0.42	0	1
Nghe An*	1583	0.26	0.44	0	1
Quang Nam*	1583	0.25	0.43	0	1
household size	1583	4.18	1.75	1	14
Education Level					
HH no degree*	1583	0.01	0.08	0	1
HH primary school*	1583	0.28	0.45	0	1
HH lower secondary school*	1583	0.31	0.46	0	1
HH upper secondary school*	1583	0.11	0.31	0	1
HH junior college*	1583	0.0038	0.06	0	1
HH tertiary*	1583	0.01	0.11	0	1
HH education no info*	1583	0.28	0.45	0	1
Spouse no degree*	1583	0.0044	0.07	0	1
Spouse primary school*	1583	0.21	0.4	0	1
Spouse lower secondary school*	1583	0.26	0.44	0	1
Spouse upper secondary school*	1583	0.06	0.24	0	1
Spouse junior college*	1583	0.01	0.1	0	1
Spouse tertiary*	1583	0.01	0.09	0	1
Spouse other education*	1583	0.0006	0.03	0	1
Spouse education no info*	1583	0.45	0.5	0	1
Credit constraint					
CC in 2006*	1583	0.35	0.48	0	1
CC in 2007*	1583	0.37	0.48	0	1
Not CC*	1583	0.58	0.49	0	1
CC only in 2006*	1583	0.05	0.21	0	1
CC only in 2007*	1583	0.07	0.26	0	1
CC both in 2006 and in 2007*	1583	0.3	0.46	0	1
Past loss experience					
No. of loss experiences	1583	1.36	1.37	0	8
AI*	1583	0.09	0.29	0	1
flood*	1583	0.22	0.42	0	1
typhoon*	1583	0.22	0.41	0	1
drought*	1583	0.06	0.23	0	1
hail*	1583	0.03	0.16	0	1
landslide*	1583	0.01	0.08	0	1
other epidemics*	1583	0.24	0.43	0	1
No. AI	1583	0.11	0.37	0	3
No. floods	1583	0.29	0.63	0	5

No. of AI 2003—2006	1583	0.07	0.28	0	3
No. of floods 2003—2006	1583	0.08	0.33	0	4
No. of typhoons 2003—2006	1583	0.16	0.39	0	2
No. of droughts 2003—2006	1583	0.03	0.17	0	1
No. of hails 2003—2006	1583	0.01	0.11	0	2
No. of landslides 2003—2006	1583	0.0038	0.07	0	2
No. of epidemics 2003—2006	1583	0.28	0.76	0	4
Nature of past losses/damages house lost*	1583	0.0025	0.05	0	1
house damage*	1583	0.13	0.34	0	1
physical assets loss*	1583	0.07	0.26	0	1
physical livestock loss*	1583	0.28	0.45	0	1
economic livestock loss*	1583	0.06	0.23	0	1
harvest loss*	1583	0.4	0.49	0	1
human casualty*	1583	0.0038	0.06	0	1
human sickness/injury*	1583	0.01	0.09	0	1
other losses*	1583	0.01	0.12	0	1
Attitude towards risk highly risk averse*	1577	0.64	0.48	0	1
moderately risk averse*	1577	0.14	0.35	0	1
risk loving 1*	1577	0.22	0.41	0	1
risk averse*	1576	0.43	0.49	0	1
loss averse*	1576	0.36	0.48	0	1
risk loving 2*	1576	0.22	0.41	0	1
Assets asset (thousand VND):	1583	2054.48	4062.67	0	18650
livestock (thousand VND):	1583	275.26	1345.73	0	15000
Income income	1583	21903.72	14332.14	661.5	74280
change in income	1583	1.11	0.11	0.6	1.75

* Dummy variables.

B. Interval Regressions of *γ*

Table B.1. Interval Regressions of *γ*

	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
HH head Primary	-	-0.201*	-0.210*	-0.220*	asset			-0.0293*	-0.0275
	(0.	(0.117)	(0.119)	(0.118)				(0.0174)	(0.0174)
HH head Lower	-	-0.185	-0.194	-0.202*	livesto			-0.0446	-0.0484
	(0.	(0.118)	(0.120)	(0.118)				(0.0504)	(0.0506)
HH head Upper	-	-0.171	-0.181	-0.192	AI				-0.0219
	(0.	(0.119)	(0.121)	(0.120)					(0.0228)
HH head Junior	-	-0.218	-0.231	-0.237	flood				-0.0298
	(0.	(0.156)	(0.158)	(0.156)					(0.0184)
HH head Bachelor	-	-0.228*	-0.233*	-0.237*	typhoo				0.000183
	(0.	(0.133)	(0.134)	(0.133)					(0.0184)
HH head Education	-	-0.212*	-0.221*	-0.233**	drough				0.0443
	(0.	(0.117)	(0.119)	(0.117)					(0.0315)
HH Spouse Primary	-	-0.120	-0.116	-0.129	hail				0.0816*
	(0.	(0.110)	(0.110)	(0.110)					(0.0448)
HH Spouse Lower	-	-0.0831	-0.0786	-0.0905	landsli				0.0327
	(0.	(0.110)	(0.110)	(0.110)					(0.0850)
HH Spouse Upper	-	-0.0897	-0.0880	-0.0951	other				0.00458
	(0.	(0.113)	(0.113)	(0.113)					(0.0166)
HH Spouse Junior	-	-0.147	-0.146	-0.158	other				- [illegible]
	(0.	(0.126)	(0.127)	(0.126)					(0.0194)
HH Spouse Master	-	-0.106	-0.109	-0.112	consta	0.530***	0.597***	0.610***	0.632***
	(0.	(0.135)	(0.135)	(0.135)	(0.151)	(0.148)	(0.150)	(0.150)	
HH Spouse Other	-	-0.255	-0.256	-0.351					
	(0.	(0.259)	(0.259)	(0.261)					
HH Spouse Education	-	-0.0423	-0.0403	-0.0526					
	(0.	(0.109)	(0.110)	(0.110)					
Ha Tay		-0.0502**	-0.0523***	-0.0502**					
		(0.0199)	(0.0200)	(0.0208)					
Nghe An		0.0601***	0.0631***	0.0756***					
		(0.0213)	(0.0213)	(0.0228)					
Quang Nam		-0.0906***	-0.0918***	-0.0760***					
		(0.0193)	(0.0193)	(0.0224)					
ln(sigma) constant						-	-	-	-
						(0.0352)	(0.0351)	(0.0351)	(0.0351)
Observations						1577	1577	1577	1577

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$ The unit of fixed asset and livestock is set at million VND.

C Estimation results of reduced-form regressions of subjective interest rates

Table C.1: Regressions on respondent's attributes

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
rural	-3.087***	-0.0163	-0.00416	-1.205***	0.0219	0.0156**	0.350	0.0262***	0.0177***
	(0.567)	(0.0188)	(0.00979)	(0.396)	(0.0138)	(0.00680)	(0.232)	(0.00667)	(0.00418)
wife	0.753*	0.0593***	0.0207***	0.555*	0.0117	0.00178	0.211	-0.000286	-0.0000828
	(0.406)	(0.0135)	(0.00699)	(0.283)	(0.00989)	(0.00485)	(0.166)	(0.00476)	(0.00298)
husband	-1.257	-0.0273	-0.00480	-0.221	-0.00154	0.00510	-0.0132	0.0350**	0.0236**
	(1.278)	(0.0425)	(0.0221)	(0.893)	(0.0312)	(0.0153)	(0.523)	(0.0150)	(0.00941)
son	-0.273	0.0347	0.0210	-0.278	0.00358	0.00128	-0.0985	0.00260	0.00123
	(0.896)	(0.0298)	(0.0155)	(0.626)	(0.0219)	(0.0107)	(0.367)	(0.0105)	(0.00660)
daughter	-1.710	0.0133	0.00118	-2.005**	0.0309	0.0271	-0.970*	0.0144	0.0158
	(1.397)	(0.0464)	(0.0241)	(0.976)	(0.0341)	(0.0167)	(0.572)	(0.0164)	(0.0103)
others	-0.315	-0.00184	-0.00207	0.253	0.0323	-0.00423	0.446	0.00767	-0.00487
	(0.882)	(0.0293)	(0.0152)	(0.616)	(0.0215)	(0.0106)	(0.361)	(0.0104)	(0.00650)
Age	0.0264	0.000178	0.00162	-0.0534	-0.000965	-0.000173	0.0167	0.000931	0.000549
	(0.0747)	(0.00247)	(0.00128)	(0.0522)	(0.00182)	(0.000891)	(0.0306)	(0.000875)	(0.000547)
age sq	-0.000419	-0.00000505	-0.0000192*	0.000479	0.00000190	-0.00000222	-0.000215	-0.0000121	-0.00000733
	(0.000677)	(0.0000224)	(0.0000116)	(0.000473)	(0.0000165)	(0.00000808)	(0.000277)	(0.00000792)	(0.00000496)
Ha Tay	1.121**	-0.0873***	-0.0284***	0.837***	0.0271**	0.0345***	0.221	0.0292***	0.0330***
	(0.460)	(0.0153)	(0.00791)	(0.321)	(0.0112)	(0.00550)	(0.188)	(0.00541)	(0.00338)
Nghe An	0.489	-0.0855***	-0.0174**	0.580*	0.0247**	0.0237***	0.0804	0.0205***	0.0202***
	(0.469)	(0.0156)	(0.00808)	(0.327)	(0.0114)	(0.00560)	(0.192)	(0.00549)	(0.00344)
Quang Nam	7.360***	0.156***	0.0831***	3.853***	0.123***	0.0636***	2.811***	0.0734***	0.0376***
	(0.463)	(0.0154)	(0.00800)	(0.324)	(0.0113)	(0.00556)	(0.190)	(0.00545)	(0.00341)
constant	2.882	0.196***	0.0725**	3.175**	0.110**	0.0548**	0.00136	0.0136	0.0134
	(2.050)	(0.0679)	(0.0352)	(1.431)	(0.0498)	(0.0245)	(0.839)	(0.0240)	(0.0150)
Observations	1563	1566	1573	1565	1568	1575	1565	1568	1575
Adjusted R^2	0.196	0.197	0.148	0.109	0.088	0.084	0.178	0.127	0.104

The numbers in parentheses are standard errors. * p <.10, ** p <.05, *** p <.01
Time-to-maturity—D: One day, M: One month, Y: One year.

Loan principal (in thousand VND)—100, 1000 and 4000.

For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.2: Regressions on credit constraint dummy variables

	100 D	100 M	100 Y	100	1000 M	1000 Y	4000 D	4000 M	4000 Y
CC only in 2006	0.602	0.0349	0.0274*	1.54	0.0307	0.00581	0.606*	0.0144	-0.00219
	(0.845)	(0.0281)	(0.0140)	(0.5	(0.0194)	(0.00943)	(0.342)	(0.00953)	(0.00585)
CC only in 2007	-0.363	0.0174	0.00996	1.06	0.0118	0.00617	0.451	0.00304	-0.00125
	(0.687)	(0.0228)	(0.0115)	(0.4	(0.0157)	(0.00771)	(0.278)	(0.00774)	(0.00479)
CC both in 2006 and	0.0536	0.0252*	0.0150**	0.09	0.0140	0.00447	0.137	0.00291	-0.00279
	(0.389)	(0.0129)	(0.00649	(0.2	(0.00889)	(0.00435)	(0.157)	(0.00438)	(0.00270)
Constant	2.599***	0.173***	0.105***	1.93	0.128***	0.0836***	1.298***	0.0815***	0.0616***
	(0.227)	(0.00755)	(0.00379	(0.1	(0.00521)	(0.00254)	(0.0919)	(0.00256)	(0.00158)
Observations	1563	1566	1573	15	1568	1575	1565	1568	1575
Adjusted R^2	-0.001	0.001	0.003	0.0	0.001	-0.001	0.002	-0.000	-0.001

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$

Time-to-maturity—D: One day, M: One month, Y: One year.

Loan principal (in thousand VND)—100, 1000 and 4000.

For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.3: Regressions on past loss experience variables

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
AI	1.011*	0.0292	0.0171*	0.980**	0.0238*	0.0182***	0.590**	0.0180***	0.0118***
	(0.589)	(0.0198)	(0.00990)	(0.396)	(0.0138)	(0.00668)	(0.237)	(0.00674)	(0.00416)
flood	2.812***	0.0531***	0.0218***	1.465***	0.0355***	0.00882*	1.401***	0.0242***	0.00397
	(0.419)	(0.0141)	(0.00713)	(0.283)	(0.00983)	(0.00483)	(0.169)	(0.00481)	(0.00301)
typhoon	2.291***	0.0497***	0.0181**	0.678**	0.0103	0.00343	0.719***	0.00910*	0.00287
	(0.424)	(0.0143)	(0.00723)	(0.287)	(0.00996)	(0.00489)	(0.171)	(0.00487)	(0.00305)
drought	-1.502**	-0.00898	0.0151	-0.0520	0.0420**	0.0243***	-0.247	0.0220***	0.00316
	(0.724)	(0.0243)	(0.0123)	(0.489)	(0.0170)	(0.00836)	(0.292)	(0.00832)	(0.00521)
hail	-1.943*	-0.0551	-0.0297*	-1.139	-0.0312	-0.00858	-0.966**	-0.0155	-0.00472
	(1.054)	(0.0354)	(0.0176)	(0.712)	(0.0248)	(0.0119)	(0.425)	(0.0121)	(0.00741)
landslide	-2.276	0.0295	0.0578	-0.228	-0.0321	-0.0210	0.448	0.00586	-0.0120
	(2.114)	(0.0710)	(0.0360)	(1.428)	(0.0497)	(0.0244)	(0.852)	(0.0243)	(0.0152)
other epidemics	0.471	0.0943***	0.0413***	0.583**	0.0307***	0.0129***	0.241	0.0117**	0.00643**
	(0.399)	(0.0134)	(0.00680)	(0.270)	(0.00937)	(0.00460)	(0.161)	(0.00458)	(0.00287)
others	-0.149	0.00678	-0.000678	0.758**	-0.00323	0.00340	-0.118	0.00113	0.00378
	(0.475)	(0.0159)	(0.00808)	(0.321)	(0.0111)	(0.00547)	(0.192)	(0.00545)	(0.00341)
constant	1.449***	0.136***	0.0909***	1.328***	0.114***	0.0766***	0.869***	0.0703***	0.0558***
	(0.261)	(0.00875)	(0.00443)	(0.176)	(0.00611)	(0.00299)	(0.105)	(0.00299)	(0.00187)
Observations	1563	1566	1573	1565	1568	1575	1565	1568	1575
Adjusted R^2	0.065	0.044	0.034	0.030	0.018	0.013	0.072	0.030	0.006

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$

Time-to-maturity—D: One day, M: One month, Y: One year.

Loan principal (in thousand VND)—100, 1000 and 4000.

For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.4: Regressions on the number of past AI/flood loss experiences

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
No. of AI	0.929**	0.0303*	0.0166**	0.639**	0.0140	0.0107**	0.482***	0.0124**	0.00698**
	(0.465)	(0.0155)	(0.00778)	(0.308)	(0.0107)	(0.00521)	(0.184)	(0.00522)	(0.00324)
No. of floods	1.431***	0.0321***	0.0141***	1.013***	0.0280***	0.00916***	0.986***	0.0180***	0.00252
	(0.273)	(0.00913)	(0.00460)	(0.181)	(0.00628)	(0.00308)	(0.109)	(0.00307)	(0.00192)
constant	2.096***	0.171***	0.106***	1.749***	0.125***	0.0818***	1.057***	0.0766***	0.0590***
	(0.194)	(0.00647)	(0.00326)	(0.128)	(0.00446)	(0.00219)	(0.0770)	(0.00218)	(0.00136)
Observations	1563	1566	1573	1565	1568	1575	1565	1568	1575
Adjusted R^2	0.020	0.010	0.008	0.023	0.013	0.008	0.056	0.026	0.003

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$ Time-to-maturity D: One day, M: One month, Y: One year.

Loan principal (in thousand VND)100, 1000 and 4000.

For instance, 100D stands for a one-month loan with loan principal of 100,000 VND

Table C.5: Regressions on the nature of past losses/damages

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
house lost	-3.537	-0.0657	-0.0506	-2.231	-0.000722	0.0134	-1.826	-0.0173	-0.0185
	(3.261)	(0.111)	(0.0566)	(2.240)	(0.0781)	(0.0384)	(1.328)	(0.0380)	(0.0238)
house damage	6.419***	0.129***	0.0440***	2.029***	0.0343***	0.00551	2.049***	0.0283***	-0.000449
	(0.503)	(0.0171)	(0.00873)	(0.346)	(0.0121)	(0.00592)	(0.205)	(0.00587)	(0.00367)
phys assets loss	-0.452	-0.0287	-0.00412	-0.159	-0.00505	0.00207	-0.0663	-0.00572	0.00394
	(0.665)	(0.0225)	(0.0115)	(0.456)	(0.0159)	(0.00782)	(0.271)	(0.00775)	(0.00485)
phys livestock loss	0.690*	0.0742***	0.0261***	0.775***	0.0280***	0.00877**	0.609***	0.0154***	0.00311
	(0.368)	(0.0125)	(0.00636)	(0.252)	(0.00879)	(0.00431)	(0.150)	(0.00428)	(0.00267)
econ livestock loss	0.739	0.0639***	0.0293**	0.0955	0.0113	0.0151*	1.265***	0.0272***	0.0213***
	(0.717)	(0.0243)	(0.0123)	(0.493)	(0.0172)	(0.00835)	(0.292)	(0.00837)	(0.00518)
harvest loss	0.0300	0.00772	0.0106*	0.708***	0.0289***	0.0149***	0.193	0.0143***	0.00722***
	(0.340)	(0.0115)	(0.00589)	(0.234)	(0.00814)	(0.00399)	(0.139)	(0.00397)	(0.00248)
human casualty	-2.070	-0.000366	-0.0142	-1.002	-0.0151	-0.0226	-0.500	0.00886	0.00654
	(2.681)	(0.0909)	(0.0465)	(1.842)	(0.0642)	(0.0316)	(1.092)	(0.0313)	(0.0196)
human sickness/injury	2.056	0.181***	0.107***	3.166**	0.0668	0.0371	2.318***	0.0373*	0.00749
	(1.924)	(0.0652)	(0.0334)	(1.321)	(0.0461)	(0.0226)	(0.783)	(0.0224)	(0.0140)
others	-1.124	-0.0761	-0.0259	0.414	-0.00440	-0.00341	0.201	0.0169	0.0101
	(1.378)	(0.0467)	(0.0239)	(0.947)	(0.0330)	(0.0162)	(0.561)	(0.0161)	(0.0101)
constant	1.568***	0.141***	0.0925***	1.329***	0.110***	0.0753***	0.797***	0.0678***	0.0551***
	(0.258)	(0.00873)	(0.00446)	(0.177)	(0.00616)	(0.00302)	(0.105)	(0.00300)	(0.00188)
Observations	1563	1566	1573	1565	1568	1575	1565	1568	1575
Adjusted R^2	0.099	0.062	0.035	0.034	0.016	0.010	0.088	0.036	0.012

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$ Time-to-maturity—D: One day, M: One month, Y: One year.

Loan principal (in thousand VND)—100, 1000 and 4000.

For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.6: Regressions on attitude towards risk

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
moderately risk averse	-0.179	-0.0398**	-0.0212**	0.27	-0.0203*	-0.00264	0.283	-0.00592	0.000308
	(0.503)	(0.0168)	(0.00847)	(0.337)	(0.0116)	(0.00568)	(0.206)	(0.00573)	(0.00353)
risk loving 1	2.630***	0.0600***	0.0150**	0.359	0.00298	0.00755	0.107	-0.00102	0.000872
	(0.425)	(0.0142)	(0.00718)	(0.285)	(0.00986)	(0.00482)	(0.174)	(0.00485)	(0.003)
constant	2.075***	0.177***	0.112***	2.003***	0.137***	0.0844***	1.338***	0.0844***	0.0603***
	(0.215)	(0.00716)	(0.00362)	(0.144)	(0.00498)	(0.00243)	(0.0881)	(0.00245)	-0.00151
Observations Adjusted R2	1557	1560	1567	1559	1562	1569	1559	1562	1569
	0.025	0.017	0.007	0	0.001	0.001	0	-0.001	-0.001

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$
Time-to-maturity—D: One day, M: One month, Y: One year.
Loan principal (in thousand VND)—100, 1000 and 4000.
For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.7: Regression on loss aversion types

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
loss averse	0.0354	-0.0219*	-0.00358	-0.238	0.0132	0.00821*	0.243	0.00806*	0.00556**
	(0.391)	(0.0130)	(0.00659)	(0.262)	(0.00904)	(0.00441)	(0.160)	(0.00445)	(0.00274)
risk loving 2	2.692***	0.0580***	0.0174**	0.208	0.0131	0.0119**	0.171	0.00397	0.00314
	(0.452)	(0.0151)	(0.00764)	(0.304)	(0.0105)	(0.00512)	(0.185)	(0.00515)	(0.00318)
constant	2.026***	0.180***	0.109***	2.161***	0.127***	0.0801***	1.279***	0.0796***	0.0579***
	(0.264)	(0.00878)	(0.00445)	(0.177)	(0.00610)	(0.00298)	(0.108)	(0.00300)	(0.00185)
Observations	1556	1559	1566	1558	1561	1568	1558	1561	1568
Adjusted R^2	0.025	0.016	0.004	0.000	0.000	0.003	0.000	0.001	0.001

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$
Time-to-maturity D: One day, M: One month, Y: One year.
Loan principal (in thousand VND)100, 1000 and 4000.
For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

Table C.8: Regressions on income change

	100 D	100 M	100 Y	1000 D	1000 M	1000 Y	4000 D	4000 M	4000 Y
change in income	-0.631	-0.0912*	-0.0317	-3.678***	-0.198***	-0.0820***	-2.043***	-0.0637***	-0.0198*
	(1.611)	(0.0535)	(0.0270)	(1.064)	(0.0366)	(0.0179)	(0.650)	(0.0181)	(0.0112)
constant	3.316*	0.285***	0.147***	6.193***	0.354***	0.177***	3.664***	0.154***	0.0825***
	(1.794)	(0.0596)	(0.0300)	(1.185)	(0.0407)	(0.0200)	(0.724)	(0.0201)	(0.0125)
Observations	1563	1566	1573	1565	1568	1575	1565	1568	1575
Adjusted R^2	-0.001	0.001	0.000	0.007	0.018	0.012	0.006	0.007	0.001

The numbers in parentheses are standard errors. * $p < .10$, ** $p < .05$, *** $p < .01$
Time-to-maturity—D: One day, M: One month, Y: One year.
Loan principal (in thousand VND)—100, 1000 and 4000.
For instance, 100D stands for a one-month loan with loan principal of 100,000 VND.

D. Estimation results of the Euler equations

Table D.1: Estimation of ρ: No credit constraints

	(1) Simple	(2) Tanaka	(3) Fitted
ρ	0.000197***	0.000198***	0.000172***
	(0.00000410)	(0.00000508)	(0.00000347)
Observations	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01
βisset at0.99.

Table D.2: Estimation of β: No credit constraints

	(1) Simple	(2) Tanaka	(3) Fitted
β	0.991***	0.990***	0.994***
	(0.000621)	(0.000768)	(0.000524)
Observations	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01
ρ is set at 0.0002.

Table D.3: Estimation of ρ: With subjective credit constraints

	(1) Simple	(2) Tanaka	(3) Fitted	(4) Simple	(5) Tanaka	(6) Fitted	(7) Simple	(8) Tanaka	(9) Fitted
ρ_0	0.000141***	0.000125***	0.000109***	0.000195***	0.000232***	0.000181***	0.000156***	0.000143***	0.000113***
	(0.0000135)	(0.0000169)	(0.0000102)	(0.0000171)	(0.0000153)	(0.0000105)	(0.0000208)	(0.0000238)	(0.0000148)
ρ_1: CCin2007	0.000179***	0.000260***	0.000178***				0.000479***	0.000362***	0.000558***
	(0.0000407)	(0.0000568)	(0.0000272)				(0.0000903)	(0.0000751)	(0.0000692)
λ: CCin2007				0.00390	0.00139	0.000509	-0.0180***	-0.00404*	-0.00909***
				(0.00253)	(0.00165)	(0.000671)	(0.00500)	(0.00219)	(0.00141)
λ: CCin2007*asset				0.000000845***	0.000000276	0.000000185**	0.000000579*	0.000000316	0.000000146
				(0.000000277)	(0.000000193)	(8.62e-08)	(0.000000331)	(0.000000224)	(0.000000115)
λ: CCin2007*income				-0.000000241*	-0.000000249***	-6.19e-08*	-5.86e-08	-6.14e-08	3.56e-08
				(0.000000126)	(8.18e-08)	(3.55e-08)	(0.000000146)	(9.83e-08)	(4.52e-08)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01
β is set at 0.99

Table D.4: Estimation of β: With subjective credit constraints

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted
β_0	0.999***	1.001***	1.004***	0.991***	0.986***	0.994***	0.997***	0.998***	1.003***
	(0.00205)	(0.00252)	(0.00155)	(0.00259)	(0.00225)	(0.00158)	(0.00280)	(0.00345)	(0.00181)
β_1: CCin2007	-0.0256***	-0.0373***	-0.0266***				-0.0652***	-0.0542***	-0.0795***
	(0.00597)	(0.00803)	(0.00399)				(0.0107)	(0.0101)	(0.00747)
λ: CCin2007				0.00398	0.00136	0.000620	-0.0177***	-0.00483**	-0.00903***
				(0.00253)	(0.00165)	(0.000670)	(0.00446)	(0.00210)	(0.00116)
λ: CCin2007*asset				0.000000848***	0.000000278	0.000000197**	0.000000580*	0.000000298	0.000000124
				(0.000000277)	(0.000000194)	(8.59e-08)	(0.000000297)	(0.000000211)	(9.52e-08)
λ: CCin2007*income				-0.000000232*	-0.000000235***	-5.80e-08	-2.91e-08	-5.26e-08	3.08e-08
				(0.000000127)	(8.14e-08)	(3.54e-08)	(0.000000132)	(9.39e-08)	(3.66e-08)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01

ρ is set at 0.0002.

Table D.5: Estimation of ρ: Credit constraints represented by disaster loss experiences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted
ρ_0	0.000169***	0.000168***	0.000139***	0.000184***	0.000175***	0.000149***	0.000196***	0.000183***	0.000151***
	(0.00000572)	(0.00000716)	(0.00000473)	(0.0000109)	(0.0000126)	(0.00000937)	(0.0000145)	(0.0000173)	(0.00000936)
ρ_1: AI	0.0000433**	0.0000496**	0.0000557***				0.000129	0.000000323	-0.000445**
	(0.0000202)	(0.0000214)	(0.0000166)				(0.000363)	(0.000186)	(0.000218)
ρ_1: flood	0.0000885***	0.0000791***	0.000113***				0.000220	0.0000756	0.000705***
	(0.0000148)	(0.0000159)	(0.0000127)				(0.000207)	(0.000133)	(0.000170)
λ: AI				0.0158	0.00871	0.00370	0.0143	0.0115	0.00514
				(0.0126)	(0.00663)	(0.00461)	(0.0194)	(0.00870)	(0.00806)
λ: flood				-0.00325	0.00345	-0.00297	-0.0221	-0.00178	-0.0131***
				(0.00963)	(0.00583)	(0.00294)	(0.0191)	(0.0103)	(0.00440)
λ: AI*asset				0.0000222***	0.0000111**	0.00000701***	0.0000195**	0.0000103**	-0.00000261
				(0.00000813)	(0.00000473)	(0.00000251)	(0.00000787)	(0.00000461)	(0.00000309)
λ: flood*asset				-0.00000887***	-0.00000438**	-0.00000300***	-0.00000791**	-0.00000412**	0.00000102
				(0.00000323)	(0.00000192)	(0.00000101)	(0.00000315)	(0.00000186)	(0.00000123)
λ: AI*income				-0.00000258**	-0.00000126*	-0.000000784**	-0.00000269**	-0.00000132**	0.000000642
				(0.00000110)	(0.000000660)	(0.000000337)	(0.00000116)	(0.000000662)	(0.000000422)
λ: flood*income				0.00000133**	0.000000466	0.000000607***	0.00000125**	0.000000471	-0.000000257
				(0.000000646)	(0.000000388)	(0.000000193)	(0.000000622)	(0.000000378)	(0.000000227)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01

β is set at 0.99.

Table D.6: Estimation of β: Credit constraints represented by disaster loss experiences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted
β_0	0.995***	0.995***	0.999***	0.992***	0.994***	0.998***	0.991***	0.993***	0.998***
	(0.000871)	(0.00109)	(0.000727)	(0.00165)	(0.00189)	(0.00141)	(0.00223)	(0.00262)	(0.00122)
β_1: AI	-0.00658**	-0.00742**	-0.00839***				-0.0155	0.00407	0.0526**
	(0.00304)	(0.00324)	(0.00256)				(0.0500)	(0.0279)	(0.0268)
β_1: flood	-0.0132***	-0.0119***	-0.0170***				-0.0332	-0.0119	-0.0981***
	(0.00225)	(0.00242)	(0.00195)				(0.0281)	(0.0195)	(0.0161)
λ: AI				0.0157	0.00854	0.00374	0.0158	0.0121	0.00221
				(0.0126)	(0.00659)	(0.00458)	(0.0185)	(0.00859)	(0.00575)
λ: flood				-0.00311	0.00359	-0.00299	-0.0226	-0.00162	-0.0130***
				(0.00958)	(0.00577)	(0.00291)	(0.0185)	(0.0102)	(0.00313)
λ: AI*asset				0.0000220***	0.0000109**	0.00000699***	0.0000191**	0.0000102**	-0.00000268
				(0.00000809)	(0.00000470)	(0.00000248)	(0.00000763)	(0.00000459)	(0.00000247)
λ: flood*asset				-0.00000882***	-0.00000434**	-0.00000300***	-0.00000777**	-0.00000406**	0.00000101
				(0.00000322)	(0.00000190)	(0.000000993)	(0.00000305)	(0.00000186)	(0.000000989)
λ: AI*income				-0.00000256**	-0.00000124*	-0.000000785**	-0.00000264**	-0.00000127*	0.000000630*
				(0.00000109)	(0.000000655)	(0.000000334)	(0.00000113)	(0.000000659)	(0.000000331)
λ: flood*income				0.00000132**	0.000000457	0.000000607***	0.00000124**	0.000000457	-0.000000262
				(0.000000643)	(0.000000384)	(0.000000192)	(0.000000605)	(0.000000375)	(0.000000185)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01
ρ is set at 0.0002

Table D.7: Estimation of ρ: Credit constraints represented by nature of damage/losses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted	Simple	Tanaka	Fitted
ρ_0	0.000155***	0.000155***	0.000113***	0.000125***	0.000128***	0.0000972***	0.000141***	0.000113***	0.0000605*
	(0.00000993)	(0.0000119)	(0.00000938)	(0.0000199)	(0.0000274)	(0.0000178)	(0.0000440)	(0.0000376)	(0.0000339)
ρ_1: house damage	0.000137***	0.000123***	0.000152***				-0.000440	-0.000258	-0.000528*
	(0.0000226)	(0.0000266)	(0.0000195)				(0.000590)	(0.000365)	(0.000315)
ρ_1: phys livestock loss	0.0000424***	0.0000362**	0.0000592***				-0.000873*	-0.000474*	0.0000833
	(0.0000135)	(0.0000159)	(0.0000110)				(0.000482)	(0.000286)	(0.000214)
ρ_1: harvest loss	0.0000352*	0.0000388	0.0000554**				0.000586	0.000390*	0.000318
	(0.0000214)	(0.0000238)	(0.0000220)				(0.000365)	(0.000227)	(0.000196)
λ_1: house damage				0.0406**	0.0275*	0.0171**	-0.0117	-0.00868	0.0359**
				(0.0202)	(0.0152)	(0.00730)	(0.0785)	(0.0364)	(0.0165)
λ_1: phys livestock loss				0.0214**	0.0164**	0.00658**	0.0464**	0.00935	0.00309
				(0.00961)	(0.00720)	(0.00328)	(0.0231)	(0.0126)	(0.00496)
λ_1: harvest loss				-0.0111	-0.0118	-0.00646	0.00252	0.0102	-0.0103*
				(0.0128)	(0.00925)	(0.00454)	(0.0251)	(0.0182)	(0.00608)
λ_1: house damage*asset				0.000000629	-0.00000226	-0.000000713	0.00000885	0.00000198	0.00000238
				(0.00000388)	(0.00000278)	(0.00000127)	(0.0000118)	(0.00000639)	(0.00000214)
λ_1: phys livestock loss*asset				-0.00000821***	-0.00000628***	-0.00000344***	0.00000397	0.000000226	-0.00000355**
				(0.00000216)	(0.00000176)	(0.000000838)	(0.00000847)	(0.00000417)	(0.00000157)
λ_1: harvest loss*asset				0.00000543***	0.00000483***	0.00000257***	-0.00000555	-0.00000106	0.00000184*
				(0.00000178)	(0.00000142)	(0.000000689)	(0.00000815)	(0.00000410)	(0.00000110)
λ_1: house damage*income				-0.00000137	-0.000000696	-0.000000392	0.00000173	0.000000955	-0.000000813*
				(0.000000889)	(0.000000659)	(0.000000315)	(0.00000286)	(0.00000138)	(0.000000422)
λ_1: phys livestock loss*income				0.000000190	8.62e-08	0.000000172	0.00000125	0.000000832	0.000000260
				(0.000000372)	(0.000000288)	(0.000000132)	(0.00000127)	(0.000000787)	(0.000000244)
λ_1: harvest loss*income				0.000000130	0.000000110	8.16e-08	-0.00000137	-0.000000951	0.000000110
				(0.000000444)	(0.000000323)	(0.000000153)	(0.00000123)	(0.000000745)	(0.000000215)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. *p<.10, **p<.05, ***p<.01
β is set at 0.99.

Table D.8: Estimation of β: Credit constraints represented by nature of damage

	(1) Simple	(2) Tanaka	(3) Fitted	(4) Simple	(5) Tanaka	(6) Fitted	(7) Simple	(8) Tanaka	(9) Fitted
β_0	0.997***	0.997***	1.003***	1.001***	1.001***	1.006***	1.003***	1.006***	1.012***
	(0.00150)	(0.00180)	(0.00144)	(0.00296)	(0.00412)	(0.00263)	(0.00364)	(0.00519)	(0.00474)
β_1: house damage	-0.0205***	-0.0182***	-0.0227***				0.0578	0.0424	0.0855*
	(0.00330)	(0.00391)	(0.00287)				(0.0563)	(0.0463)	(0.0474)
β_1: phys livestock loss	-0.00654***	-0.00559**	-0.00886***				0.139**	0.0793**	-0.0110
	(0.00204)	(0.00240)	(0.00166)				(0.0561)	(0.0401)	(0.0283)
β_1: harvest loss	-0.00500	-0.00577	-0.00780**				-0.0945**	-0.0641**	-0.0496*
	(0.00322)	(0.00361)	(0.00336)				(0.0434)	(0.0319)	(0.0262)
λ_1: house damage				0.0405**	0.0276*	0.0169**	-0.0140	-0.00702	0.0345**
				(0.0196)	(0.0149)	(0.00707)	(0.0462)	(0.0289)	(0.0145)
λ_1: phys livestock loss				0.0214**	0.0164**	0.00674**	0.0425**	0.00765	0.00283
				(0.00930)	(0.00701)	(0.00314)	(0.0168)	(0.0119)	(0.00412)
λ_1: harvest loss				-0.0111	-0.0117	-0.00643	0.00483	0.0117	-0.00970*
				(0.0125)	(0.00903)	(0.00439)	(0.0189)	(0.0164)	(0.00521)
λ_1: house damage*asset				0.000000656	-0.00000221	-0.000000694	0.00000722	0.00000153	0.00000255
				(0.00000374)	(0.00000270)	(0.00000121)	(0.00000772)	(0.00000532)	(0.00000182)
λ_1: phys livestock loss*asset				-0.00000815***	-0.00000628***	-0.00000346***	0.00000393	0.000000173	-0.00000346***
				(0.00000208)	(0.00000171)	(0.000000798)	(0.00000624)	(0.00000369)	(0.00000123)
λ_1: harvest loss*asset				0.00000539***	0.00000482***	0.00000257***	-0.00000512	-0.000000942	0.00000171*
				(0.00000172)	(0.00000137)	(0.000000650)	(0.00000588)	(0.00000362)	(0.000000885)
λ_1: house damage*income				-0.00000136	-0.000000708	-0.000000383	0.00000159	0.000000920	-0.000000767**
				(0.000000865)	(0.000000646)	(0.000000307)	(0.00000184)	(0.00000114)	(0.000000373)
λ_1: phys livestock loss*income				0.000000184	9.17e-08	0.000000167	0.00000124	0.000000964	0.000000275
				(0.000000362)	(0.000000281)	(0.000000126)	(0.000000799)	(0.000000650)	(0.000000202)
λ_1: harvest loss*income				0.000000134	0.000000110	8.11e-08	-0.00000147	-0.00000105	8.58e-08
				(0.000000431)	(0.000000316)	(0.000000148)	(0.000000940)	(0.000000677)	(0.000000187)
Observations	14064	14064	14118	14064	14064	14118	14064	14064	14118

The numbers in parentheses are standard errors. $*p<.10$, $**p<.05$, $***p<.01$
ρ is set at 0.0002